

# ***BMW i3 Cost Analysis***

## ***Zone 6: Cooling Pack & HVAC***



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**Technical Disclaimer:** The goal of this analysis is to establish a should cost value for manufacturing the vehicle and its sub-systems. These cost totals do not include tooling, Engineering Research and Development (ER&D), testing and calibration, logistics, or profit. Manufacturing process assumptions, such as manual assembly vs. automation or mold cavity numbers, were selected based on an annual volume of 20,000.

<u>Subject</u>	<u>Page</u>
<u><a href="#">Disclaimers</a></u>	<u>2</u>
<u><a href="#">Description of Report Content</a></u>	<u>20</u>
<u><a href="#">Data Overview</a></u>	<u>21</u>
<u><a href="#">Interpreting Data</a></u>	<u>29</u>
<u><a href="#">Cost Analysis</a></u>	<u>35</u>
<u><a href="#">Zone 6: Cooling Pack &amp; HVAC Overview</a></u>	<u>36</u>
<u><a href="#">Zone 6: Cooling Pack &amp; HVAC</a></u>	<u>37</u>
<u><a href="#">Cooling Pack Overview</a></u>	<u>38</u>
<u><a href="#">Cooling Pack</a></u>	<u>44</u>

**Note: Munro logo in upper right of each page is a link to the front page of the report.**

<u>Subject</u>	<u>Page</u>
<u><a href="#">Cooling Fan Air Duct Asm</a></u>	<u>45</u>
<u><a href="#">Cooling Fan Air Duct Installation</a></u>	<u>62</u>
<u><a href="#">Coolant Hot Bottle Asm</a></u>	<u>64</u>
<u><a href="#">Coolant Hot Bottle Installation</a></u>	<u>71</u>
<u><a href="#">Cooling Pack Asm</a></u>	<u>73</u>
<u><a href="#">Cooling Pack Lower Isolator Asm</a></u>	<u>233</u>
<u><a href="#">Cooling Pack Installation</a></u>	<u>242</u>
<u><a href="#">Cooling Pack Line Bundle Passenger Side Asm</a></u>	<u>244</u>
<u><a href="#">Cooling Pack Line Bundle Installation</a></u>	<u>406</u>

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<u>Subject</u>	<u>Page</u>
<u>Lower Radiator Hose Asm</u>	<u>408</u>
<u>Lower Radiator Hose Installation</u>	<u>452</u>
<u>Cooling Pack Bundle Bracket Driver Side Asm</u>	<u>454</u>
<u>Cooling Pack Bundle Bracket DS Installation</u>	<u>461</u>
<u>Cooling Pack Line Bundle Driver Side Asm</u>	<u>463</u>
<u>Cooling Pack Line Bundle DS Installation</u>	<u>490</u>
<u>Upper Radiator Hose Asm</u>	<u>492</u>
<u>Upper Radiator Hose Installation</u>	<u>525</u>
<u>Coolant Pump Bracket Asm</u>	<u>527</u>

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<u>Subject</u>	<u>Page</u>
<u>Coolant Pump Bracket Installation</u>	536
<u>Coolant Pump Installation</u>	538
<u>Front Refrigerant Line Bundle Asm</u>	540
<u>Front Refrigerant Line Bundle Installation</u>	811
<u>Refrigerant Return Line Asm</u>	813
<u>Refrigerant Return Line Asm Installation</u>	866
<u>Refrigerant Sending Line Asm</u>	868
<u>Refrigerant Sending Line Installation</u>	941
<u>HVAC Overview</u>	943

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<u>Subject</u>	<u>Page</u>
<u>HVAC</u>	<u>946</u>
<u>HVAC Unit Asm</u>	<u>947</u>
<u>HVAC Unit Installation</u>	<u>1184</u>
<u>HVAC Unit Drain Valve Asm</u>	<u>1186</u>
<u>HVAC Unit Drain Valve Installation</u>	<u>1195</u>
<u>Driver Windshield Duct Asm</u>	<u>1197</u>
<u>Driver Windshield Duct Installation</u>	<u>1204</u>
<u>Passenger Windshield Duct Asm</u>	<u>1206</u>
<u>Passenger Windshield Duct Installation</u>	<u>1213</u>

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<u>Subject</u>	<u>Page</u>
<u><a href="#">Driver Demist Duct Asm</a></u>	<u><a href="#">1215</a></u>
<u><a href="#">Driver Demist Duct Installation</a></u>	<u><a href="#">1222</a></u>
<u><a href="#">Passenger Demist Duct Asm</a></u>	<u><a href="#">1224</a></u>
<u><a href="#">Passenger Demist Duct Installation</a></u>	<u><a href="#">1231</a></u>
<u><a href="#">Passenger IP Duct Asm</a></u>	<u><a href="#">1233</a></u>
<u><a href="#">Passenger IP Duct Installation</a></u>	<u><a href="#">1242</a></u>
<u><a href="#">Driver IP Duct Asm</a></u>	<u><a href="#">1244</a></u>
<u><a href="#">Driver IP Duct Installation</a></u>	<u><a href="#">1253</a></u>
<u><a href="#">Cabin Heater Coolant Reservoir Asm</a></u>	<u><a href="#">1255</a></u>

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<u>Subject</u>	<u>Page</u>
<u>Cabin Heater Coolant Reservoir Installation</u>	<u>1302</u>
<u>Ext HVAC Duct Asm</u>	<u>1304</u>
<u>Ext HVAC Duct Installation</u>	<u>1318</u>
<u>Heat Exchanger Asm</u>	<u>1320</u>
<u>Heat Exchanger Installation</u>	<u>1435</u>
<u>Plenum Asm</u>	<u>1437</u>
<u>Plenum Installation</u>	<u>1460</u>
<u>Appendix Reports</u>	<u>1462</u>
<u>TechInsights Electronics Reports</u>	<u>1463</u>

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## Subject

## Page

Munro & Associates Wire Harness Reports

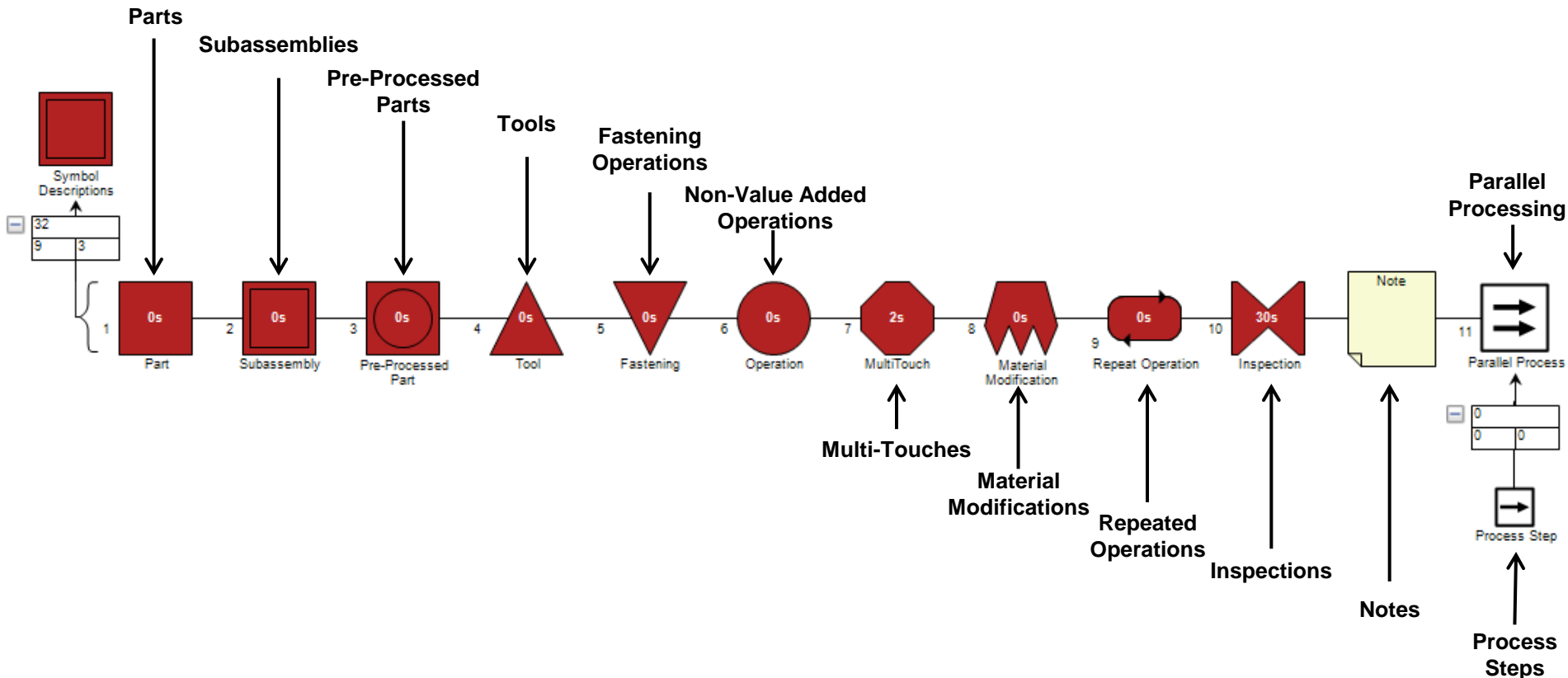
1561

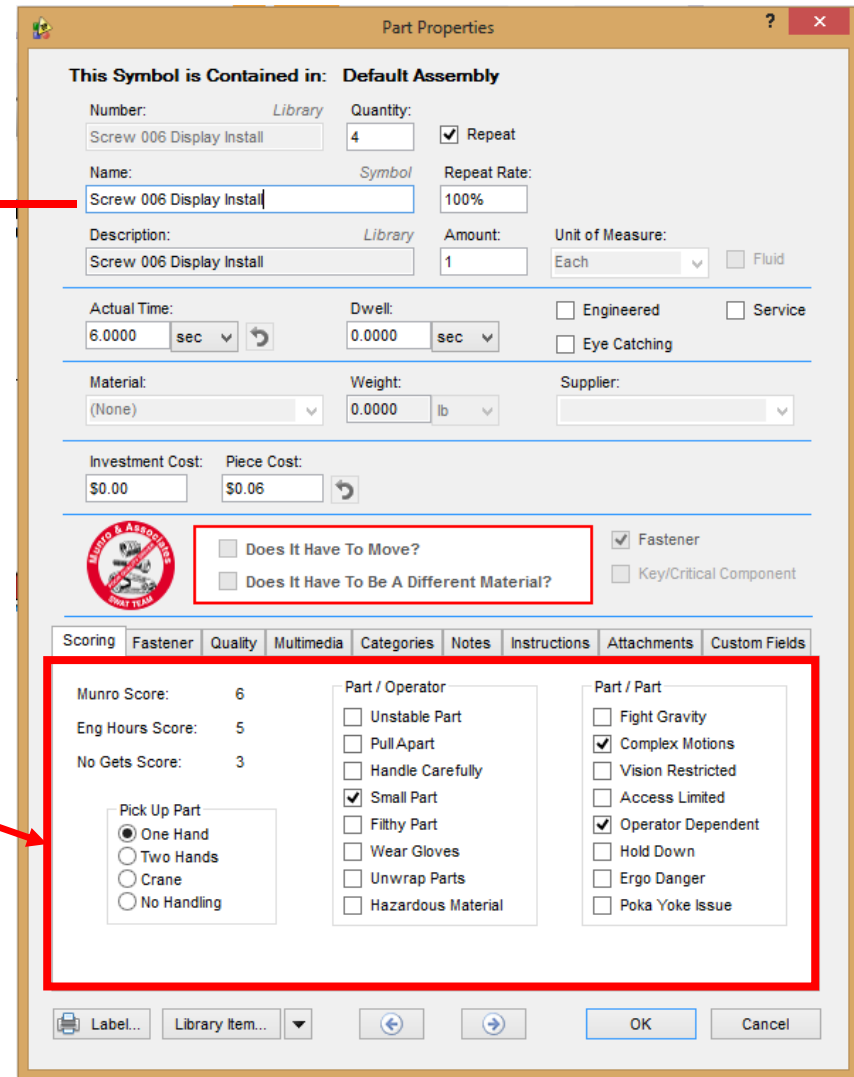
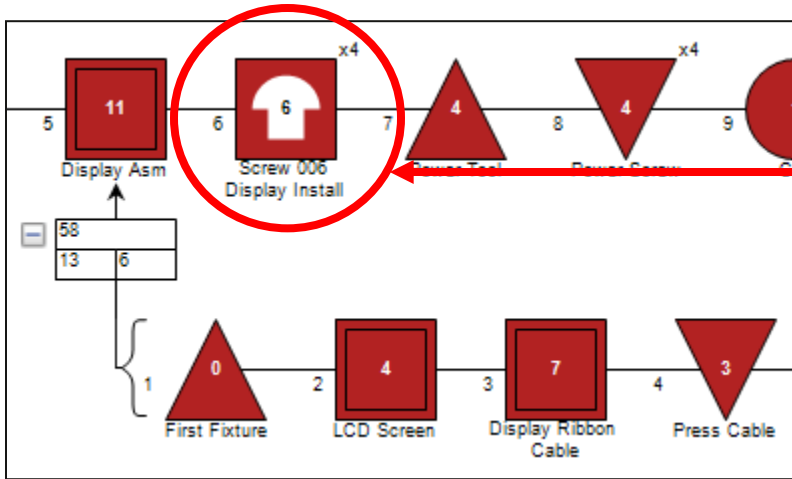
Technical References

1616

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- The Design Profit® Software is used to provide a detailed cost map analyzing every subassembly, part, operation, & tool in the manufacturing process.
- The various symbols shown below are used in a hierarchical diagram to quantify & compare design and manufacturing efficiencies & costs.





Part Properties

This Symbol is Contained in: Default Assembly

Number: Screw 006 Display Install Library Quantity: 4 Repeat

Name: Screw 006 Display Install Symbol Repeat Rate: 100%

Description: Screw 006 Display Install Library Amount: 1 Unit of Measure: Each  Fluid

Actual Time: 6.0000 sec Dwell: 0.0000 sec  Engineered  Service  Eye Catching

Material: (None) Weight: 0.0000 lb Supplier: [Dropdown]

Investment Cost: \$0.00 Piece Cost: \$0.06

Does It Have To Move?  Fastener  Key/Critical Component

Does It Have To Be A Different Material?

Scoring Fastener Quality Multimedia Categories Notes Instructions Attachments Custom Fields

Munro Score: 6 Part / Operator Part / Part

Eng Hours Score: 5  Unstable Part  Fight Gravity

No Gets Score: 3  Pull Apart  Complex Motions

Handle Carefully  Vision Restricted

Small Part  Access Limited

Filthy Part  Operator Dependent

Wear Gloves  Hold Down

Unwrap Parts  Ergo Danger

Hazardous Material  Poka Yoke Issue

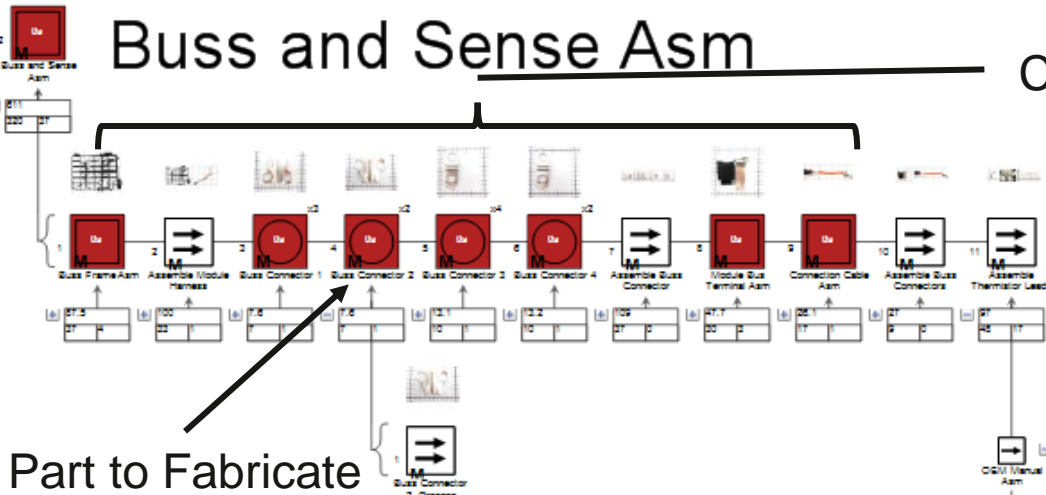
Pick Up Part  One Hand  Two Hands  Crane  No Handling

Label... Library Item... [Navigation] OK Cancel

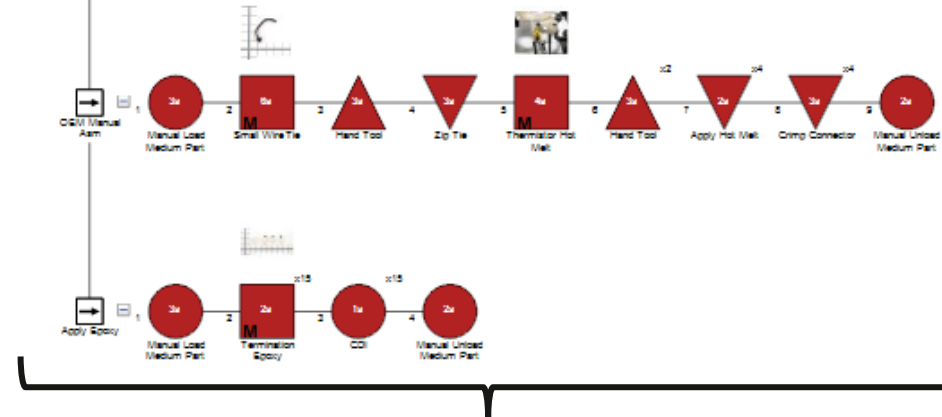
Each symbol is created by filling out a properties window. Penalty conditions and other information related to the symbol are assigned, in order to calculate the effect of handling difficulties on assembly time.

## Buss and Sense Asm

Components to be Assembled

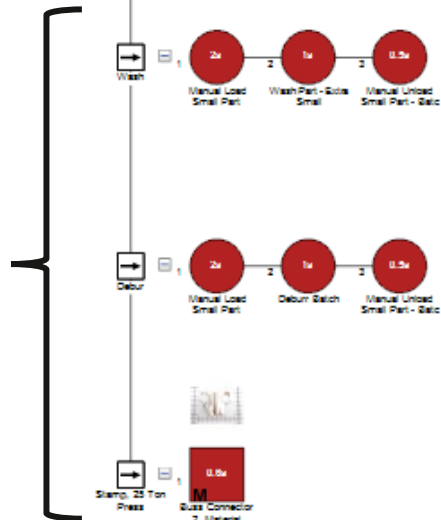


Part to Fabricate



## Assembly Operations

## Fabrication Operations



Above is a Design Profit cost map. The top horizontal line of symbols indicates the assemblies, parts, and assembly processes used to create the above parent assembly. Each of the symbols below a parent are analyzed in detail. Total costs are then rolled-up to the parent symbol. The vertical string of symbols on the left shows the details of each step and work cell in the fabrication process. The vertical string of symbols on the right shows the details of each step and work cell in the assembly process.

The following assumptions were made for the cost analysis:

- All processing was documented in the Design Profit software.
- All raw material prices are based on quotes and published information.
- All manufacturing processes include the man and machine to establish an hourly cost for the manufacturing work cell for each process and country utilized in creating the vehicle. These work cell rates are used along with calculation of cycle time to generate the process costs of components. Machine rates are developed through an internal model, accounting for all aspects of the primary and secondary equipment for the process. Operator rates are based on the specific country, and related industry labor rates. Adjustments are made for the number of operators in the workcell.
- Common/basic components were costed as commodity items. These included: bearings, seals, fasteners, and electronic components.
- Bearings/Seals/Fasteners are compared to numerous costed bills of materials to establish a purchased price.
- Electronic component costs are based on the costed bill of materials on hand, quote requests, and published information. Component pricing is run through trend lines to establish a cost for the appropriate targeted volumes.
- Machining cycle times are calculated using operations based on speeds and feeds from the standard machinist handbook.

## Sales, General, and Administration:

- The SG&A mark-up used for commodity parts is a flat 3.0% typically used as a standard industry value. This mark-up accounts for the purchasing and handling of commodity parts.
- The SG&A mark-up used for fabricated parts raw material and processing costs is a variable rate based on the technology level associated with the system. A table of the standard percentage mark-ups is shown to the right. Low technology is typical of a system mostly consisting of simple parts, such as basic stampings and injection molded parts. High technology is typically a system with complex automated assembly, high tolerance machined parts, and complex electronic systems, or more standard processes applied to new applications. Cutting edge is typically a system that uses first to market application of an advanced technology.

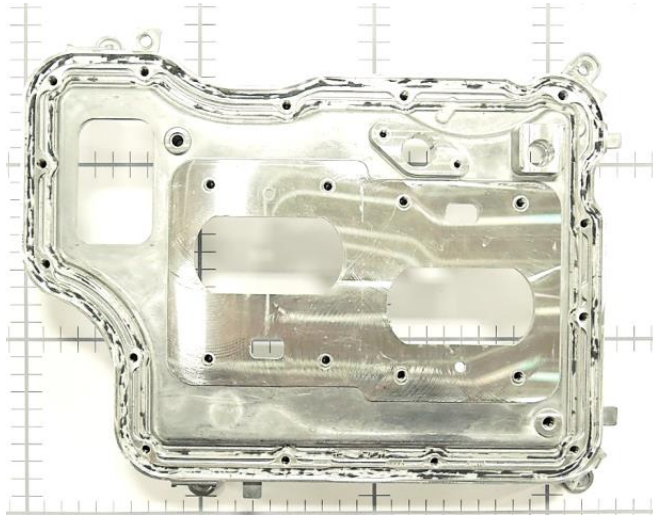
	Technology Level	SG&A Mark-Ups
Low	1	6.0%
	2	7.0%
	3	8.0%
	4	9.0%
	5	10.0%
Medium	6	11.0%
	7	12.0%
	8	13.0%
	9	14.0%
	10	15.0%
High	11	16.0%
	12	17.0%
	13	18.0%
	14	19.0%
	15	20.0%
Cutting Edge	16	21.0%
	17	22.0%
	18	23.0%
	19	24.0%
	20	25.0%

Quality Burden (Q Burden) is the additional cost carried by each good product unit, to account for the actions and materials used to correct defects in parts (as received or produced) or in production processes. Q Burden is a key component of the Cost of Quality and may be considered equivalent to failure costs. Q Burden reflects the variable cost of poor quality. The probability of a defect can be estimated from industry averages or can be based on company statistics. Q Burden is calculated by adding the incident and disposition costs for each defect and multiplying the sum by the probability of a defect occurrence. The incident is the set of actions that are taken immediately upon the discovery of a real or suspected defect. The disposition is the actions to deal with the defective production after the incident.

Q Burden does not include:

- Base overhead associated with the quality organization (the amount required to assure compliance with industry and customer standards)
- Process documentation generally needed in order to communicate requirements and standards for production, inspection, and testing
- Inspection and test equipment depreciation and consumables (unless needed for troubleshooting defective product)
- Defect prevention activity (investment in new equipment, process improvement, mistake-proofing activities, redesign, lean/six sigma activities, etc.)





The die casting material costs and cycle times are calculated in an internal parametric based cost estimating sheet, and outputs are fed into Design Profit to develop final fabrication costs. Since die casting is a more material driven primary fabrication process, the cells to the right include general dimensional values and material selections.

## Die Casting Material Costs & Cycle Times

**Part Name: Top Plate, Top Plate w/Silicone Bead**

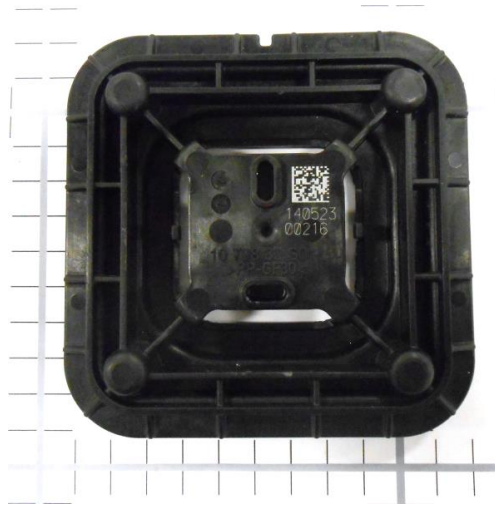
### Inputs:

Die Casting Inputs:			
1	Height - Tool Draw	82	mm
2	Length - Longest	314	mm
3	Width - Shortest	250	mm
4	Max. Wall Thickness	5.5	mm
5	Weight of Part - Finished	0.738	kg
6	Percent Loss from Machining	7.00	%
7	Number of Cavities in Tool	2	
8	Number of Die Lock Features	0	
9	Material Number	7	

Material Name	Abbreviation	Cost (\$/kg)
Al-9Si-3Cu(Fe)	A380	\$2.27

### Outputs to DP:

Die Casting Outputs:			
1	Min. Die Casting Machine	1927	tons
2	Die Casting Time	28.13	sec
3	Raw Material Weight	0.790	kg
4	Material Cost	\$1.79	



The injection molding material costs and cycle times are calculated in an internal parametric based cost estimating sheet, and outputs are fed into Design Profit to develop final fabrication costs. Since injection molding is a more complex material driven primary fabrication process, the cells to the right include detailed dimensional values and material selections.

## Injection Molding Material Costs & Cycle Times

**Part Name: Vent Body**

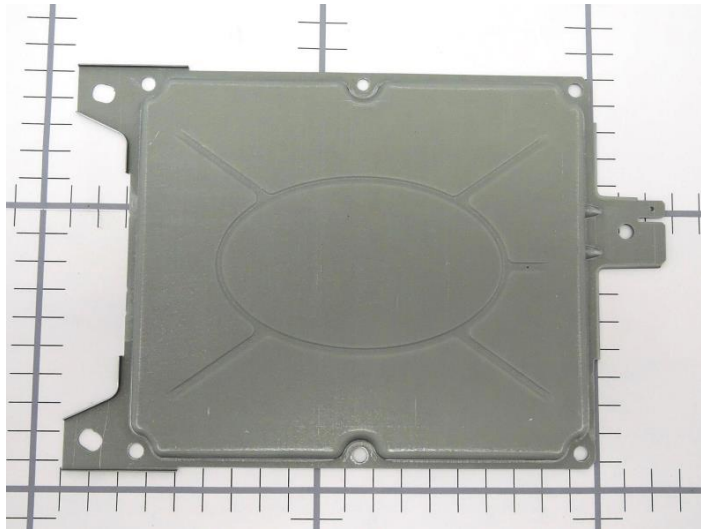
### Inputs:

Injection Molding Inputs:			
1	Number of Injection Shots: (1, 2, & 3)	1	
2	Weight of Part	0.050	kg
3	Number of Cavities in Tool	2	
4	Number of Die Lock Features	0	
5	Recycle Offal (1=Yes, 0=No)	0	
6	Height - Tool Draw	19.52	mm
Inputs for Each Injection Shot:			
7	Injection Process: (Standard=1, MuCell=2, & Foaming Agent=3)	1	
8	Length - Longest (mm)	105.4	
9	Width - Shortest (mm)	105.3	
10	Percentage of Part Area Used Based on Square Area of Length x Width	90.00	
11	Nominal Wall Thickness (mm)	2	
12	Material Number	59	

	Material Name	Abbreviation	Cost (\$/kg)	Offal Value (\$/kg)
-	Polypropylene (30% glass)	PP + GF30	\$2.71	\$0.00
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-

### Outputs to DP:

Injection Molding Outputs:			
1	Min. Injection Molding Press	103	tons
Outputs for Each Injection Shot:		PP + GF30	-
2	Injection Molding Time (sec)	7.29	-
3	Net Weight (kg)	0.050	-
4	Raw Material Weight (kg)	0.053	-
5	Raw Material Cost	\$0.14	-



The stamping material costs and cycle times are calculated in an internal parametric based cost estimating sheet, and outputs are fed into Design Profit to develop final fabrication costs. Since stamping is a more machine driven primary fabrication process, the cells to the right include dimensional values related to stations operating in the press, along with material selections.

## Stamping Material Costs & Cycle Times

**Part Name: Bottom Cover, Cell Control**

### Inputs:

Stamping Inputs:			
General Inputs:			
1	Stamping Quality: (Standard=1, Fine Blanking=2)	1	
2	Parts per Hit (Side by Side Across Press Width)	1	
3	Material Number	6	
Blanking Inputs:			
4	Shape Type: (Formed Sheet=1, Drawn Box=2, Drawn Cylinder=3)	1	
5	Part Height - Tool Draw	6.73	mm
6	Wrap Length - Longest	225	mm
7	Wrap Width - Shortest	150	mm
8	Sheet Thickness	0.65	mm
9	Number of Blanking Hits (If Unknown = 0)	0	
Piercing Inputs:			
10	Number of Circular Holes	8	
11	Average Diameter of Circular Holes	5	mm
12	Number of Non-Circular Holes	2	
13	Total Perimeter of Non-Circular Holes	64	mm
14	Number of Piercing Hits (If Unknown = 0)	0	
Bending Inputs:			
15	Number of Bends	0	
16	Total Length of Bend Lines	0	mm
17	Number of Bending Hits (If Unknown = 0)	0	
Flanging Holes Inputs:			
18	Number of Flanged Holes	0	
19	Total Perimeter of Flanged Holes	0	mm
20	Number of Flanging Holes Hits (If Unknown = 0)	0	
Forming Depression Inputs:			
21	Number of Depressions	1	
22	Total Perimeter of Depressions	560	mm
23	Number of Forming Depression Hits (If Unknown = 0)	0	
Deep Drawing Inputs:			
24	Drawn Area Depth	0	mm
25	Drawn Area Length - Longest	0	mm
26	Drawn Area Width - Shortest	0	mm
27	Number of Deep Drawing Hits (If Unknown = 0)	0	

Material Name	Abbreviation	Cost (\$/kg)
Medium Carbon Steel 1040 - Galvanized	AISI 1040 - Galvs	\$1.50

### Outputs to DP:

Stamping Outputs: (Progressive Die)			
1	Stamping Press	60	tons
2	Stamping Cycle Time	0.67	sec
3	Blank Weight	0.197	kg
4	Material Cost	\$0.30	

## Zone Report Outline:

- Zone Information
  - Zone Overview
  - Zone Executive Summary
- Chapter Information
  - Chapter Overview
  - Eye Catching Features
  - Executive Summary
  - Repeating Series of Sets of Costing Detail Pages
    - Assembly Details (Set of 3 Pages)
    - Part Details (Set of 2 Pages)
    - Assembly Process (Set of 2 Pages)
- Appendix Information
  - TechInsights Reports
    - Electronic Component Costing Details
  - Munro & Associates Wire Harness Reports
    - Wire Harness Costing Details
- Zones and Chapters are meant to be similar in structure to a system and sub-system breakdown, however, they may or may not represent specific Original Equipment Manufacturer (OEM) organizations. For example, the Zone 7: Driveline contains the chapters for Motor, Gear Box and Half Shafts.



<b>Battery Pack</b>	
<b>Summary</b>	
Parts	11,254
Fasteners	246
Part Numbers	196
Steps	5,009
Fastenings	5,009
Right First Time	0.29
OEM Process Time (Hr.)	0.88
Supplier Process Time (Hr.)	29.30
Total Weight (kg)	233.71
Material Cost**	Values Available in Report
OEM Process Cost	
Supplier Process Cost	
Overhead Burden	
SG&A	
Manufacturing Cost*	


\* Excluding tooling, ER&D, logistics, and profit margin  
\*\* Includes material cost and purchased parts cost

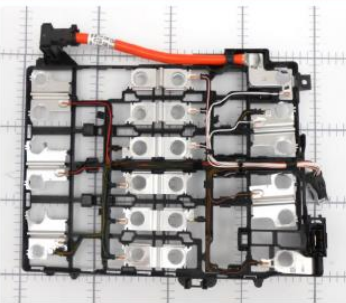

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At the beginning of each Zone report and beginning of each Chapter, there will be a Executive Summary page. This page provides the high level totals of the Zone or Chapter, based on the following detailed data. The upper part of the summary table shows typical metrics totaled from the assembly and fabrication processes, including part counts, operation counts, timing, and weights. The lower part of the table shows the total costs incurred from these processes.

## Executive Summary: Page 1 of 1

## Buss and Sense Asm



Battery Pack Asm  
 HV Battery Module, Asm  
 Buss and Sense Asm

Assembly Summary

Parts	38
Fasteners	0
Part Numbers	17
Steps	319
Fastenings	54
Weight % Time	96.82 %
OEM Process Time (Min)	4.71
Supplier Process Time (Min)	5.47
Total Weight (kg)	0.46

Material Cost**	Values Available in Report
OEM Process Cost	
Supplier Process Cost	
Q Burden	
SG&A	
Manufacturing Cost*	

\* Excluding tooling, ER&D, logistics, and profit margin  
 \*\* Includes material cost and purchased parts

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11

## Assembly Details: Page 1 of 3

As the report progresses through the breakdown hierarchy of the Chapter, when an assembly is analyzed, three detail pages will be provided. The first page, shown to the left, is a high level overview. The top left photo is the independent assembly, placed on a grid for a reference perspective. The bottom left photo is the assembly in location, once it is assembled to its parent assembly. The top right is a list of the parent assemblies of this assembly. The bottom right is a table summarizing total metrics and costs related to the completed assembly.

Buss and Sense Asm											
Name	Qty	Fasteners	Parts	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Buss Frame Asm	1	19	4	37	19	99.61%	0.80	0.00	22.00	17.74	0.15
Assemble Module Harness	1	10	1	33	10	99.47%	1.67	0.00	0.00	0.00	0.00
Buss Connector 1	3	0	1	7	0	99.94%	0.00	0.00	0.00	7.60	0.01
Buss Connector 2	2	0	1	7	0	99.94%	0.00	0.00	0.00	7.60	0.01
Buss Connector 3	4	0	1	10	0	99.90%	0.00	0.00	5.60	7.60	0.01
Buss Connector 4	2	0	1	10	0	99.90%	0.00	0.00	5.60	7.67	0.01
Assemble Buss Connector	1	11	0	37	11	99.62%	1.18	0.00	38.00	0.00	0.00
Module Bus Terminal Asm	1	2	3	30	2	99.70%	0.00	0.00	27.00	20.70	0.06
Connection Cable Asm	1	1	1	17	1	99.83%	0.00	0.00	14.00	12.10	0.10
Assemble Buss Connectors	1	2	0	9	2	99.85%	0.28	0.00	10.00	0.00	0.00
Assemble Thermistor Leads	1	9	17	48	9	99.85%	0.78	0.00	50.00	0.00	0.00

Buss and Sense Asm											
Name	Part	Series	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost		
Buss Frame Asm											
Assemble Module Harness											
Buss Connector 1											
Buss Connector 2											
Buss Connector 3											
Buss Connector 4											
Assemble Buss Connector											
Module Bus Terminal Asm											
Connection Cable Asm											
Assemble Buss Connectors											
Assemble Thermistor Leads											

Values Available in Report

The second assembly detail page, shown to the left, is the detailed breakdown of the totals for each line item within the current assembly. The line items within the breakdown will include assemblies, parts, and assembly processes. This makes these tables effectively a combined Bill of Materials (BOM) and Bill of Process (BOP) for that assembly. The top table provides the typical metrics totaled from the assembly and fabrication process of each line item. The bottom table provides the total costs incurred from these processes.

## Assembly Details: Page 2 of 3

- Note for large assemblies with many line items this page could become multiple pages.

**Buss and Sense Asm**

**Detailed Summary**

Parts	38
Fasteners	0
Part Numbers	17
Steps	319
Fastenings	54
Right First Time	96.82
OEM Asm. Time (Min)	4.71
OEM Fab. Time (Min)	0.00
Supplier Asm. Time (Min)	2.24
Supplier Fab. Time (Min)	0.46
Total Weight (kg)	0.46
Processed Part	Values Available in Report
Material Cost	
OEM Asm. Cost	
OEM Fab. Cost	
Supplier Asm. Cost	
Supplier Fab. Cost	
Q Burden	
SG&A	
Manufacturing Cost*	

\* Excluding tooling, ER&D, logistics, and profit margin  
 \*\* Includes material cost and purchased parts cost

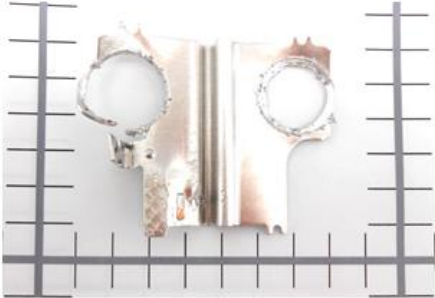
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The third assembly detail page, shown to the left, is a detailed summary of the totals shown on the previous page. The upper part of the summary table shows typical metrics totaled from the assembly and fabrication process, including part counts, operation counts, timing, and weights. The lower part of the table shows the total costs incurred from these processes.

## Assembly Details: Page 3 of 3




## Buss Connector 2





- ...Buss and Sense Asm
- Buss Connector 2
- Buss Connector 2, Process



### Process Summary

Right First Time	99.94 %
Process Time (Sec)	7.60
Total Weight (kg)	0.01

Material Cost**	Values Available in Report
OEM Process Cost	
Supplier Process Cost	
Q Burden	
SG&A	
Manufacturing Cost*	


\* Excluding tooling, ER&D, logistics, and profit margin  
\*\* Includes material cost and purchased parts cost

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14

## Part Details: Page 1 of 2

As the report progresses through the breakdown hierarchy of the Chapter, when a part is analyzed, two detail pages will be provided. The first page, shown to the left, is a high level overview. The top left photo is the independent part, placed on a grid for a reference perspective. The bottom left photo is the part in location, once it is assembled to its parent assembly. The top right is a list of the parent assemblies of this part. The bottom right is a table summarizing total metrics and costs related to the completed part.

## Buss Connector 2



---

**Buss Connector 2, Process**

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	3.50	1						
Debur	3.50	1						
Stamp, 25 Ton Press	0.60	1						

Values Available in Report

---

**Buss Connector 2, Process**

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
<span style="color: red;">■</span> Buss Connector 2, Material	1	Aluminum 1350 - Coil Stock					

Values Available in Report


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15


The second part detail page, shown to the left, is the detailed breakdown of the totals for the raw materials and each process step to fabricate the part. The top table provides the typical fabrication process metrics and costs totaled for each step. The bottom table provides the total costs for raw material or purchased parts used in the fabrication process.

## Part Details: Page 2 of 2

- Note for complex parts with many steps this page could become multiple pages.

## Assemble Thermistor Leads






\HV Battery Module, Asm  
 \Buss and Sense Asm  
 \Assemble Thermistor Leads

### Process Summary

Right First Time	99.67 %
Process Time (sec)	97.00
Total Weight (kg)	0.01

Material Cost**	Values Available in Report
OEM Process Cost	
Supplier Process Cost	
Q Burden	
SG&A	
Manufacturing Cost*	

\* Excluding tooling, ER&D, logistics, and profit margin  
 \*\* Includes material cost and purchased parts cost




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16

## Assembly Process Details: Page 1 of 2

As the report progresses through the breakdown hierarchy of the Chapter, when an assembly process is analyzed, two detail pages will be provided. The first page, shown to the left, is a high level overview. The top left are photos of the purchased parts utilized in the process, placed on a grid for a reference perspective. The bottom left photo is a view of the location, once the process is complete. The top right is a list of the parent assemblies of this process. The bottom right is a table summarizing total metrics and costs related to the process.

## Assemble Thermistor Leads



---

**Assemble Thermistor Leads**

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/hr)	Country	Process Cost	Right First Time	Q Burden
OEM Manual Asm	47.00	1	1.00					
Apply Epoxy	50.00	1	0.25					

Values Available in Report

---

**Assemble Thermistor Leads**

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Small Wire Tie	1	Commodity Item					
Thermistor Hot Mat	1	Commodity Item					
Termination Epoxy	15	Commodity Item					

Values Available in Report

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17

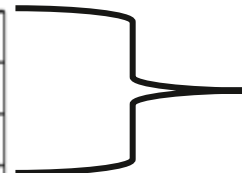
The second assembly process detail page, shown to the left, is the detailed breakdown of the totals for the purchased parts and each assembly process step. The top table provides the typical assembly process metrics and costs totaled for each step. The bottom table provides the total costs for purchased parts used in the assembly process. If a electronic component or wire harness are in the list of purchased parts, then this page will also have a link to the accompanying report in the Appendix.

## Assembly Process Details: Page 2 of 2

- Note for complex processes with many steps this page could become multiple pages.

## Detailed Summary

Parts	38
Fasteners	0
Part Numbers	17
Steps	319
Fastenings	54
Right First Time	96.82%
OEM Asm. Time (Min)	4.71
OEM Fab. Time (Min)	0.00
Supplier Asm. Time (Min)	3.23
Supplier Fab. Time (Min)	2.24
Total Weight (kg)	0.46



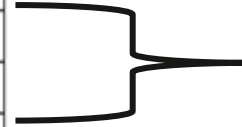
Summary tables, include three metrics related to part count. The first metric, “Parts” is the total quantity of parts. The second metric, “Fasteners” is the total quantity of fasteners, within that total part count, meaning that the fasteners count is a sub-total of the parts count. The third metric, “Part Numbers” is the total unique part instances in the total part count (this includes numbers for both main parts and fasteners).

Purchased Part Cost	<b>Values Available in Report</b>
Material Cost	
OEM Asm. Cost	
OEM Fab. Cost	
Supplier Asm. Cost	
Supplier Fab. Cost	
Q Burden	
SG&A	
Manufacturing Cost*	

## Detailed Summary

Parts	38
Fasteners	0
Part Numbers	17
Steps	319
Fastenings	54
Right First Time	96.82%
OEM Asm. Time (Min)	4.71
OEM Fab. Time (Min)	0.00
Supplier Asm. Time (Min)	3.23
Supplier Fab. Time (Min)	2.24
Total Weight (kg)	0.46

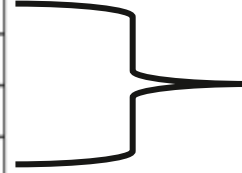
Purchased Part Cost	<b>Values Available in Report</b>
Material Cost	
OEM Asm. Cost	
OEM Fab. Cost	
Supplier Asm. Cost	
Supplier Fab. Cost	
Q Burden	
SG&A	
Manufacturing Cost*	



Summary tables, also include two metrics related to operation counts. The first “Steps”, is the total count of the operations required to complete an assembly, part, or assembly process. Operations counted in this total include handling of parts, movement of equipment or operators, handling of tools, fastenings of parts and assemblies, operations to add and remove material during the fabrication process, etc. The second “Fastenings” is the total count of the operations specifically related to fastenings components together, meaning that the fastening count is a sub-total of the steps count.

## Detailed Summary

Parts	38
Fasteners	0
Part Numbers	17
Steps	319
Fastenings	54
Right First Time	96.82%
OEM Asm. Time (Min)	4.71
OEM Fab. Time (Min)	0.00
Supplier Asm. Time (Min)	3.23
Supplier Fab. Time (Min)	2.24
Total Weight (kg)	0.46
Purchased Part Cost	<b>Values Available in Report</b>
Material Cost	
OEM Asm. Cost	
OEM Fab. Cost	
Supplier Asm. Cost	
Supplier Fab. Cost	
Q Burden	
SG&A	
Manufacturing Cost*	



Often it would be expected that the analysis would have the same number of fasteners to fastenings, however, that is not always the case. One scenario is shown to the right, where there are less fasteners, than fastenings. This is typical of welding operations or the application of sealant or adhesive, as there is not a standard bolt, nut, or clip to be counted as a fastener. A second scenario is where there are more fasteners, than fastenings. This is typical of a process that engages multiple fasteners at the same time, like a multi-head nut runner.

## Detailed Summary

Parts	38
Fasteners	0
Part Numbers	17
Steps	319
Fastenings	54
Right First Time	96.82%
OEM Asm. Time (Min)	4.71
OEM Fab. Time (Min)	0.00
Supplier Asm. Time (Min)	3.23
Supplier Fab. Time (Min)	2.24
Total Weight (kg)	0.46


Purchased Part Cost	<b>Values Available in Report</b>
Material Cost	
OEM Asm. Cost	
OEM Fab. Cost	
Supplier Asm. Cost	
Supplier Fab. Cost	
Q Burden	
SG&A	
Manufacturing Cost*	



Summary tables include “Right First Time” (RFT). This value states the probability that all the steps that total to this point in the process will be completed without an error. Naturally, as the number and complexity of steps required to complete the assembly, part, or assembly process increase, the RFT percentage will decrease. RFT is calculated using typical best-in-class PPM values for incident rates. However, even with high Sigma level processes, as the steps count increases greatly, the RFT percentage will decrease greatly.



## Driver Side Half Shaft Installation




No Commodity Items  
Required for This  
Process

Zone 7 Driveline  
Half Shafts  
Driver Side Half Shaft Installation

Process Summary

Right First Time	99.96 %
Process Time (Sec)	12.00
Total Weight (kg)	0.00
Material Cost**	\$0.00
OEM Process Cost	Values Available in Report
Supplier Process Cost	
Q Burden	
SG&A	
Manufacturing Cost*	

\* Excluding tooling, ER&D, logistics, and profit margin  
\*\* Includes material cost and purchased parts




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340

Some assembly processes will not require the use of commodity items in the process to fasten parts and assemblies. For example, the installation of the half shafts to the vehicle utilizes a press fit, and therefore does not require commodities, like bolts, nuts, or clips to fasten in place. When no commodities are required, the top left photos will be replaced with the standard statement shown on the left. Additionally there will be no weight or material cost / purchased parts cost present in the process summary.

# Interpreting Data – Low Q Burden

Buss Connector 2, Process								
Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	3.60	1						\$0.00
Debur	3.60	1						\$0.00
Stamp, 25 Ton Press	0.60	1						\$0.00

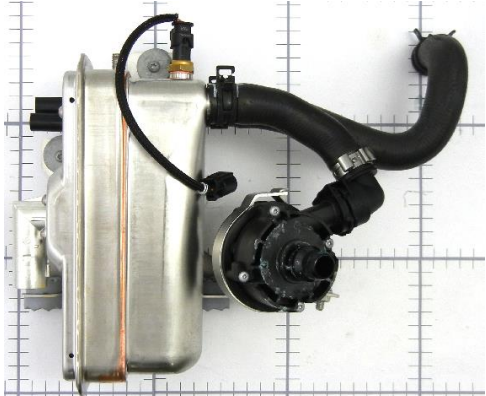
**Values Available in Report**



Some assembly and fabrication process steps that have few operations or operations with low PPMs of defects, will often display \$0.00 in Q Burden. This is simply because the Q Burden value for that step in the process is less than one cent. However, this fraction of a cent of cost will be rolled-up to any parent part or assembly for these processes and added to its totals.

# *Cost Analysis*

## Zone 6: Cooling Pack & HVAC Overview



Zone 6 includes the powertrain cooling system and the passenger HVAC system. The cooling module located in the front of the vehicle includes a pair of heat exchangers one for cooling the electronics and range extender engine and the other is the AC condenser. The system also includes all plumbing and tubing for transfer fluids to their respective components. The HVAC system includes the in cabin module with the typical components i.e. heater core AC evaporator, blower motor and various mode doors for air flow. The HVAC system also includes an electrical heating element for the heating system as the system does not use the engine coolant for heating.

All major components were costed in detail, while prices were applied to commodity items (i.e. seals, fasteners, latches, and seat belts).

*Estimates are based on actual parts.*

*Photos: Background on 100mm grid paper.*

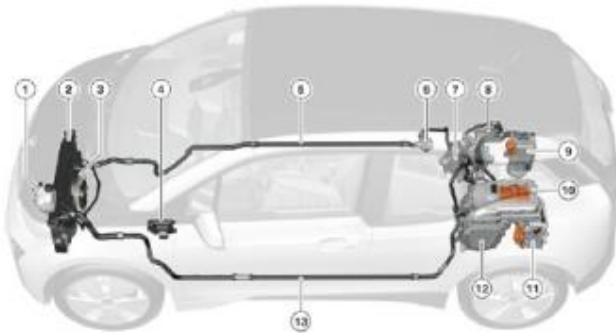
## Summary

<b>Parts</b>	<b>1,129</b>
<b>Fasteners</b>	<b>204</b>
<b>Part Numbers</b>	<b>476</b>
<b>Steps</b>	<b>7,132</b>
<b>Fastenings</b>	<b>903</b>
<b>Right First Time</b>	<b>39.19%</b>
<b>OEM Process Time (Hrs)</b>	<b>0.28</b>
<b>Supplier Process Time (Hrs)</b>	<b>4.96</b>
<b>Total Weight (kg)</b>	<b>38.99</b>
<b>Material Cost**</b>	<b>\$672.52</b>
<b>OEM Process Cost</b>	<b>\$25.46</b>
<b>Supplier Process Cost</b>	<b>\$161.61</b>
<b>Q Burden</b>	<b>\$14.04</b>
<b>SG&amp;A</b>	<b>\$69.44</b>
<b>Manufacturing Cost*</b>	<b>\$943.07</b>

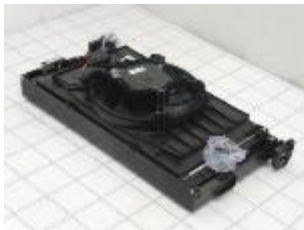
\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Cooling Pack Overview



Graphics From: BMW Group technical Training



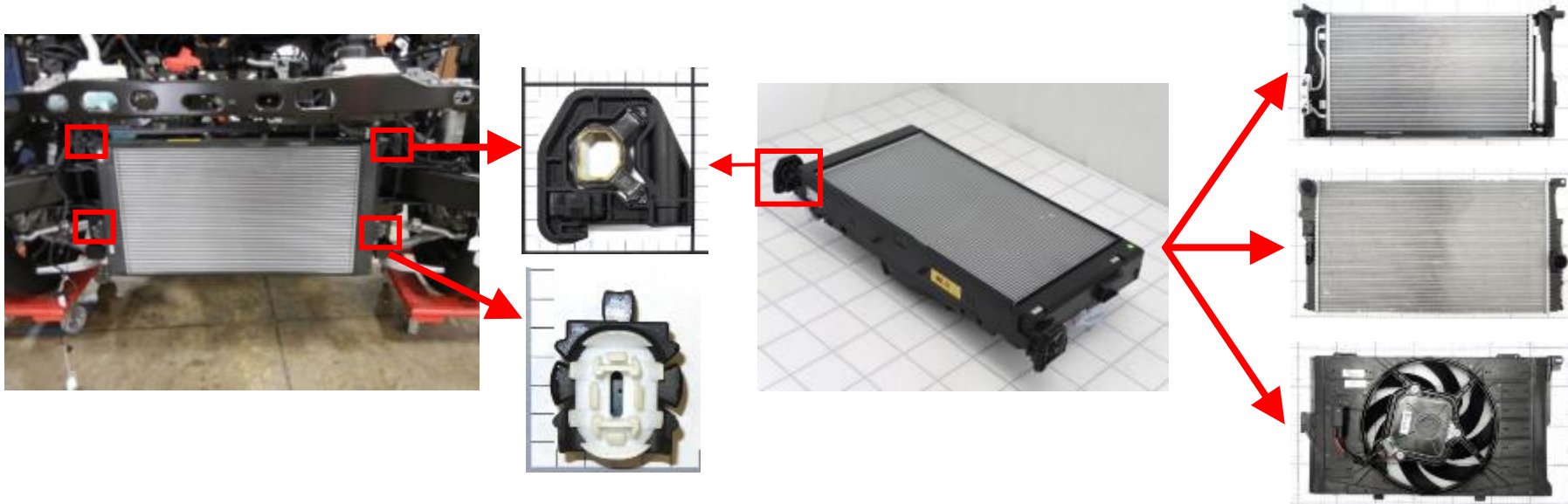
The cooling system of the i3 is a circulatory system for the range extender electrical machine and other high-voltage components cooling. Assembly and manufacturing details for the cooling system will be covered throughout the report.

As the traditional BMW vehicle, the cooling module at the front of i3 is made up of the coolant-air heat exchanger, the electric fan and optional active air cooling flaps. Due to most of components which should be cooled locate at the rear of vehicle, long feed and return lines connect the front cooling module to these components such as range extender electrical machine, convenience charging electronics, electrical machine etc. The recirculation of the coolant is guaranteed using a electric coolant pump and similar to the cooling systems of current BMW vehicles with combustion engines, the control in the i3 is also affected depending on the cooling power requirement. This control is integrated in Electrical Digital Motor Electronics(EDME). If the air stream is insufficient for cooling the coolant in the radiator, the electric fan is also switched on by the EDME. The cross flow radiator uses flat tube-fin structure and the aluminum flat tubes and corrugated thin belts are welded together by controlled atmosphere oven brazing. To enhance the heat dissipation capability, the belts are processed with fins and the flat tubes are manufactured as microchannel tubes through rolling form process.

All major components were costed in detail, while prices were applied to commodity items (i.e. fasteners, seals, rivets, snap rings).

*Estimates are based on actual parts.*

*Photos: Background on 100mm grid paper.*

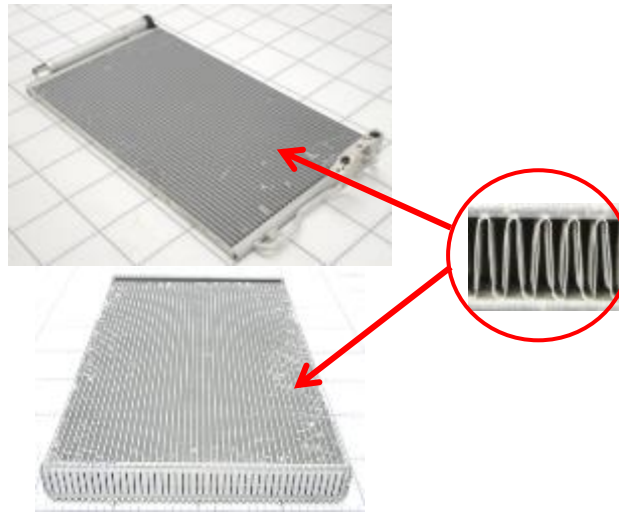


## Description:

- Condenser, radiator and electrical fan are integrated in one frame box.
- Four isolators (2 upper and 2 lower) connect the front-end cooling module to the vehicle suspension to reduce noise and vibration level.

## Advantages:

- Reduce space utilization and fasteners, leading compact structure and better wiring layout for other systems and components
- Specially designed isolators improve i3's NVH performance and riding comfort



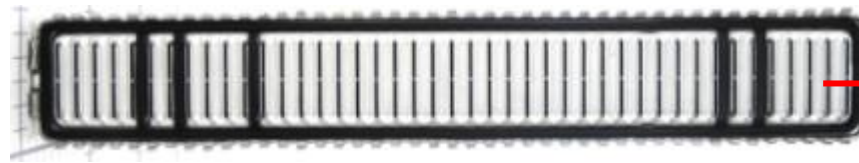
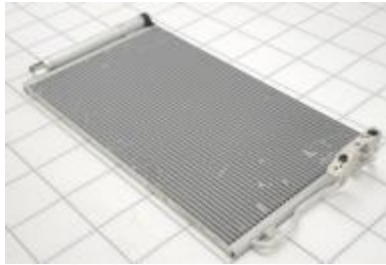
## Description:

- Controlled atmosphere brazing of aluminum (CAB) is the joining process for assembling aluminum condenser and radiator cores.

## Advantages:

- Flux is noncorrosive, requiring no post braze cleaning
- Continuous flow for high volume throughput
- Accepts a less demanding dimensional fit-up
- Easy implementation for automatic production line layout and reduce assembly time





## Description:

- The tubes of condenser and radiator are aluminum multi-port extrusion. Due to large internal surface area, heat conduction efficiency is improved.

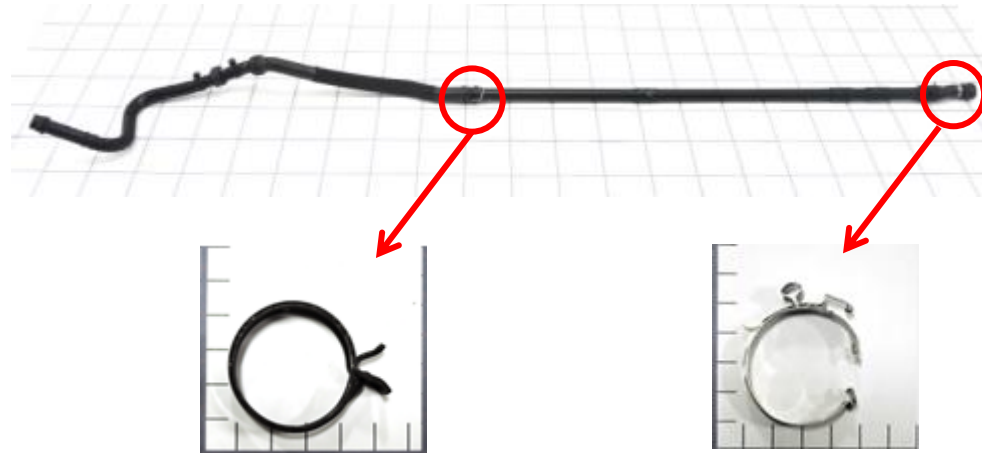
## Advantages:

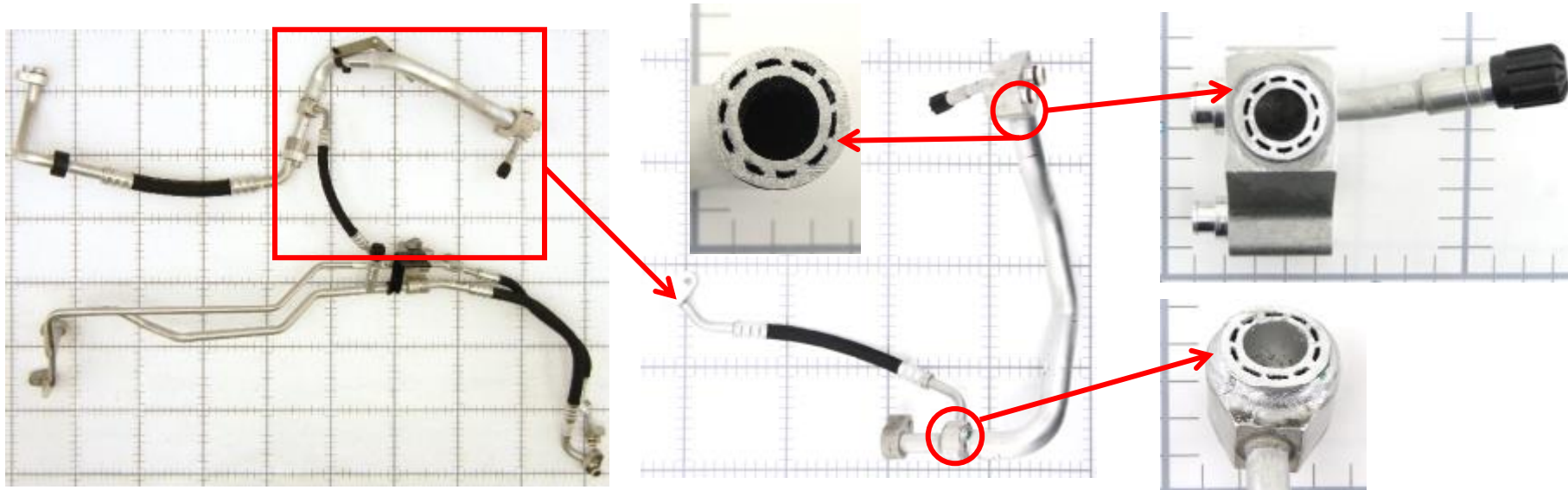
- Light weight, good thermal and electrical conductivity
- Outstanding pressure and corrosion resistance
- Great shaping, bending performance and high recyclability
- Easy layout for automatic extrusion line production



## Observations:

- The usual connection between plastic tubes and hoses in coolant systems are used by different kinds of hose clamps, which is more efficient and economic way for manufacturing and assembly process and easier replacement when some sections are broken.
- Over-molded plastic hoop on the interface between plastic tube and hose was found in the BMW i3 cooling lines. Even though this unusual connection is more reliable and better chemical resistant than hose clamps, however, for the manufacturing and maintenance process, it is much more difficult and costly than hose clamps. Further, no matter which section tube is broken, it needs to replace whole tube line, not just for the broken section.





## Description:

- Double-pipe Internal Heat Exchanger is used for front refrigerant line of air conditioning system.
- In the refrigeration cycle, the low-temperature gaseous refrigerant flows in the inner tube, and exchanges heat with the high-temperature liquid refrigerant flowing in the gap between the inner and outer tubes.

## Advantages:

- Integrate two pipes, which are separated in a conventional refrigeration cycle, into one pipe with inner and outer tubes and save the layout space.
- Enhance heat exchange performance at the same power level.
- Can easily be manufactured by extrusion process and reduce process steps and cost.

## Summary

<b>Parts</b>	<b>624</b>
<b>Fasteners</b>	<b>91</b>
<b>Part Numbers</b>	<b>269</b>
<b>Steps</b>	<b>4,686</b>
<b>Fastenings</b>	<b>472</b>
<b>Right First Time</b>	<b>58.22%</b>
<b>OEM Process Time (Hrs)</b>	<b>0.19</b>
<b>Supplier Process Time (Hrs)</b>	<b>3.44</b>
<b>Total Weight (kg)</b>	<b>24.78</b>
<b>Material Cost**</b>	<b>\$331.25</b>
<b>OEM Process Cost</b>	<b>\$17.76</b>
<b>Supplier Process Cost</b>	<b>\$93.88</b>
<b>Q Burden</b>	<b>\$8.11</b>
<b>SG&amp;A</b>	<b>\$30.58</b>
<b>Manufacturing Cost*</b>	<b>\$481.58</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Cooling Fan Air Duct Asm



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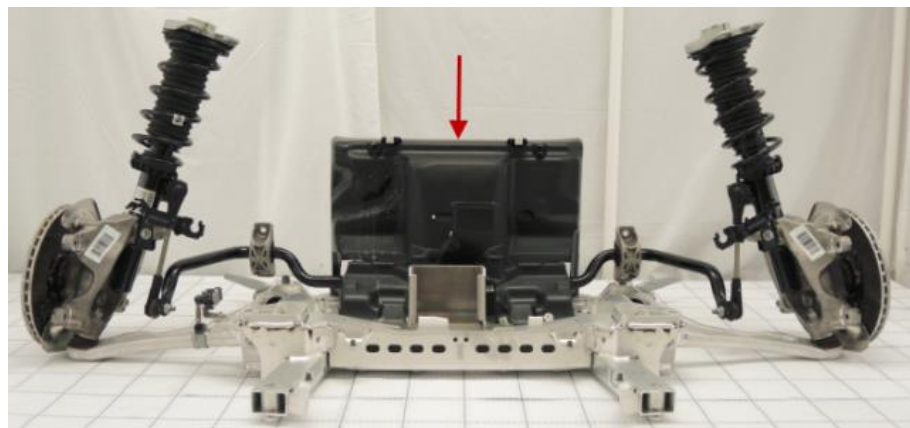
\Zone 6 Cooling Pack & HVAC

\Cooling Pack

\Cooling Fan Air Duct Asm

## Assembly Summary

<b>Parts</b>	<b>18</b>
<b>Fasteners</b>	<b>14</b>
<b>Part Numbers</b>	<b>8</b>
<b>Steps</b>	<b>44</b>
<b>Fastenings</b>	<b>14</b>
<b>Right First Time</b>	<b>98.45 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>3.32</b>
<b>Total Weight (kg)</b>	<b>1.29</b>



<b>Material Cost**</b>	<b>\$4.21</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$3.04</b>
<b>Q Burden</b>	<b>\$0.23</b>
<b>SG&amp;A</b>	<b>\$0.81</b>
<b>Manufacturing Cost*</b>	<b>\$8.29</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Cooling Fan Air Duct Asm



## Cooling Fan Air Duct Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Lower Cooling Fan Air Duct, Cooling Fan Air Duct As	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.38	0.3860
Upper Cooling Fan Air Duct, Cooling Fan Air Duct As	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.40	0.6460
Upper Cooling Fan Air Duct Installation	1	10	10	23	10	99.35 %	0.00	0.00	1.33	0.00	0.0304
Intake, Cooling Fan Air Duct Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.07	0.1120
Intake, Cooling Fan Air Duct Installation	1	2	2	6	2	99.57 %	0.00	0.00	0.45	0.00	0.0092
Shield, Cooling Fan Air Duct	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.07	0.0920
Cooling Fan Air Shield Installation	1	2	2	7	2	99.56 %	0.00	0.00	0.62	0.00	0.0138

## Cooling Fan Air Duct Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Lower Cooling Fan Air Duct, Cooling Fan Air Duct As	\$0.00	\$1.11	\$0.00	\$0.00	\$0.00	\$0.46	\$0.00	\$0.19	\$1.76
Upper Cooling Fan Air Duct, Cooling Fan Air Duct As	\$0.00	\$1.86	\$0.00	\$0.00	\$0.00	\$0.58	\$0.00	\$0.29	\$2.73
Upper Cooling Fan Air Duct Installation	\$0.60	\$0.00	\$0.00	\$0.00	\$1.00	\$0.00	\$0.10	\$0.14	\$1.84
Intake, Cooling Fan Air Duct Asm	\$0.00	\$0.29	\$0.00	\$0.00	\$0.00	\$0.06	\$0.00	\$0.04	\$0.42
Intake, Cooling Fan Air Duct Installation	\$0.04	\$0.00	\$0.00	\$0.00	\$0.34	\$0.00	\$0.06	\$0.04	\$0.48
Shield, Cooling Fan Air Duct	\$0.00	\$0.25	\$0.00	\$0.00	\$0.00	\$0.12	\$0.00	\$0.04	\$0.42
Cooling Fan Air Shield Installation	\$0.06	\$0.00	\$0.00	\$0.00	\$0.46	\$0.00	\$0.07	\$0.06	\$0.65

## Detailed Summary

<b>Parts</b>	<b>18</b>
<b>Fasteners</b>	<b>14</b>
<b>Part Numbers</b>	<b>8</b>
<b>Steps</b>	<b>44</b>
<b>Fastenings</b>	<b>14</b>
<b>Right First Time</b>	<b>98.45%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>2.40</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.92</b>
<b>Total Weight (kg)</b>	<b>1.29</b>
<b>Purchased Part Cost</b>	
	<b>\$0.70</b>
<b>Material Cost</b>	
	<b>\$3.51</b>
<b>OEM Asm. Cost</b>	
	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	
	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	
	<b>\$1.80</b>
<b>Supplier Fab. Cost</b>	
	<b>\$1.24</b>
<b>Q Burden</b>	
	<b>\$0.23</b>
<b>SG&amp;A</b>	
	<b>\$0.81</b>
<b>Manufacturing Cost*</b>	
	<b>\$8.29</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Lower Cooling Fan Air Duct, Cooling Fan Air Duct As



\...

\Cooling Fan Air Duct Asm

\Lower Cooling Fan Air Duct, Cooling Fan Air Duct As

\Lower Cooling Fan Air Duct Process

## Process Summary

<b>Right First Time</b>	<b>99.99 %</b>
<b>Process Time (Sec)</b>	<b>22.88</b>
<b>Total Weight (kg)</b>	<b>0.39</b>

<b>Material Cost**</b>	<b>\$1.11</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.46</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.19</b>
<b>Manufacturing Cost*</b>	<b>\$1.76</b>



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Lower Cooling Fan Air Duct, Cooling Fan Air Duct As



## Lower Cooling Fan Air Duct Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
720 Ton Injection Molding Press	22.88	1	0.25	72.07	ESP	\$0.46	99.99%	\$0.00

## Lower Cooling Fan Air Duct Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Lower Cooling Fan Air Duct	1	PPGF30	\$2.71	0.3860	0.4110	\$0.00	\$1.11

# Upper Cooling Fan Air Duct, Cooling Fan Air Duct As



\...

\Cooling Fan Air Duct Asm

\Upper Cooling Fan Air Duct, Cooling Fan Air Duct As

\Upper Cooling Fan Air Duct Process

## Process Summary

<b>Right First Time</b>	<b>99.99 %</b>
<b>Process Time (Sec)</b>	<b>23.76</b>
<b>Total Weight (kg)</b>	<b>0.65</b>

<b>Material Cost**</b>	<b>\$1.86</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.58</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.29</b>
<b>Manufacturing Cost*</b>	<b>\$2.73</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Upper Cooling Fan Air Duct, Cooling Fan Air Duct As



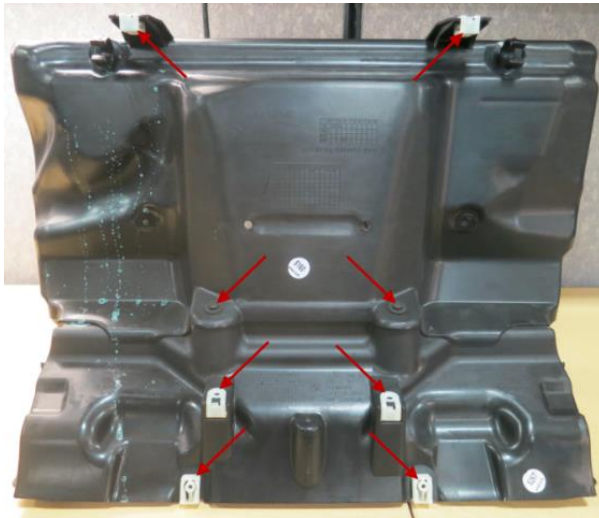
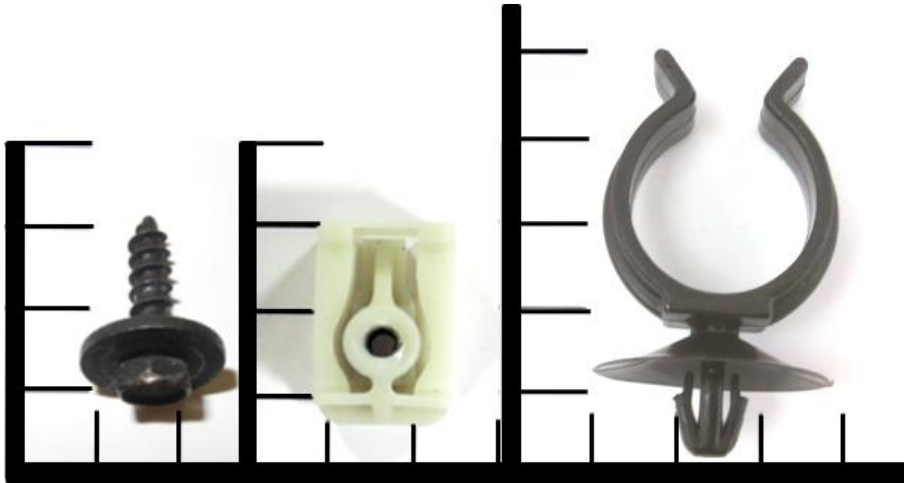
## Upper Cooling Fan Air Duct Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
950 Ton Injection Molding Press	23.76	1	0.25	87.38	ESP	\$0.58	99.99%	\$0.00

## Upper Cooling Fan Air Duct Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Upper Cooling Fan Air Duct	1	PPGF30	\$2.71	0.6460	0.6860	\$0.00	\$1.86

# Upper Cooling Fan Air Duct Installation



- \...
- \Cooling Pack
- \Cooling Fan Air Duct Asm
- \Upper Cooling Fan Air Duct Installation

## Process Summary

Right First Time	99.35 %
Process Time (Sec)	80.00
Total Weight (kg)	0.03
Material Cost**	\$0.60
OEM Process Cost	\$0.00
Supplier Process Cost	\$1.00
Q Burden	\$0.10
SG&A	\$0.14
Manufacturing Cost*	\$1.84

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Upper Cooling Fan Air Duct Installation



## Upper Cooling Fan Air Duct Installation

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	80.00	1	1.00	45.01	ESP	\$1.00	99.35%	\$0.10

## Upper Cooling Fan Air Duct Installation

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Plastic J-Nut White	4	Commodity Item	Purchased	0.0026	-	\$0.08	\$0.00
M5x18mm-Hex SEMS Screw	2	Commodity Item	Purchased	0.0046	-	\$0.02	\$0.00
Plastic J-Nut	2	Commodity Item	Purchased	0.0026	-	\$0.08	\$0.00
Clip, Harness Anchor	2	Commodity Item	Purchased	0.0028	-	\$0.04	\$0.00

# Intake, Cooling Fan Air Duct Asm



\...

\Cooling Fan Air Duct Asm

\Intake, Cooling Fan Air Duct Asm

\Intake, Cooling Fan Air Duct Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	4.35
Total Weight (kg)	0.11

Material Cost**	\$0.29
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.08
Q Burden	\$0.00
SG&A	\$0.04
Manufacturing Cost*	\$0.42

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Intake, Cooling Fan Air Duct Asm



## Intake, Cooling Fan Air Duct Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
610 Ton Injection Molding Press	17.40	4	0.25	65.91	ESP	\$0.08	99.99%	\$0.00

## Intake, Cooling Fan Air Duct Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Intake, Cooling Fan Air Duct Asm	1	PP	\$2.38	0.1120	0.1200	\$0.00	\$0.29



\...

- \Cooling Pack
- \Cooling Fan Air Duct Asm
- \Intake, Cooling Fan Air Duct Installation

## Process Summary

Right First Time	99.57 %
Process Time (Sec)	27.00
Total Weight (kg)	0.01

Material Cost**	\$0.04
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.34
Q Burden	\$0.06
SG&A	\$0.04
Manufacturing Cost*	\$0.48

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Intake, Cooling Fan Air Duct Installation



## Intake, Cooling Fan Air Duct Installation

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	27.00	1	1.00	45.01	ESP	\$0.34	99.57%	\$0.06

## Intake, Cooling Fan Air Duct Installation

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
M5x18mm-Hex SEMS Screw	2	Commodity Item	Purchased	0.0046	-	\$0.02	\$0.00

# Shield, Cooling Fan Air Duct



\...

- \Cooling Fan Air Duct Asm
- \Shield, Cooling Fan Air Duct
- \Shield, Cooling Fan Air Duct Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	4.10
Total Weight (kg)	0.09

Material Cost**	\$0.25
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.12
Q Burden	\$0.00
SG&A	\$0.04
Manufacturing Cost*	\$0.42

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Shield, Cooling Fan Air Duct

## Shield, Cooling Fan Air Duct Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
1200 Ton Injection Molding Press	16.40	4	0.25	107.61	ESP	\$0.12	99.99%	\$0.00

## Shield, Cooling Fan Air Duct Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Shield, Cooling Fan Air Duct	1	PPTD20	\$2.54	0.0920	0.0990	\$0.00	\$0.25

# Cooling Fan Air Shield Installation

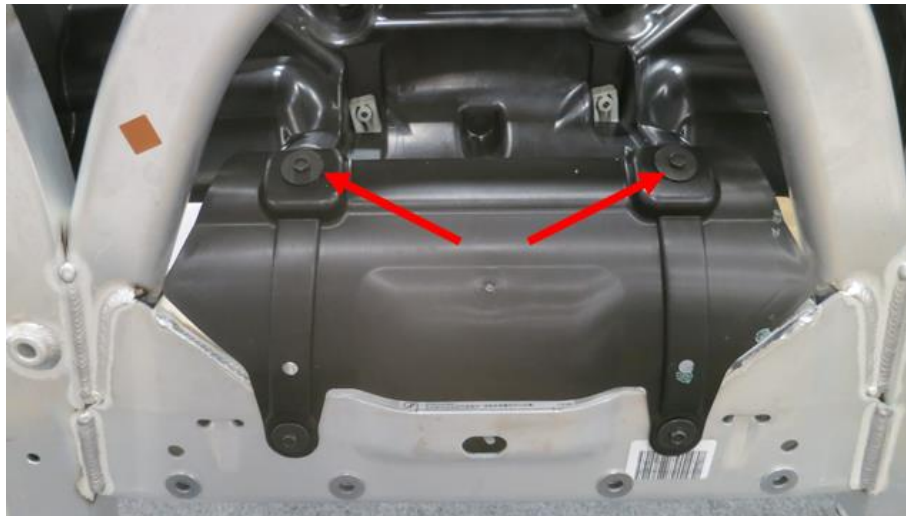


- \...
- \Cooling Pack
- \Cooling Fan Air Duct Asm
- \Cooling Fan Air Shield Installation

## Process Summary

Right First Time	99.56 %
Process Time (Sec)	37.00
Total Weight (kg)	0.01

Material Cost**	\$0.06
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.46
Q Burden	\$0.07
SG&A	\$0.06
Manufacturing Cost*	\$0.65



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Cooling Fan Air Shield Installation



## Cooling Fan Air Shield Installation

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	37.00	1	1.00	45.01	ESP	\$0.46	99.56%	\$0.07

## Cooling Fan Air Shield Installation

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
M5x19mm-Hex SEMS Screw	2	Commodity Item	Purchased	0.0069	-	\$0.03	\$0.00

# Cooling Fan Air Duct Installation



\...

\Zone 6 Cooling Pack & HVAC

\Cooling Pack

\Cooling Fan Air Duct Installation

## Process Summary

Right First Time	99.14 %
Process Time (Sec)	64.00
Total Weight (kg)	0.03

Material Cost**	\$0.12
OEM Process Cost	\$1.63
Supplier Process Cost	\$0.00
Q Burden	\$0.13
SG&A	\$0.20
Manufacturing Cost*	\$2.07

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Cooling Fan Air Duct Installation



## Cooling Fan Air Duct Installation

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
OEM Manual Asm	64.00	1	1.00	91.41	GER	\$1.63	99.14 %	\$0.13

## Cooling Fan Air Duct Installation

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
M5x19mm-Hex SEMS Screw	2	Commodity Item	Purchased	0.0069	-	\$0.03	\$0.00
M5x19mm-Hex SEMS Screw	2	Commodity Item	Purchased	0.0069	-	\$0.03	\$0.00

# Coolant Hot Bottle Asm



- \...
- \Zone 6 Cooling Pack & HVAC
- \Cooling Pack
- \Coolant Hot Bottle Asm

## Assembly Summary

<b>Parts</b>	<b>3</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>8</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.71 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>0.54</b>
<b>Total Weight (kg)</b>	<b>0.37</b>

<b>Material Cost**</b>	<b>\$1.42</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.41</b>
<b>Q Burden</b>	<b>\$0.04</b>
<b>SG&amp;A</b>	<b>\$0.17</b>
<b>Manufacturing Cost*</b>	<b>\$2.04</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Coolant Hot Bottle Asm



Coolant Hot Bottle Asm											
Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Coolant Hot Bottle, Coolant Hot Bottle Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.15	0.3315
Assemble Coolant Hot Bottle Asm	1	2	2	6	2	99.72 %	0.00	0.00	0.38	0.00	0.0398

Coolant Hot Bottle Asm									
Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Coolant Hot Bottle, Coolant Hot Bottle Asm	\$0.00	\$0.85	\$0.00	\$0.00	\$0.00	\$0.11	\$0.00	\$0.11	\$1.07
Assemble Coolant Hot Bottle Asm	\$0.57	\$0.00	\$0.00	\$0.00	\$0.30	\$0.00	\$0.04	\$0.05	\$0.97

## Detailed Summary

<b>Parts</b>	<b>3</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>8</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.71%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.38</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.15</b>
<b>Total Weight (kg)</b>	<b>0.37</b>
<b>Purchased Part Cost</b>	<b>\$0.57</b>
<b>Material Cost</b>	<b>\$0.85</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.30</b>
<b>Supplier Fab. Cost</b>	<b>\$0.11</b>
<b>Q Burden</b>	<b>\$0.04</b>
<b>SG&amp;A</b>	<b>\$0.17</b>
<b>Manufacturing Cost*</b>	<b>\$2.04</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



- \...
- \Coolant Hot Bottle Asm
- \Coolant Hot Bottle, Coolant Hot Bottle Asm
- \Coolant Hot Bottle Process

## Process Summary

<b>Right First Time</b>	<b>99.99 %</b>
<b>Process Time (Sec)</b>	<b>9.13</b>
<b>Total Weight (kg)</b>	<b>0.33</b>

<b>Material Cost**</b>	<b>\$0.85</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.11</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.11</b>
<b>Manufacturing Cost*</b>	<b>\$1.07</b>



\* Excluding tooling, ER&D, logistics, and profit margin  
 \*\* Includes material cost and purchased parts cost

# Coolant Hot Bottle, Coolant Hot Bottle Asm



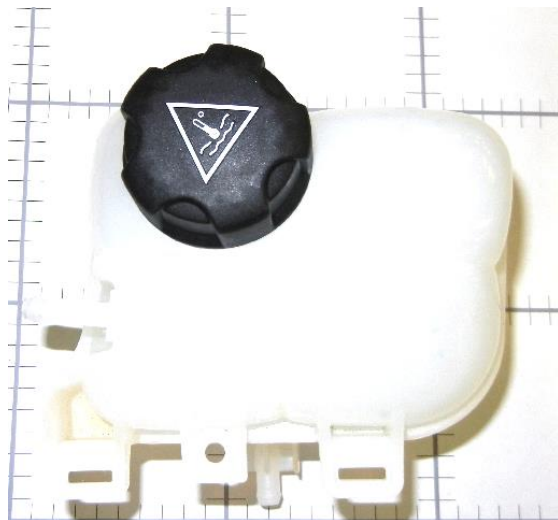
## Coolant Hot Bottle Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
300 Ton Injection Molding Press	36.52	4	0.25	42.25	ITA	\$0.11	99.99%	\$0.00

## Coolant Hot Bottle Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Coolant Hot Bottle	1	PP	\$2.38	0.3315	0.3570	\$0.00	\$0.85

# Assemble Coolant Hot Bottle Asm



- \...
- \Cooling Pack
- \Coolant Hot Bottle Asm
- \Assemble Coolant Hot Bottle Asm

## Process Summary

<b>Right First Time</b>	<b>99.72 %</b>
<b>Process Time (Sec)</b>	<b>23.00</b>
<b>Total Weight (kg)</b>	<b>0.04</b>

<b>Material Cost**</b>	<b>\$0.57</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.30</b>
<b>Q Burden</b>	<b>\$0.04</b>
<b>SG&amp;A</b>	<b>\$0.05</b>
<b>Manufacturing Cost*</b>	<b>\$0.97</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Coolant Hot Bottle Asm



## Assemble Coolant Hot Bottle Asm

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	23.00	1	1.00	47.68	ITA	\$0.30	99.72 %	\$0.04

## Assemble Coolant Hot Bottle Asm

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Cap,Coolant Hot Bottle Asm	1	Commodity Item	Purchased	0.0387	-	\$0.50	\$0.00
O-Ring,Coolant Hot Bottle Asm	1	Commodity Item	Purchased	0.0011	-	\$0.07	\$0.00

# Coolant Hot Bottle Installation



\...  
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\Cooling Pack  
\Coolant Hot Bottle Installation

## Process Summary

Right First Time	99.66 %
Process Time (Sec)	43.00
Total Weight (kg)	0.01

Material Cost**	\$0.02
OEM Process Cost	\$1.09
Supplier Process Cost	\$0.00
Q Burden	\$0.05
SG&A	\$0.13
Manufacturing Cost*	\$1.29



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Coolant Hot Bottle Installation



## Coolant Hot Bottle Installation

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
OEM Manual Asm	43.00	1	1.00	91.41	GER	\$1.09	99.66%	\$0.05

## Coolant Hot Bottle Installation

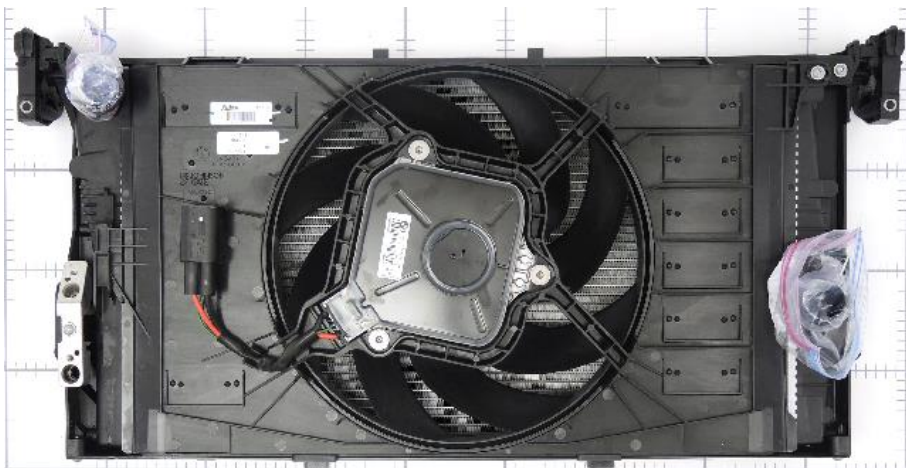
Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
M6x16mm-Pan Head Torx Bolt	1	Commodity Item	Purchased	0.0059	-	\$0.02	\$0.00



# Cooling Pack Asm



**MUNRO**  
& ASSOCIATES, INC.



\...

\Zone 6 Cooling Pack & HVAC

\Cooling Pack

\Cooling Pack Asm

## Assembly Summary

<b>Parts</b>	<b>237</b>
<b>Fasteners</b>	<b>14</b>
<b>Part Numbers</b>	<b>51</b>
<b>Steps</b>	<b>1,542</b>
<b>Fastenings</b>	<b>55</b>
<b>Right First Time</b>	<b>87.60 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>67.53</b>
<b>Total Weight (kg)</b>	<b>9.54</b>
<b>Material Cost**</b>	<b>\$74.21</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$29.75</b>
<b>Q Burden</b>	<b>\$1.99</b>
<b>SG&amp;A</b>	<b>\$9.42</b>
<b>Manufacturing Cost*</b>	<b>\$115.37</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Cooling Pack Asm



**MUNRO**  
& ASSOCIATES, INC.

## Cooling Pack Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Radiator Module Asm, Cooling Pack Asm	1	95	4	599	4	96.37 %	0.00	0.00	3.13	22.02	3.0380
Radiator Upper Cover Asm, Cooling Pack Asm	1	4	3	11	3	99.88 %	0.00	0.00	0.57	0.22	0.1975
Assemble Radiator Upper Cover	1	1	2	7	2	99.67 %	0.00	0.00	0.65	0.00	0.0039
Condenser Module Asm, Cooling Pack Asm	1	115	22	834	22	93.96 %	0.00	0.00	7.08	25.66	2.6799
Assemble Condenser Module Asm to Cooling Pack	1	2	3	10	3	99.55 %	0.00	0.00	0.63	0.00	0.0078
Cooling Fan Asm, Cooling Pack Asm	1	12	12	36	12	98.48 %	0.00	0.00	2.21	0.49	3.4651
Assemble Cooling Fan	1	0	1	4	1	99.94 %	0.00	0.00	0.27	0.00	0.0000
Cooling Pack Upper Isolator Asm	2	4	2	13	2	99.73 %	0.00	0.00	0.38	1.66	0.0714
Assemble Cooling Pack Upper Isolator to Pack	1	0	4	9	4	99.74 %	0.00	0.00	0.53	0.00	0.0000

## Cooling Pack Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Radiator Module Asm, Cooling Pack Asm	\$0.00	\$18.47	\$0.00	\$0.00	\$2.48	\$7.13	\$0.55	\$3.37	\$32.00
Radiator Upper Cover Asm, Cooling Pack Asm	\$0.30	\$0.83	\$0.00	\$0.00	\$0.25	\$0.18	\$0.02	\$0.16	\$1.74
Assemble Radiator Upper Cover	\$0.02	\$0.00	\$0.00	\$0.00	\$0.52	\$0.00	\$0.05	\$0.06	\$0.65
Condenser Module Asm, Cooling Pack Asm	\$8.08	\$14.28	\$0.00	\$0.00	\$6.59	\$8.69	\$0.93	\$3.79	\$42.37
Assemble Condenser Module Asm to Cooling Pack	\$0.04	\$0.00	\$0.00	\$0.00	\$0.50	\$0.00	\$0.07	\$0.06	\$0.67
Cooling Fan Asm, Cooling Pack Asm	\$25.46	\$6.11	\$0.00	\$0.00	\$0.92	\$0.56	\$0.23	\$1.67	\$34.95
Assemble Cooling Fan	\$0.00	\$0.00	\$0.00	\$0.00	\$0.21	\$0.00	\$0.01	\$0.03	\$0.25
Cooling Pack Upper Isolator Asm	\$0.00	\$0.31	\$0.00	\$0.00	\$0.16	\$0.49	\$0.04	\$0.11	\$1.11
Assemble Cooling Pack Upper Isolator to Pack	\$0.00	\$0.00	\$0.00	\$0.00	\$0.42	\$0.00	\$0.04	\$0.05	\$0.51

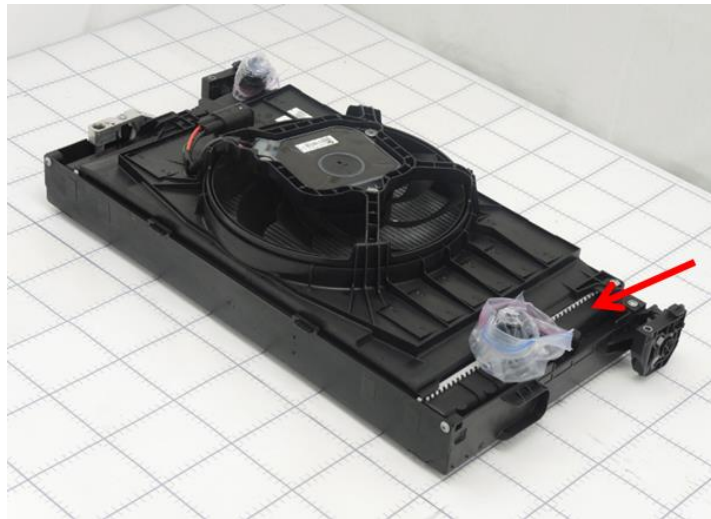
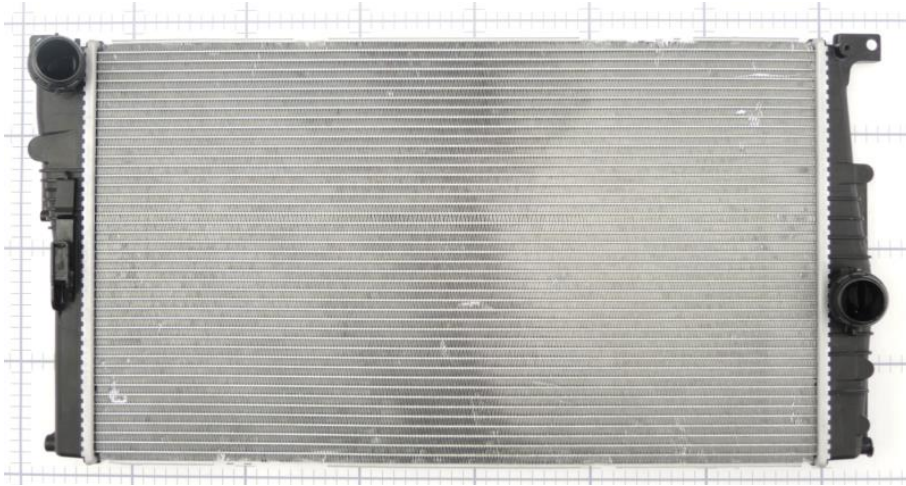
## Detailed Summary

<b>Parts</b>	<b>237</b>
<b>Fasteners</b>	<b>14</b>
<b>Part Numbers</b>	<b>51</b>
<b>Steps</b>	<b>1,542</b>
<b>Fastenings</b>	<b>55</b>
<b>Right First Time</b>	<b>87.6%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>15.84</b>
<b>Supplier Fab. Time (Min)</b>	<b>51.70</b>
<b>Total Weight (kg)</b>	<b>9.54</b>
<b>Purchased Part Cost</b>	
	<b>\$33.90</b>
<b>Material Cost</b>	
	<b>\$40.31</b>
<b>OEM Asm. Cost</b>	
	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	
	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	
	<b>\$12.21</b>
<b>Supplier Fab. Cost</b>	
	<b>\$17.54</b>
<b>Q Burden</b>	
	<b>\$1.99</b>
<b>SG&amp;A</b>	
	<b>\$9.42</b>
<b>Manufacturing Cost*</b>	
	<b>\$115.37</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Radiator Module Asm, Cooling Pack Asm



\...  
 \Cooling Pack  
 \Cooling Pack Asm  
 \Radiator Module Asm, Cooling Pack Asm  
**Assembly Summary**

<b>Parts</b>	<b>95</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>7</b>
<b>Steps</b>	<b>599</b>
<b>Fastenings</b>	<b>4</b>
<b>Right First Time</b>	<b>96.37 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>25.14</b>
<b>Total Weight (kg)</b>	<b>3.04</b>

<b>Material Cost**</b>	<b>\$18.47</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$9.61</b>
<b>Q Burden</b>	<b>\$0.55</b>
<b>SG&amp;A</b>	<b>\$3.37</b>
<b>Manufacturing Cost*</b>	<b>\$32.00</b>

\* Excluding tooling, ER&D, logistics, and profit margin  
 \*\* Includes material cost and purchased parts cost

# Radiator Module Asm, Cooling Pack Asm



**MUNRO**  
& ASSOCIATES, INC.

## Radiator Module Asm, Cooling Pack Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
DS Inlet Tube, Radiator Module Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.32	0.2407
PS Outlet Tube, Radiator Module Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.32	0.2311
Seal, Radiator Module Asm	2	1	0	1	0	99.99 %	0.00	0.00	0.00	0.08	0.0081
Radiator Core Asm, Radiator Module Asm	1	91	1	579	1	96.45 %	0.00	0.00	2.78	21.22	2.5489
Assemble Radiator Module	1	0	3	11	3	99.96 %	0.00	0.00	0.35	0.00	0.0000

## Radiator Module Asm, Cooling Pack Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
DS Inlet Tube, Radiator Module Asm	\$0.00	\$1.02	\$0.00	\$0.00	\$0.00	\$0.14	\$0.00	\$0.14	\$1.30
PS Outlet Tube, Radiator Module Asm	\$0.00	\$0.98	\$0.00	\$0.00	\$0.00	\$0.14	\$0.00	\$0.13	\$1.26
Seal, Radiator Module Asm	\$0.00	\$0.04	\$0.00	\$0.00	\$0.00	\$0.04	\$0.00	\$0.01	\$0.09
Radiator Core Asm, Radiator Module Asm	\$0.00	\$16.39	\$0.00	\$0.00	\$2.34	\$6.76	\$0.54	\$3.06	\$29.10
Assemble Radiator Module	\$0.00	\$0.00	\$0.00	\$0.00	\$0.13	\$0.00	\$0.01	\$0.02	\$0.16

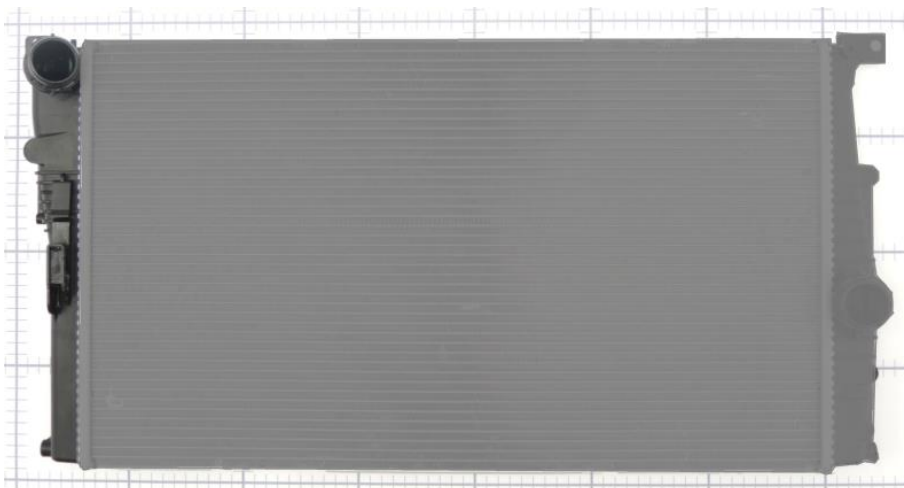
## Detailed Summary

<b>Parts</b>	<b>95</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>7</b>
<b>Steps</b>	<b>599</b>
<b>Fastenings</b>	<b>4</b>
<b>Right First Time</b>	<b>96.37%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>3.13</b>
<b>Supplier Fab. Time (Min)</b>	<b>22.02</b>
<b>Total Weight (kg)</b>	<b>3.04</b>
<b>Purchased Part Cost</b>	<b>\$0.00</b>
<b>Material Cost</b>	<b>\$18.47</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$2.48</b>
<b>Supplier Fab. Cost</b>	<b>\$7.13</b>
<b>Q Burden</b>	<b>\$0.55</b>
<b>SG&amp;A</b>	<b>\$3.37</b>
<b>Manufacturing Cost*</b>	<b>\$32.00</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# DS Inlet Tube, Radiator Module Asm



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\Radiator Module Asm, Cooling Pack Asm

\DS Inlet Tube, Radiator Module Asm

\DS Inlet Tube Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	19.18
Total Weight (kg)	0.24

Material Cost**	\$1.02
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.14
Q Burden	\$0.00
SG&A	\$0.14
Manufacturing Cost*	\$1.30

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# DS Inlet Tube, Radiator Module Asm



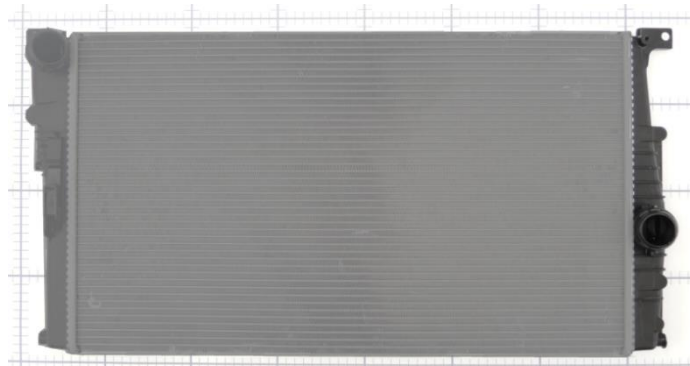
## DS Inlet Tube Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
300 Ton Injection Molding Press	38.36	2	0.25	26.59	POL	\$0.14	99.99%	\$0.00

## DS Inlet Tube Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material_DS Inlet Tube	1	PA66 GF30	\$3.95	0.2407	0.2590	\$0.00	\$1.02





\...

- \Radiator Module Asm, Cooling Pack Asm
- \PS Outlet Tube, Radiator Module Asm
- \PS Outlet Tube Process

## Process Summary

<b>Right First Time</b>	<b>99.99 %</b>
<b>Process Time (Sec)</b>	<b>19.13</b>
<b>Total Weight (kg)</b>	<b>0.23</b>

<b>Material Cost**</b>	<b>\$0.98</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.14</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.13</b>
<b>Manufacturing Cost*</b>	<b>\$1.26</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# PS Outlet Tube, Radiator Module Asm

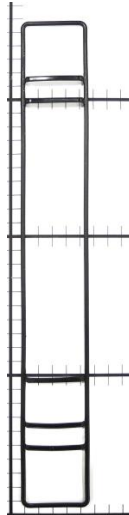


## PS Outlet Tube Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
300 Ton Injection Molding Press	38.26	2	0.25	26.59	POL	\$0.14	99.99%	\$0.00

## PS Outlet Tube Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material,PS Outlet Tube	1	PA66 GF30	\$3.95	0.2311	0.2480	\$0.00	\$0.98



\...

\Radiator Module Asm, Cooling Pack Asm

\Seal, Radiator Module Asm

\Seal Process

## Process Summary

<b>Right First Time</b>	<b>99.99 %</b>
<b>Process Time (Sec)</b>	<b>4.89</b>
<b>Total Weight (kg)</b>	<b>0.01</b>

<b>Material Cost**</b>	<b>\$0.04</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.04</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.01</b>
<b>Manufacturing Cost*</b>	<b>\$0.09</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Seal, Radiator Module Asm

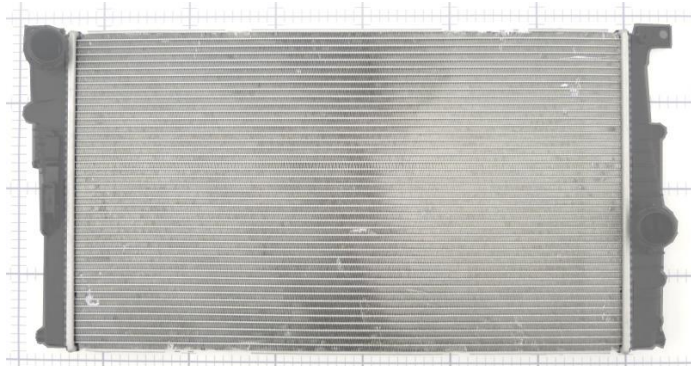
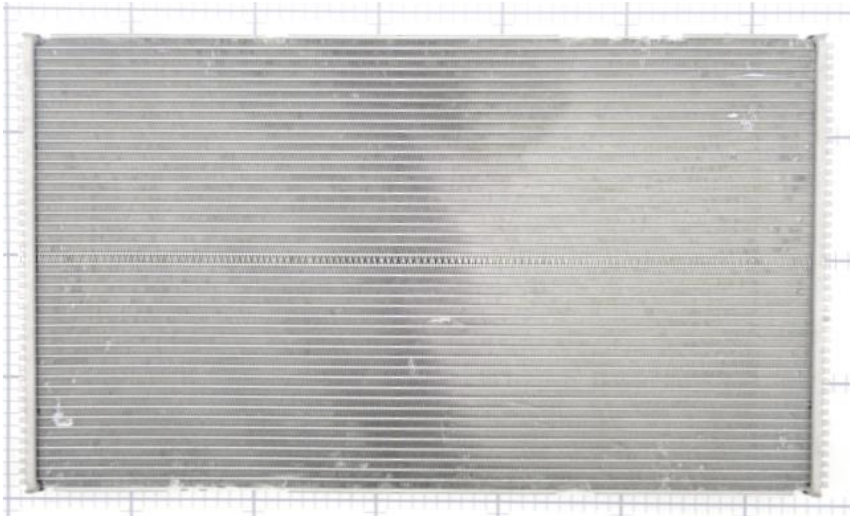


## Seal Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Extrude: 45mm, 1 Layer & Auto	4.89	1	0.50	31.13	POL	\$0.04	99.99%	\$0.00

## Seal Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Seal	1	EPDM (Extrusion Grade)	\$4.43	0.0081	0.0081	\$0.00	\$0.04



\...

- \Cooling Pack Asm
- \Radiator Module Asm, Cooling Pack Asm
- \Radiator Core Asm, Radiator Module Asm

### Assembly Summary

<b>Parts</b>	<b>91</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>4</b>
<b>Steps</b>	<b>579</b>
<b>Fastenings</b>	<b>1</b>
<b>Right First Time</b>	<b>96.45 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>23.99</b>
<b>Total Weight (kg)</b>	<b>2.55</b>

<b>Material Cost**</b>	<b>\$16.39</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$9.11</b>
<b>Q Burden</b>	<b>\$0.54</b>
<b>SG&amp;A</b>	<b>\$3.06</b>
<b>Manufacturing Cost*</b>	<b>\$29.10</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Radiator Core Asm,Radiator Module Asm



**MUNRO**  
& ASSOCIATES, INC.

## Radiator Core Asm,Radiator Module Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
End Cap,Radiator Module Asm	2	1	0	7	0	99.97 %	0.00	0.00	0.00	0.33	0.0951
Side Plate,Radiator Module Asm	2	1	0	7	0	99.97 %	0.00	0.00	0.00	0.33	0.0791
Radiator Cooling Fin,Radiator Module Asm	44	1	0	4	0	99.97 %	0.00	0.00	0.00	0.41	0.0290
Radiator Cooling Tube, Radiator Module Asm	43	1	0	4	0	99.97 %	0.00	0.00	0.00	0.04	0.0215
Assemble Radiator Core	1	0	1	112	1	99.57 %	0.00	0.00	2.78	0.23	0.0000

## Radiator Core Asm,Radiator Module Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
End Cap,Radiator Module Asm	\$0.00	\$0.82	\$0.00	\$0.00	\$0.00	\$0.14	\$0.01	\$0.11	\$1.08
Side Plate,Radiator Module Asm	\$0.00	\$0.38	\$0.00	\$0.00	\$0.00	\$0.13	\$0.01	\$0.06	\$0.58
Radiator Cooling Fin,Radiator Module Asm	\$0.00	\$0.23	\$0.00	\$0.00	\$0.00	\$0.12	\$0.01	\$0.04	\$0.40
Radiator Cooling Tube, Radiator Module Asm	\$0.00	\$0.09	\$0.00	\$0.00	\$0.00	\$0.01	\$0.01	\$0.01	\$0.12
Assemble Radiator Core	\$0.00	\$0.00	\$0.00	\$0.00	\$2.34	\$0.42	\$0.06	\$0.33	\$3.15

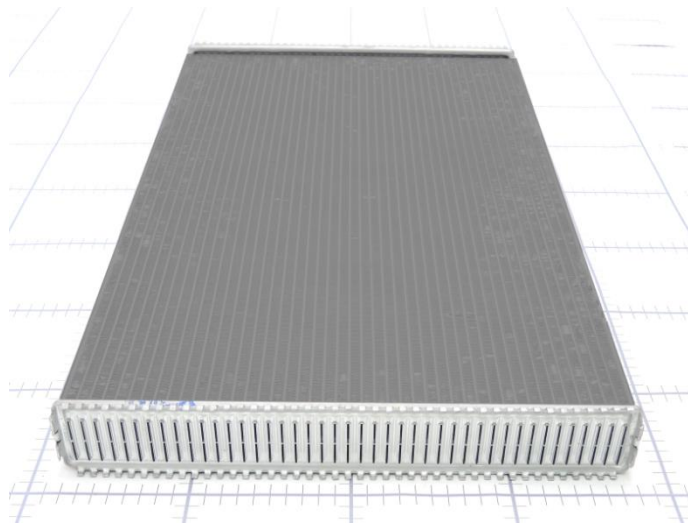
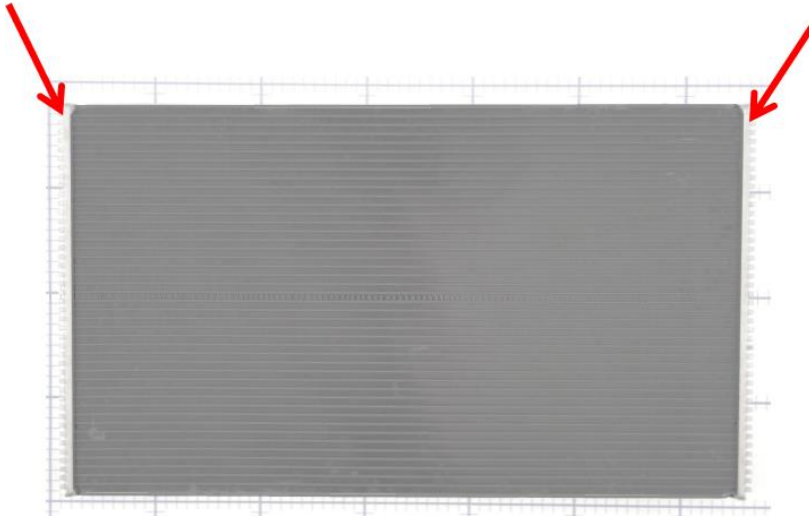
## Detailed Summary

<b>Parts</b>	<b>91</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>4</b>
<b>Steps</b>	<b>579</b>
<b>Fastenings</b>	<b>1</b>
<b>Right First Time</b>	<b>96.45%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>2.78</b>
<b>Supplier Fab. Time (Min)</b>	<b>21.22</b>
<b>Total Weight (kg)</b>	<b>2.55</b>
<b>Purchased Part Cost</b>	<b>\$0.00</b>
<b>Material Cost</b>	<b>\$16.39</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$2.34</b>
<b>Supplier Fab. Cost</b>	<b>\$6.76</b>
<b>Q Burden</b>	<b>\$0.54</b>
<b>SG&amp;A</b>	<b>\$3.06</b>
<b>Manufacturing Cost*</b>	<b>\$29.10</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# End Cap,Radiator Module Asm



\...  
\Radiator Core Asm,Radiator Module Asm  
\End Cap,Radiator Module Asm  
\End Cap Process

## Process Summary

Right First Time	99.97 %
Process Time (Sec)	19.82
Total Weight (kg)	0.10

Material Cost**	\$0.82
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.14
Q Burden	\$0.01
SG&A	\$0.11
Manufacturing Cost*	\$1.08

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# End Cap,Radiator Module Asm

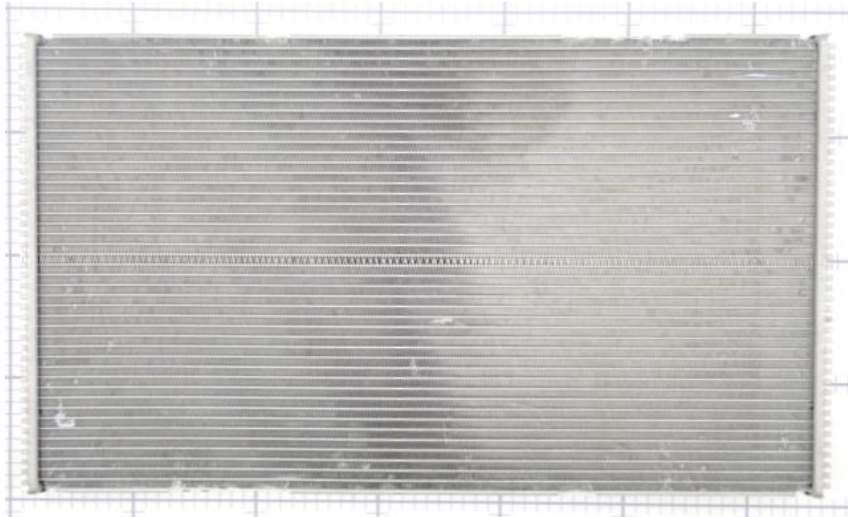
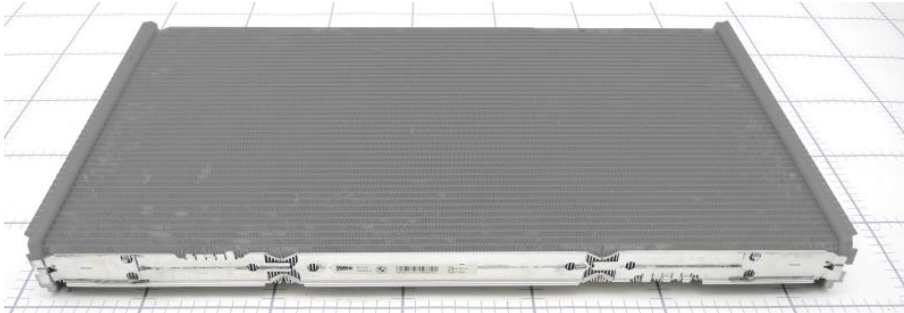
## End Cap Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	9.00	1	0.25	21.02	POL	\$0.05	99.99%	\$0.00
Deburr	9.00	1	0.25	25.70	POL	\$0.06	99.99%	\$0.00
300 Ton Stamping Press	1.82	1	0.25	40.35	POL	\$0.02	99.99%	\$0.00

## End Cap Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material,End Cap	1	Aluminum 3003-O - Coil Stock	\$4.08	0.0951	0.2010	\$0.00	\$0.82

# Side Plate,Radiator Module Asm



\...  
\Radiator Core Asm,Radiator Module Asm  
\Side Plate,Radiator Module Asm  
\Side Plate Process

## Process Summary

<b>Right First Time</b>	<b>99.97 %</b>
<b>Process Time (Sec)</b>	<b>19.71</b>
<b>Total Weight (kg)</b>	<b>0.08</b>

<b>Material Cost**</b>	<b>\$0.38</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.13</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.06</b>
<b>Manufacturing Cost*</b>	<b>\$0.58</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Side Plate,Radiator Module Asm

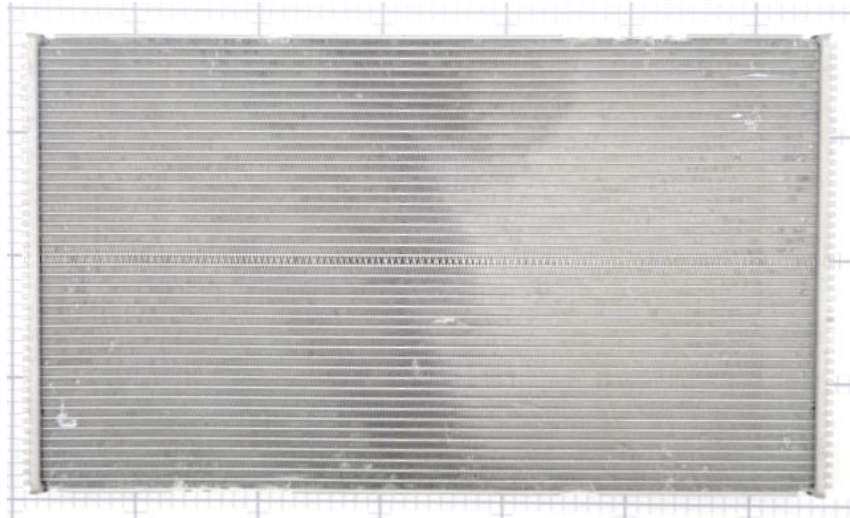
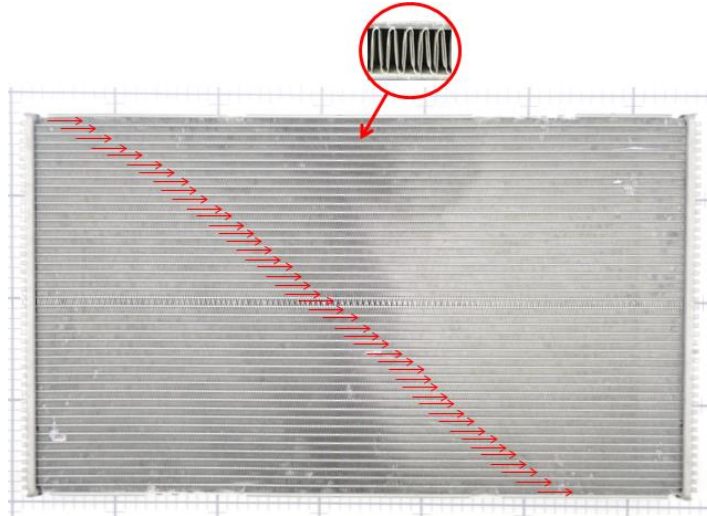


## Side Plate Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	9.00	1	0.25	21.02	POL	\$0.05	99.99%	\$0.00
Deburr	9.00	1	0.25	25.70	POL	\$0.06	99.99%	\$0.00
200 Ton Stamping Press	1.71	1	0.25	30.81	POL	\$0.01	99.99%	\$0.00

## Side Plate Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material,Side Plate	1	Aluminum 3003-O - Coil Stock	\$4.08	0.0791	0.0940	\$0.00	\$0.38



- \...
- \Radiator Core Asm,Radiator Module Asm
- \Radiator Cooling Fin,Radiator Module Asm
- \Radiator Cooling Fin Process

## Process Summary

<b>Right First Time</b>	<b>99.97 %</b>
<b>Process Time (Sec)</b>	<b>24.56</b>
<b>Total Weight (kg)</b>	<b>0.03</b>
<b>Material Cost**</b>	<b>\$0.23</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.12</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.04</b>
<b>Manufacturing Cost*</b>	<b>\$0.40</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Radiator Cooling Fin,Radiator Module Asm



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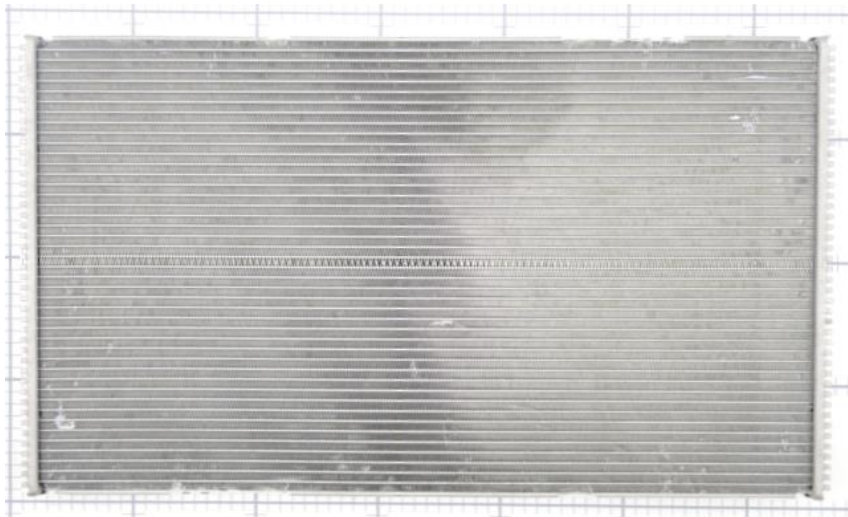
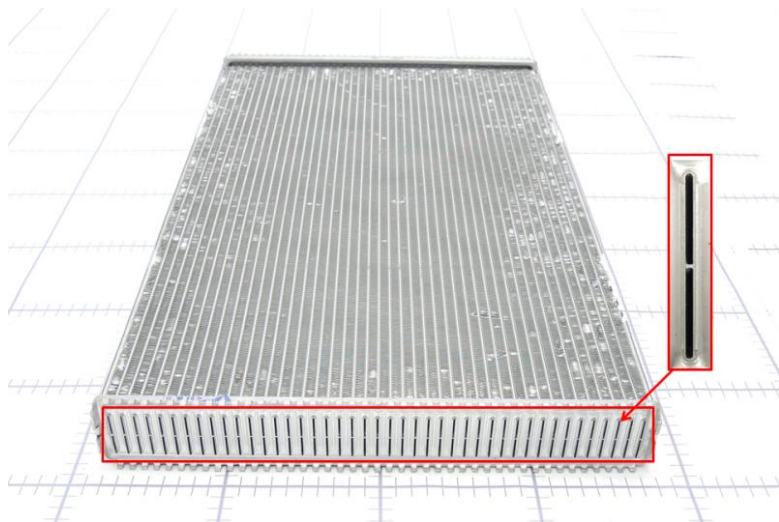
## Radiator Cooling Fin Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Roll Form Fins	24.56	1	0.25	17.81	POL	\$0.12	99.97%	\$0.01

## Radiator Cooling Fin Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material,Radiator Cooling Fin	1	Aluminum 3003 - Fin Stock	\$8.00	0.0290	0.0290	\$0.00	\$0.23

# Radiator Cooling Tube, Radiator Module Asm



\...

- \Radiator Core Asm,Radiator Module Asm
- \Radiator Cooling Tube, Radiator Module Asm
- \Radiator Cooling Tube Process

## Process Summary

<b>Right First Time</b>	<b>99.97 %</b>
<b>Process Time (Sec)</b>	<b>2.31</b>
<b>Total Weight (kg)</b>	<b>0.02</b>

<b>Material Cost**</b>	<b>\$0.09</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.01</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.01</b>
<b>Manufacturing Cost*</b>	<b>\$0.12</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Radiator Cooling Tube, Radiator Module Asm



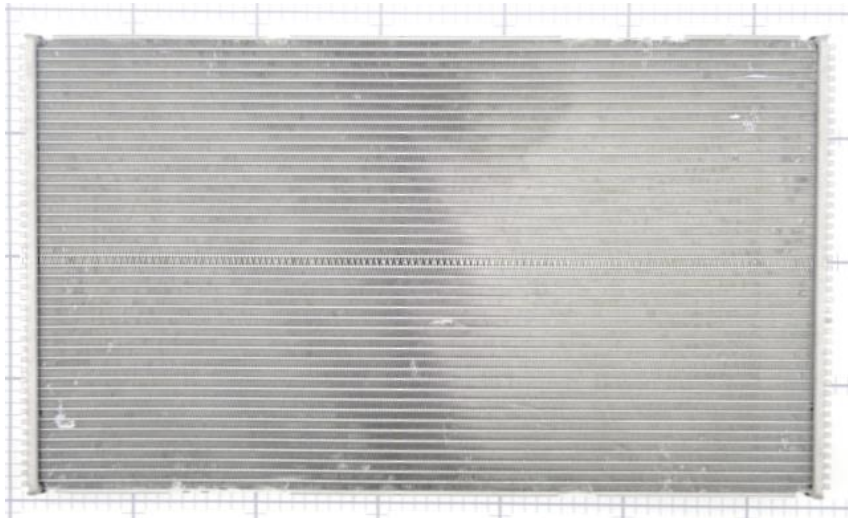
## Radiator Cooling Tube Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Saw Cut	2.31	1	0.25	16.83	POL	\$0.01	99.97%	\$0.01

## Radiator Cooling Tube Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material,Radiator Cooling Tube	1	Aluminum 3003-O - Coil Stock	\$4.08	0.0215	0.0230	\$0.00	\$0.09

No Commodity Items  
Required for This  
Process



\...  
\Radiator Module Asm, Cooling Pack Asm  
\Radiator Core Asm,Radiator Module Asm  
\Assemble Radiator Core

## Process Summary

<b>Right First Time</b>	<b>99.57 %</b>
<b>Process Time (Sec)</b>	<b>180.55</b>
<b>Total Weight (kg)</b>	<b>0.00</b>
<b>Material Cost**</b>	<b>\$0.00</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$2.76</b>
<b>Q Burden</b>	<b>\$0.06</b>
<b>SG&amp;A</b>	<b>\$0.33</b>
<b>Manufacturing Cost*</b>	<b>\$3.15</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



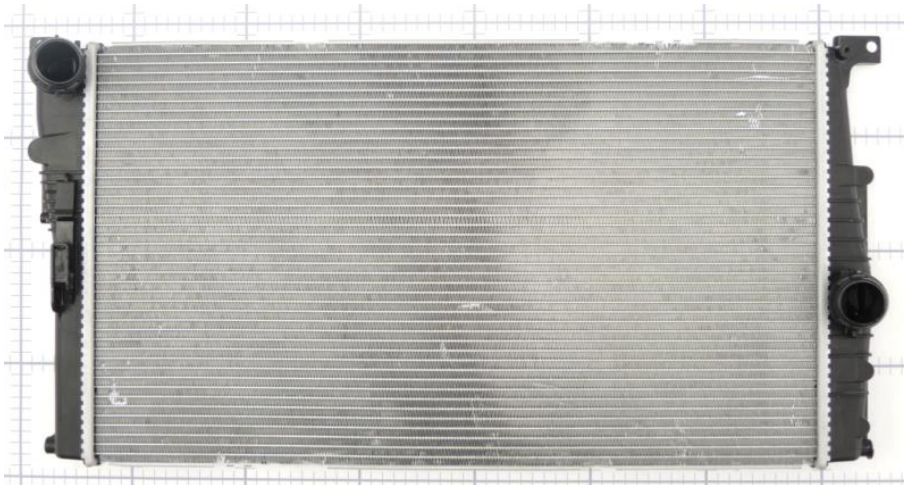
# Assemble Radiator Core



Assemble Radiator Core										
Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden		
Wash	14.00	1	0.25	106.88	POL	\$0.42	99.99 %	\$0.00		
Braze, Oven	18.89	1	0.25	189.73	POL	\$1.00	99.97 %	\$0.00		
Drying	12.89	1	0.25	83.75	POL	\$0.30	99.98 %	\$0.00		
Flux Application	12.89	1	0.25	34.32	POL	\$0.12	99.98 %	\$0.00		
Degrease	12.89	1	0.25	64.79	POL	\$0.23	99.98 %	\$0.00		
Supplier Automated Asm	109.00	1	0.25	22.88	POL	\$0.69	99.69 %	\$0.05		

Assemble Radiator Core								
Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost	

## No Commodity Items Required for This Process



\...

- \Cooling Pack Asm
- \Radiator Module Asm, Cooling Pack Asm
- \Assemble Radiator Module

### Process Summary

<b>Right First Time</b>	<b>99.96 %</b>
<b>Process Time (Sec)</b>	<b>21.00</b>
<b>Total Weight (kg)</b>	<b>0.00</b>
<b>Material Cost**</b>	<b>\$0.00</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.13</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.02</b>
<b>Manufacturing Cost*</b>	<b>\$0.16</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Radiator Module



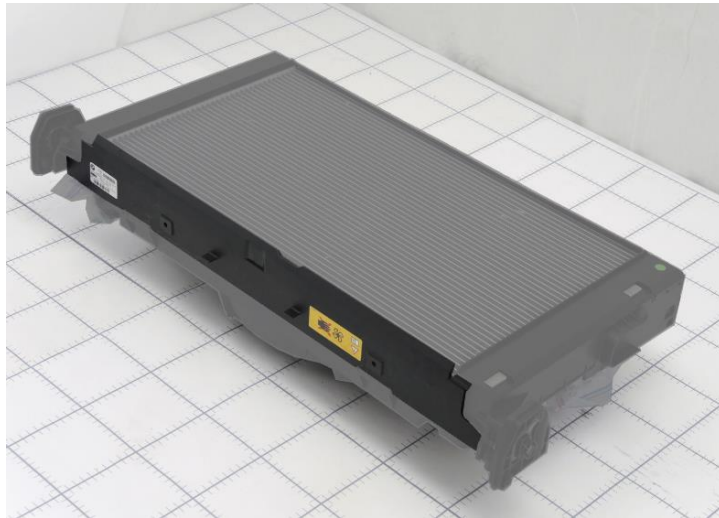
## Assemble Radiator Module

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Automated Asm	21.00	1	0.25	22.88	POL	\$0.13	99.96%	\$0.01

## Assemble Radiator Module

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Radiator Upper Cover Asm, Cooling Pack Asm



\...  
 \Cooling Pack  
 \Cooling Pack Asm  
 \Radiator Upper Cover Asm, Cooling Pack Asm  
**Assembly Summary**

<b>Parts</b>	<b>4</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>4</b>
<b>Steps</b>	<b>11</b>
<b>Fastenings</b>	<b>3</b>
<b>Right First Time</b>	<b>99.88 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>0.79</b>
<b>Total Weight (kg)</b>	<b>0.20</b>

<b>Material Cost**</b>	<b>\$1.13</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.43</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.16</b>
<b>Manufacturing Cost*</b>	<b>\$1.74</b>

\* Excluding tooling, ER&D, logistics, and profit margin  
 \*\* Includes material cost and purchased parts cost

# Radiator Upper Cover Asm, Cooling Pack Asm



## Radiator Upper Cover Asm, Cooling Pack Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Radiator Upper Cover, Cooling Pack Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.22	0.1972
Assemble Labels on to the radiator Upper Cover	1	3	3	9	3	99.89 %	0.00	0.00	0.57	0.00	0.0003

## Radiator Upper Cover Asm, Cooling Pack Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Radiator Upper Cover, Cooling Pack Asm	\$0.00	\$0.83	\$0.00	\$0.00	\$0.00	\$0.18	\$0.00	\$0.12	\$1.13
Assemble Labels on to the radiator Upper Cover	\$0.30	\$0.00	\$0.00	\$0.00	\$0.25	\$0.00	\$0.02	\$0.04	\$0.61

# Radiator Upper Cover Asm, Cooling Pack Asm

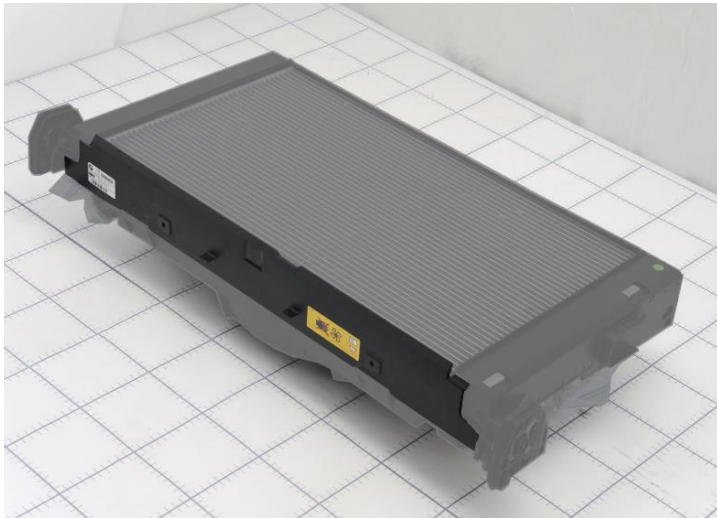
## Detailed Summary

<b>Parts</b>	<b>4</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>4</b>
<b>Steps</b>	<b>11</b>
<b>Fastenings</b>	<b>3</b>
<b>Right First Time</b>	<b>99.88%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.57</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.22</b>
<b>Total Weight (kg)</b>	<b>0.20</b>
<b>Purchased Part Cost</b>	<b>\$0.30</b>
<b>Material Cost</b>	<b>\$0.83</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.25</b>
<b>Supplier Fab. Cost</b>	<b>\$0.18</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.16</b>
<b>Manufacturing Cost*</b>	<b>\$1.74</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Radiator Upper Cover, Cooling Pack Asm



\...

- \Radiator Upper Cover Asm, Cooling Pack Asm
- \Radiator Upper Cover, Cooling Pack Asm
- \Radiator Upper Cover Process

## Process Summary

<b>Right First Time</b>	<b>99.99 %</b>
<b>Process Time (Sec)</b>	<b>13.07</b>
<b>Total Weight (kg)</b>	<b>0.20</b>

<b>Material Cost**</b>	<b>\$0.83</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.18</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.12</b>
<b>Manufacturing Cost*</b>	<b>\$1.13</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Radiator Upper Cover, Cooling Pack Asm



**MUNRO**  
& ASSOCIATES, INC.

## Radiator Upper Cover Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
610 Ton Injection Molding Press	26.14	2	0.25	48.51	POL	\$0.18	99.99%	\$0.00

## Radiator Upper Cover Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Radiator Upper Cover	1	PA66 GF30	\$3.95	0.1972	0.2110	\$0.00	\$0.83



# Assemble Labels on to the radiator Upper Cover



- \...
- \Cooling Pack Asm
- \Radiator Upper Cover Asm, Cooling Pack Asm
- \Assemble Labels on to the radiator Upper Cover

## Process Summary

Right First Time	99.89 %
Process Time (Sec)	34.23
Total Weight (kg)	0.00
Material Cost**	\$0.30
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.25
Q Burden	\$0.02
SG&A	\$0.04
Manufacturing Cost*	\$0.61



\* Excluding tooling, ER&D, logistics, and profit margin  
 \*\* Includes material cost and purchased parts cost

# Assemble Labels on to the radiator Upper Cover



## Assemble Labels on to the radiator Upper Cover

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	34.23	1	1.00	26.36	POL	\$0.25	99.89%	\$0.02

## Assemble Labels on to the radiator Upper Cover

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Label, Valeo Supplier Long QR Code, Radiator Upper	1	Commodity Item	Purchased	0.0001	-	\$0.10	\$0.00
Label, Valeo Supplier Short QR Code, Radiator Upper	1	Commodity Item	Purchased	0.0001	-	\$0.10	\$0.00
Label, Valeo Supplier Warning Label, Radiator Upper	1	Commodity Item	Purchased	0.0001	-	\$0.10	\$0.00

# Assemble Radiator Upper Cover

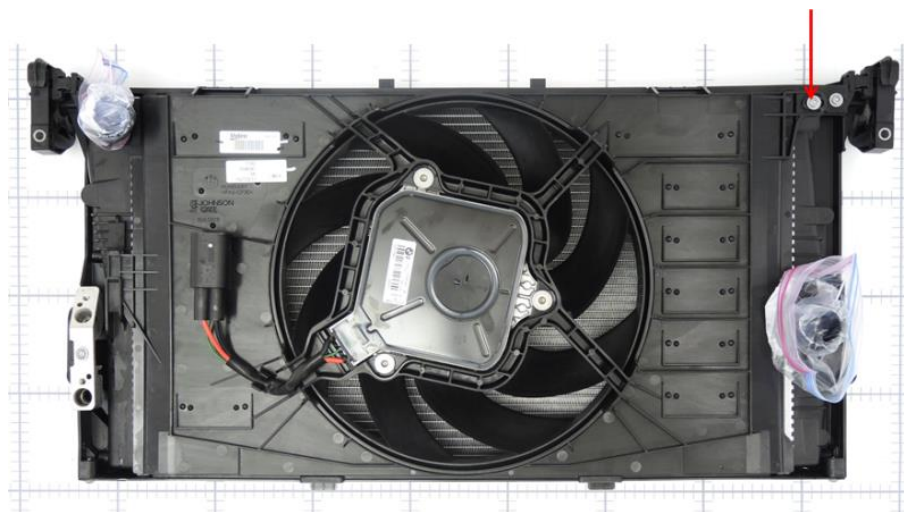


- \...
- \Cooling Pack
- \Cooling Pack Asm
- \Assemble Radiator Upper Cover

## Process Summary

Right First Time	99.67 %
Process Time (Sec)	39.00
Total Weight (kg)	0.00

Material Cost**	\$0.02
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.52
Q Burden	\$0.05
SG&A	\$0.06
Manufacturing Cost*	\$0.65



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Radiator Upper Cover

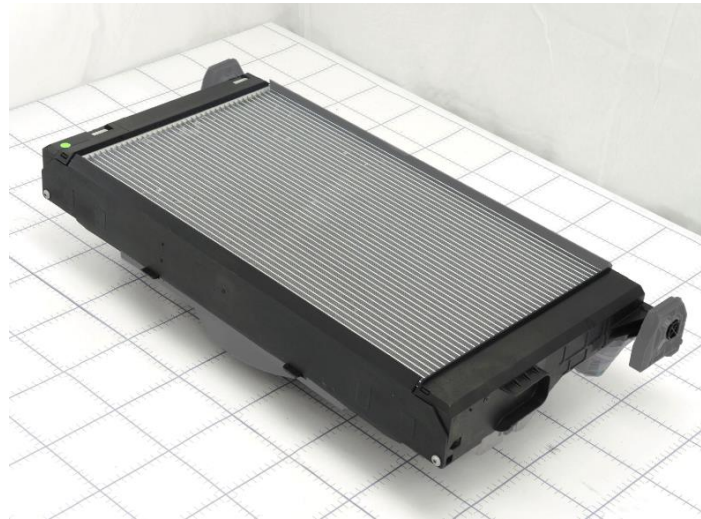
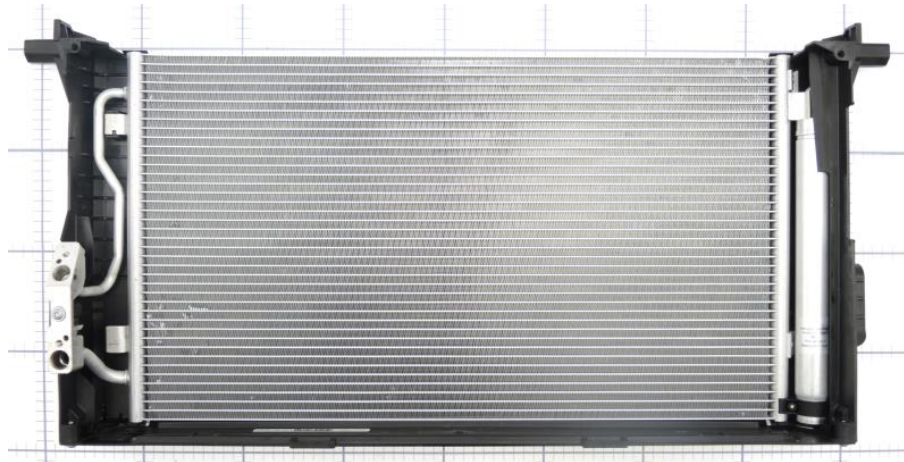


## Assemble Radiator Upper Cover

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	39.00	1	1.00	47.68	ITA	\$0.52	99.67%	\$0.05

## Assemble Radiator Upper Cover

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
M6x19mm-Flanged Torx Screw	1	Commodity Item	Purchased	0.0039	-	\$0.02	\$0.00



\...  
 \Cooling Pack  
 \Cooling Pack Asm  
 \Condenser Module Asm, Cooling Pack Asm  
**Assembly Summary**

<b>Parts</b>	<b>115</b>
<b>Fasteners</b>	<b>4</b>
<b>Part Numbers</b>	<b>28</b>
<b>Steps</b>	<b>834</b>
<b>Fastenings</b>	<b>22</b>
<b>Right First Time</b>	<b>93.96 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>32.74</b>
<b>Total Weight (kg)</b>	<b>2.68</b>

<b>Material Cost**</b>	<b>\$22.36</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$15.29</b>
<b>Q Burden</b>	<b>\$0.93</b>
<b>SG&amp;A</b>	<b>\$3.79</b>
<b>Manufacturing Cost*</b>	<b>\$42.37</b>

\* Excluding tooling, ER&D, logistics, and profit margin  
 \*\* Includes material cost and purchased parts cost

# Condenser Module Asm, Cooling Pack Asm



**MUNRO**  
& ASSOCIATES, INC.

## Condenser Module Asm, Cooling Pack Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Condenser Asm, Condenser Module Asm	1	107	14	799	14	94.69 %	0.00	0.00	5.42	24.95	1.9793
DS Cover Asm, Condenser Module Asm	1	2	1	6	1	99.94 %	0.00	0.00	0.26	0.26	0.2546
PS Cover Asm, Condenser Module Asm	1	2	1	6	1	99.94 %	0.00	0.00	0.26	0.26	0.2372
Lower Cover, Condenser Module Asm	1	2	1	6	1	99.94 %	0.00	0.00	0.26	0.19	0.2003
Assemble Condenser Module	1	2	5	13	5	99.42 %	0.00	0.00	0.87	0.00	0.0078

## Condenser Module Asm, Cooling Pack Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Condenser Asm, Condenser Module Asm	\$7.74	\$11.34	\$0.00	\$0.00	\$5.87	\$8.31	\$0.82	\$3.29	\$37.37
DS Cover Asm, Condenser Module Asm	\$0.10	\$1.08	\$0.00	\$0.00	\$0.12	\$0.11	\$0.01	\$0.16	\$1.58
PS Cover Asm, Condenser Module Asm	\$0.10	\$1.01	\$0.00	\$0.00	\$0.12	\$0.11	\$0.01	\$0.15	\$1.50
Lower Cover, Condenser Module Asm	\$0.10	\$0.85	\$0.00	\$0.00	\$0.12	\$0.16	\$0.01	\$0.14	\$1.37
Assemble Condenser Module	\$0.04	\$0.00	\$0.00	\$0.00	\$0.38	\$0.00	\$0.09	\$0.05	\$0.56

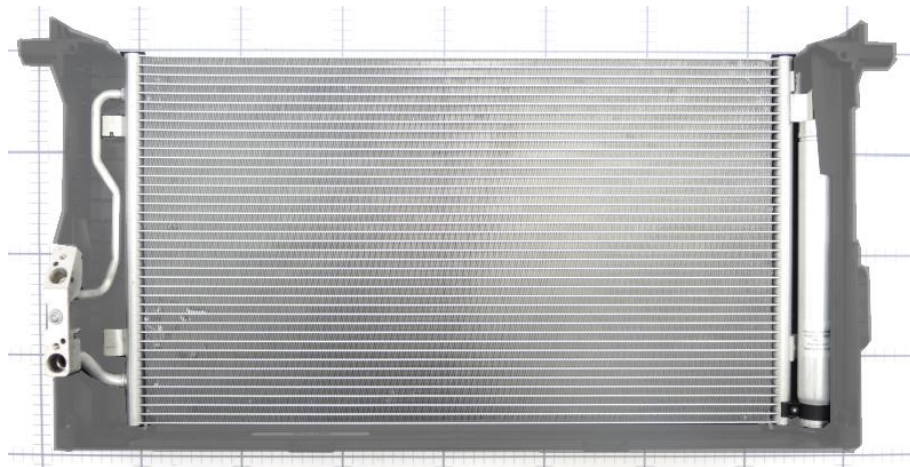
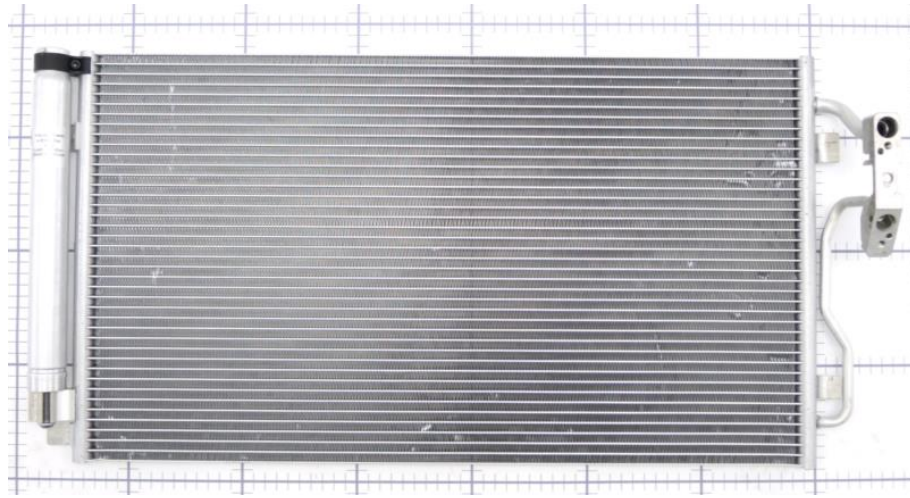
## Detailed Summary

<b>Parts</b>	<b>115</b>
<b>Fasteners</b>	<b>4</b>
<b>Part Numbers</b>	<b>28</b>
<b>Steps</b>	<b>834</b>
<b>Fastenings</b>	<b>22</b>
<b>Right First Time</b>	<b>93.96%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>7.08</b>
<b>Supplier Fab. Time (Min)</b>	<b>25.66</b>
<b>Total Weight (kg)</b>	<b>2.68</b>
<b>Purchased Part Cost</b>	
	<b>\$8.08</b>
<b>Material Cost</b>	
	<b>\$14.28</b>
<b>OEM Asm. Cost</b>	
	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	
	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	
	<b>\$6.59</b>
<b>Supplier Fab. Cost</b>	
	<b>\$8.69</b>
<b>Q Burden</b>	
	<b>\$0.93</b>
<b>SG&amp;A</b>	
	<b>\$3.79</b>
<b>Manufacturing Cost*</b>	
	<b>\$42.37</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Condenser Asm, Condenser Module Asm



\...

- \Cooling Pack Asm
- \Condenser Module Asm, Cooling Pack Asm
- \Condenser Asm, Condenser Module Asm

## Assembly Summary

<b>Parts</b>	<b>107</b>
<b>Fasteners</b>	<b>2</b>
<b>Part Numbers</b>	<b>21</b>
<b>Steps</b>	<b>799</b>
<b>Fastenings</b>	<b>14</b>
<b>Right First Time</b>	<b>94.69 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>30.38</b>
<b>Total Weight (kg)</b>	<b>1.98</b>

<b>Material Cost**</b>	<b>\$19.08</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$14.18</b>
<b>Q Burden</b>	<b>\$0.82</b>
<b>SG&amp;A</b>	<b>\$3.29</b>
<b>Manufacturing Cost*</b>	<b>\$37.37</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Condenser Asm, Condenser Module Asm



**MUNRO**  
& ASSOCIATES, INC.

## Condenser Asm, Condenser Module Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
DS End Cap Asm, Condenser Asm	1	9	4	144	4	99.05 %	0.00	0.00	0.58	3.33	0.2283
PS End Cap Asm, Condenser Asm	1	13	6	129	6	99.28 %	0.00	0.00	0.97	2.01	0.1435
Condenser Cooling Fin,Condenser Asm	40	1	0	4	0	99.97 %	0.00	0.00	0.00	0.44	0.0136
Condenser Multi-Channel Cooling Tube,Condenser Asm	39	1	0	4	0	99.97 %	0.00	0.00	0.00	0.04	0.0203
Condenser Side Cooling Tube, Condenser Asm	2	1	0	4	0	99.97 %	0.00	0.00	0.00	0.04	0.0171
Assemble Condenser	1	0	0	106	0	99.61 %	0.00	0.00	3.19	0.23	0.0000
Plastic Bracket, Condenser Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.06	0.0065
Assemble Drier Unit	1	3	4	11	4	99.46 %	0.00	0.00	0.68	0.00	0.2311

## Condenser Asm, Condenser Module Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
DS End Cap Asm, Condenser Asm	\$0.00	\$1.44	\$0.00	\$0.00	\$1.47	\$1.51	\$0.14	\$0.53	\$5.08
PS End Cap Asm, Condenser Asm	\$0.12	\$1.00	\$0.00	\$0.00	\$1.55	\$0.66	\$0.11	\$0.39	\$3.84
Condenser Cooling Fin,Condenser Asm	\$0.00	\$0.11	\$0.00	\$0.00	\$0.00	\$0.13	\$0.01	\$0.03	\$0.28
Condenser Multi-Channel Cooling Tube,Condenser Asm	\$0.00	\$0.11	\$0.00	\$0.00	\$0.00	\$0.01	\$0.01	\$0.01	\$0.14
Condenser Side Cooling Tube, Condenser Asm	\$0.00	\$0.09	\$0.00	\$0.00	\$0.00	\$0.01	\$0.01	\$0.01	\$0.12
Assemble Condenser	\$0.00	\$0.00	\$0.00	\$0.00	\$2.55	\$0.42	\$0.06	\$0.36	\$3.38
Plastic Bracket, Condenser Asm	\$0.00	\$0.03	\$0.00	\$0.00	\$0.00	\$0.01	\$0.00	\$0.01	\$0.05
Assemble Drier Unit	\$7.62	\$0.00	\$0.00	\$0.00	\$0.30	\$0.00	\$0.08	\$0.26	\$8.27

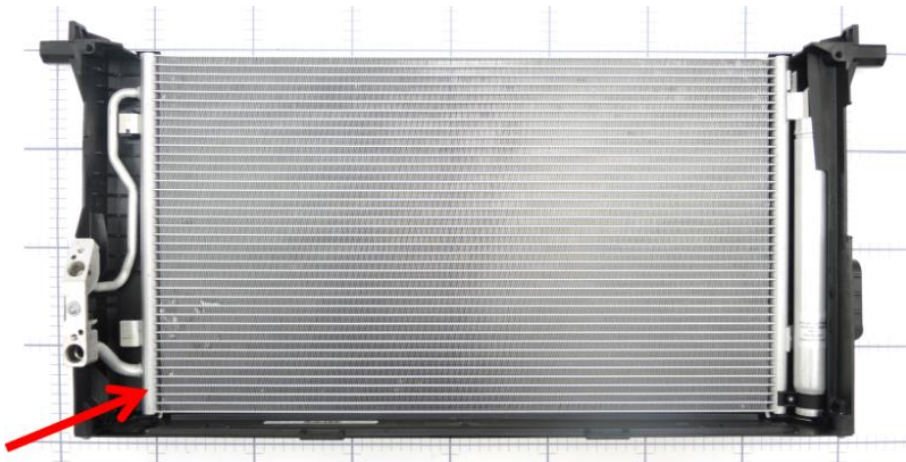
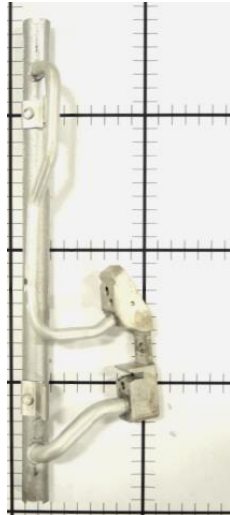
## Detailed Summary

<b>Parts</b>	<b>107</b>
<b>Fasteners</b>	<b>2</b>
<b>Part Numbers</b>	<b>21</b>
<b>Steps</b>	<b>799</b>
<b>Fastenings</b>	<b>14</b>
<b>Right First Time</b>	<b>94.69%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>5.42</b>
<b>Supplier Fab. Time (Min)</b>	<b>24.95</b>
<b>Total Weight (kg)</b>	<b>1.98</b>
<b>Purchased Part Cost</b>	
	<b>\$7.74</b>
<b>Material Cost</b>	
	<b>\$11.34</b>
<b>OEM Asm. Cost</b>	
	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	
	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	
	<b>\$5.87</b>
<b>Supplier Fab. Cost</b>	
	<b>\$8.31</b>
<b>Q Burden</b>	
	<b>\$0.82</b>
<b>SG&amp;A</b>	
	<b>\$3.29</b>
<b>Manufacturing Cost*</b>	
	<b>\$37.37</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# DS End Cap Asm, Condenser Asm



- \...
- \Condenser Module Asm, Cooling Pack Asm
- \Condenser Asm, Condenser Module Asm
- \DS End Cap Asm, Condenser Asm

## Assembly Summary

<b>Parts</b>	<b>9</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>8</b>
<b>Steps</b>	<b>144</b>
<b>Fastenings</b>	<b>4</b>
<b>Right First Time</b>	<b>99.05 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>3.91</b>
<b>Total Weight (kg)</b>	<b>0.23</b>

<b>Material Cost**</b>	<b>\$1.44</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$2.97</b>
<b>Q Burden</b>	<b>\$0.14</b>
<b>SG&amp;A</b>	<b>\$0.53</b>
<b>Manufacturing Cost*</b>	<b>\$5.08</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# DS End Cap Asm, Condenser Asm



**MUNRO**  
& ASSOCIATES, INC.

## DS End Cap Asm, Condenser Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Half U-Tube1,DS End Cap Asm	1	1	0	7	0	99.97 %	0.00	0.00	0.00	0.33	0.0329
Half U-Tube2,DS End Cap Asm	1	1	0	7	0	99.96 %	0.00	0.00	0.00	0.33	0.0520
Small U-Tube Cap,DS End Cap Asm	2	1	0	7	0	99.97 %	0.00	0.00	0.00	0.11	0.0013
Upper Bracket,DS End Cap Asm	1	1	0	7	0	99.97 %	0.00	0.00	0.00	0.16	0.0074
Lower Bracket,DS End Cap Asm	1	1	0	7	0	99.97 %	0.00	0.00	0.00	0.16	0.0100
Connecting Tube Asm, DS End Cap Asm	1	3	2	82	2	99.33 %	0.00	0.00	0.11	2.13	0.1234
Assemble DS End Cap	1	0	2	13	2	99.92 %	0.00	0.00	0.47	0.00	0.0000

## DS End Cap Asm, Condenser Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Half U-Tube1,DS End Cap Asm	\$0.00	\$0.35	\$0.00	\$0.00	\$0.00	\$0.13	\$0.01	\$0.06	\$0.54
Half U-Tube2,DS End Cap Asm	\$0.00	\$0.35	\$0.00	\$0.00	\$0.00	\$0.14	\$0.01	\$0.06	\$0.55
Small U-Tube Cap,DS End Cap Asm	\$0.00	\$0.01	\$0.00	\$0.00	\$0.00	\$0.02	\$0.00	\$0.00	\$0.04
Upper Bracket,DS End Cap Asm	\$0.00	\$0.05	\$0.00	\$0.00	\$0.00	\$0.02	\$0.00	\$0.01	\$0.09
Lower Bracket,DS End Cap Asm	\$0.00	\$0.05	\$0.00	\$0.00	\$0.00	\$0.02	\$0.00	\$0.01	\$0.09
Connecting Tube Asm, DS End Cap Asm	\$0.00	\$0.62	\$0.00	\$0.00	\$0.36	\$1.16	\$0.10	\$0.26	\$2.49
Assemble DS End Cap	\$0.00	\$0.00	\$0.00	\$0.00	\$1.11	\$0.00	\$0.01	\$0.13	\$1.25

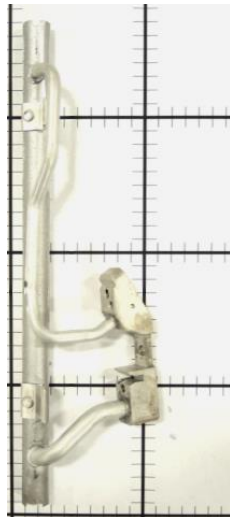
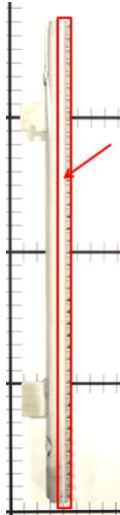
## Detailed Summary

<b>Parts</b>	<b>9</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>8</b>
<b>Steps</b>	<b>144</b>
<b>Fastenings</b>	<b>4</b>
<b>Right First Time</b>	<b>99.05%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.58</b>
<b>Supplier Fab. Time (Min)</b>	<b>3.33</b>
<b>Total Weight (kg)</b>	<b>0.23</b>
<b>Purchased Part Cost</b>	
	<b>\$0.00</b>
<b>Material Cost</b>	<b>\$1.44</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$1.47</b>
<b>Supplier Fab. Cost</b>	<b>\$1.51</b>
<b>Q Burden</b>	<b>\$0.14</b>
<b>SG&amp;A</b>	<b>\$0.53</b>
<b>Manufacturing Cost*</b>	<b>\$5.08</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Half U-Tube1,DS End Cap Asm



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\DS End Cap Asm, Condenser Asm

\Half U-Tube1,DS End Cap Asm

\Half U-Tube1 Process

## Process Summary

Right First Time	99.97 %
Process Time (Sec)	19.82
Total Weight (kg)	0.03

Material Cost**	\$0.35
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.13
Q Burden	\$0.01
SG&A	\$0.06
Manufacturing Cost*	\$0.54

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Half U-Tube1,DS End Cap Asm

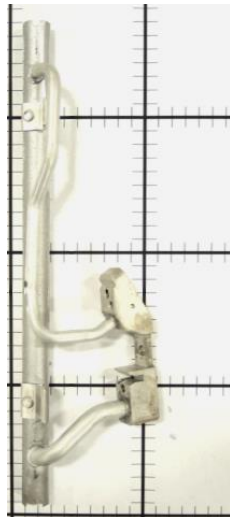
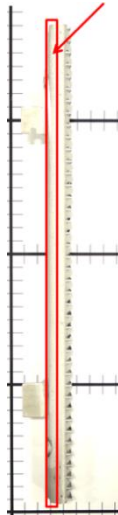
## Half U-Tube1 Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	9.00	1	0.25	21.02	POL	\$0.05	99.99%	\$0.00
Deburr	9.00	1	0.25	22.18	POL	\$0.06	99.99%	\$0.00
300 Ton Stamping Press	1.82	1	0.25	40.35	POL	\$0.02	99.99%	\$0.00

## Half U-Tube1 Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material,Half U-Tube1	1	Aluminum 3003-O - Coil Stock	\$4.08	0.0329	0.0860	\$0.00	\$0.35

# Half U-Tube2,DS End Cap Asm



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\DS End Cap Asm, Condenser Asm

\Half U-Tube2,DS End Cap Asm

\Half U-Tube2 Process

## Process Summary

<b>Right First Time</b>	<b>99.96 %</b>
<b>Process Time (Sec)</b>	<b>19.82</b>
<b>Total Weight (kg)</b>	<b>0.05</b>

<b>Material Cost**</b>	<b>\$0.35</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.14</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.06</b>
<b>Manufacturing Cost*</b>	<b>\$0.55</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Half U-Tube2,DS End Cap Asm



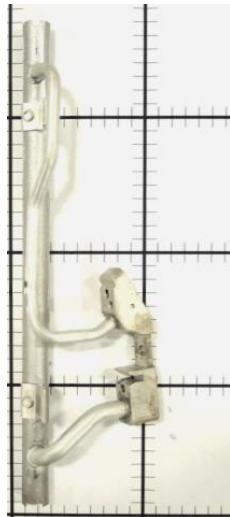
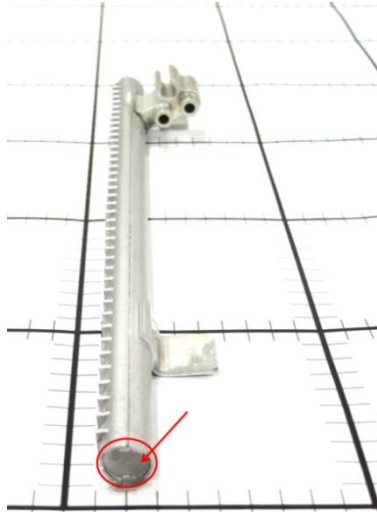
## Half U-Tube2 Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	9.00	1	0.25	21.02	POL	\$0.05	99.99%	\$0.00
Deburr	9.00	1	0.25	25.70	POL	\$0.06	99.99%	\$0.00
300 Ton Stamping Press	1.82	1	0.25	40.35	POL	\$0.02	99.99%	\$0.00

## Half U-Tube2 Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material,Half U-Tube2	1	Aluminum 3003-O - Coil Stock	\$4.08	0.0520	0.0860	\$0.00	\$0.35

# Small U-Tube Cap,DS End Cap Asm



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- \DS End Cap Asm, Condenser Asm
- \Small U-Tube Cap,DS End Cap Asm
- \Small U-Tube Cap Process

## Process Summary

<b>Right First Time</b>	<b>99.97 %</b>
<b>Process Time (Sec)</b>	<b>6.60</b>
<b>Total Weight (kg)</b>	<b>0.00</b>

<b>Material Cost**</b>	<b>\$0.01</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.02</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.00</b>
<b>Manufacturing Cost*</b>	<b>\$0.04</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Small U-Tube Cap,DS End Cap Asm



## Small U-Tube Cap Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	3.50	1	0.25	11.90	POL	\$0.01	99.99%	\$0.00
Deburr	2.50	1	0.25	5.14	POL	\$0.00	99.99%	\$0.00
25 Ton Stamping Press	0.60	1	0.25	14.18	POL	\$0.00	99.99%	\$0.00

## Small U-Tube Cap Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material,Small U-Tube Cap	1	Aluminum 3003-O - Coil Stock	\$4.08	0.0013	0.0030	\$0.00	\$0.01

# Upper Bracket,DS End Cap Asm



\...

- \DS End Cap Asm, Condenser Asm
- \Upper Bracket,DS End Cap Asm
- \Upper Bracket Process

## Process Summary

Right First Time	99.97 %
Process Time (Sec)	9.60
Total Weight (kg)	0.01

Material Cost**	\$0.05
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.02
Q Burden	\$0.00
SG&A	\$0.01
Manufacturing Cost*	\$0.09

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Upper Bracket,DS End Cap Asm



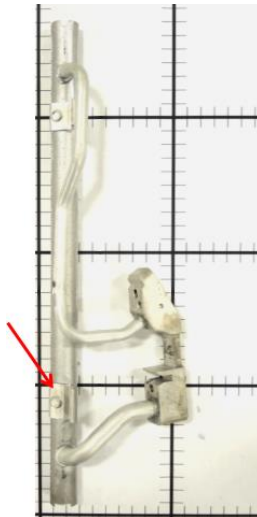
## Upper Bracket Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.90	POL	\$0.02	99.99%	\$0.00
Deburr	4.00	1	0.25	5.14	POL	\$0.01	99.99%	\$0.00
25 Ton Stamping Press	0.60	1	0.25	14.18	POL	\$0.00	99.99%	\$0.00

## Upper Bracket Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material,Upper Bracket	1	Aluminum 3003-O - Coil Stock	\$4.08	0.0074	0.0110	\$0.00	\$0.05

# Lower Bracket, DS End Cap Asm



\...

- \DS End Cap Asm, Condenser Asm
- \Lower Bracket, DS End Cap Asm
- \Lower Bracket Process

## Process Summary

<b>Right First Time</b>	<b>99.97 %</b>
<b>Process Time (Sec)</b>	<b>9.60</b>
<b>Total Weight (kg)</b>	<b>0.01</b>

<b>Material Cost**</b>	<b>\$0.05</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.02</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.01</b>
<b>Manufacturing Cost*</b>	<b>\$0.09</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Lower Bracket, DS End Cap Asm



## Lower Bracket Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.90	POL	\$0.02	99.99%	\$0.00
Deburr	4.00	1	0.25	5.14	POL	\$0.01	99.99%	\$0.00
25 Ton Stamping Press	0.60	1	0.25	14.18	POL	\$0.00	99.99%	\$0.00

## Lower Bracket Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Lower Bracket	1	Aluminum 3003-O - Coil Stock	\$4.08	0.0100	0.0130	\$0.00	\$0.05

# Connecting Tube Asm, DS End Cap Asm



- \...
- \Condenser Asm, Condenser Module Asm
- \DS End Cap Asm, Condenser Asm
- \Connecting Tube Asm, DS End Cap Asm

## Assembly Summary

<b>Parts</b>	<b>3</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>82</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.33 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>2.24</b>
<b>Total Weight (kg)</b>	<b>0.12</b>

<b>Material Cost**</b>	<b>\$0.62</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$1.51</b>
<b>Q Burden</b>	<b>\$0.10</b>
<b>SG&amp;A</b>	<b>\$0.26</b>
<b>Manufacturing Cost*</b>	<b>\$2.49</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Connecting Tube Asm, DS End Cap Asm



**MUNRO**  
& ASSOCIATES, INC.

## Connecting Tube Asm, DS End Cap Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Block, Connecting Tube Asm	1	1	0	44	0	99.87 %	0.00	0.00	0.00	1.33	0.0871
Air Inlet Tube, Connecting Tube Asm	1	1	0	16	0	99.63 %	0.00	0.00	0.00	0.46	0.0281
Condensate Outlet Tube, Connecting Tube Asm	1	1	0	12	0	99.87 %	0.00	0.00	0.00	0.33	0.0082
Assemble Connecting Tube	1	0	2	7	2	99.97 %	0.00	0.00	0.11	0.00	0.0000

## Connecting Tube Asm, DS End Cap Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Block, Connecting Tube Asm	\$0.00	\$0.34	\$0.00	\$0.00	\$0.00	\$0.72	\$0.02	\$0.13	\$1.21
Air Inlet Tube, Connecting Tube Asm	\$0.00	\$0.19	\$0.00	\$0.00	\$0.00	\$0.24	\$0.06	\$0.05	\$0.54
Condensate Outlet Tube, Connecting Tube Asm	\$0.00	\$0.09	\$0.00	\$0.00	\$0.00	\$0.20	\$0.02	\$0.03	\$0.34
Assemble Connecting Tube	\$0.00	\$0.00	\$0.00	\$0.00	\$0.36	\$0.00	\$0.01	\$0.04	\$0.41

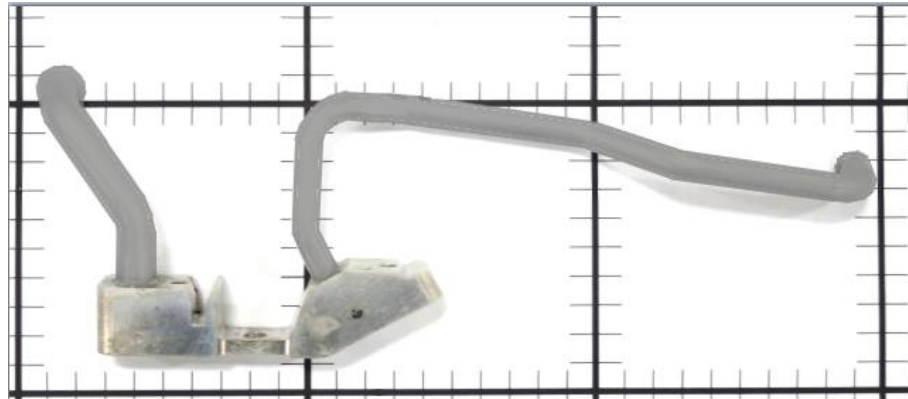
## Detailed Summary

<b>Parts</b>	<b>3</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>82</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.33%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.11</b>
<b>Supplier Fab. Time (Min)</b>	<b>2.13</b>
<b>Total Weight (kg)</b>	<b>0.12</b>
<b>Purchased Part Cost</b>	<b>\$0.00</b>
<b>Material Cost</b>	<b>\$0.62</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.36</b>
<b>Supplier Fab. Cost</b>	<b>\$1.16</b>
<b>Q Burden</b>	<b>\$0.10</b>
<b>SG&amp;A</b>	<b>\$0.26</b>
<b>Manufacturing Cost*</b>	<b>\$2.49</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Block, Connecting Tube Asm



\...  
\Connecting Tube Asm, DS End Cap Asm  
\Block, Connecting Tube Asm  
\Block Process

## Process Summary

Right First Time	99.87 %
Process Time (Sec)	80.03
Total Weight (kg)	0.09

Material Cost**	\$0.34
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.72
Q Burden	\$0.02
SG&A	\$0.13
Manufacturing Cost*	\$1.21

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Block, Connecting Tube Asm



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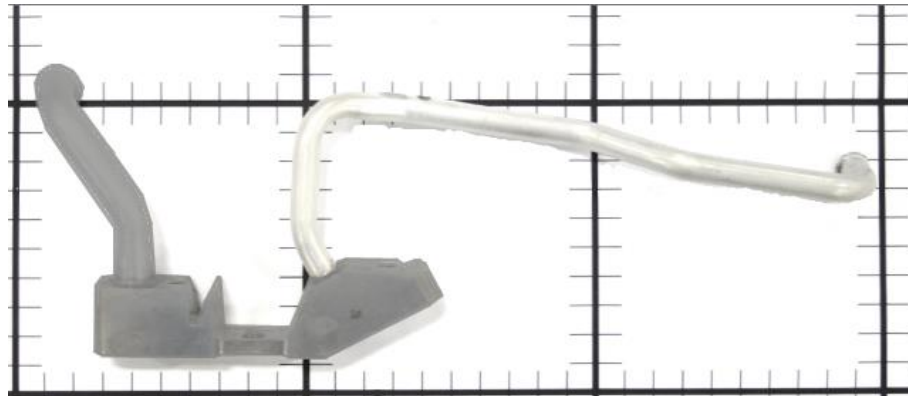
## Block Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.90	POL	\$0.02	99.99 %	\$0.00
Deburr	4.00	1	0.25	5.14	POL	\$0.01	99.99 %	\$0.00
CNC Machine	64.49	1	0.25	36.14	POL	\$0.65	99.94 %	\$0.01
Cut Off	4.26	1	0.25	16.83	POL	\$0.02	99.98 %	\$0.00
Heat Treat	2.15	1	0.25	21.59	POL	\$0.01	99.99 %	\$0.00
2200 Ton Extrusion Press	0.12	1	4.00	512.84	POL	\$0.02	99.99 %	\$0.00

## Block Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material,Block	1	Aluminum 6061 - Billet Stock	\$2.80	0.0871	0.1228	\$0.00	\$0.34

# Air Inlet Tube, Connecting Tube Asm



\...

- \Connecting Tube Asm, DS End Cap Asm
- \Air Inlet Tube, Connecting Tube Asm
- \Air Inlet Tube Process

## Process Summary

Right First Time	99.63 %
Process Time (Sec)	27.86
Total Weight (kg)	0.03

Material Cost**	\$0.19
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.24
Q Burden	\$0.06
SG&A	\$0.05
Manufacturing Cost*	\$0.54

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Air Inlet Tube, Connecting Tube Asm



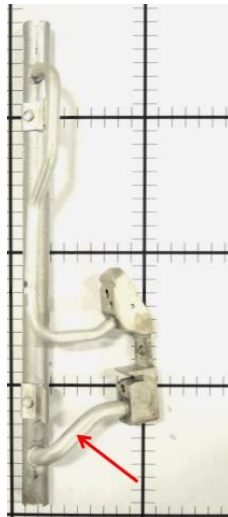
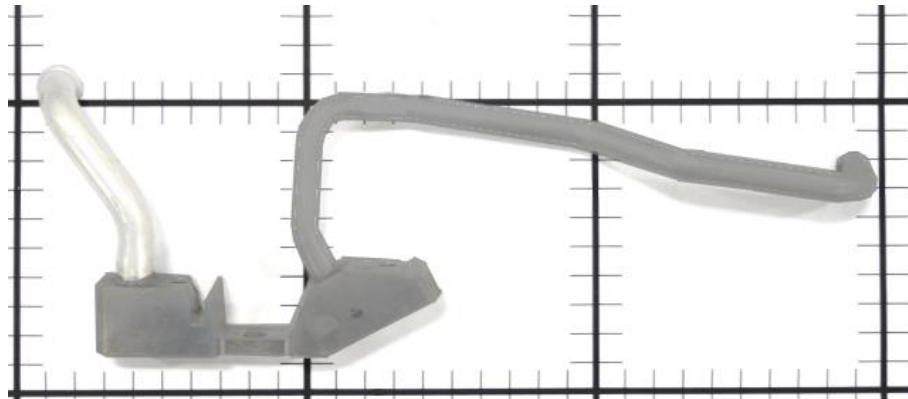
## Air Inlet Tube Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	21.02	POL	\$0.03	99.99 %	\$0.00
Tube Bending	20.00	1	0.25	33.82	POL	\$0.19	99.67 %	\$0.05
Cut Off	2.79	1	0.25	16.83	POL	\$0.01	99.98 %	\$0.00
2200 Ton Extrusion Press	0.07	1	4.00	512.84	POL	\$0.01	99.99 %	\$0.00

## Air Inlet Tube Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material,Air Inlet Tube	1	Aluminum 6061 - Billet Stock	\$2.80	0.0281	0.0695	\$0.00	\$0.19

# Condensate Outlet Tube, Connecting Tube Asm



\...

- \Connecting Tube Asm, DS End Cap Asm
- \Condensate Outlet Tube, Connecting Tube Asm
- \Condensate Outlet Tube Process

## Process Summary

Right First Time	99.87 %
Process Time (Sec)	19.86
Total Weight (kg)	0.01

Material Cost**	\$0.09
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.20
Q Burden	\$0.02
SG&A	\$0.03
Manufacturing Cost*	\$0.34

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Condensate Outlet Tube, Connecting Tube Asm



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## Condensate Outlet Tube Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	21.02	POL	\$0.03	99.99 %	\$0.00
Tube Bending	12.00	1	0.25	43.16	POL	\$0.14	99.91 %	\$0.01
Cut Off	2.79	1	0.25	16.83	POL	\$0.01	99.98 %	\$0.00
2200 Ton Extrusion Press	0.07	1	4.00	512.84	POL	\$0.01	99.99 %	\$0.00

## Condensate Outlet Tube Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Condensate Outlet Tube	1	Aluminum 6061 - Billet Stock	\$2.80	0.0082	0.0321	\$0.00	\$0.09



## No Commodity Items Required for This Process



\...

- \DS End Cap Asm, Condenser Asm
- \Connecting Tube Asm, DS End Cap Asm
- \Assemble Connecting Tube

### Process Summary

<b>Right First Time</b>	<b>99.97 %</b>
<b>Process Time (Sec)</b>	<b>6.79</b>
<b>Total Weight (kg)</b>	<b>0.00</b>
<b>Material Cost**</b>	<b>\$0.00</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.36</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.04</b>
<b>Manufacturing Cost*</b>	<b>\$0.41</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Connecting Tube



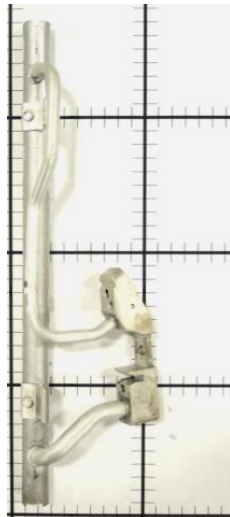
## Assemble Connecting Tube

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Braze, Oven	6.79	1	0.25	189.73	POL	\$0.36	99.97%	\$0.01

## Assemble Connecting Tube

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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## No Commodity Items Required for This Process



\...

\Condenser Asm, Condenser Module Asm  
\DS End Cap Asm, Condenser Asm  
\Assemble DS End Cap

### Process Summary

<b>Right First Time</b>	<b>99.92 %</b>
<b>Process Time (Sec)</b>	<b>28.05</b>
<b>Total Weight (kg)</b>	<b>0.00</b>

<b>Material Cost**</b>	<b>\$0.00</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$1.11</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.13</b>
<b>Manufacturing Cost*</b>	<b>\$1.25</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble DS End Cap



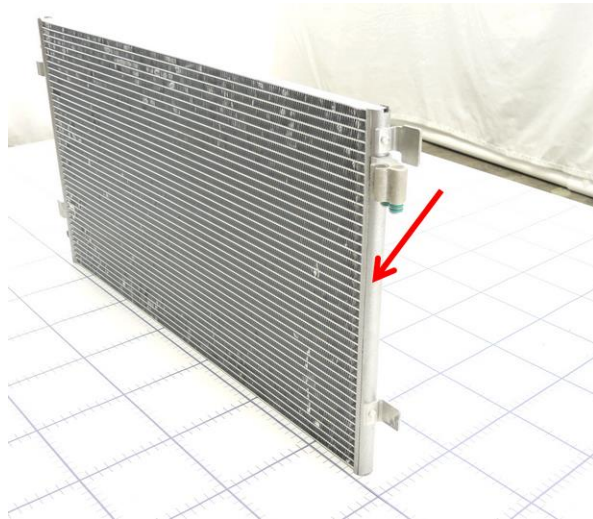
## Assemble DS End Cap

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Braze, Oven	20.05	1	0.25	189.73	POL	\$1.06	99.97%	\$0.01
Supplier Automated Asm	8.00	1	0.25	22.88	POL	\$0.05	99.95%	\$0.01

## Assemble DS End Cap

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# PS End Cap Asm, Condenser Asm



- \...
- \Condenser Module Asm, Cooling Pack Asm
- \Condenser Asm, Condenser Module Asm
- \PS End Cap Asm, Condenser Asm

## Assembly Summary

<b>Parts</b>	<b>13</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>8</b>
<b>Steps</b>	<b>129</b>
<b>Fastenings</b>	<b>6</b>
<b>Right First Time</b>	<b>99.28 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>2.97</b>
<b>Total Weight (kg)</b>	<b>0.14</b>

<b>Material Cost**</b>	<b>\$1.12</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$2.22</b>
<b>Q Burden</b>	<b>\$0.11</b>
<b>SG&amp;A</b>	<b>\$0.39</b>
<b>Manufacturing Cost*</b>	<b>\$3.84</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# PS End Cap Asm, Condenser Asm



**MUNRO**  
& ASSOCIATES, INC.

## PS End Cap Asm, Condenser Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Half U-Tube1,PS End Cap Asm	1	1	0	7	0	99.97 %	0.00	0.00	0.00	0.33	0.0329
Half U-Tube2,PS End Cap Asm	1	1	0	7	0	99.96 %	0.00	0.00	0.00	0.33	0.0410
Small U-Tube Cap,PS End Cap Asm	2	1	0	7	0	99.97 %	0.00	0.00	0.00	0.11	0.0013
Upper Bracket,PS End Cap Asm	1	1	0	7	0	99.97 %	0.00	0.00	0.00	0.16	0.0094
Lower Bracket,PS End Cap Asm	1	1	0	7	0	99.97 %	0.00	0.00	0.00	0.16	0.0094
Drier Unit Connector Asm, Right End Cap Asm	1	3	0	57	0	99.67 %	0.00	0.00	0.08	0.81	0.0478
Assemble Right End Cap	1	4	6	23	6	99.80 %	0.00	0.00	0.89	0.00	0.0004

## PS End Cap Asm, Condenser Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Half U-Tube1,PS End Cap Asm	\$0.00	\$0.35	\$0.00	\$0.00	\$0.00	\$0.11	\$0.01	\$0.06	\$0.53
Half U-Tube2,PS End Cap Asm	\$0.00	\$0.35	\$0.00	\$0.00	\$0.00	\$0.11	\$0.01	\$0.06	\$0.53
Small U-Tube Cap,PS End Cap Asm	\$0.00	\$0.01	\$0.00	\$0.00	\$0.00	\$0.02	\$0.00	\$0.00	\$0.04
Upper Bracket,PS End Cap Asm	\$0.00	\$0.07	\$0.00	\$0.00	\$0.00	\$0.02	\$0.00	\$0.01	\$0.11
Lower Bracket,PS End Cap Asm	\$0.00	\$0.05	\$0.00	\$0.00	\$0.00	\$0.02	\$0.00	\$0.01	\$0.09
Drier Unit Connector Asm, Right End Cap Asm	\$0.00	\$0.16	\$0.00	\$0.00	\$0.25	\$0.35	\$0.05	\$0.09	\$0.90
Assemble Right End Cap	\$0.12	\$0.00	\$0.00	\$0.00	\$1.30	\$0.00	\$0.03	\$0.16	\$1.61

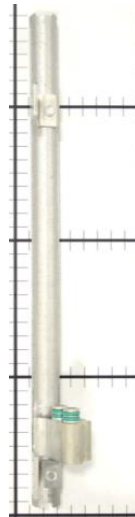
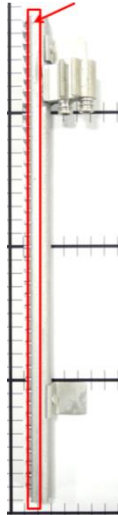
## Detailed Summary

<b>Parts</b>	<b>13</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>8</b>
<b>Steps</b>	<b>129</b>
<b>Fastenings</b>	<b>6</b>
<b>Right First Time</b>	<b>99.28%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.97</b>
<b>Supplier Fab. Time (Min)</b>	<b>2.01</b>
<b>Total Weight (kg)</b>	<b>0.14</b>
<b>Purchased Part Cost</b>	
	<b>\$0.12</b>
<b>Material Cost</b>	
	<b>\$1.00</b>
<b>OEM Asm. Cost</b>	
	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	
	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	
	<b>\$1.55</b>
<b>Supplier Fab. Cost</b>	
	<b>\$0.66</b>
<b>Q Burden</b>	
	<b>\$0.11</b>
<b>SG&amp;A</b>	
	<b>\$0.39</b>
<b>Manufacturing Cost*</b>	
	<b>\$3.84</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Half U-Tube1,PS End Cap Asm



\...

\PS End Cap Asm, Condenser Asm  
\Half U-Tube1,PS End Cap Asm  
\Half U-Tube1 Process

## Process Summary

<b>Right First Time</b>	<b>99.97 %</b>
<b>Process Time (Sec)</b>	<b>19.82</b>
<b>Total Weight (kg)</b>	<b>0.03</b>

<b>Material Cost**</b>	<b>\$0.35</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.11</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.06</b>
<b>Manufacturing Cost*</b>	<b>\$0.53</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Half U-Tube1,PS End Cap Asm



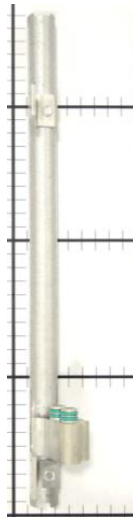
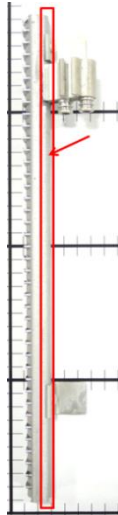
## Half U-Tube1 Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	9.00	1	0.25	11.90	POL	\$0.03	99.99%	\$0.00
Deburr	9.00	1	0.25	25.70	POL	\$0.06	99.99%	\$0.00
300 Ton Stamping Press	1.82	1	0.25	40.35	POL	\$0.02	99.99%	\$0.00

## Half U-Tube1 Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material,Half U-Tube1	1	Aluminum 3003-O - Coil Stock	\$4.08	0.0329	0.0860	\$0.00	\$0.35

# Half U-Tube2,PS End Cap Asm



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- \PS End Cap Asm, Condenser Asm
- \Half U-Tube2,PS End Cap Asm
- \Half U-Tube2 Process

## Process Summary

<b>Right First Time</b>	<b>99.96 %</b>
<b>Process Time (Sec)</b>	<b>19.82</b>
<b>Total Weight (kg)</b>	<b>0.04</b>

<b>Material Cost**</b>	<b>\$0.35</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.11</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.06</b>
<b>Manufacturing Cost*</b>	<b>\$0.53</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Half U-Tube2,PS End Cap Asm

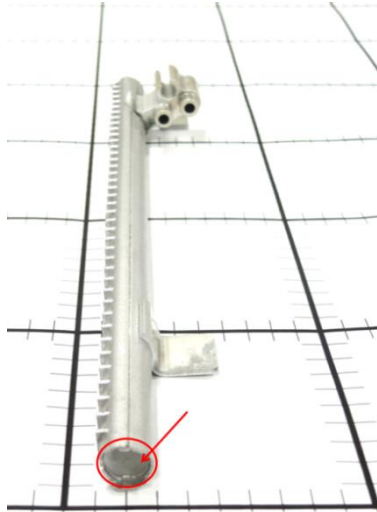
## Half U-Tube2 Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	9.00	1	0.25	11.90	POL	\$0.03	99.99%	\$0.00
Deburr	9.00	1	0.25	25.70	POL	\$0.06	99.99%	\$0.00
300 Ton Stamping Press	1.82	1	0.25	40.35	POL	\$0.02	99.99%	\$0.00

## Half U-Tube2 Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material,Half U-Tube2	1	Aluminum 3003-O - Coil Stock	\$4.08	0.0410	0.0860	\$0.00	\$0.35

# Small U-Tube Cap,PS End Cap Asm



\...

- \PS End Cap Asm, Condenser Asm
- \Small U-Tube Cap,PS End Cap Asm
- \Small U-Tube Cap Process

## Process Summary

<b>Right First Time</b>	<b>99.97 %</b>
<b>Process Time (Sec)</b>	<b>6.60</b>
<b>Total Weight (kg)</b>	<b>0.00</b>

<b>Material Cost**</b>	<b>\$0.01</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.02</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.00</b>
<b>Manufacturing Cost*</b>	<b>\$0.04</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Small U-Tube Cap,PS End Cap Asm



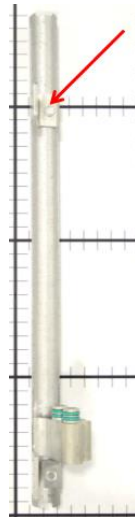
## Small U-Tube Cap Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	3.50	1	0.25	11.90	POL	\$0.01	99.99%	\$0.00
Deburr	2.50	1	0.25	5.14	POL	\$0.00	99.99%	\$0.00
25 Ton Stamping Press	0.60	1	0.25	14.18	POL	\$0.00	99.99%	\$0.00

## Small U-Tube Cap Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material,Small U-Tube Cap	1	Aluminum 3003-O - Coil Stock	\$4.08	0.0013	0.0030	\$0.00	\$0.01

# Upper Bracket,PS End Cap Asm



\...  
\PS End Cap Asm, Condenser Asm  
\Upper Bracket,PS End Cap Asm  
\Upper Bracket Process

## Process Summary

Right First Time	99.97 %
Process Time (Sec)	9.60
Total Weight (kg)	0.01

Material Cost**	\$0.07
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.02
Q Burden	\$0.00
SG&A	\$0.01
Manufacturing Cost*	\$0.11

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Upper Bracket,PS End Cap Asm



## Upper Bracket Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.90	POL	\$0.02	99.99%	\$0.00
Deburr	4.00	1	0.25	5.14	POL	\$0.01	99.99%	\$0.00
25 Ton Stamping Press	0.60	1	0.25	14.18	POL	\$0.00	99.99%	\$0.00

## Upper Bracket Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material,Upper Bracket	1	Aluminum 3003-O - Coil Stock	\$4.08	0.0094	0.0160	\$0.00	\$0.07

# Lower Bracket,PS End Cap Asm



\...  
\PS End Cap Asm, Condenser Asm  
\Lower Bracket,PS End Cap Asm  
\Lower Bracket Process

## Process Summary

Right First Time	99.97 %
Process Time (Sec)	9.60
Total Weight (kg)	0.01

Material Cost**	\$0.05
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.02
Q Burden	\$0.00
SG&A	\$0.01
Manufacturing Cost*	\$0.09

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Lower Bracket,PS End Cap Asm

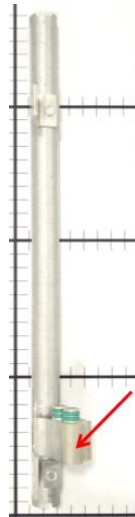
## Lower Bracket Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.90	POL	\$0.02	99.99%	\$0.00
Deburr	4.00	1	0.25	5.14	POL	\$0.01	99.99%	\$0.00
25 Ton Stamping Press	0.60	1	0.25	14.18	POL	\$0.00	99.99%	\$0.00

## Lower Bracket Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material,Lower Bracket	1	Aluminum 6061 - Coil Stock	\$2.80	0.0094	0.0180	\$0.00	\$0.05

# Drier Unit Connector Asm, Right End Cap Asm



\...

\Condenser Asm, Condenser Module Asm

\PS End Cap Asm, Condenser Asm

\Drier Unit Connector Asm, Right End Cap Asm

## Assembly Summary

<b>Parts</b>	<b>3</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>2</b>
<b>Steps</b>	<b>57</b>
<b>Fastenings</b>	<b>0</b>
<b>Right First Time</b>	<b>99.67 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>0.88</b>
<b>Total Weight (kg)</b>	<b>0.05</b>

<b>Material Cost**</b>	<b>\$0.16</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.60</b>
<b>Q Burden</b>	<b>\$0.05</b>
<b>SG&amp;A</b>	<b>\$0.09</b>
<b>Manufacturing Cost*</b>	<b>\$0.90</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Drier Unit Connector Asm, Right End Cap Asm



## Drier Unit Connector Asm, Right End Cap Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Block,Drier Unit Connector Asm	1	1	0	11	0	99.95 %	0.00	0.00	0.00	0.29	0.0444
Tiny Tube,Drier Unit Connector Asm	2	1	0	13	0	99.90 %	0.00	0.00	0.00	0.11	0.0017
Assemble Drier Unit Connector	1	0	0	17	0	99.94 %	0.00	0.00	0.08	0.30	0.0000

## Drier Unit Connector Asm, Right End Cap Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Block,Drier Unit Connector Asm	\$0.00	\$0.14	\$0.00	\$0.00	\$0.00	\$0.16	\$0.01	\$0.04	\$0.34
Tiny Tube,Drier Unit Connector Asm	\$0.00	\$0.01	\$0.00	\$0.00	\$0.00	\$0.04	\$0.02	\$0.01	\$0.07
Assemble Drier Unit Connector	\$0.00	\$0.00	\$0.00	\$0.00	\$0.25	\$0.11	\$0.01	\$0.04	\$0.42

# Drier Unit Connector Asm, Right End Cap Asm

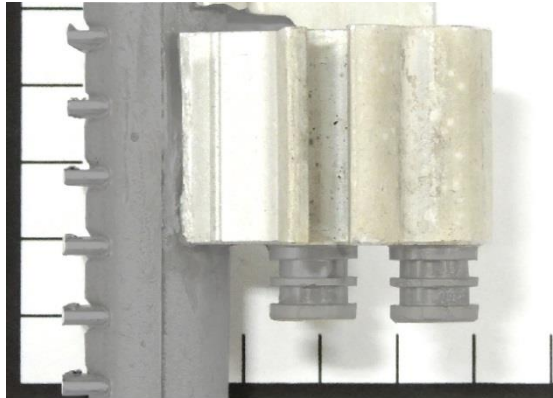
## Detailed Summary

<b>Parts</b>	<b>3</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>2</b>
<b>Steps</b>	<b>57</b>
<b>Fastenings</b>	<b>0</b>
<b>Right First Time</b>	<b>99.67%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.08</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.81</b>
<b>Total Weight (kg)</b>	<b>0.05</b>
<b>Purchased Part Cost</b>	
	<b>\$0.00</b>
<b>Material Cost</b>	
	<b>\$0.16</b>
<b>OEM Asm. Cost</b>	
	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	
	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	
	<b>\$0.25</b>
<b>Supplier Fab. Cost</b>	
	<b>\$0.35</b>
<b>Q Burden</b>	
	<b>\$0.05</b>
<b>SG&amp;A</b>	
	<b>\$0.09</b>
<b>Manufacturing Cost*</b>	
	<b>\$0.90</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Block, Drier Unit Connector Asm



\...

\Drier Unit Connector Asm, Right End Cap Asm

\Block, Drier Unit Connector Asm

\Drier Unit Connector Process

## Process Summary

<b>Right First Time</b>	<b>99.95 %</b>
<b>Process Time (Sec)</b>	<b>17.27</b>
<b>Total Weight (kg)</b>	<b>0.04</b>

<b>Material Cost**</b>	<b>\$0.14</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.16</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.04</b>
<b>Manufacturing Cost*</b>	<b>\$0.34</b>



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Block, Drier Unit Connector Asm



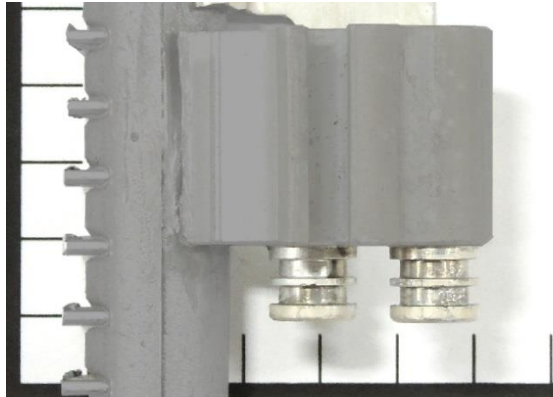
## Drier Unit Connector Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
CNC Machine	12.75	1	0.25	36.14	POL	\$0.13	99.98 %	\$0.00
Cut Off	4.47	1	0.25	16.83	POL	\$0.02	99.98 %	\$0.00
2200 Ton Extrusion Press	0.05	1	4.00	512.84	POL	\$0.01	99.99 %	\$0.00

## Drier Unit Connector Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Block	1	Aluminum 6061 - Billet Stock	\$2.80	0.0444	0.0495	\$0.00	\$0.14

# Tiny Tube, Drier Unit Connector Asm



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\Drier Unit Connector Asm, Right End Cap Asm

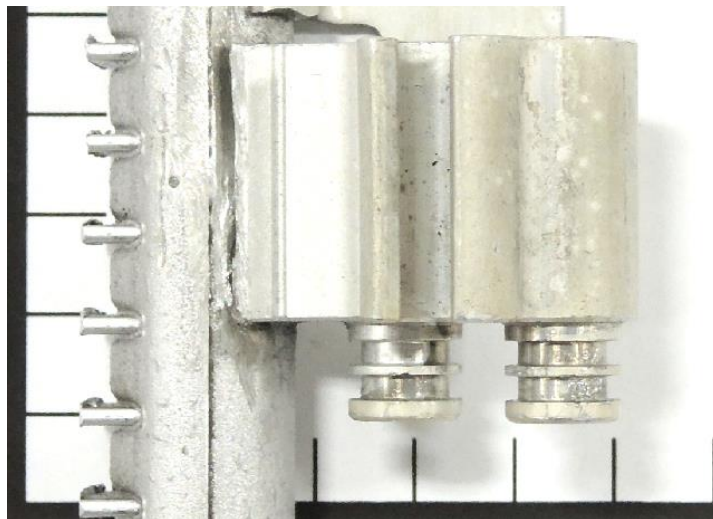
\Tiny Tube, Drier Unit Connector Asm

\Tiny Tube Process

## Process Summary

Right First Time	99.90 %
Process Time (Sec)	6.54
Total Weight (kg)	0.00

Material Cost**	\$0.01
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.04
Q Burden	\$0.02
SG&A	\$0.01
Manufacturing Cost*	\$0.07



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Tiny Tube, Drier Unit Connector Asm



## Tiny Tube Process

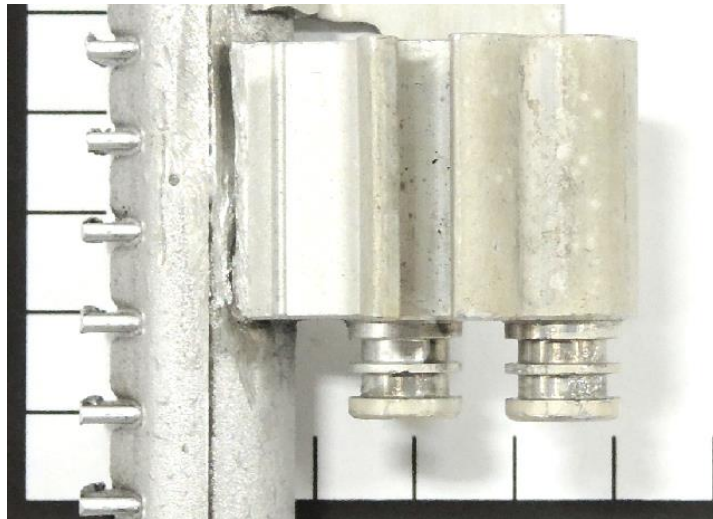
Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
CNC Machine	4.10	1	0.25	25.47	POL	\$0.03	99.95 %	\$0.01
Cut Off	2.43	1	0.25	16.83	POL	\$0.01	99.96 %	\$0.01
2200 Ton Extrusion Press	0.01	1	4.00	512.84	POL	\$0.00	99.99 %	\$0.00

## Tiny Tube Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Tiny Tube	1	Aluminum 6061-T6 - Bar Stock	\$3.31	0.0017	0.0028	\$0.00	\$0.01



## No Commodity Items Required for This Process



\...

\PS End Cap Asm, Condenser Asm

\Drier Unit Connector Asm, Right End Cap Asm

\Assemble Drier Unit Connector

### Process Summary

<b>Right First Time</b>	<b>99.94 %</b>
<b>Process Time (Sec)</b>	<b>22.73</b>
<b>Total Weight (kg)</b>	<b>0.00</b>

<b>Material Cost**</b>	<b>\$0.00</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.36</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.04</b>
<b>Manufacturing Cost*</b>	<b>\$0.42</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Drier Unit Connector



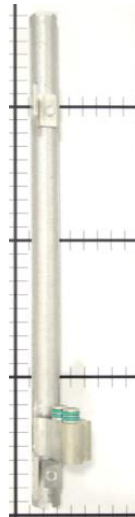
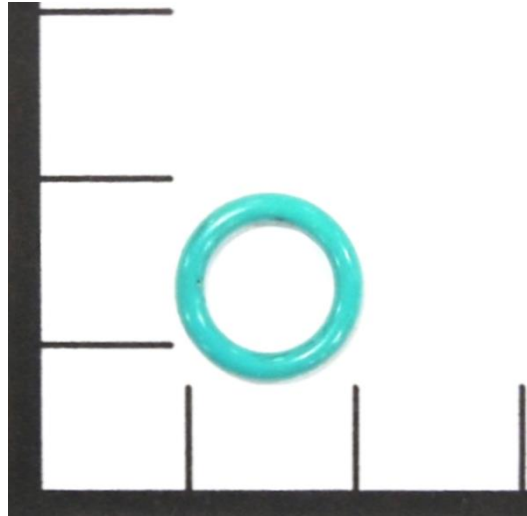
## Assemble Drier Unit Connector

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.90	POL	\$0.02	99.99%	\$0.00
Deburr	4.00	1	0.25	5.14	POL	\$0.01	99.99%	\$0.00
CNC Machine	8.95	1	0.25	36.14	POL	\$0.09	99.99%	\$0.00
Braze, Oven	4.78	1	0.25	189.73	POL	\$0.25	99.97%	\$0.00

## Assemble Drier Unit Connector

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Assemble Right End Cap



\...  
\Condenser Asm, Condenser Module Asm  
\PS End Cap Asm, Condenser Asm  
\Assemble Right End Cap

## Process Summary

<b>Right First Time</b>	<b>99.80 %</b>
<b>Process Time (Sec)</b>	<b>53.23</b>
<b>Total Weight (kg)</b>	<b>0.00</b>

<b>Material Cost**</b>	<b>\$0.12</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$1.30</b>
<b>Q Burden</b>	<b>\$0.03</b>
<b>SG&amp;A</b>	<b>\$0.16</b>
<b>Manufacturing Cost*</b>	<b>\$1.61</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Right End Cap

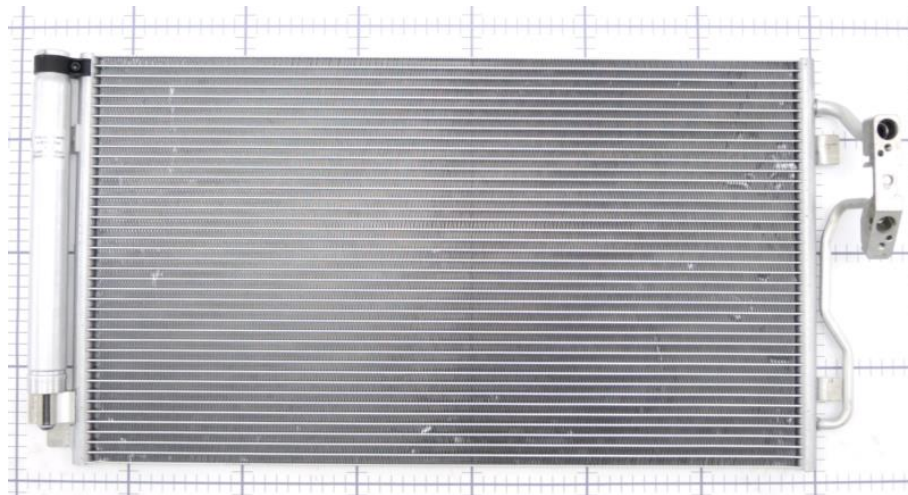
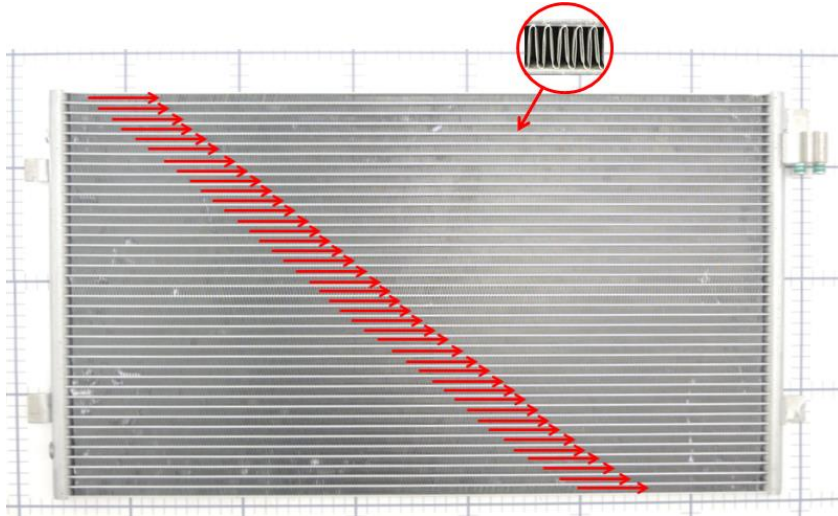


## Assemble Right End Cap

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	25.00	1	1.00	26.36	POL	\$0.18	99.88 %	\$0.02
Braze, Oven	20.23	1	0.25	189.73	POL	\$1.07	99.97 %	\$0.01
Supplier Automated Asm	8.00	1	0.25	22.88	POL	\$0.05	99.95 %	\$0.01

## Assemble Right End Cap

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
8mm O-Ring, Right End Cap Asm	4	Commodity Item	Purchased	0.0001	-	\$0.03	\$0.00



- \...
- \Condenser Asm, Condenser Module Asm
- \Condenser Cooling Fin, Condenser Asm
- \Condenser Cooling Fin Process

## Process Summary

<b>Right First Time</b>	<b>99.97 %</b>
<b>Process Time (Sec)</b>	<b>26.61</b>
<b>Total Weight (kg)</b>	<b>0.01</b>

<b>Material Cost**</b>	<b>\$0.11</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.13</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.03</b>
<b>Manufacturing Cost*</b>	<b>\$0.28</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Condenser Cooling Fin, Condenser Asm



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## Condenser Cooling Fin Process

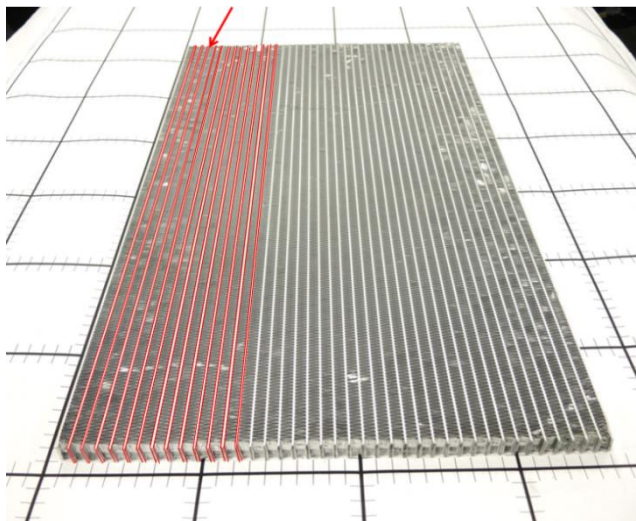
Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Roll Form Fins	26.61	1	0.25	17.81	POL	\$0.13	99.97%	\$0.01

## Condenser Cooling Fin Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Condenser Cooling Fin	1	Aluminum 3003 - Fin Stock	\$8.00	0.0136	0.0136	\$0.00	\$0.11

# Condenser Multi-Channel Cooling Tube, Condenser Asm

\...  
 \Condenser Asm, Condenser Module Asm  
 \Condenser Multi-Channel Cooling Tube, Condenser Asm  
 \Condenser Multi-Channel Cooling Tube Process



## Process Summary

<b>Right First Time</b>	<b>99.97 %</b>
<b>Process Time (Sec)</b>	<b>2.31</b>
<b>Total Weight (kg)</b>	<b>0.02</b>

<b>Material Cost**</b>	<b>\$0.11</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.01</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.01</b>
<b>Manufacturing Cost*</b>	<b>\$0.14</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Condenser Multi-Channel Cooling Tube, Condenser Asm



## Condenser Multi-Channel Cooling Tube Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Saw Cut	2.31	1	0.25	16.83	POL	\$0.01	99.97%	\$0.01

## Condenser Multi-Channel Cooling Tube Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Condenser Multi-Channel Cooling Tube	1	Aluminum 3003 -MPE Tube	\$5.00	0.0203	0.0215	\$0.00	\$0.11



# Condenser Side Cooling Tube, Condenser Asm



\...

- \Condenser Asm, Condenser Module Asm
- \Condenser Side Cooling Tube, Condenser Asm
- \Condenser Side Cooling Tube Process

## Process Summary

<b>Right First Time</b>	<b>99.97 %</b>
<b>Process Time (Sec)</b>	<b>2.31</b>
<b>Total Weight (kg)</b>	<b>0.02</b>

<b>Material Cost**</b>	<b>\$0.09</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.01</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.01</b>
<b>Manufacturing Cost*</b>	<b>\$0.12</b>



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Condenser Side Cooling Tube, Condenser Asm



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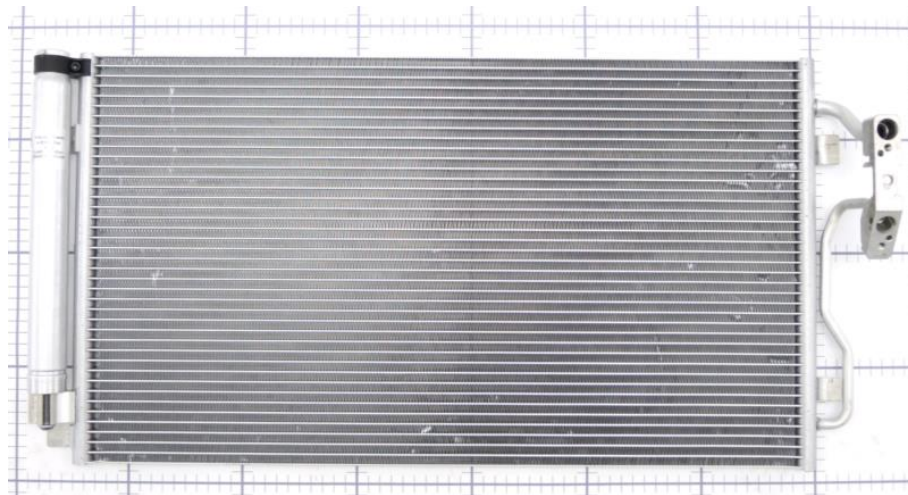
## Condenser Side Cooling Tube Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Saw Cut	2.31	1	0.25	16.83	POL	\$0.01	99.97%	\$0.01

## Condenser Side Cooling Tube Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Condenser Side Cooling Tube	1	Aluminum 3003 - MPE Tube	\$5.00	0.0171	0.0180	\$0.00	\$0.09

## No Commodity Items Required for This Process



\...  
\Condenser Module Asm, Cooling Pack Asm  
\Condenser Asm, Condenser Module Asm  
\Assemble Condenser

### Process Summary

<b>Right First Time</b>	<b>99.61 %</b>
<b>Process Time (Sec)</b>	<b>205.55</b>
<b>Total Weight (kg)</b>	<b>0.00</b>
<b>Material Cost**</b>	<b>\$0.00</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$2.96</b>
<b>Q Burden</b>	<b>\$0.06</b>
<b>SG&amp;A</b>	<b>\$0.36</b>
<b>Manufacturing Cost*</b>	<b>\$3.38</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Condenser



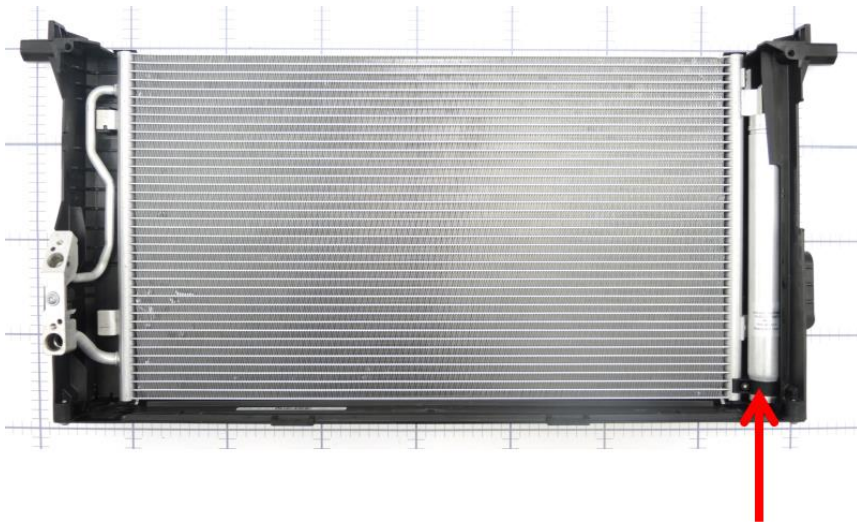
## Assemble Condenser

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Leak Test	36.00	1	1.00	27.57	POL	\$0.28	99.98 %	\$0.00
Wash	14.00	1	0.25	106.88	POL	\$0.42	99.99 %	\$0.00
Braze, Oven	18.89	1	0.25	189.73	POL	\$1.00	99.97 %	\$0.00
Drying	12.89	1	0.25	83.75	POL	\$0.30	99.98 %	\$0.00
Flux Application	12.89	1	0.25	34.32	POL	\$0.12	99.98 %	\$0.00
Degrease	12.89	1	0.25	64.79	POL	\$0.23	99.98 %	\$0.00
Supplier Automated Asm	98.00	1	0.25	22.88	POL	\$0.62	99.75 %	\$0.04

## Assemble Condenser

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Plastic Bracket, Condenser Asm



\...

- \Condenser Asm, Condenser Module Asm
- \Plastic Bracket, Condenser Asm
- \Plastic Bracket Processing

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	3.66
Total Weight (kg)	0.01

Material Cost**	\$0.03
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.01
Q Burden	\$0.00
SG&A	\$0.01
Manufacturing Cost*	\$0.05

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Plastic Bracket, Condenser Asm



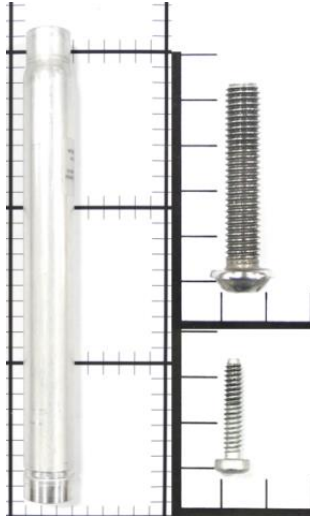
## Plastic Bracket Processing

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
55Ton Injection Molding Press	21.96	6	0.25	14.28	POL	\$0.01	99.99%	\$0.00

## Plastic Bracket Processing

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Plastic Bracket	1	PA66 GF30	\$3.95	0.0065	0.0070	\$0.00	\$0.03

# Assemble Drier Unit

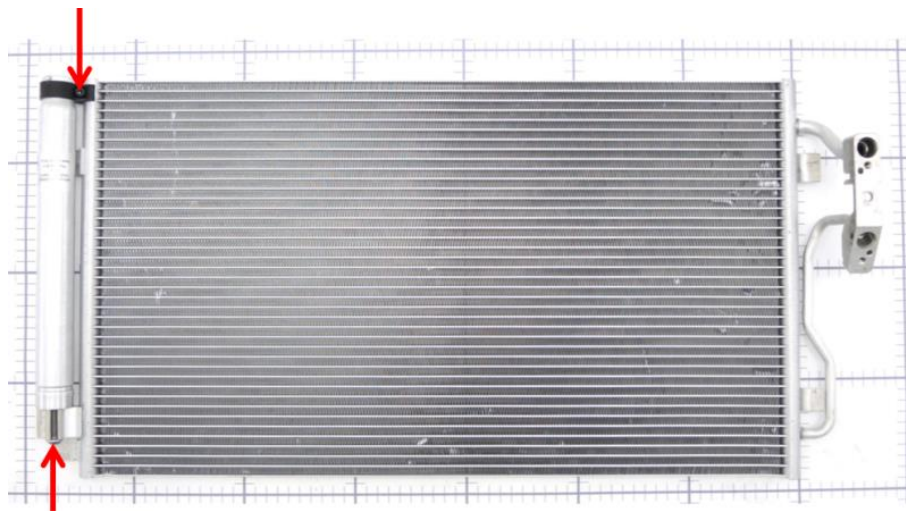


\...  
 \Condenser Module Asm, Cooling Pack Asm  
 \Condenser Asm, Condenser Module Asm  
 \Assemble Drier Unit

## Process Summary

<b>Right First Time</b>	<b>99.46 %</b>
<b>Process Time (Sec)</b>	<b>41.00</b>
<b>Total Weight (kg)</b>	<b>0.23</b>

<b>Material Cost**</b>	<b>\$7.62</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.30</b>
<b>Q Burden</b>	<b>\$0.08</b>
<b>SG&amp;A</b>	<b>\$0.26</b>
<b>Manufacturing Cost*</b>	<b>\$8.27</b>



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Drier Unit

## Assemble Drier Unit

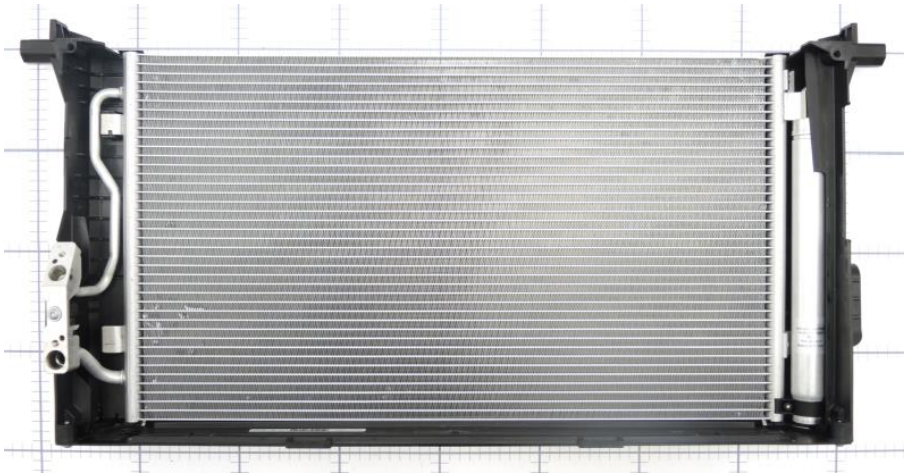
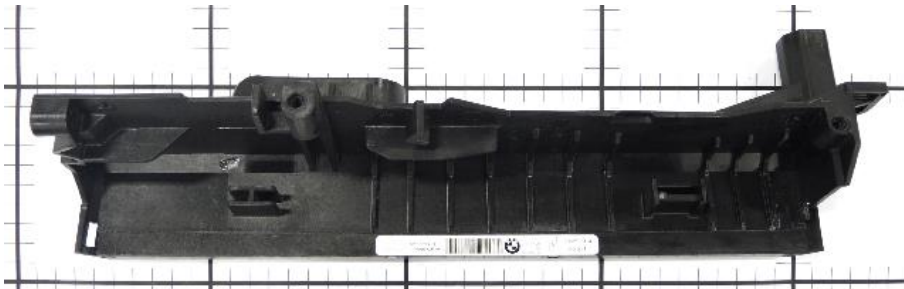
Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	41.00	1	1.00	26.36	POL	\$0.30	99.46%	\$0.08

## Assemble Drier Unit

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Drier Unit, Condenser Asm	1	Commodity Item	Purchased	0.2129	-	\$7.50	\$0.00
M4x22mm-Pan Torx Screw	1	Commodity Item	Purchased	0.0024	-	\$0.01	\$0.00
M8x40mm - Torx Screw/w Loctite	1	Commodity Item	Purchased	0.0158	-	\$0.11	\$0.00



# DS Cover Asm, Condenser Module Asm



\...  
 \Cooling Pack Asm  
 \Condenser Module Asm, Cooling Pack Asm  
 \DS Cover Asm, Condenser Module Asm  
**Assembly Summary**

<b>Parts</b>	<b>2</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>2</b>
<b>Steps</b>	<b>6</b>
<b>Fastenings</b>	<b>1</b>
<b>Right First Time</b>	<b>99.94 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>0.52</b>
<b>Total Weight (kg)</b>	<b>0.25</b>

<b>Material Cost**</b>	<b>\$1.18</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.23</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.16</b>
<b>Manufacturing Cost*</b>	<b>\$1.58</b>

\* Excluding tooling, ER&D, logistics, and profit margin  
 \*\* Includes material cost and purchased parts cost

# DS Cover Asm, Condenser Module Asm



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## DS Cover Asm, Condenser Module Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
DS Cover, DS Cover Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.26	0.2545
Assemble Label	1	1	1	4	1	99.95 %	0.00	0.00	0.26	0.00	0.0001

## DS Cover Asm, Condenser Module Asm

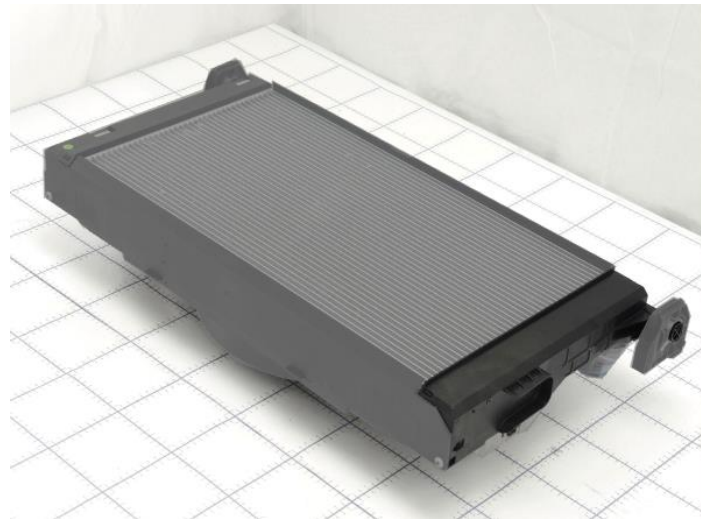
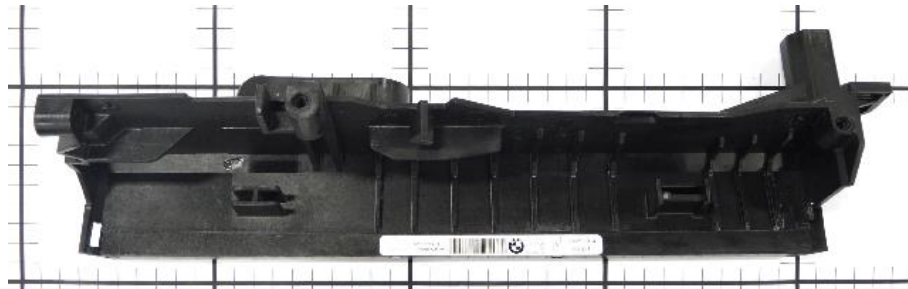
Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
DS Cover, DS Cover Asm	\$0.00	\$1.08	\$0.00	\$0.00	\$0.00	\$0.11	\$0.00	\$0.14	\$1.34
Assemble Label	\$0.10	\$0.00	\$0.00	\$0.00	\$0.12	\$0.00	\$0.01	\$0.02	\$0.24

## Detailed Summary

<b>Parts</b>	<b>2</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>2</b>
<b>Steps</b>	<b>6</b>
<b>Fastenings</b>	<b>1</b>
<b>Right First Time</b>	<b>99.94%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.26</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.26</b>
<b>Total Weight (kg)</b>	<b>0.25</b>
<b>Purchased Part Cost</b>	<b>\$0.10</b>
<b>Material Cost</b>	<b>\$1.08</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.12</b>
<b>Supplier Fab. Cost</b>	<b>\$0.11</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.16</b>
<b>Manufacturing Cost*</b>	<b>\$1.58</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



\...

- \DS Cover Asm, Condenser Module Asm
- \DS Cover, DS Cover Asm
- \Left Cover Process

## Process Summary

<b>Right First Time</b>	<b>99.99 %</b>
<b>Process Time (Sec)</b>	<b>15.30</b>
<b>Total Weight (kg)</b>	<b>0.25</b>

<b>Material Cost**</b>	<b>\$1.08</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.11</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.14</b>
<b>Manufacturing Cost*</b>	<b>\$1.34</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# DS Cover, DS Cover Asm



## Left Cover Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
300 Ton Injection Molding Press	30.60	2	0.25	26.59	POL	\$0.11	99.99%	\$0.00

## Left Cover Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, DS Cover	1	PA66 GF30	\$3.95	0.2545	0.2740	\$0.00	\$1.08

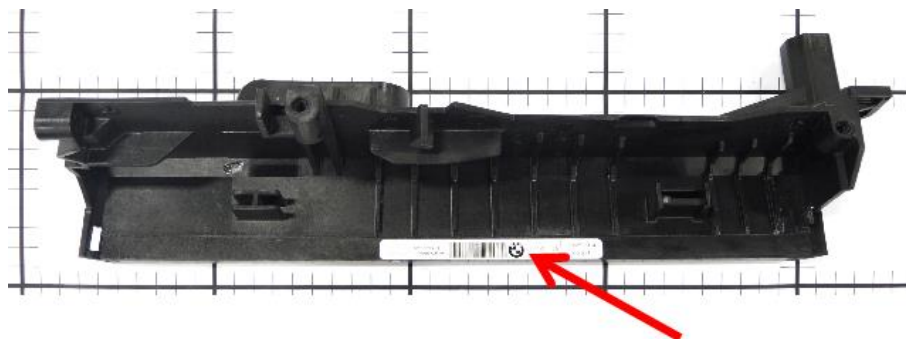
\...  
 \Condenser Module Asm, Cooling Pack Asm  
 \DS Cover Asm, Condenser Module Asm  
 \Assemble Label



## Process Summary

<b>Right First Time</b>	<b>99.95 %</b>
<b>Process Time (Sec)</b>	<b>15.75</b>
<b>Total Weight (kg)</b>	<b>0.00</b>

<b>Material Cost**</b>	<b>\$0.10</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.12</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.02</b>
<b>Manufacturing Cost*</b>	<b>\$0.24</b>



\* Excluding tooling, ER&D, logistics, and profit margin  
 \*\* Includes material cost and purchased parts cost

# Assemble Label

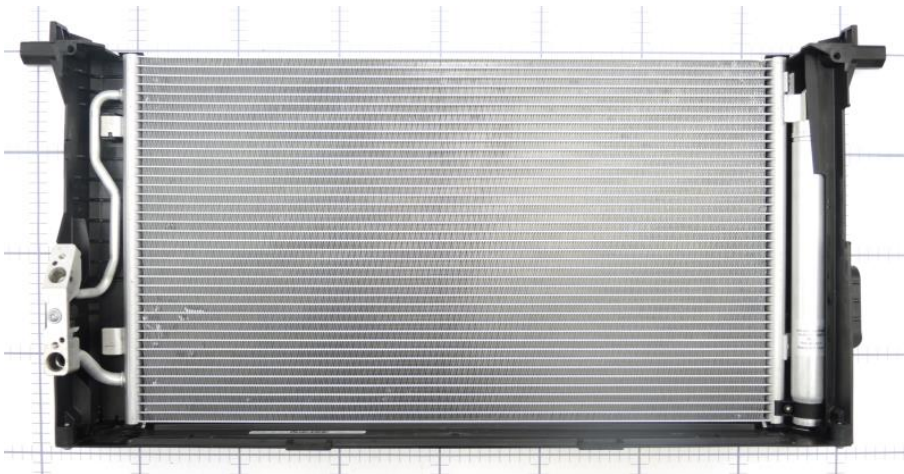
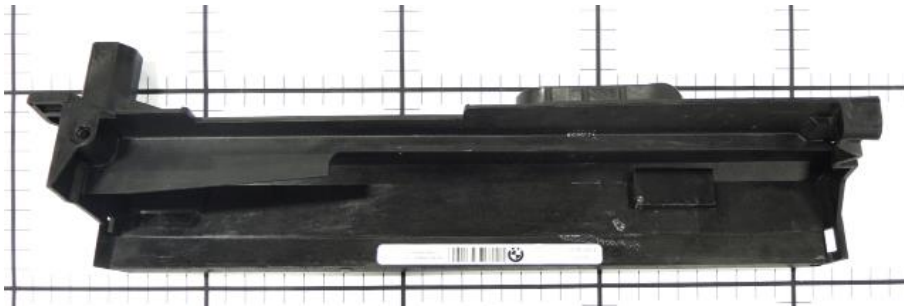


## Assemble Label

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	15.75	1	1.00	26.36	POL	\$0.12	99.95%	\$0.01

## Assemble Label

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Label, Valeo Supplier Label, Left Cover	1	Commodity Item	Purchased	0.0001	-	\$0.10	\$0.00



\...  
 \Cooling Pack Asm  
 \Condenser Module Asm, Cooling Pack Asm  
 \PS Cover Asm, Condenser Module Asm  
**Assembly Summary**

<b>Parts</b>	<b>2</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>2</b>
<b>Steps</b>	<b>6</b>
<b>Fastenings</b>	<b>1</b>
<b>Right First Time</b>	<b>99.94 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>0.52</b>
<b>Total Weight (kg)</b>	<b>0.24</b>

<b>Material Cost**</b>	<b>\$1.11</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.23</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.15</b>
<b>Manufacturing Cost*</b>	<b>\$1.50</b>

\* Excluding tooling, ER&D, logistics, and profit margin  
 \*\* Includes material cost and purchased parts cost



# PS Cover Asm, Condenser Module Asm



**MUNRO**  
& ASSOCIATES, INC.

## PS Cover Asm, Condenser Module Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
PS Cover, Condenser Module Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.26	0.2371
Assemble Label	1	1	1	4	1	99.95 %	0.00	0.00	0.26	0.00	0.0001

## PS Cover Asm, Condenser Module Asm

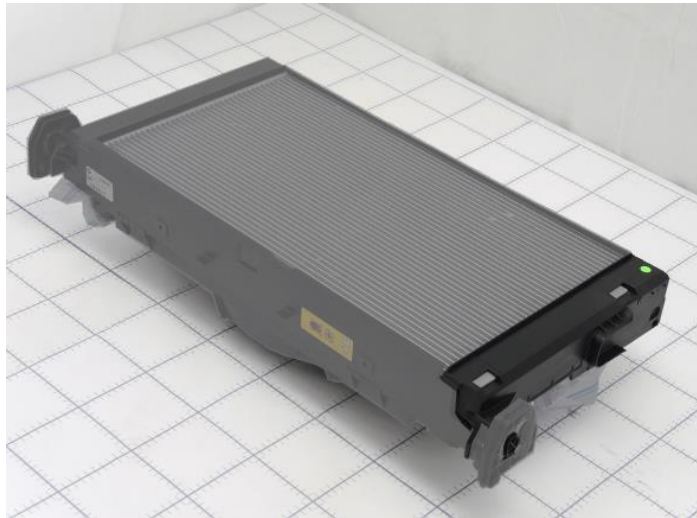
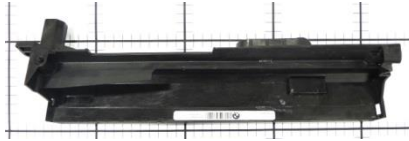
Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
PS Cover, Condenser Module Asm	\$0.00	\$1.01	\$0.00	\$0.00	\$0.00	\$0.11	\$0.00	\$0.13	\$1.26
Assemble Label	\$0.10	\$0.00	\$0.00	\$0.00	\$0.12	\$0.00	\$0.01	\$0.02	\$0.24

## Detailed Summary

<b>Parts</b>	<b>2</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>2</b>
<b>Steps</b>	<b>6</b>
<b>Fastenings</b>	<b>1</b>
<b>Right First Time</b>	<b>99.94%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.26</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.26</b>
<b>Total Weight (kg)</b>	<b>0.24</b>
<b>Purchased Part Cost</b>	<b>\$0.10</b>
<b>Material Cost</b>	<b>\$1.01</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.12</b>
<b>Supplier Fab. Cost</b>	<b>\$0.11</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.15</b>
<b>Manufacturing Cost*</b>	<b>\$1.50</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



\...

- \PS Cover Asm, Condenser Module Asm
- \PS Cover, Condenser Module Asm
- \Right Cover Process

## Process Summary

<b>Right First Time</b>	<b>99.99 %</b>
<b>Process Time (Sec)</b>	<b>15.30</b>
<b>Total Weight (kg)</b>	<b>0.24</b>

<b>Material Cost**</b>	<b>\$1.01</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.11</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.13</b>
<b>Manufacturing Cost*</b>	<b>\$1.26</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# PS Cover, Condenser Module Asm



## Right Cover Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
300 Ton Injection Molding Press	30.60	2	0.25	26.59	POL	\$0.11	99.99%	\$0.00

## Right Cover Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Right Cover	1	PA66 GF30	\$3.95	0.2371	0.2550	\$0.00	\$1.01

\...  
 \Condenser Module Asm, Cooling Pack Asm  
 \PS Cover Asm, Condenser Module Asm  
 \Assemble Label



## Process Summary

<b>Right First Time</b>	<b>99.95 %</b>
<b>Process Time (Sec)</b>	<b>15.75</b>
<b>Total Weight (kg)</b>	<b>0.00</b>

<b>Material Cost**</b>	<b>\$0.10</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.12</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.02</b>
<b>Manufacturing Cost*</b>	<b>\$0.24</b>



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Label

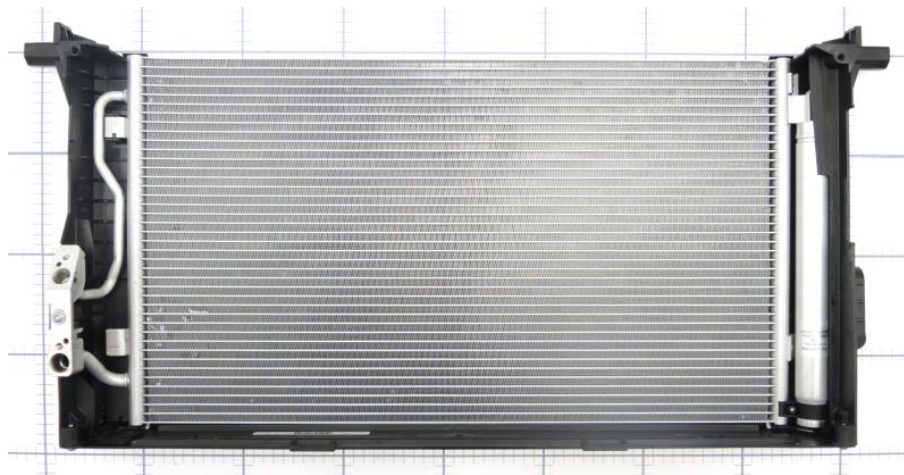
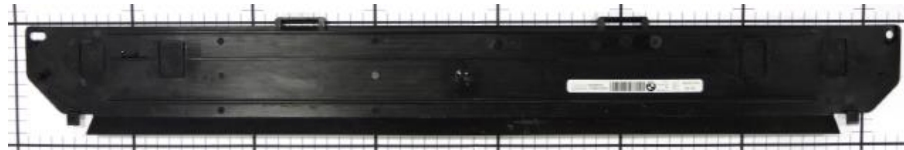
## Assemble Label

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	15.75	1	1.00	26.36	POL	\$0.12	99.95%	\$0.01

## Assemble Label

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Label, Valeo Supplier Label, Right Cover	1	Commodity Item	Purchased	0.0001	-	\$0.10	\$0.00

# Lower Cover, Condenser Module Asm



\...

\Cooling Pack Asm

\Condenser Module Asm, Cooling Pack Asm

\Lower Cover, Condenser Module Asm

## Assembly Summary

<b>Parts</b>	<b>2</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>2</b>
<b>Steps</b>	<b>6</b>
<b>Fastenings</b>	<b>1</b>
<b>Right First Time</b>	<b>99.94 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>0.46</b>
<b>Total Weight (kg)</b>	<b>0.20</b>

<b>Material Cost**</b>	<b>\$0.95</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.27</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.14</b>
<b>Manufacturing Cost*</b>	<b>\$1.37</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Lower Cover, Condenser Module Asm



## Lower Cover, Condenser Module Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Lower Cover, Condenser Module Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.19	0.2002
Assemble Label	1	1	1	4	1	99.95 %	0.00	0.00	0.26	0.00	0.0001

## Lower Cover, Condenser Module Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Lower Cover, Condenser Module Asm	\$0.00	\$0.85	\$0.00	\$0.00	\$0.00	\$0.16	\$0.00	\$0.12	\$1.13
Assemble Label	\$0.10	\$0.00	\$0.00	\$0.00	\$0.12	\$0.00	\$0.01	\$0.02	\$0.24



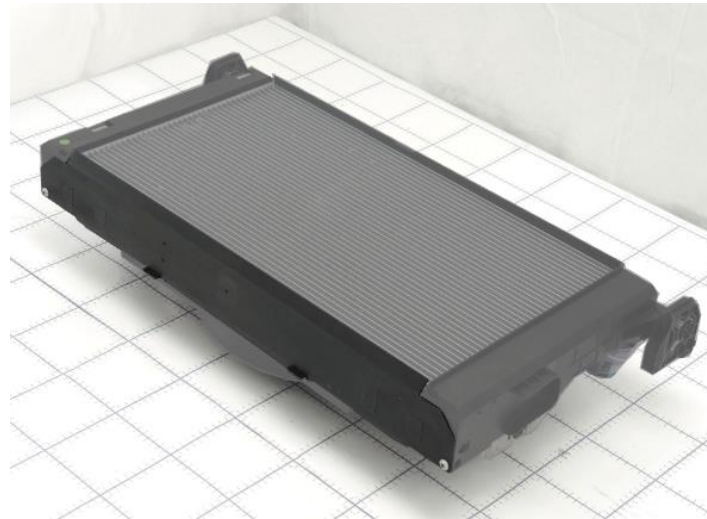
## Detailed Summary

<b>Parts</b>	<b>2</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>2</b>
<b>Steps</b>	<b>6</b>
<b>Fastenings</b>	<b>1</b>
<b>Right First Time</b>	<b>99.94%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.26</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.19</b>
<b>Total Weight (kg)</b>	<b>0.20</b>
<hr/>	
<b>Purchased Part Cost</b>	<b>\$0.10</b>
<b>Material Cost</b>	<b>\$0.85</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.12</b>
<b>Supplier Fab. Cost</b>	<b>\$0.16</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.14</b>
<b>Manufacturing Cost*</b>	<b>\$1.37</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Lower Cover, Condenser Module Asm



\...

- \Lower Cover, Condenser Module Asm
- \Lower Cover, Condenser Module Asm
- \Lower Cover Process

## Process Summary

<b>Right First Time</b>	<b>99.99 %</b>
<b>Process Time (Sec)</b>	<b>11.68</b>
<b>Total Weight (kg)</b>	<b>0.20</b>

<b>Material Cost**</b>	<b>\$0.85</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.16</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.12</b>
<b>Manufacturing Cost*</b>	<b>\$1.13</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Lower Cover, Condenser Module Asm



## Lower Cover Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
610 Ton Injection Molding Press	23.36	2	0.25	48.51	POL	\$0.16	99.99%	\$0.00

## Lower Cover Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Lower Cover	1	PA66 GF30	\$3.95	0.2002	0.2150	\$0.00	\$0.85

\...  
 \Condenser Module Asm, Cooling Pack Asm  
 \Lower Cover, Condenser Module Asm  
 \Assemble Label



## Process Summary

<b>Right First Time</b>	<b>99.95 %</b>
<b>Process Time (Sec)</b>	<b>15.75</b>
<b>Total Weight (kg)</b>	<b>0.00</b>

<b>Material Cost**</b>	<b>\$0.10</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.12</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.02</b>
<b>Manufacturing Cost*</b>	<b>\$0.24</b>



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Label



## Assemble Label

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	15.75	1	1.00	26.36	POL	\$0.12	99.95%	\$0.01

## Assemble Label

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Label, Valeo Supplier Label, Lower Cover	1	Commodity Item	Purchased	0.0001	-	\$0.10	\$0.00

# Assemble Condenser Module



\...

- \Cooling Pack Asm
- \Condenser Module Asm, Cooling Pack Asm
- \Assemble Condenser Module

## Process Summary

Right First Time	99.42 %
Process Time (Sec)	52.00
Total Weight (kg)	0.01

Material Cost**	\$0.04
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.38
Q Burden	\$0.09
SG&A	\$0.05
Manufacturing Cost*	\$0.56

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Condenser Module



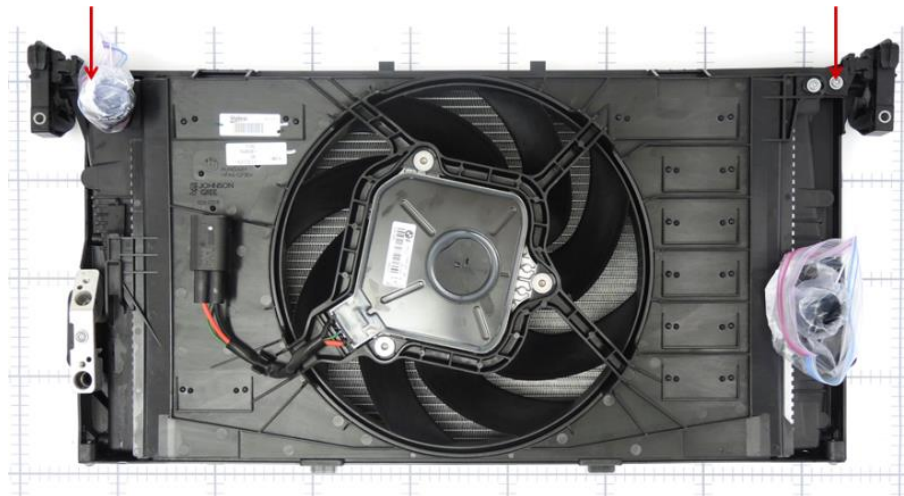
## Assemble Condenser Module

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	52.00	1	1.00	26.36	POL	\$0.38	99.42 %	\$0.09

## Assemble Condenser Module

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
M6x19mm-Flanged Torx Screw	2	Commodity Item	Purchased	0.0039	-	\$0.02	\$0.00

# Assemble Condenser Module Asm to Cooling Pack



\...

\Cooling Pack

\Cooling Pack Asm

\Assemble Condenser Module Asm to Cooling Pack

## Process Summary

Right First Time	99.55 %
Process Time (Sec)	38.00
Total Weight (kg)	0.01

Material Cost**	\$0.04
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.50
Q Burden	\$0.07
SG&A	\$0.06
Manufacturing Cost*	\$0.67

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Assemble Condenser Module Asm to Cooling Pack

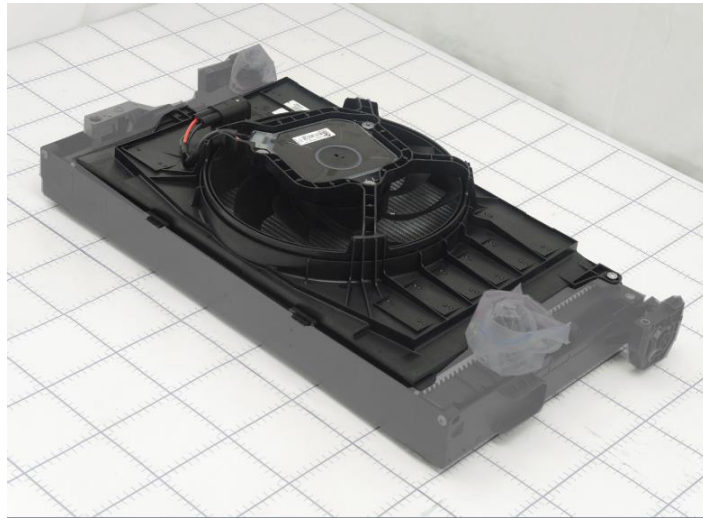
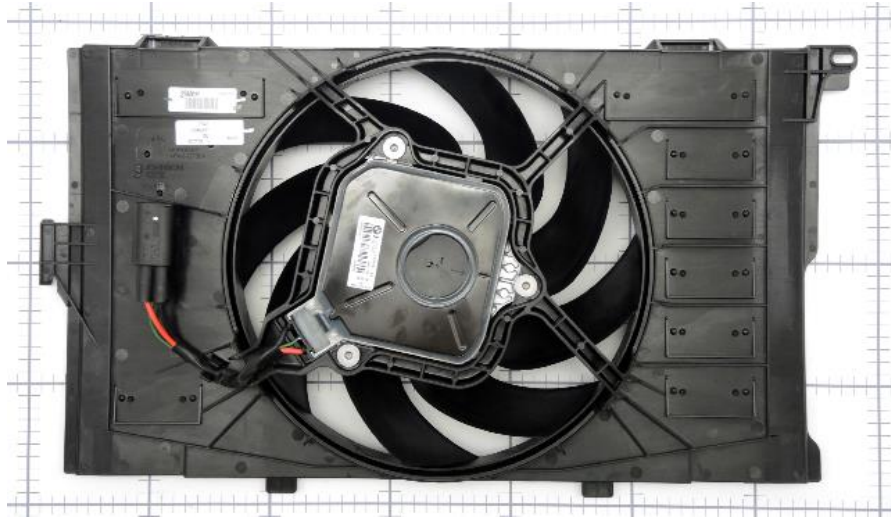
## Assemble Condenser Module Asm to Cooling Pack

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	38.00	1	1.00	47.68	ITA	\$0.50	99.55%	\$0.07

## Assemble Condenser Module Asm to Cooling Pack

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
M6x19mm-Flanged Torx Screw	2	Commodity Item	Purchased	0.0039	-	\$0.02	\$0.00

# Cooling Fan Asm, Cooling Pack Asm



\...  
 \Cooling Pack  
 \Cooling Pack Asm  
 \Cooling Fan Asm, Cooling Pack Asm  
**Assembly Summary**

<b>Parts</b>	<b>12</b>
<b>Fasteners</b>	<b>7</b>
<b>Part Numbers</b>	<b>8</b>
<b>Steps</b>	<b>36</b>
<b>Fastenings</b>	<b>12</b>
<b>Right First Time</b>	<b>98.48 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>2.70</b>
<b>Total Weight (kg)</b>	<b>3.47</b>

<b>Material Cost**</b>	<b>\$31.57</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$1.48</b>
<b>Q Burden</b>	<b>\$0.23</b>
<b>SG&amp;A</b>	<b>\$1.67</b>
<b>Manufacturing Cost*</b>	<b>\$34.95</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Cooling Fan Asm, Cooling Pack Asm



**MUNRO**  
& ASSOCIATES, INC.

## Cooling Fan Asm, Cooling Pack Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Cooling Fan Shroud Asm, Cooling Fan Asm	1	3	2	8	2	99.91 %	0.00	0.00	0.36	0.33	1.0182
Assemble Fan DC Motor to Shroud	1	4	5	12	5	99.25 %	0.00	0.00	0.92	0.00	2.0582
Fan Blade, Cooling Fan Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.16	0.3780
Assemble Fan Blade	1	4	5	13	5	99.32 %	0.00	0.00	0.93	0.00	0.0107

## Cooling Fan Asm, Cooling Pack Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Cooling Fan Shroud Asm, Cooling Fan Asm	\$0.20	\$4.45	\$0.00	\$0.00	\$0.15	\$0.40	\$0.01	\$0.61	\$5.83
Assemble Fan DC Motor to Shroud	\$25.18	\$0.00	\$0.00	\$0.00	\$0.38	\$0.00	\$0.11	\$0.80	\$26.47
Fan Blade, Cooling Fan Asm	\$0.00	\$1.66	\$0.00	\$0.00	\$0.00	\$0.15	\$0.00	\$0.22	\$2.03
Assemble Fan Blade	\$0.08	\$0.00	\$0.00	\$0.00	\$0.39	\$0.00	\$0.10	\$0.05	\$0.62

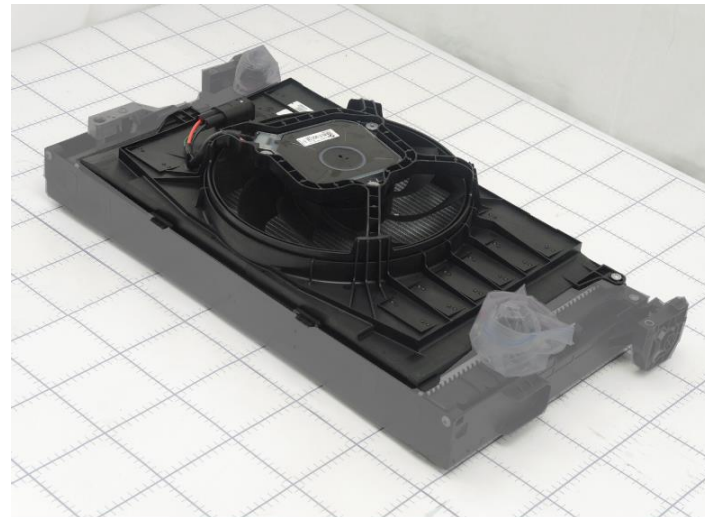
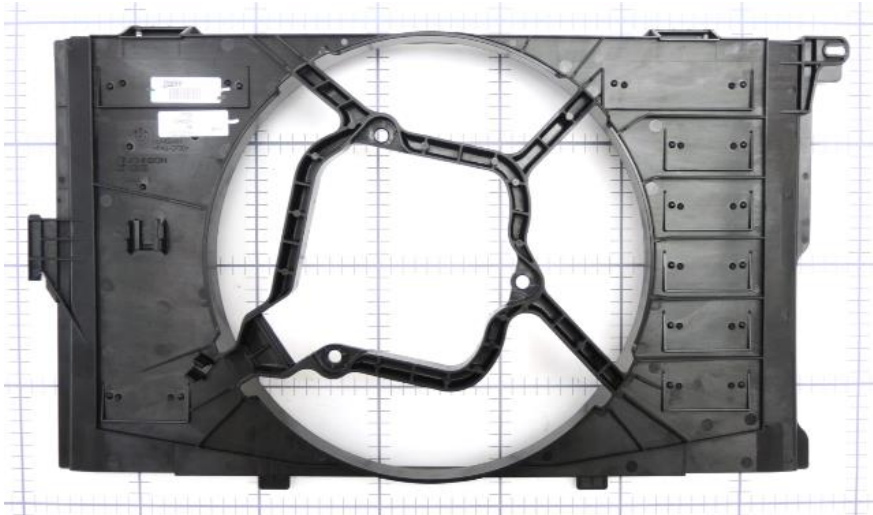
## Detailed Summary

<b>Parts</b>	<b>12</b>
<b>Fasteners</b>	<b>7</b>
<b>Part Numbers</b>	<b>8</b>
<b>Steps</b>	<b>36</b>
<b>Fastenings</b>	<b>12</b>
<b>Right First Time</b>	<b>98.48%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>2.21</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.49</b>
<b>Total Weight (kg)</b>	<b>3.47</b>
<b>Purchased Part Cost</b>	
	<b>\$25.46</b>
<b>Material Cost</b>	<b>\$6.11</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.92</b>
<b>Supplier Fab. Cost</b>	<b>\$0.56</b>
<b>Q Burden</b>	<b>\$0.23</b>
<b>SG&amp;A</b>	<b>\$1.67</b>
<b>Manufacturing Cost*</b>	<b>\$34.95</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Cooling Fan Shroud Asm, Cooling Fan Asm



- \...
  - \Cooling Pack Asm
  - \Cooling Fan Asm, Cooling Pack Asm
  - \Cooling Fan Shroud Asm, Cooling Fan Asm
- ## Assembly Summary

<b>Parts</b>	<b>3</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>8</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.91 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>0.69</b>
<b>Total Weight (kg)</b>	<b>1.02</b>

<b>Material Cost**</b>	<b>\$4.65</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.56</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.61</b>
<b>Manufacturing Cost*</b>	<b>\$5.83</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Cooling Fan Shroud Asm, Cooling Fan Asm



## Cooling Fan Shroud Asm, Cooling Fan Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Cooling Fan Shroud, Cooling Fan Shroud Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.33	1.0180
Assemble Labels	1	2	2	6	2	99.92 %	0.00	0.00	0.36	0.00	0.0002

## Cooling Fan Shroud Asm, Cooling Fan Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Cooling Fan Shroud, Cooling Fan Shroud Asm	\$0.00	\$4.45	\$0.00	\$0.00	\$0.00	\$0.40	\$0.00	\$0.58	\$5.44
Assemble Labels	\$0.20	\$0.00	\$0.00	\$0.00	\$0.15	\$0.00	\$0.01	\$0.02	\$0.39

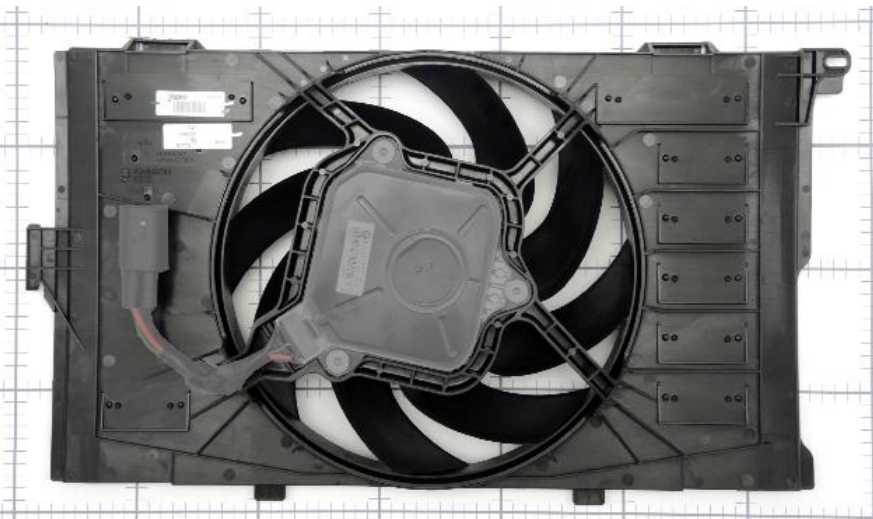
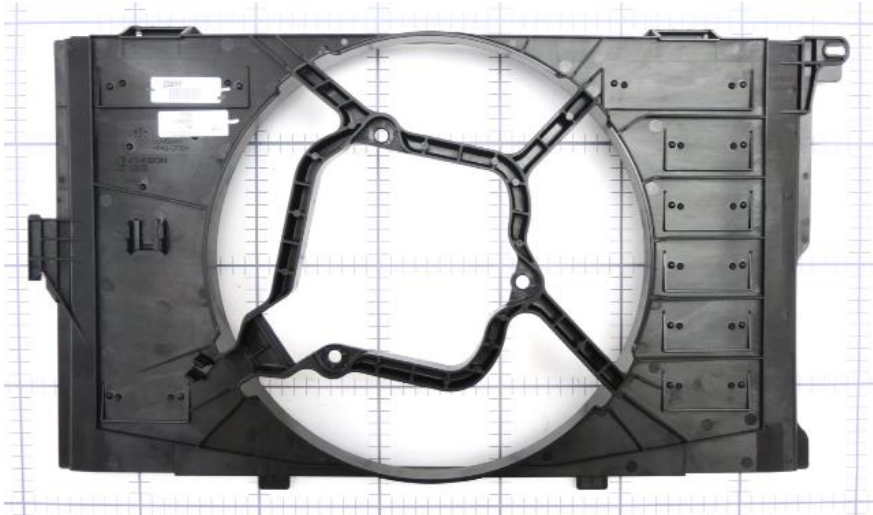
## Detailed Summary

<b>Parts</b>	<b>3</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>8</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.91%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.36</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.33</b>
<b>Total Weight (kg)</b>	<b>1.02</b>
<b>Purchased Part Cost</b>	
	<b>\$0.20</b>
<b>Material Cost</b>	
	<b>\$4.45</b>
<b>OEM Asm. Cost</b>	
	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	
	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	
	<b>\$0.15</b>
<b>Supplier Fab. Cost</b>	
	<b>\$0.40</b>
<b>Q Burden</b>	
	<b>\$0.01</b>
<b>SG&amp;A</b>	
	<b>\$0.61</b>
<b>Manufacturing Cost*</b>	
	<b>\$5.83</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Cooling Fan Shroud, Cooling Fan Shroud Asm



\...

- \Cooling Fan Shroud Asm, Cooling Fan Asm
- \Cooling Fan Shroud, Cooling Fan Shroud Asm
- \Cooling Fan Shroud Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	19.93
Total Weight (kg)	1.02
Material Cost**	\$4.45
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.40
Q Burden	\$0.00
SG&A	\$0.58
Manufacturing Cost*	\$5.44

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Cooling Fan Shroud, Cooling Fan Shroud Asm



## Cooling Fan Shroud Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
950 Ton Injection Molding Press	19.93	1	0.25	73.08	HUN	\$0.40	99.99%	\$0.00

## Cooling Fan Shroud Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Cooling Fan Shroud	1	PA6 GF30	\$4.10	1.0180	1.0840	\$0.00	\$4.45

# Assemble Labels

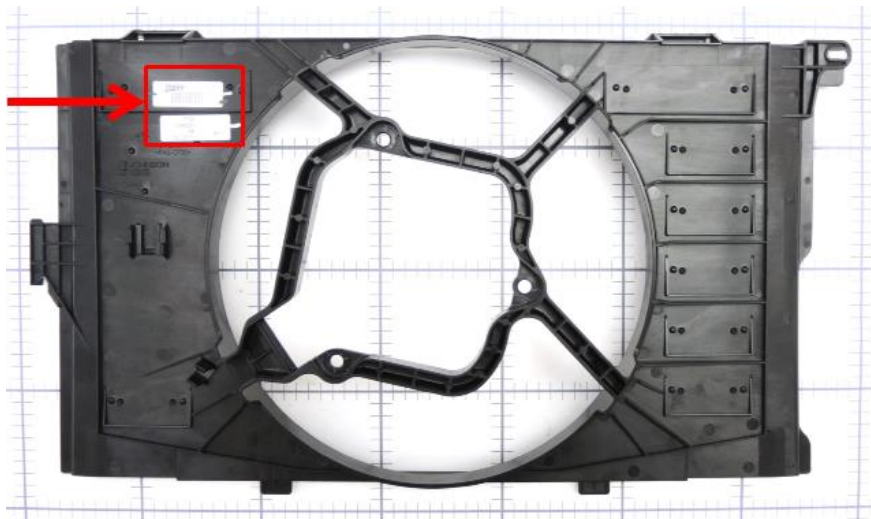


- \...
- \Cooling Fan Asm, Cooling Pack Asm
- \Cooling Fan Shroud Asm, Cooling Fan Asm
- Assemble Labels

## Process Summary

<b>Right First Time</b>	<b>99.92 %</b>
<b>Process Time (Sec)</b>	<b>21.75</b>
<b>Total Weight (kg)</b>	<b>0.00</b>

<b>Material Cost**</b>	<b>\$0.20</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.15</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.02</b>
<b>Manufacturing Cost*</b>	<b>\$0.39</b>



\* Excluding tooling, ER&D, logistics, and profit margin  
 \*\* Includes material cost and purchased parts cost

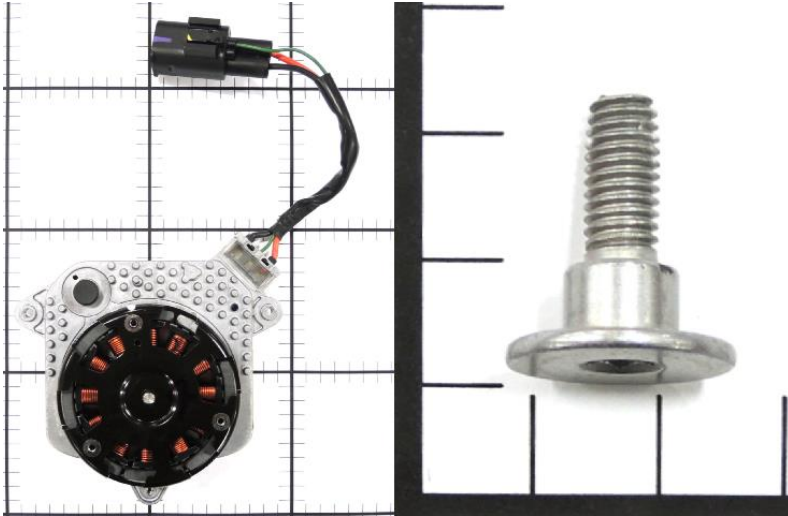
# Assemble Labels



Assemble Labels									
Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden	
Supplier Manual Asm	21.75	1	1.00	24.91	HUN	\$0.15	99.92%	\$0.01	

Assemble Labels								
Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost	
Label, Valeo Supplier QR Label, Cooling Fan Shroud	1	Commodity Item	Purchased	0.0001	-	\$0.10	\$0.00	
Label, Valeo Supplier, Cooling Fan Shroud	1	Commodity Item	Purchased	0.0001	-	\$0.10	\$0.00	

# Assemble Fan DC Motor to Shroud



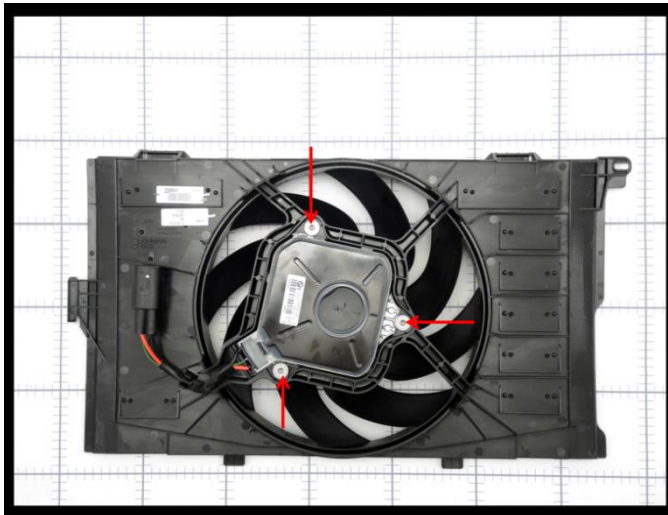
\...

- \Cooling Pack Asm
- \Cooling Fan Asm, Cooling Pack Asm
- \Assemble Fan DC Motor to Shroud

## Process Summary

Right First Time	99.25 %
Process Time (Sec)	55.00
Total Weight (kg)	2.06

Material Cost**	\$25.18
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.38
Q Burden	\$0.11
SG&A	\$0.80
Manufacturing Cost*	\$26.47



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Fan DC Motor to Shroud



## Assemble Fan DC Motor to Shroud

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	55.00	1	1.00	24.91	HUN	\$0.38	99.25%	\$0.11

## Assemble Fan DC Motor to Shroud

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Fan DC Motor, Fan DC Motor Asm	1	Commodity Item	Purchased	2.0360	-	\$25.00	\$0.00
M6x20mm - Hex Screw	3	Commodity Item	Purchased	0.0074	-	\$0.06	\$0.00

# Fan Blade, Cooling Fan Asm



\...

\Cooling Fan Asm, Cooling Pack Asm

\Fan Blade, Cooling Fan Asm

\Fan Blade process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	9.36
Total Weight (kg)	0.38

Material Cost**	\$1.66
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.15
Q Burden	\$0.00
SG&A	\$0.22
Manufacturing Cost*	\$2.03



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Fan Blade, Cooling Fan Asm



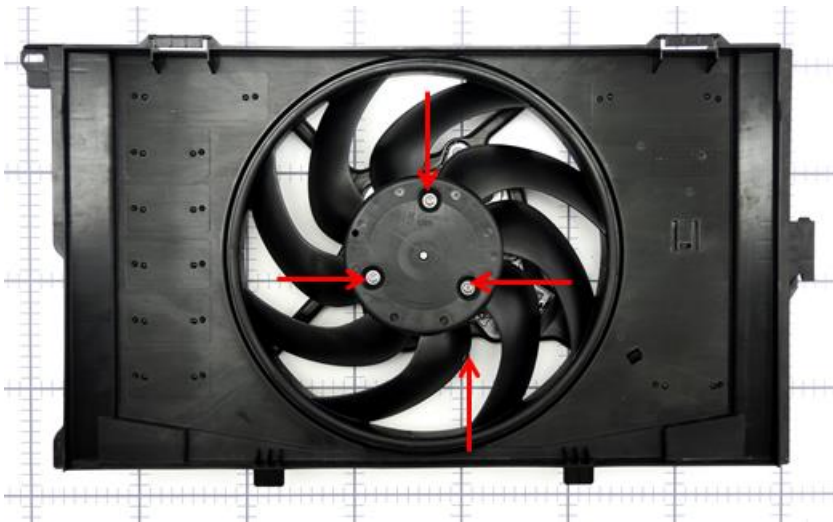
## Fan Blade process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
720 Ton Injection Molding Press	18.72	2	0.25	58.75	HUN	\$0.15	99.99%	\$0.00

## Fan Blade process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Fan Blade	1	PA6 GF30	\$4.10	0.3780	0.4040	\$0.00	\$1.66

# Assemble Fan Blade



\...

- \Cooling Pack Asm
- \Cooling Fan Asm, Cooling Pack Asm
- \Assemble Fan Blade

## Process Summary

Right First Time	99.32 %
Process Time (Sec)	56.00
Total Weight (kg)	0.01

Material Cost**	\$0.08
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.39
Q Burden	\$0.10
SG&A	\$0.05
Manufacturing Cost*	\$0.62

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Assemble Fan Blade



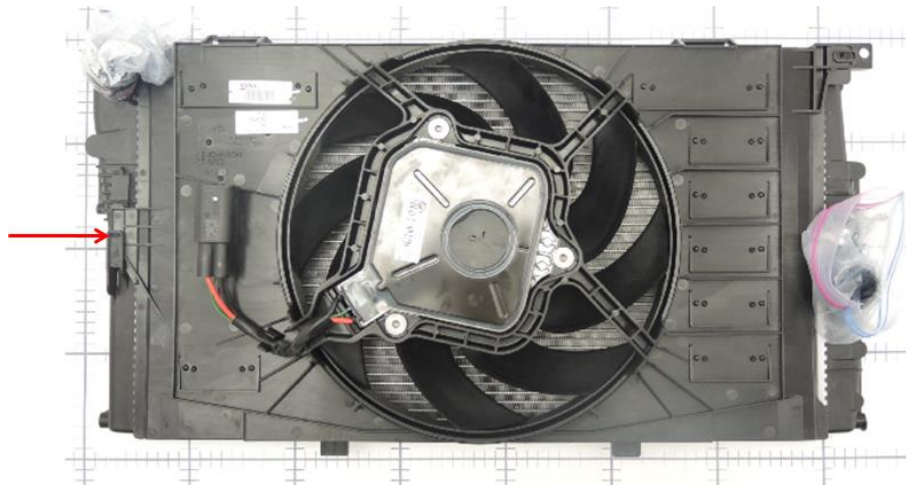
## Assemble Fan Blade

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	56.00	1	1.00	24.91	HUN	\$0.39	99.32 %	\$0.10

## Assemble Fan Blade

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
M5x14-Pan Torx Screw/w Washers	3	Commodity Item	Purchased	0.0034	-	\$0.02	\$0.00
Snap Clip, Fan Blade	1	Commodity Item	Purchased	0.0005	-	\$0.02	\$0.00

## No Commodity Items Required for This Process



\...  
\Cooling Pack  
\Cooling Pack Asm  
\Assemble Cooling Fan

### Process Summary

Right First Time	99.94 %
Process Time (Sec)	16.00
Total Weight (kg)	0.00
Material Cost**	\$0.00
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.21
Q Burden	\$0.01
SG&A	\$0.03
Manufacturing Cost*	\$0.25

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Cooling Fan



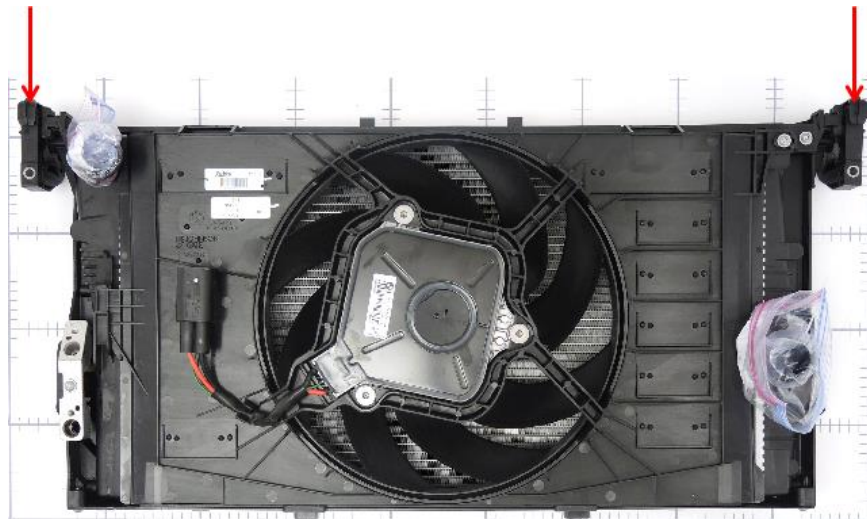
## Assemble Cooling Fan

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	16.00	1	1.00	47.68	ITA	\$0.21	99.94%	\$0.01

## Assemble Cooling Fan

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Cooling Pack Upper Isolator Asm



- \...
  - \Cooling Pack
  - \Cooling Pack Asm
  - \Cooling Pack Upper Isolator Asm
- ## Assembly Summary

<b>Parts</b>	<b>4</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>4</b>
<b>Steps</b>	<b>13</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.73 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>2.04</b>
<b>Total Weight (kg)</b>	<b>0.07</b>

<b>Material Cost**</b>	<b>\$0.31</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.65</b>
<b>Q Burden</b>	<b>\$0.04</b>
<b>SG&amp;A</b>	<b>\$0.11</b>
<b>Manufacturing Cost*</b>	<b>\$1.11</b>

\* Excluding tooling, ER&D, logistics, and profit margin  
 \*\* Includes material cost and purchased parts cost

# Cooling Pack Upper Isolator Asm



**MUNRO**  
& ASSOCIATES, INC.

## Cooling Pack Upper Isolator Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Upper Isolator Housing, Cooling Pack Upper Isolator	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.08	0.0489
Upper Isolator, Cooling Pack Upper Isolator Asm	1	2	0	2	0	99.98 %	0.00	0.00	0.00	0.59	0.0147
Buffer Block, Cooling Pack Upper Isolator Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.99	0.0078
Assemble Cooling Pack Upper Isolator	1	0	2	6	2	99.77 %	0.00	0.00	0.38	0.00	0.0000

## Cooling Pack Upper Isolator Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Upper Isolator Housing, Cooling Pack Upper Isolator	\$0.00	\$0.21	\$0.00	\$0.00	\$0.00	\$0.02	\$0.00	\$0.03	\$0.26
Upper Isolator, Cooling Pack Upper Isolator Asm	\$0.00	\$0.07	\$0.00	\$0.00	\$0.00	\$0.22	\$0.00	\$0.03	\$0.33
Buffer Block, Cooling Pack Upper Isolator Asm	\$0.00	\$0.03	\$0.00	\$0.00	\$0.00	\$0.25	\$0.00	\$0.03	\$0.31
Assemble Cooling Pack Upper Isolator	\$0.00	\$0.00	\$0.00	\$0.00	\$0.16	\$0.00	\$0.03	\$0.02	\$0.21

## Detailed Summary

<b>Parts</b>	<b>4</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>4</b>
<b>Steps</b>	<b>13</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.73%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.38</b>
<b>Supplier Fab. Time (Min)</b>	<b>1.66</b>
<b>Total Weight (kg)</b>	<b>0.07</b>
<b>Purchased Part Cost</b>	<b>\$0.00</b>
<b>Material Cost</b>	<b>\$0.31</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.16</b>
<b>Supplier Fab. Cost</b>	<b>\$0.49</b>
<b>Q Burden</b>	<b>\$0.04</b>
<b>SG&amp;A</b>	<b>\$0.11</b>
<b>Manufacturing Cost*</b>	<b>\$1.11</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Upper Isolator Housing, Cooling Pack

## Upper Isolato



\...

- \Cooling Pack Upper Isolator Asm
- \Upper Isolator Housing, Cooling Pack Upper Isolato
- \Upper Isolator Housing Process

### Process Summary

<b>Right First Time</b>	<b>99.99 %</b>
<b>Process Time (Sec)</b>	<b>4.54</b>
<b>Total Weight (kg)</b>	<b>0.05</b>
<b>Material Cost**</b>	<b>\$0.21</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.02</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.03</b>
<b>Manufacturing Cost*</b>	<b>\$0.26</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Upper Isolator Housing, Cooling Pack

## Upper Isolato



### Upper Isolator Housing Process

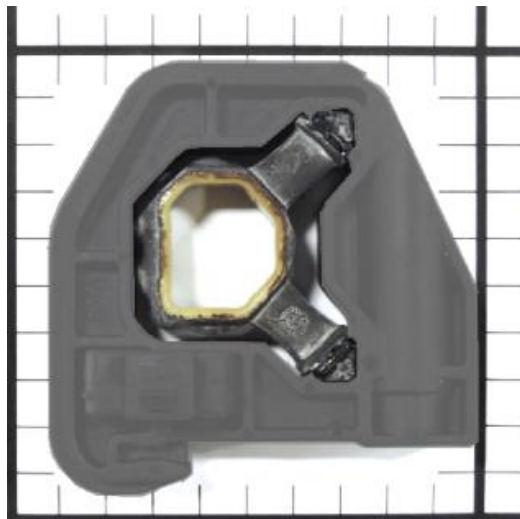
Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
150 Ton Injection Molding Press	22.70	5	0.25	18.58	CZE	\$0.02	99.99%	\$0.00

### Upper Isolator Housing Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Upper Isolator Housing	1	PA66 GF30	\$3.95	0.0489	0.0530	\$0.00	\$0.21



# Upper Isolator, Cooling Pack Upper Isolator Asm



\...

- \Cooling Pack Upper Isolator Asm
- \Upper Isolator, Cooling Pack Upper Isolator Asm
- \Upper Isolator Process

## Process Summary

<b>Right First Time</b>	<b>99.98 %</b>
<b>Process Time (Sec)</b>	<b>35.30</b>
<b>Total Weight (kg)</b>	<b>0.01</b>
<b>Material Cost**</b>	<b>\$0.07</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.22</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.03</b>
<b>Manufacturing Cost*</b>	<b>\$0.33</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Upper Isolator, Cooling Pack Upper Isolator Asm



## Upper Isolator Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
55Ton Injection Molding Press	564.80	16	0.25	22.55	CZE	\$0.22	99.98 %	\$0.00

## Upper Isolator Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material 1, Upper Isolator	1	PA66	\$4.15	0.0007	0.0010	\$0.00	\$0.01
Material 2, Upper Isolator	1	EPDM	\$4.04	0.0140	0.0150	\$0.00	\$0.06

# Buffer Block, Cooling Pack Upper Isolator Asm



\...

- \Cooling Pack Upper Isolator Asm
- \Buffer Block, Cooling Pack Upper Isolator Asm
- \Buffer Block Process

## Process Summary

<b>Right First Time</b>	<b>99.99 %</b>
<b>Process Time (Sec)</b>	<b>59.53</b>
<b>Total Weight (kg)</b>	<b>0.01</b>

<b>Material Cost**</b>	<b>\$0.03</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.25</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.03</b>
<b>Manufacturing Cost*</b>	<b>\$0.31</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Buffer Block, Cooling Pack Upper Isolator Asm



## Buffer Block Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
55Ton Injection Molding Press	476.24	8	0.25	14.88	CZE	\$0.25	99.99%	\$0.00

## Buffer Block Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Buffer Block	1	EPDM	\$4.04	0.0078	0.0080	\$0.00	\$0.03

No Commodity Items  
Required for This  
Process



\...  
\Cooling Pack Asm  
\Cooling Pack Upper Isolator Asm  
\Assemble Cooling Pack Upper Isolator

## Process Summary

Right First Time	99.77 %
Process Time (Sec)	23.00
Total Weight (kg)	0.00
Material Cost**	\$0.00
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.16
Q Burden	\$0.03
SG&A	\$0.02
Manufacturing Cost*	\$0.21

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Cooling Pack Upper Isolator



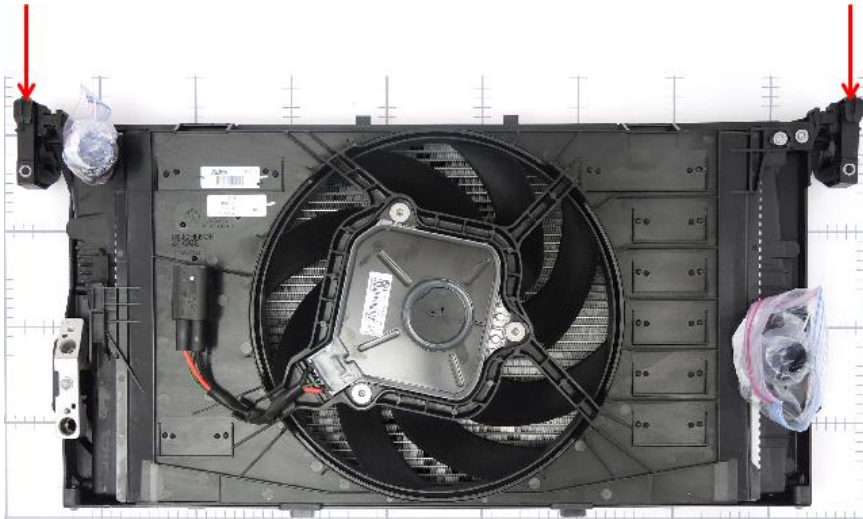
## Assemble Cooling Pack Upper Isolator

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	23.00	1	1.00	24.59	CZE	\$0.16	99.77%	\$0.03

## Assemble Cooling Pack Upper Isolator

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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## No Commodity Items Required for This Process



\...  
\Cooling Pack  
\Cooling Pack Asm  
\Assemble Cooling Pack Upper Isolator to Pack

### Process Summary

Right First Time	99.74 %
Process Time (Sec)	32.00
Total Weight (kg)	0.00
Material Cost**	\$0.00
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.42
Q Burden	\$0.04
SG&A	\$0.05
Manufacturing Cost*	\$0.51

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Cooling Pack Upper Isolator to Pack



## Assemble Cooling Pack Upper Isolator to Pack

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
<a href="#">Supplier Manual Asm</a>	32.00	1	1.00	47.68	ITA	\$0.42	99.74 %	\$0.04

## Assemble Cooling Pack Upper Isolator to Pack

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Cooling Pack Lower Isolator Asm



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\Zone 6 Cooling Pack & HVAC

\Cooling Pack

\Cooling Pack Lower Isolator Asm

## Assembly Summary

<b>Parts</b>	<b>2</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>2</b>
<b>Steps</b>	<b>8</b>
<b>Fastenings</b>	<b>1</b>
<b>Right First Time</b>	<b>99.85 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>1.99</b>
<b>Total Weight (kg)</b>	<b>0.04</b>

<b>Material Cost**</b>	<b>\$0.16</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.53</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.08</b>
<b>Manufacturing Cost*</b>	<b>\$0.79</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Cooling Pack Lower Isolator Asm



## Cooling Pack Lower Isolator Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Plastic Connector, Cooling Pack Lower Isolator Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.05	0.0045
Isolator, Cooling Pack Lower Isolator Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	1.73	0.0315
Assemble Cooling Pack Lower Isolator Asm	1	0	1	4	1	99.87 %	0.00	0.00	0.22	0.00	0.0000

## Cooling Pack Lower Isolator Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Plastic Connector, Cooling Pack Lower Isolator Asm	\$0.00	\$0.02	\$0.00	\$0.00	\$0.00	\$0.01	\$0.00	\$0.00	\$0.04
Isolator, Cooling Pack Lower Isolator Asm	\$0.00	\$0.14	\$0.00	\$0.00	\$0.00	\$0.43	\$0.00	\$0.07	\$0.64
Assemble Cooling Pack Lower Isolator Asm	\$0.00	\$0.00	\$0.00	\$0.00	\$0.09	\$0.00	\$0.02	\$0.01	\$0.12

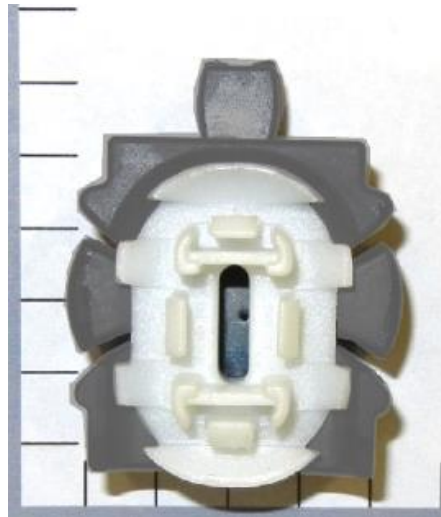
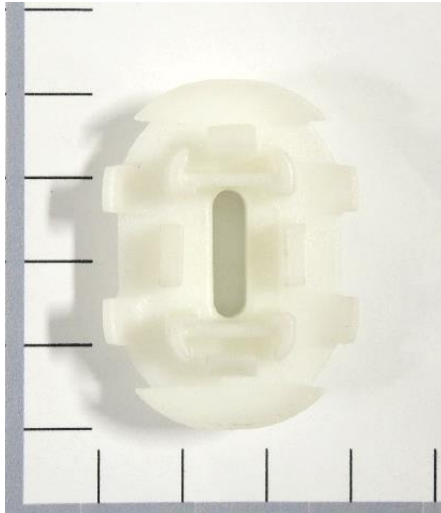
## Detailed Summary

<b>Parts</b>	<b>2</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>2</b>
<b>Steps</b>	<b>8</b>
<b>Fastenings</b>	<b>1</b>
<b>Right First Time</b>	<b>99.85%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.22</b>
<b>Supplier Fab. Time (Min)</b>	<b>1.77</b>
<b>Total Weight (kg)</b>	<b>0.04</b>
<hr/>	
<b>Purchased Part Cost</b>	<b>\$0.00</b>
<b>Material Cost</b>	<b>\$0.16</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.09</b>
<b>Supplier Fab. Cost</b>	<b>\$0.44</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.08</b>
<b>Manufacturing Cost*</b>	<b>\$0.79</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Plastic Connector, Cooling Pack Lower Isolator Asm



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- \Cooling Pack Lower Isolator Asm
- \Plastic Connector, Cooling Pack Lower Isolator Asm
- \Plastic Connector Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	2.71
Total Weight (kg)	0.00

Material Cost**	\$0.02
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.01
Q Burden	\$0.00
SG&A	\$0.00
Manufacturing Cost*	\$0.04

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Plastic Connector, Cooling Pack Lower Isolator Asm



## Plastic Connector Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
55Ton Injection Molding Press	16.26	6	0.25	14.88	CZE	\$0.01	99.99%	\$0.00

## Plastic Connector Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material,Plastic Connector	1	PA66 GF15	\$4.32	0.0045	0.0050	\$0.00	\$0.02



\...  
 \Cooling Pack Lower Isolator Asm  
 \Isolator, Cooling Pack Lower Isolator Asm  
 \Plastic Connector Process

## Process Summary

<b>Right First Time</b>	<b>99.99 %</b>
<b>Process Time (Sec)</b>	<b>103.55</b>
<b>Total Weight (kg)</b>	<b>0.03</b>

<b>Material Cost**</b>	<b>\$0.14</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.43</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.07</b>
<b>Manufacturing Cost*</b>	<b>\$0.64</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Isolator, Cooling Pack Lower Isolator Asm



## Plastic Connector Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
55Ton Injection Molding Press	621.30	6	0.25	14.88	CZE	\$0.43	99.99%	\$0.00

## Plastic Connector Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material_Isolator	1	EPDM	\$4.04	0.0315	0.0340	\$0.00	\$0.14

## No Commodity Items Required for This Process



\...

\Cooling Pack

\Cooling Pack Lower Isolator Asm

\Assemble Cooling Pack Lower Isolator Asm

### Process Summary

Right First Time	99.87 %
Process Time (Sec)	13.00
Total Weight (kg)	0.00

Material Cost**	\$0.00
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.09
Q Burden	\$0.02
SG&A	\$0.01
Manufacturing Cost*	\$0.12

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Assemble Cooling Pack Lower Isolator Asm



## Assemble Cooling Pack Lower Isolator Asm

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
<a href="#">Supplier Manual Asm</a>	13.00	1	1.00	24.59	CZE	\$0.09	99.87%	\$0.02

## Assemble Cooling Pack Lower Isolator Asm

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Cooling Pack Installation



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\Zone 6 Cooling Pack & HVAC

\Cooling Pack

\Cooling Pack Installation

## Process Summary

Right First Time	98.89 %
Process Time (Sec)	122.00
Total Weight (kg)	0.03

Material Cost**	\$0.12
OEM Process Cost	\$3.10
Supplier Process Cost	\$0.00
Q Burden	\$0.17
SG&A	\$0.38
Manufacturing Cost*	\$3.76



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Cooling Pack Installation

## Cooling Pack Installation

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
OEM Manual Asm	122.00	1	1.00	91.41	GER	\$3.10	98.89%	\$0.17

## Cooling Pack Installation

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
M6x23mm-Torx SEMS Bolt	2	Commodity Item	Purchased	0.0083	-	\$0.03	\$0.00
M6x30mm-Pan Head Torx Bolt	2	Commodity Item	Purchased	0.0076	-	\$0.03	\$0.00

# Cooling Pack Line Bundle Passenger Side Asm



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\Zone 6 Cooling Pack & HVAC

\Cooling Pack

\Cooling Pack Line Bundle Passenger Side Asm

## Assembly Summary

<b>Parts</b>	<b>98</b>
<b>Fasteners</b>	<b>12</b>
<b>Part Numbers</b>	<b>54</b>
<b>Steps</b>	<b>744</b>
<b>Fastenings</b>	<b>101</b>
<b>Right First Time</b>	<b>91.15 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>33.11</b>
<b>Total Weight (kg)</b>	<b>2.31</b>

<b>Material Cost**</b>	<b>\$15.15</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$13.51</b>
<b>Q Burden</b>	<b>\$1.39</b>
<b>SG&amp;A</b>	<b>\$3.22</b>
<b>Manufacturing Cost*</b>	<b>\$33.27</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Cooling Pack Line Bundle Passenger Side Asm



**MUNRO**  
& ASSOCIATES, INC.

## Cooling Pack Line Bundle Passenger Side Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Combination Bracket Asm,Cooling Pack Bundle Brkt	3	12	9	60	9	98.90 %	0.00	0.00	1.50	1.20	0.1012
Pressure Pipe Asm,Cooling Pack Line Bundle Passen	1	17	14	182	14	98.42 %	0.00	0.00	4.31	2.85	0.2841
Suction Pipe Asm,Cooling Pack Line Bundle Passenge	1	11	9	128	9	98.64 %	0.00	0.00	2.75	3.04	0.5662
Compressor Suction PipeAsm,Cooling Pack Line Bund	1	11	9	130	9	98.68 %	0.00	0.00	2.34	2.98	0.3486
Coolant Feed LineAsm, Cooling Pack Line Bundle Pa	1	23	18	85	18	98.64 %	0.00	0.00	3.74	1.63	0.8050
Assemble Cooling Pack Bundle Passenger Side Asm	1	0	24	32	24	99.70 %	0.00	0.00	1.37	0.00	0.0000

## Cooling Pack Line Bundle Passenger Side Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Combination Bracket Asm,Cooling Pack Bundle Brkt	\$0.25	\$0.46	\$0.00	\$0.00	\$0.60	\$0.28	\$0.17	\$0.17	\$1.92
Pressure Pipe Asm,Cooling Pack Line Bundle Passen	\$0.27	\$1.55	\$0.00	\$0.00	\$1.68	\$1.41	\$0.24	\$0.56	\$5.71
Suction Pipe Asm,Cooling Pack Line Bundle Passenge	\$0.16	\$3.51	\$0.00	\$0.00	\$1.07	\$1.44	\$0.21	\$0.73	\$7.11
Compressor Suction PipeAsm,Cooling Pack Line Bund	\$0.16	\$2.13	\$0.00	\$0.00	\$0.91	\$1.39	\$0.20	\$0.54	\$5.33
Coolant Feed LineAsm, Cooling Pack Line Bundle Pa	\$1.04	\$4.20	\$0.00	\$0.00	\$1.64	\$0.78	\$0.21	\$0.83	\$8.69
Assemble Cooling Pack Bundle Passenger Side Asm	\$0.00	\$0.00	\$0.00	\$0.00	\$0.57	\$0.00	\$0.05	\$0.07	\$0.68

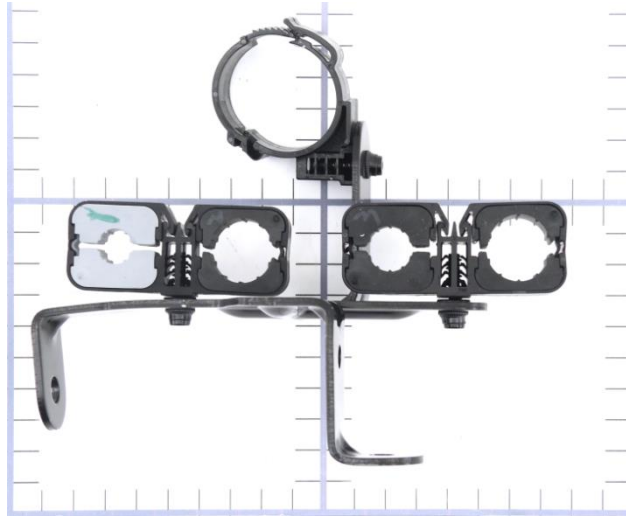
## Detailed Summary

<b>Parts</b>	<b>98</b>
<b>Fasteners</b>	<b>12</b>
<b>Part Numbers</b>	<b>54</b>
<b>Steps</b>	<b>744</b>
<b>Fastenings</b>	<b>101</b>
<b>Right First Time</b>	<b>91.15%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>19.01</b>
<b>Supplier Fab. Time (Min)</b>	<b>14.10</b>
<b>Total Weight (kg)</b>	<b>2.31</b>
<b>Purchased Part Cost</b>	
	<b>\$2.38</b>
<b>Material Cost</b>	
	<b>\$12.77</b>
<b>OEM Asm. Cost</b>	
	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	
	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	
	<b>\$7.66</b>
<b>Supplier Fab. Cost</b>	
	<b>\$5.85</b>
<b>Q Burden</b>	
	<b>\$1.39</b>
<b>SG&amp;A</b>	
	<b>\$3.22</b>
<b>Manufacturing Cost*</b>	
	<b>\$33.27</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Combination Bracket Asm, Cooling Pack Bundle Brkt



\...  
 \Cooling Pack  
 \Cooling Pack Line Bundle Passenger Side Asm  
 \Combination Bracket Asm, Cooling Pack Bundle Brkt

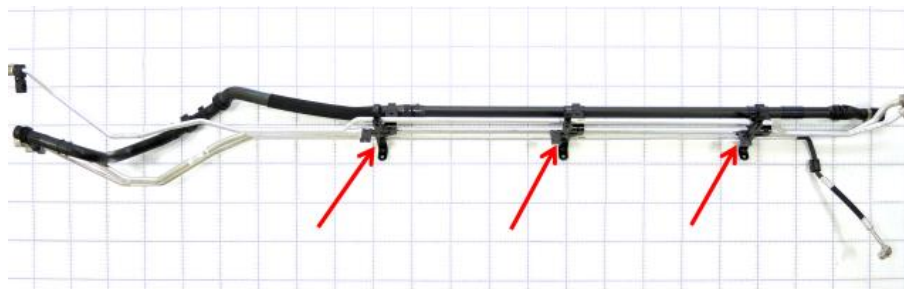
## Assembly Summary

<b>Parts</b>	<b>12</b>
<b>Fasteners</b>	<b>3</b>
<b>Part Numbers</b>	<b>7</b>
<b>Steps</b>	<b>60</b>
<b>Fastenings</b>	<b>9</b>
<b>Right First Time</b>	<b>98.90 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>2.70</b>
<b>Total Weight (kg)</b>	<b>0.10</b>

<b>Material Cost**</b>	<b>\$0.71</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.88</b>
<b>Q Burden</b>	<b>\$0.17</b>
<b>SG&amp;A</b>	<b>\$0.17</b>
<b>Manufacturing Cost*</b>	<b>\$1.92</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Combination Bracket Asm, Cooling Pack Bundle Brkt



## Combination Bracket Asm, Cooling Pack Bundle Brkt

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Metal Bracket Asm, Combination Bracket Asm	1	5	2	25	2	99.73 %	0.00	0.00	0.20	0.37	0.0654
Double Line Clip Asm, Combination Bracket Asm	2	3	2	12	2	99.86 %	0.00	0.00	0.33	0.41	0.0139
Assemble Cooling Pack Bracket PS Asm	1	1	3	8	3	99.45 %	0.00	0.00	0.63	0.00	0.0080

## Combination Bracket Asm, Cooling Pack Bundle Brkt

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Metal Bracket Asm, Combination Bracket Asm	\$0.15	\$0.36	\$0.00	\$0.00	\$0.06	\$0.07	\$0.04	\$0.06	\$0.74
Double Line Clip Asm, Combination Bracket Asm	\$0.00	\$0.05	\$0.00	\$0.00	\$0.14	\$0.10	\$0.02	\$0.03	\$0.35
Assemble Cooling Pack Bracket PS Asm	\$0.10	\$0.00	\$0.00	\$0.00	\$0.26	\$0.00	\$0.08	\$0.03	\$0.48



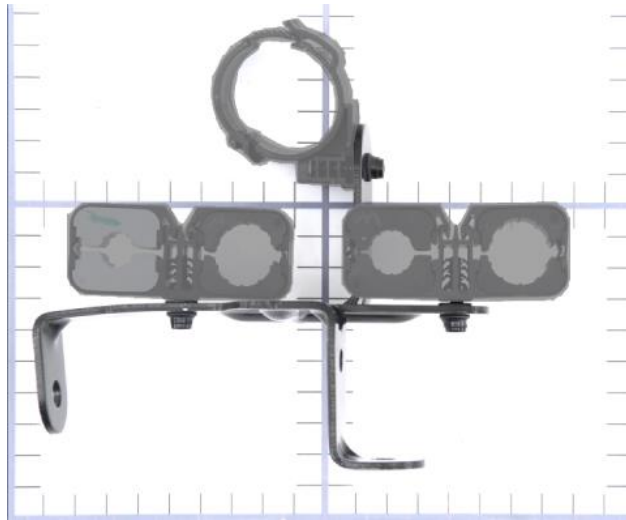
## Detailed Summary

<b>Parts</b>	<b>12</b>
<b>Fasteners</b>	<b>3</b>
<b>Part Numbers</b>	<b>7</b>
<b>Steps</b>	<b>60</b>
<b>Fastenings</b>	<b>9</b>
<b>Right First Time</b>	<b>98.9%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>1.50</b>
<b>Supplier Fab. Time (Min)</b>	<b>1.20</b>
<b>Total Weight (kg)</b>	<b>0.10</b>
<hr/>	
<b>Purchased Part Cost</b>	<b>\$0.25</b>
<b>Material Cost</b>	<b>\$0.46</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.60</b>
<b>Supplier Fab. Cost</b>	<b>\$0.28</b>
<b>Q Burden</b>	<b>\$0.17</b>
<b>SG&amp;A</b>	<b>\$0.17</b>
<b>Manufacturing Cost*</b>	<b>\$1.92</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Metal Bracket Asm, Combination Bracket Asm



- \...
- \Cooling Pack Line Bundle Passenger Side Asm
- \Combination Bracket Asm, Cooling Pack Bundle Brkt
- \Metal Bracket Asm, Combination Bracket Asm

## Assembly Summary

<b>Parts</b>	<b>5</b>
<b>Fasteners</b>	<b>3</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>25</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.73 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>0.57</b>
<b>Total Weight (kg)</b>	<b>0.07</b>

<b>Material Cost**</b>	<b>\$0.51</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.13</b>
<b>Q Burden</b>	<b>\$0.04</b>
<b>SG&amp;A</b>	<b>\$0.06</b>
<b>Manufacturing Cost*</b>	<b>\$0.74</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Metal Bracket Asm, Combination Bracket Asm



## Metal Bracket Asm, Combination Bracket Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Bracket, Bracket Asm	1	1	0	7	0	99.97 %	0.00	0.00	0.00	0.16	0.0549
Assemble Bracket	1	4	2	17	2	99.76 %	0.00	0.00	0.20	0.21	0.0105

## Metal Bracket Asm, Combination Bracket Asm

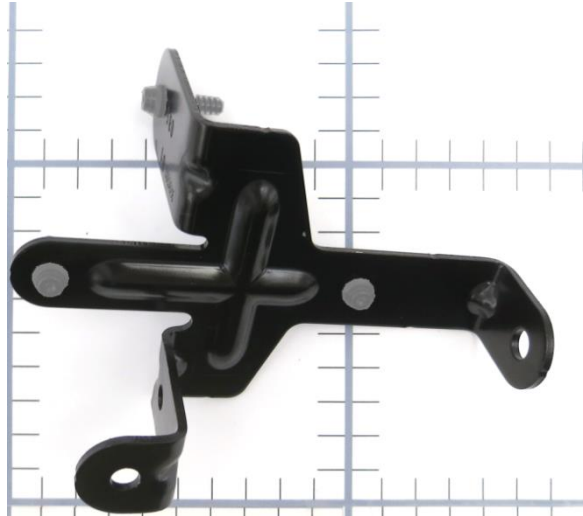
Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Bracket, Bracket Asm	\$0.00	\$0.34	\$0.00	\$0.00	\$0.00	\$0.03	\$0.00	\$0.04	\$0.41
Assemble Bracket	\$0.15	\$0.02	\$0.00	\$0.00	\$0.06	\$0.05	\$0.04	\$0.02	\$0.33

## Detailed Summary

<b>Parts</b>	<b>5</b>
<b>Fasteners</b>	<b>3</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>25</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.73%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.20</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.37</b>
<b>Total Weight (kg)</b>	<b>0.07</b>
<b>Purchased Part Cost</b>	
	<b>\$0.15</b>
<b>Material Cost</b>	
	<b>\$0.36</b>
<b>OEM Asm. Cost</b>	
	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	
	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	
	<b>\$0.06</b>
<b>Supplier Fab. Cost</b>	
	<b>\$0.07</b>
<b>Q Burden</b>	
	<b>\$0.04</b>
<b>SG&amp;A</b>	
	<b>\$0.06</b>
<b>Manufacturing Cost*</b>	
	<b>\$0.74</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



\...

\Metal Bracket Asm, Combination Bracket Asm  
 \Bracket, Bracket Asm  
 \Bracket Process

## Process Summary

<b>Right First Time</b>	<b>99.97 %</b>
<b>Process Time (Sec)</b>	<b>9.67</b>
<b>Total Weight (kg)</b>	<b>0.05</b>

<b>Material Cost**</b>	<b>\$0.34</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.03</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.04</b>
<b>Manufacturing Cost*</b>	<b>\$0.41</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Bracket, Bracket Asm

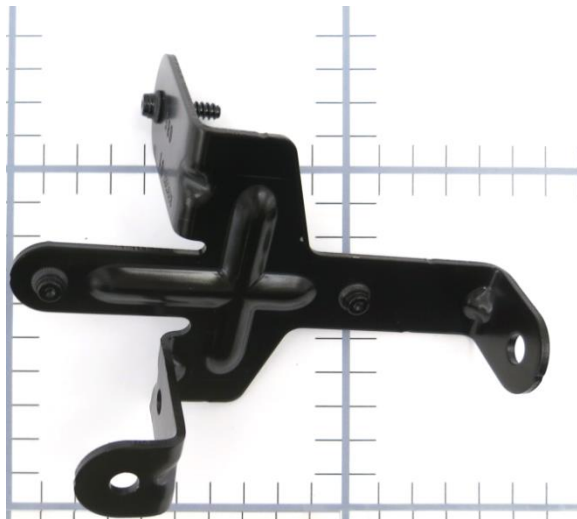
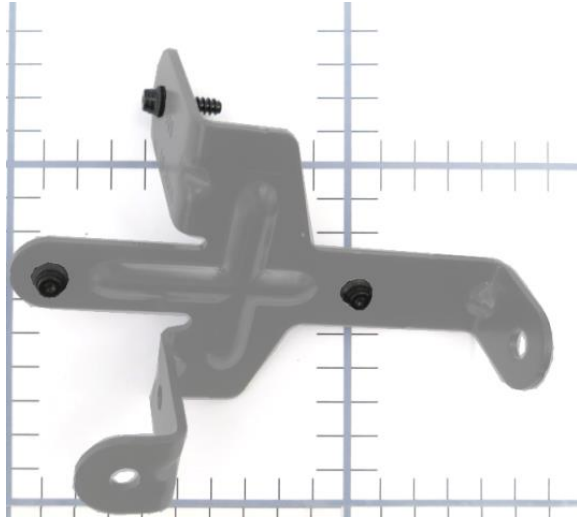
## Bracket Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.95	HUN	\$0.02	99.99%	\$0.00
Deburr	4.00	1	0.25	4.86	HUN	\$0.01	99.99%	\$0.00
60 Ton Stamping Press	0.67	1	0.25	17.46	HUN	\$0.00	99.99%	\$0.00

## Bracket Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Bracket	1	Aluminum 6061 - Coil Stock	\$2.80	0.0549	0.1200	\$0.00	\$0.34

# Assemble Bracket



\...  
 \Combination Bracket Asm, Cooling Pack Bundle Brkt  
 \Metal Bracket Asm, Combination Bracket Asm  
 \Assemble Bracket

## Process Summary

<b>Right First Time</b>	<b>99.76 %</b>
<b>Process Time (Sec)</b>	<b>24.51</b>
<b>Total Weight (kg)</b>	<b>0.01</b>

<b>Material Cost**</b>	<b>\$0.17</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.11</b>
<b>Q Burden</b>	<b>\$0.04</b>
<b>SG&amp;A</b>	<b>\$0.02</b>
<b>Manufacturing Cost*</b>	<b>\$0.33</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Bracket



## Assemble Bracket

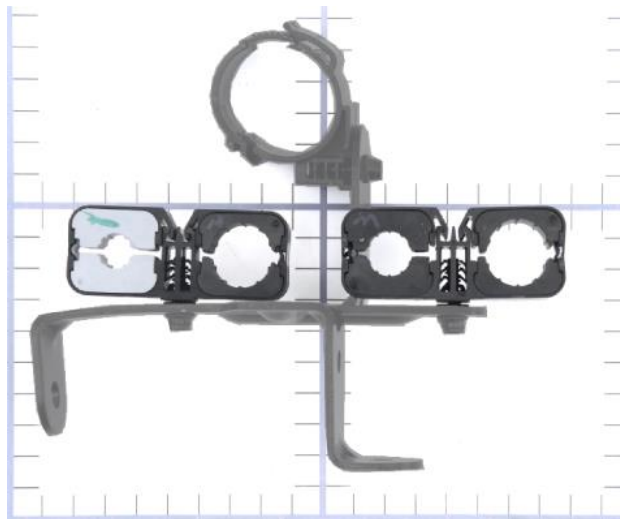
Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Cure	10.33	1	0.25	9.58	HUN	\$0.03	99.97 %	\$0.01
Dip Painting Line	2.18	1	0.25	31.47	HUN	\$0.02	99.99 %	\$0.00
Supplier Automated Asm	12.00	1	0.25	17.59	HUN	\$0.06	99.81 %	\$0.03

## Assemble Bracket

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Paint, Bracket Asm	1	E-Coat		By Area	0.0000	-	\$0.00
M5x18-Press-in Screw	3	Commodity Item		Purchased	0.0035	-	\$0.05



# Double Line Clip Asm, Combination Bracket Asm



- \...
- \Cooling Pack Line Bundle Passenger Side Asm
- \Combination Bracket Asm, Cooling Pack Bundle Brkt
- \Double Line Clip Asm, Combination Bracket Asm

## Assembly Summary

<b>Parts</b>	<b>3</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>12</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.86 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>0.75</b>
<b>Total Weight (kg)</b>	<b>0.01</b>

<b>Material Cost**</b>	<b>\$0.05</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.24</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.03</b>
<b>Manufacturing Cost*</b>	<b>\$0.35</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Double Line Clip Asm, Combination Bracket Asm



## Double Line Clip Asm, Combination Bracket Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Double Line Clip, Double line Clip Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.05	0.0067
Isolator 1, Double Line Clip Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.18	0.0043
Isolator 2, Double Line Clip Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.18	0.0029
Assemble Double Line Clip Asm	1	0	2	6	2	99.89 %	0.00	0.00	0.33	0.00	0.0000

## Double Line Clip Asm, Combination Bracket Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Double Line Clip, Double line Clip Asm	\$0.00	\$0.03	\$0.00	\$0.00	\$0.00	\$0.01	\$0.00	\$0.00	\$0.05
Isolator 1, Double Line Clip Asm	\$0.00	\$0.01	\$0.00	\$0.00	\$0.00	\$0.05	\$0.00	\$0.01	\$0.06
Isolator 2, Double Line Clip Asm	\$0.00	\$0.01	\$0.00	\$0.00	\$0.00	\$0.05	\$0.00	\$0.01	\$0.06
Assemble Double Line Clip Asm	\$0.00	\$0.00	\$0.00	\$0.00	\$0.14	\$0.00	\$0.02	\$0.02	\$0.17

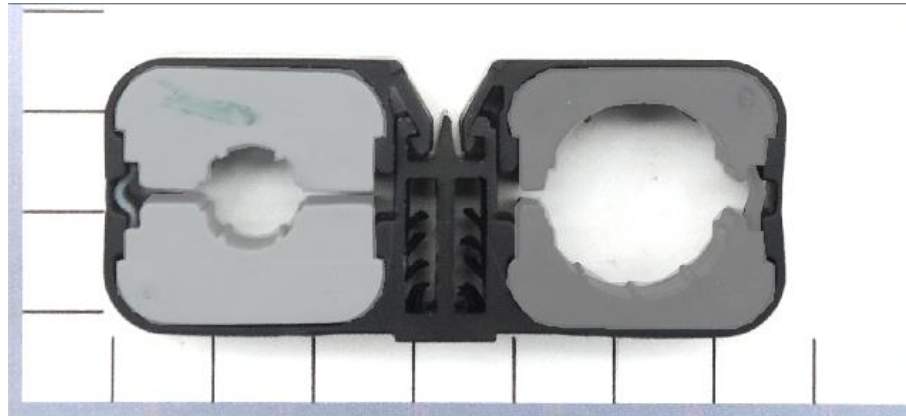
## Detailed Summary

<b>Parts</b>	<b>3</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>12</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.86%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.33</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.41</b>
<b>Total Weight (kg)</b>	<b>0.01</b>
<b>Purchased Part Cost</b>	
	<b>\$0.00</b>
<b>Material Cost</b>	
	<b>\$0.05</b>
<b>OEM Asm. Cost</b>	
	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	
	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	
	<b>\$0.14</b>
<b>Supplier Fab. Cost</b>	
	<b>\$0.10</b>
<b>Q Burden</b>	
	<b>\$0.02</b>
<b>SG&amp;A</b>	
	<b>\$0.03</b>
<b>Manufacturing Cost*</b>	
	<b>\$0.35</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Double Line Clip, Double line Clip Asm



\...

- \Double Line Clip Asm, Combination Bracket Asm
- \Double Line Clip, Double line Clip Asm
- \Double Line Clip Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	2.74
Total Weight (kg)	0.01
Material Cost**	\$0.03
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.01
Q Burden	\$0.00
SG&A	\$0.00
Manufacturing Cost*	\$0.05

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Double Line Clip, Double line Clip Asm



## Double Line Clip Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
55Ton Injection Molding Press	16.44	6	0.25	14.89	HUN	\$0.01	99.99%	\$0.00

## Double Line Clip Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Double Line Clip	1	PA6	\$4.39	0.0067	0.0070	\$0.00	\$0.03

# Isolator 1, Double Line Clip Asm



\...

\Double Line Clip Asm, Combination Bracket Asm

\Isolator 1, Double Line Clip Asm

\Isolator 1 Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	11.06
Total Weight (kg)	0.00

Material Cost**	\$0.01
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.05
Q Burden	\$0.00
SG&A	\$0.01
Manufacturing Cost*	\$0.06



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Isolator 1, Double Line Clip Asm



## Isolator 1 Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
55 Ton Injection Molding Press	66.36	6	0.25	14.89	HUN	\$0.05	99.99%	\$0.00

## Isolator 1 Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Isolator 1	1	TPE	\$2.54	0.0043	0.0050	\$0.00	\$0.01

# Isolator 2, Double Line Clip Asm



\...

\Double Line Clip Asm, Combination Bracket Asm

\Isolator 2, Double Line Clip Asm

\Isolator 2 Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	11.04
Total Weight (kg)	0.00

Material Cost**	\$0.01
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.05
Q Burden	\$0.00
SG&A	\$0.01
Manufacturing Cost*	\$0.06



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Isolator 2, Double Line Clip Asm



## Isolator 2 Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
55 Ton Injection Molding Press	66.24	6	0.25	14.89	HUN	\$0.05	99.99%	\$0.00

## Isolator 2 Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Isolator 2	1	TPE	\$2.54	0.0029	0.0030	\$0.00	\$0.01

No Commodity Items  
Required for This  
Process



\...

- \Combination Bracket Asm, Cooling Pack Bundle Brkt
- \Double Line Clip Asm, Combination Bracket Asm
- \Assemble Double Line Clip Asm

## Process Summary

Right First Time	99.89 %
Process Time (Sec)	20.00
Total Weight (kg)	0.00

Material Cost**	\$0.00
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.14
Q Burden	\$0.02
SG&A	\$0.02
Manufacturing Cost*	\$0.17

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Double Line Clip Asm



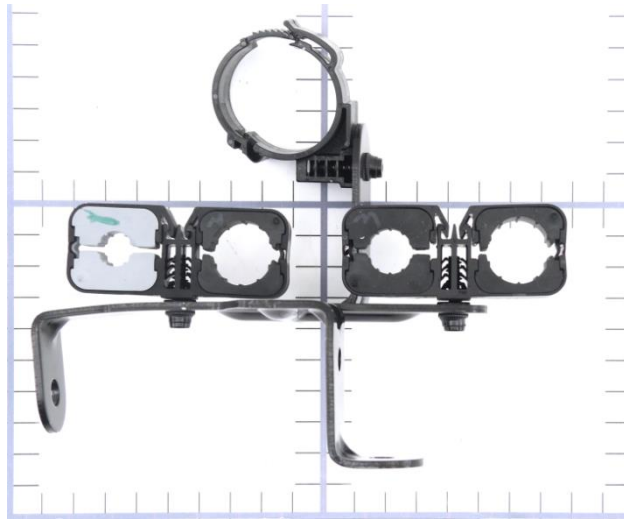
## Assemble Double Line Clip Asm

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	20.00	1	1.00	24.91	HUN	\$0.14	99.89%	\$0.02

## Assemble Double Line Clip Asm

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Assemble Cooling Pack Bracket PS Asm



\...

- \Cooling Pack Line Bundle Passenger Side Asm
- \Combination Bracket Asm, Cooling Pack Bundle Brkt
- \Assemble Cooling Pack Bracket PS Asm

## Process Summary

Right First Time	99.45 %
Process Time (Sec)	38.00
Total Weight (kg)	0.01

Material Cost**	\$0.10
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.26
Q Burden	\$0.08
SG&A	\$0.03
Manufacturing Cost*	\$0.48

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Cooling Pack Bracket PS Asm



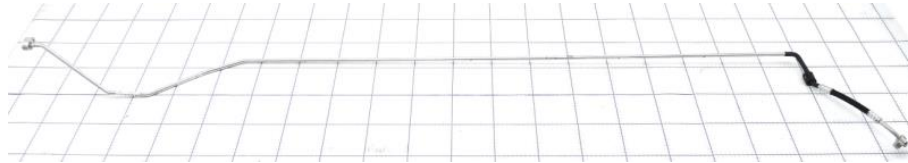
## Assemble Cooling Pack Bracket PS Asm

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	38.00	1	1.00	24.91	HUN	\$0.26	99.45%	\$0.08

## Assemble Cooling Pack Bracket PS Asm

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Line Clamp, Combination Bracket Asm	1	Commodity Item	Purchased	0.0080	-	\$0.10	\$0.00

# Pressure Pipe Asm, Cooling Pack Line Bundle Passen



\...  
 \Cooling Pack  
 \Cooling Pack Line Bundle Passenger Side Asm  
 \Pressure Pipe Asm, Cooling Pack Line Bundle Passen  
**Assembly Summary**

<b>Parts</b>	<b>17</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>16</b>
<b>Steps</b>	<b>182</b>
<b>Fastenings</b>	<b>14</b>
<b>Right First Time</b>	<b>98.42 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>7.16</b>
<b>Total Weight (kg)</b>	<b>0.28</b>

<b>Material Cost**</b>	<b>\$1.82</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$3.09</b>
<b>Q Burden</b>	<b>\$0.24</b>
<b>SG&amp;A</b>	<b>\$0.56</b>
<b>Manufacturing Cost*</b>	<b>\$5.71</b>

\* Excluding tooling, ER&D, logistics, and profit margin  
 \*\* Includes material cost and purchased parts cost

# Pressure Pipe Asm, Cooling Pack Line Bundle Passen



## Pressure Pipe Asm, Cooling Pack Line Bundle Passen

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Connector 1 Asm, Pressure Pipe Asm	1	4	3	42	3	99.73 %	0.00	0.00	0.45	0.94	0.0332
Short Tube Asm, Pressure Pipe Asm	1	2	1	36	1	99.73 %	0.00	0.00	1.03	0.33	0.0187
14mm Wrapped Hose, Hose Tube Asm	1	4	0	4	0	99.96 %	0.00	0.00	0.00	0.05	0.0218
Long Tube Asm, Pressure Pipe Asm	1	3	3	47	3	99.31 %	0.00	0.00	1.38	0.71	0.1651
Connector 2, Pressure Pipe Asm	1	1	0	30	0	99.90 %	0.00	0.00	0.00	0.81	0.0360
Tube Isolator, Pressure Pipe Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.01	0.0091
Assemble Pressure Pipe	1	2	7	16	7	99.79 %	0.00	0.00	1.45	0.00	0.0002

## Pressure Pipe Asm, Cooling Pack Line Bundle Passen

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Connector 1 Asm, Pressure Pipe Asm	\$0.04	\$0.19	\$0.00	\$0.00	\$0.19	\$0.54	\$0.04	\$0.11	\$1.11
Short Tube Asm, Pressure Pipe Asm	\$0.00	\$0.11	\$0.00	\$0.00	\$0.40	\$0.11	\$0.04	\$0.07	\$0.74
14mm Wrapped Hose, Hose Tube Asm	\$0.00	\$0.13	\$0.00	\$0.00	\$0.00	\$0.06	\$0.01	\$0.02	\$0.22
Long Tube Asm, Pressure Pipe Asm	\$0.08	\$0.92	\$0.00	\$0.00	\$0.54	\$0.24	\$0.10	\$0.21	\$2.09
Connector 2, Pressure Pipe Asm	\$0.00	\$0.16	\$0.00	\$0.00	\$0.00	\$0.46	\$0.02	\$0.07	\$0.71
Tube Isolator, Pressure Pipe Asm	\$0.00	\$0.04	\$0.00	\$0.00	\$0.00	\$0.01	\$0.00	\$0.01	\$0.05
Assemble Pressure Pipe	\$0.15	\$0.00	\$0.00	\$0.00	\$0.55	\$0.00	\$0.03	\$0.07	\$0.80

## Detailed Summary

<b>Parts</b>	<b>17</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>16</b>
<b>Steps</b>	<b>182</b>
<b>Fastenings</b>	<b>14</b>
<b>Right First Time</b>	<b>98.42%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>4.31</b>
<b>Supplier Fab. Time (Min)</b>	<b>2.85</b>
<b>Total Weight (kg)</b>	<b>0.28</b>
<hr/>	
<b>Purchased Part Cost</b>	<b>\$0.27</b>
<b>Material Cost</b>	<b>\$1.55</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$1.68</b>
<b>Supplier Fab. Cost</b>	<b>\$1.41</b>
<b>Q Burden</b>	<b>\$0.24</b>
<b>SG&amp;A</b>	<b>\$0.56</b>
<b>Manufacturing Cost*</b>	<b>\$5.71</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Connector 1 Asm, Pressure Pine Asm



- \...
- \Cooling Pack Line Bundle Passenger Side Asm
- \Pressure Pipe Asm, Cooling Pack Line Bundle Passen
- \Connector 1 Asm, Pressure Pine Asm

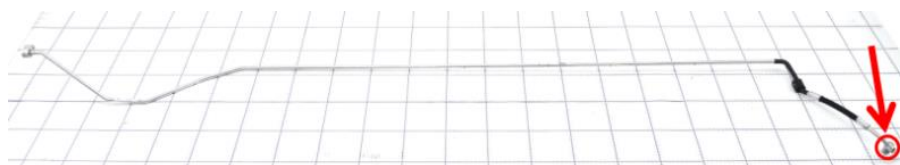
## Assembly Summary

<b>Parts</b>	<b>4</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>4</b>
<b>Steps</b>	<b>42</b>
<b>Fastenings</b>	<b>3</b>
<b>Right First Time</b>	<b>99.73 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>1.39</b>
<b>Total Weight (kg)</b>	<b>0.03</b>

<b>Material Cost**</b>	<b>\$0.23</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.72</b>
<b>Q Burden</b>	<b>\$0.04</b>
<b>SG&amp;A</b>	<b>\$0.11</b>
<b>Manufacturing Cost*</b>	<b>\$1.11</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Connector 1 Asm, Pressure Pine Asm



## Connector 1 Asm, Pressure Pine Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Connecting Block, Connector 1 Asm	1	1	0	31	0	99.91 %	0.00	0.00	0.00	0.93	0.0320
End Cap, Connector 1 Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.01	0.0003
Assemble Connector 1	1	2	3	8	3	99.83 %	0.00	0.00	0.45	0.00	0.0009

## Connector 1 Asm, Pressure Pine Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Connecting Block, Connector 1 Asm	\$0.00	\$0.18	\$0.00	\$0.00	\$0.00	\$0.53	\$0.01	\$0.09	\$0.81
End Cap, Connector 1 Asm	\$0.00	\$0.01	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.02
Assemble Connector 1	\$0.04	\$0.00	\$0.00	\$0.00	\$0.19	\$0.00	\$0.03	\$0.02	\$0.28

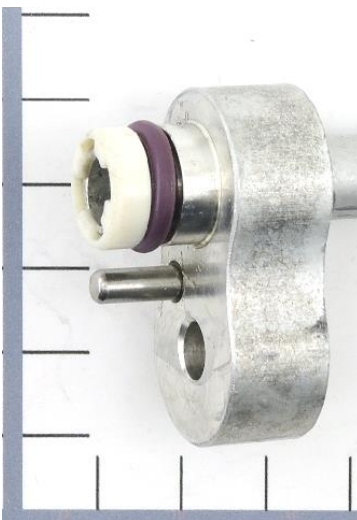
## Detailed Summary

<b>Parts</b>	<b>4</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>4</b>
<b>Steps</b>	<b>42</b>
<b>Fastenings</b>	<b>3</b>
<b>Right First Time</b>	<b>99.73%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.45</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.94</b>
<b>Total Weight (kg)</b>	<b>0.03</b>
<b>Purchased Part Cost</b>	<b>\$0.04</b>
<b>Material Cost</b>	<b>\$0.19</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.19</b>
<b>Supplier Fab. Cost</b>	<b>\$0.54</b>
<b>Q Burden</b>	<b>\$0.04</b>
<b>SG&amp;A</b>	<b>\$0.11</b>
<b>Manufacturing Cost*</b>	<b>\$1.11</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connecting Block, Connector 1 Asm



\...

\Connector 1 Asm, Pressure Pine Asm

\Connecting Block, Connector 1 Asm

\Connecting Block Process

## Process Summary

Right First Time	99.91 %
Process Time (Sec)	55.57
Total Weight (kg)	0.03
Material Cost**	\$0.18
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.53
Q Burden	\$0.01
SG&A	\$0.09
Manufacturing Cost*	\$0.81

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connecting Block, Connector 1 Asm



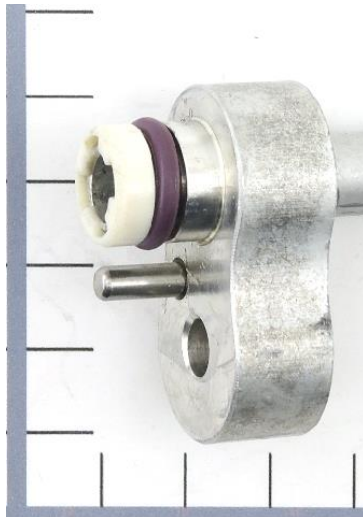
## Connecting Block Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.95	HUN	\$0.02	99.99 %	\$0.00
Deburr	4.00	1	0.25	22.62	HUN	\$0.03	99.99 %	\$0.00
CNC Machine	44.08	1	0.25	38.22	HUN	\$0.47	99.96 %	\$0.01
Cut Off	2.43	1	0.25	24.32	HUN	\$0.02	99.98 %	\$0.00
2200 Ton Extrusion Press	0.06	1	4.00	494.65	HUN	\$0.01	99.99 %	\$0.00

## Connecting Block Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Connecting Block	1	Aluminum 6061 - Billet Stock	\$2.80	0.0320	0.0643	\$0.00	\$0.18

# End Cap, Connector 1 Asm



\...

\Connector 1 Asm, Pressure Pine Asm

\End Cap, Connector 1 Asm

\End Cap Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	0.83
Total Weight (kg)	0.00

Material Cost**	\$0.01
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.00
Q Burden	\$0.00
SG&A	\$0.00
Manufacturing Cost*	\$0.02

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# End Cap, Connector 1 Asm



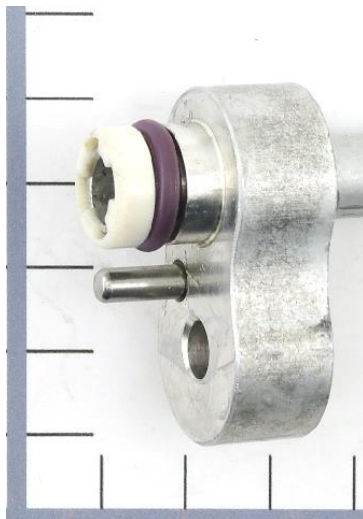
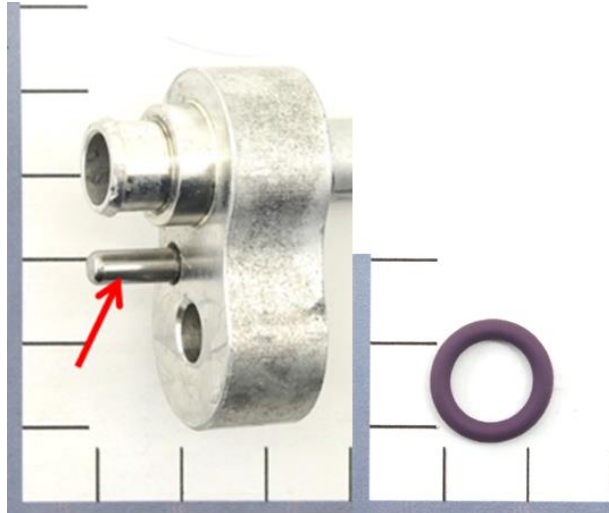
## End Cap Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
55Ton Injection Molding Press	6.64	8	0.25	14.89	HUN	\$0.00	99.99%	\$0.00

## End Cap Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material,End Cap	1	PBT	\$3.06	0.0003	0.0003	\$0.00	\$0.01

# Assemble Connector 1



\...  
 \Pressure Pipe Asm,Cooling Pack Line Bundle Passen  
 \Connector 1 Asm,Pressure Pine Asm  
 \Assemble Connector 1

## Process Summary

<b>Right First Time</b>	<b>99.83 %</b>
<b>Process Time (Sec)</b>	<b>27.00</b>
<b>Total Weight (kg)</b>	<b>0.00</b>

<b>Material Cost**</b>	<b>\$0.04</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.19</b>
<b>Q Burden</b>	<b>\$0.03</b>
<b>SG&amp;A</b>	<b>\$0.02</b>
<b>Manufacturing Cost*</b>	<b>\$0.28</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Assemble Connector 1

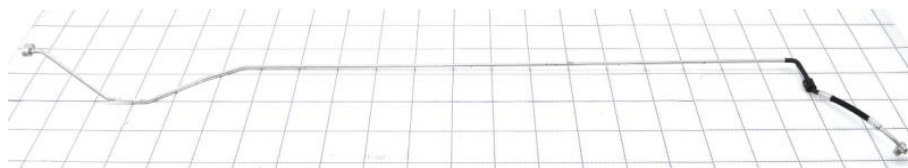
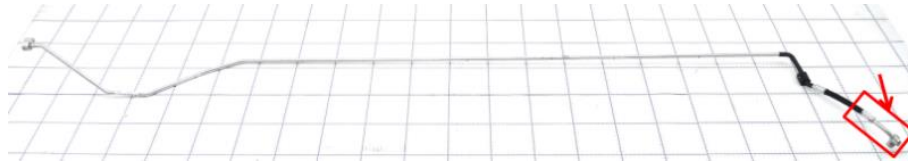


## Assemble Connector 1

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	27.00	1	1.00	24.91	HUN	\$0.19	99.83%	\$0.03

## Assemble Connector 1

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
10mm O-Ring,Connector 1 Asm	1	Commodity Item	Purchased	0.0002	-	\$0.03	\$0.00
Guide Pin,Connector 1 Asm	1	Commodity Item	Purchased	0.0007	-	\$0.01	\$0.00



- \...
- \Cooling Pack Line Bundle Passenger Side Asm
- \Pressure Pipe Asm,Cooling Pack Line Bundle Passen
- \Short Tube Asm, Pressure Pipe Asm

## Assembly Summary

<b>Parts</b>	<b>2</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>2</b>
<b>Steps</b>	<b>36</b>
<b>Fastenings</b>	<b>1</b>
<b>Right First Time</b>	<b>99.73 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>1.36</b>
<b>Total Weight (kg)</b>	<b>0.02</b>

<b>Material Cost**</b>	<b>\$0.11</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.51</b>
<b>Q Burden</b>	<b>\$0.04</b>
<b>SG&amp;A</b>	<b>\$0.07</b>
<b>Manufacturing Cost*</b>	<b>\$0.74</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Short Tube Asm, Pressure Pipe Asm



## Short Tube Asm, Pressure Pipe Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Short Tube, Pressure Pipe Asm	1	1	0	9	0	99.90 %	0.00	0.00	0.00	0.16	0.0073
Hose Crimp Fitting, Hose Tube Asm	1	1	0	21	0	99.93 %	0.00	0.00	0.27	0.17	0.0114
Assemble Hose Crimp Fitting	1	0	1	4	1	99.91 %	0.00	0.00	0.76	0.00	0.0000

## Short Tube Asm, Pressure Pipe Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Short Tube, Pressure Pipe Asm	\$0.00	\$0.04	\$0.00	\$0.00	\$0.00	\$0.05	\$0.02	\$0.01	\$0.12
Hose Crimp Fitting, Hose Tube Asm	\$0.00	\$0.07	\$0.00	\$0.00	\$0.08	\$0.06	\$0.01	\$0.03	\$0.25
Assemble Hose Crimp Fitting	\$0.00	\$0.00	\$0.00	\$0.00	\$0.32	\$0.00	\$0.01	\$0.04	\$0.37

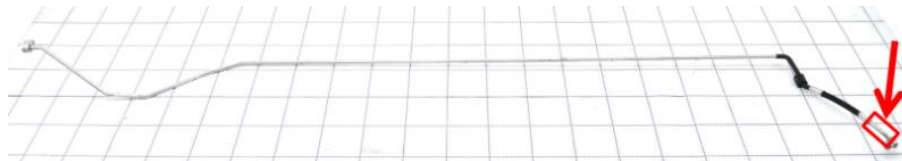
## Detailed Summary

<b>Parts</b>	<b>2</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>2</b>
<b>Steps</b>	<b>36</b>
<b>Fastenings</b>	<b>1</b>
<b>Right First Time</b>	<b>99.73%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>1.03</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.33</b>
<b>Total Weight (kg)</b>	<b>0.02</b>
<b>Purchased Part Cost</b>	
	<b>\$0.00</b>
<b>Material Cost</b>	
	<b>\$0.11</b>
<b>OEM Asm. Cost</b>	
	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	
	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	
	<b>\$0.40</b>
<b>Supplier Fab. Cost</b>	
	<b>\$0.11</b>
<b>Q Burden</b>	
	<b>\$0.04</b>
<b>SG&amp;A</b>	
	<b>\$0.07</b>
<b>Manufacturing Cost*</b>	
	<b>\$0.74</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Short Tube, Pressure Pipe Asm



\...

- \Short Tube Asm, Pressure Pipe Asm
- \Short Tube, Pressure Pipe Asm
- \Short Tube Process

## Process Summary

Right First Time	99.90 %
Process Time (Sec)	9.40
Total Weight (kg)	0.01

Material Cost**	\$0.04
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.05
Q Burden	\$0.02
SG&A	\$0.01
Manufacturing Cost*	\$0.12

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Short Tube, Pressure Pipe Asm



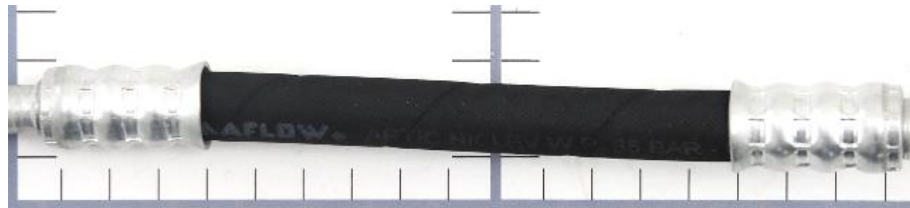
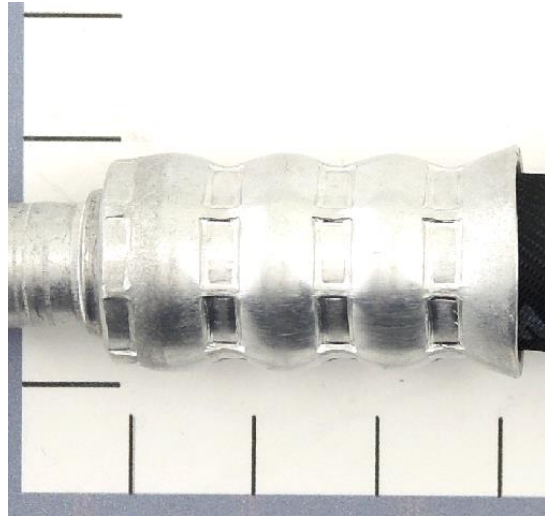
## Short Tube Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.95	HUN	\$0.02	99.99%	\$0.00
Tube Bending	4.40	1	0.25	26.59	HUN	\$0.03	99.91%	\$0.01

## Short Tube Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Short Tube	1	Aluminum 3003 - Clad Seamless Tube	\$5.00	0.0073	0.0073	\$0.00	\$0.04

# Hose Crimp Fitting, Hose Tube Asm



\...

- \Short Tube Asm, Pressure Pipe Asm
- \Hose Crimp Fitting, Hose Tube Asm
- \Hose Crimp Fitting Process

## Process Summary

Right First Time	99.93 %
Process Time (Sec)	26.32
Total Weight (kg)	0.01

Material Cost**	\$0.07
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.15
Q Burden	\$0.01
SG&A	\$0.03
Manufacturing Cost*	\$0.25

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Hose Crimp Fitting, Hose Tube Asm



Hose Crimp Fitting Process									
Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden	
Supplier Automated Asm	16.00	1	0.25	18.11	HUN	\$0.08	99.98 %	\$0.00	
Wash	5.00	1	0.25	21.64	HUN	\$0.03	99.99 %	\$0.00	
Debur	3.00	1	0.25	22.62	HUN	\$0.02	99.99 %	\$0.00	
Circular Saw	2.32	1	0.25	24.32	HUN	\$0.02	99.97 %	\$0.01	

Hose Crimp Fitting Process								
Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost	
Material, Fuel Line Crimp	1	Aluminum 3003 - Seamless Tube	\$6.00	0.0114	0.0114	\$0.00	\$0.07	



No Commodity Items  
Required for This  
Process

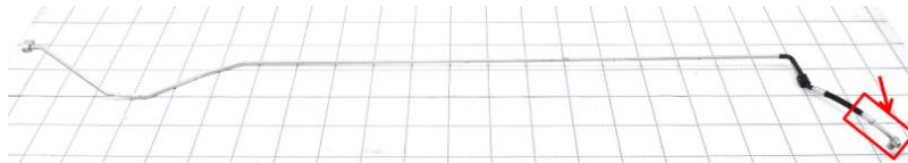
\...

- \Pressure Pipe Asm, Cooling Pack Line Bundle Passen
- \Short Tube Asm, Pressure Pipe Asm
- \Assemble Hose Crimp Fitting

## Process Summary

Right First Time	99.91 %
Process Time (Sec)	45.90
Total Weight (kg)	0.00

Material Cost**	\$0.00
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.32
Q Burden	\$0.01
SG&A	\$0.04
Manufacturing Cost*	\$0.37



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Hose Crimp Fitting



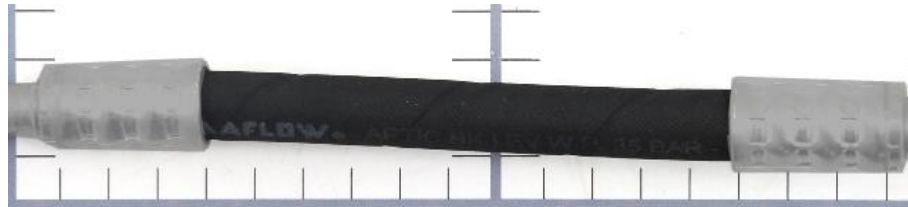
## Assemble Hose Crimp Fitting

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
<a href="#">Supplier Manual Asm</a>	45.90	1	1.00	24.91	HUN	\$0.32	99.91 %	\$0.01

## Assemble Hose Crimp Fitting

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# 14mm Wrapped Hose, Hose Tube Asm



\...

- \Pressure Pipe Asm, Cooling Pack Line Bundle Passen
- \14mm Wrapped Hose, Hose Tube Asm
- \14mm Wrapped Hose Process

## Process Summary

Right First Time	99.96 %
Process Time (Sec)	3.17
Total Weight (kg)	0.02

Material Cost**	\$0.13
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.06
Q Burden	\$0.01
SG&A	\$0.02
Manufacturing Cost*	\$0.22

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# 14mm Wrapped Hose, Hose Tube Asm

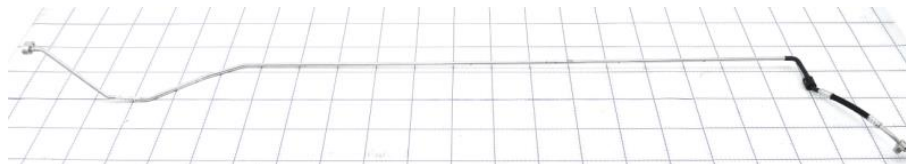
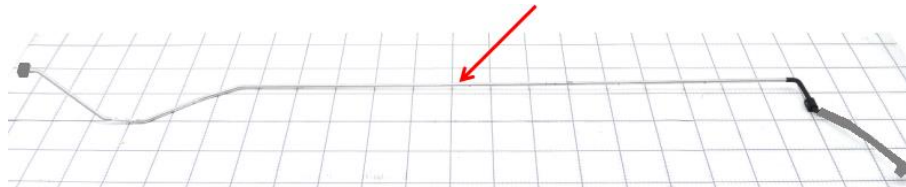


## 14mm Wrapped Hose Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Extrusion:32mm 2 Layer & Reinf	3.17	1	0.50	67.99	HUN	\$0.06	99.96%	\$0.01

## 14mm Wrapped Hose Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material,Inner Rubber Layer,14mm Hose	1	EPDM (Extrusion Grade)	\$4.43	0.0100	0.0100	\$0.00	\$0.04
Material,Reinforcement Layer,14mm-OD Hose	1	PA Thread w/PVC Coating	By Area	0.0019	-	\$0.00	\$0.03
Material,Outer Rubber Layer,14mm-OD Hose	1	EPDM (Extrusion Grade)	\$4.43	0.0087	0.0087	\$0.00	\$0.04
Material,Outer EPDM Covering,14mm Wrapped Hose	1	EPDM Covering	By Area	0.0012	-	\$0.00	\$0.02



\...

- \Cooling Pack Line Bundle Passenger Side Asm
- \Pressure Pipe Asm, Cooling Pack Line Bundle Passen
- \Long Tube Asm, Pressure Pipe Asm

## Assembly Summary

<b>Parts</b>	<b>3</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>47</b>
<b>Fastenings</b>	<b>3</b>
<b>Right First Time</b>	<b>99.31 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>2.09</b>
<b>Total Weight (kg)</b>	<b>0.17</b>

<b>Material Cost**</b>	<b>\$1.00</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.78</b>
<b>Q Burden</b>	<b>\$0.10</b>
<b>SG&amp;A</b>	<b>\$0.21</b>
<b>Manufacturing Cost*</b>	<b>\$2.09</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Long Tube Asm, Pressure Pipe Asm



**MUNRO**  
& ASSOCIATES, INC.

## Long Tube Asm, Pressure Pipe Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Long Tube, Long Tube Asm	1	1	0	15	0	99.62 %	0.00	0.00	0.00	0.53	0.1417
Assemble, Tube & Heat Shrink	1	1	2	5	2	99.85 %	0.00	0.00	0.35	0.00	0.0120
Hose Crimp Fitting, Hose Tube Asm	1	1	0	21	0	99.93 %	0.00	0.00	0.27	0.17	0.0114
Assemble Hose Crimp Fitting	1	0	1	4	1	99.92 %	0.00	0.00	0.76	0.00	0.0000

## Long Tube Asm, Pressure Pipe Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Long Tube, Long Tube Asm	\$0.00	\$0.85	\$0.00	\$0.00	\$0.00	\$0.17	\$0.06	\$0.12	\$1.20
Assemble, Tube & Heat Shrink	\$0.08	\$0.00	\$0.00	\$0.00	\$0.15	\$0.00	\$0.02	\$0.02	\$0.27
Hose Crimp Fitting, Hose Tube Asm	\$0.00	\$0.07	\$0.00	\$0.00	\$0.08	\$0.06	\$0.01	\$0.03	\$0.25
Assemble Hose Crimp Fitting	\$0.00	\$0.00	\$0.00	\$0.00	\$0.32	\$0.00	\$0.01	\$0.04	\$0.37

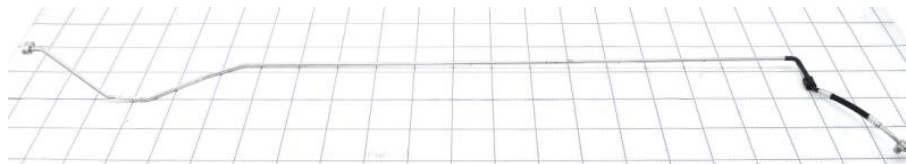
## Detailed Summary

<b>Parts</b>	<b>3</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>47</b>
<b>Fastenings</b>	<b>3</b>
<b>Right First Time</b>	<b>99.31%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>1.38</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.71</b>
<b>Total Weight (kg)</b>	<b>0.17</b>
<b>Purchased Part Cost</b>	<b>\$0.08</b>
<b>Material Cost</b>	<b>\$0.92</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.54</b>
<b>Supplier Fab. Cost</b>	<b>\$0.24</b>
<b>Q Burden</b>	<b>\$0.10</b>
<b>SG&amp;A</b>	<b>\$0.21</b>
<b>Manufacturing Cost*</b>	<b>\$2.09</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Long Tube, Long Tube Asm



\...  
\Long Tube Asm, Pressure Pipe Asm  
\Long Tube, Long Tube Asm  
\Long Tube Process

## Process Summary

<b>Right First Time</b>	<b>99.62 %</b>
<b>Process Time (Sec)</b>	<b>32.00</b>
<b>Total Weight (kg)</b>	<b>0.14</b>

<b>Material Cost**</b>	<b>\$0.85</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.17</b>
<b>Q Burden</b>	<b>\$0.06</b>
<b>SG&amp;A</b>	<b>\$0.12</b>
<b>Manufacturing Cost*</b>	<b>\$1.20</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



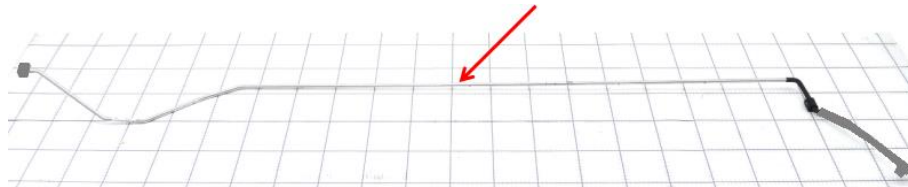
# Long Tube, Long Tube Asm

## Long Tube Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	16.00	1	0.25	11.95	HUN	\$0.05	99.98 %	\$0.00
Tube Bending	16.00	1	0.25	26.59	HUN	\$0.12	99.65 %	\$0.05

## Long Tube Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material,Long Tube	1	Aluminum 3003 -Seamless Tube	\$6.00	0.1417	0.1417	\$0.00	\$0.85



- \...
- \Pressure Pipe Asm, Cooling Pack Line Bundle Passen
- \Long Tube Asm, Pressure Pipe Asm
- \Assemble, Tube & Heat Shrink

## Process Summary

<b>Right First Time</b>	<b>99.85 %</b>
<b>Process Time (Sec)</b>	<b>20.99</b>
<b>Total Weight (kg)</b>	<b>0.01</b>

<b>Material Cost**</b>	<b>\$0.08</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.15</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.02</b>
<b>Manufacturing Cost*</b>	<b>\$0.27</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble, Tube & Heat Shrink



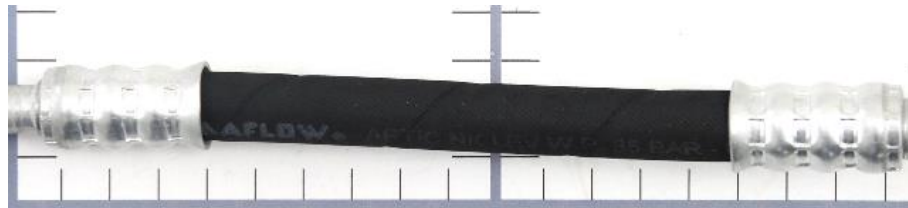
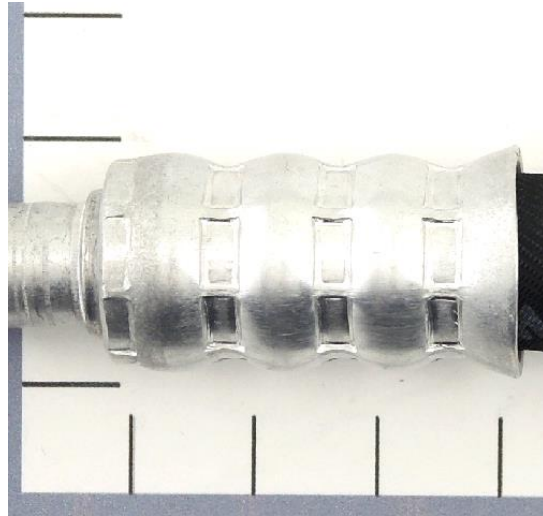
## Assemble, Tube & Heat Shrink

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Heat Shrink	20.99	1	1.00	24.91	HUN	\$0.15	99.85%	\$0.02

## Assemble, Tube & Heat Shrink

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Rubber Tube Sleeve,Long Tube Asm	1	Commodity Item	Purchased	0.0120	-	\$0.08	\$0.00

# Hose Crimp Fitting, Hose Tube Asm



\...

- \Long Tube Asm, Pressure Pipe Asm
- \Hose Crimp Fitting, Hose Tube Asm
- \Hose Crimp Fitting Process

## Process Summary

Right First Time	99.93 %
Process Time (Sec)	26.32
Total Weight (kg)	0.01

Material Cost**	\$0.07
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.15
Q Burden	\$0.01
SG&A	\$0.03
Manufacturing Cost*	\$0.25

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Hose Crimp Fitting, Hose Tube Asm



Hose Crimp Fitting Process									
Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden	
Supplier Automated Asm	16.00	1	0.25	18.11	HUN	\$0.08	99.98 %	\$0.00	
Wash	5.00	1	0.25	21.64	HUN	\$0.03	99.99 %	\$0.00	
Debur	3.00	1	0.25	22.62	HUN	\$0.02	99.99 %	\$0.00	
Circular Saw	2.32	1	0.25	24.32	HUN	\$0.02	99.97 %	\$0.01	

Hose Crimp Fitting Process								
Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost	
Material, Fuel Line Crimp	1	Aluminum 3003 - Seamless Tube	\$6.00	0.0114	0.0114	\$0.00	\$0.07	

No Commodity Items  
Required for This  
Process



\...

- \Pressure Pipe Asm, Cooling Pack Line Bundle Passen
- \Long Tube Asm, Pressure Pipe Asm
- \Assemble Hose Crimp Fitting

## Process Summary

<b>Right First Time</b>	<b>99.92 %</b>
<b>Process Time (Sec)</b>	<b>45.90</b>
<b>Total Weight (kg)</b>	<b>0.00</b>

<b>Material Cost**</b>	<b>\$0.00</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.32</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.04</b>
<b>Manufacturing Cost*</b>	<b>\$0.37</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Hose Crimp Fitting



## Assemble Hose Crimp Fitting

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
<a href="#">Supplier Manual Asm</a>	45.90	1	1.00	24.91	HUN	\$0.32	99.92%	\$0.01

## Assemble Hose Crimp Fitting

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Connector 2, Pressure Pipe Asm



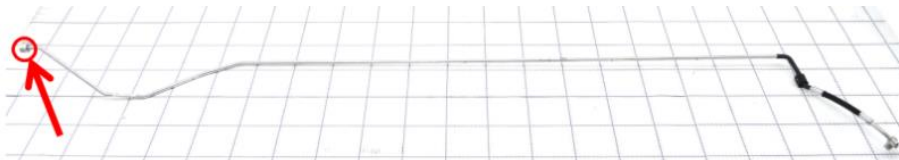
\...

- \Pressure Pipe Asm, Cooling Pack Line Bundle Passen
- \Connector 2, Pressure Pipe Asm
- \Connector 2 Process

## Process Summary

<b>Right First Time</b>	<b>99.90 %</b>
<b>Process Time (Sec)</b>	<b>48.81</b>
<b>Total Weight (kg)</b>	<b>0.04</b>

<b>Material Cost**</b>	<b>\$0.16</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.46</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.07</b>
<b>Manufacturing Cost*</b>	<b>\$0.71</b>



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Connector 2, Pressure Pipe Asm



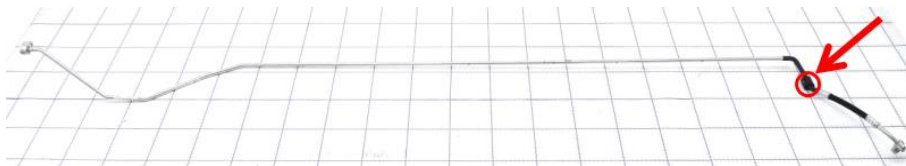
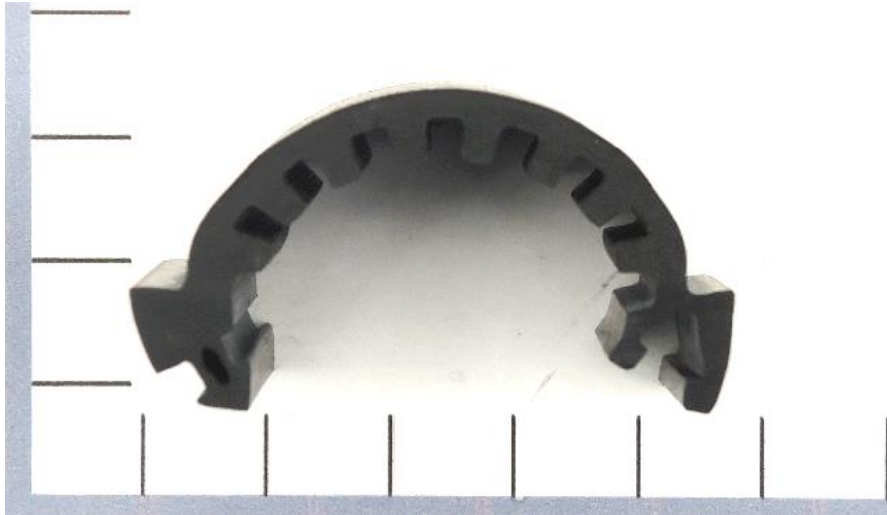
## Connector 2 Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.95	HUN	\$0.02	99.99 %	\$0.00
Deburr	4.00	1	0.25	22.62	HUN	\$0.03	99.99 %	\$0.00
CNC Machine	37.29	1	0.25	38.22	HUN	\$0.40	99.95 %	\$0.01
Cut Off	2.47	1	0.25	24.32	HUN	\$0.02	99.98 %	\$0.00
2200 Ton Extrusion Press	0.05	1	4.00	494.65	HUN	\$0.01	99.99 %	\$0.00

## Connector 2 Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Connector 2	1	Aluminum 6061 - Billet Stock	\$2.80	0.0360	0.0555	\$0.00	\$0.16

# Tube Isolator, Pressure Pipe Asm



\...

- \Pressure Pipe Asm, Cooling Pack Line Bundle Passen
- \Tube Isolator, Pressure Pipe Asm
- \Tube Isolator Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	0.74
Total Weight (kg)	0.01

Material Cost**	\$0.04
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.01
Q Burden	\$0.00
SG&A	\$0.01
Manufacturing Cost*	\$0.05

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Tube Isolator, Pressure Pipe Asm



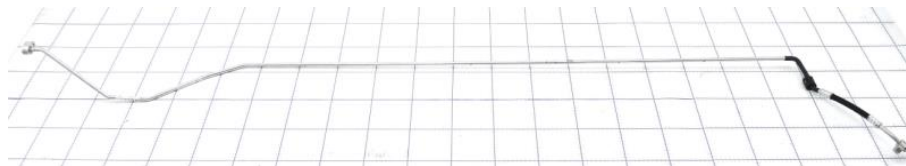
## Tube Isolator Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Extrude: 32mm, 1 Layer	0.74	1	0.50	30.26	HUN	\$0.01	99.99%	\$0.00

## Tube Isolator Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Tube Isolator	1	EPDM (Extrusion Grade)	\$4.43	0.0091	0.0091	\$0.00	\$0.04

# Assemble Pressure Pipe



\...

- \Cooling Pack Line Bundle Passenger Side Asm
- \Pressure Pipe Asm,Cooling Pack Line Bundle Passen
- \Assemble Pressure Pipe

## Process Summary

<b>Right First Time</b>	<b>99.79 %</b>
<b>Process Time (Sec)</b>	<b>86.80</b>
<b>Total Weight (kg)</b>	<b>0.00</b>
<b>Material Cost**</b>	<b>\$0.15</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.55</b>
<b>Q Burden</b>	<b>\$0.03</b>
<b>SG&amp;A</b>	<b>\$0.07</b>
<b>Manufacturing Cost*</b>	<b>\$0.80</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Pressure Pipe



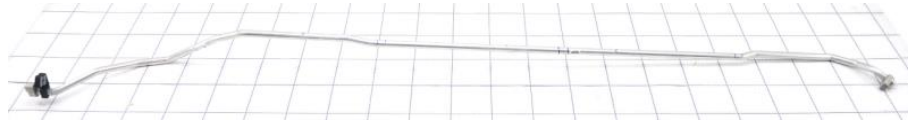
## Assemble Pressure Pipe

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Automated Asm	86.80	1	0.25	22.73	HUN	\$0.55	99.79%	\$0.03

## Assemble Pressure Pipe

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Bar Code Label,Cooling Tube 1 Asm	1	Commodity Item	Purchased	0.0001	-	\$0.05	\$0.00
QR Code Label,Cooling Tube 1 Asm	1	Commodity Item	Purchased	0.0001	-	\$0.10	\$0.00

# Suction Pipe Asm, Cooling Pack Line Bundle Passenge



\...  
 \Cooling Pack  
 \Cooling Pack Line Bundle Passenger Side Asm  
 \Suction Pipe Asm, Cooling Pack Line Bundle  
 Passenge

## Assembly Summary

<b>Parts</b>	<b>11</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>11</b>
<b>Steps</b>	<b>128</b>
<b>Fastenings</b>	<b>9</b>
<b>Right First Time</b>	<b>98.64 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>5.80</b>
<b>Total Weight (kg)</b>	<b>0.57</b>

<b>Material Cost**</b>	<b>\$3.67</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$2.51</b>
<b>Q Burden</b>	<b>\$0.21</b>
<b>SG&amp;A</b>	<b>\$0.73</b>
<b>Manufacturing Cost*</b>	<b>\$7.11</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Suction Pipe Asm, Cooling Pack Line Bundle Passage



**MUNRO**  
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## Suction Pipe Asm, Cooling Pack Line Bundle Passage

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Connector 1 Asm, Suction Pipe Asm	1	4	2	50	2	99.68 %	0.00	0.00	0.35	1.06	0.0386
Long Tube, Suction Pipe Asm	1	1	0	20	0	99.42 %	0.00	0.00	0.00	0.60	0.4789
Double Line Clip Asm, Suction Pipe Asm	1	3	2	12	2	99.86 %	0.00	0.00	0.33	0.41	0.0139
Connector 2, Suction Pipe Asm	1	1	0	30	0	99.89 %	0.00	0.00	0.00	0.97	0.0346
Assemble Suction Pipe	1	2	5	12	5	99.78 %	0.00	0.00	2.07	0.00	0.0002

## Suction Pipe Asm, Cooling Pack Line Bundle Passage

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Connector 1 Asm, Suction Pipe Asm	\$0.01	\$0.34	\$0.00	\$0.00	\$0.15	\$0.57	\$0.05	\$0.13	\$1.24
Long Tube, Suction Pipe Asm	\$0.00	\$2.87	\$0.00	\$0.00	\$0.00	\$0.20	\$0.09	\$0.37	\$3.53
Double Line Clip Asm, Suction Pipe Asm	\$0.00	\$0.05	\$0.00	\$0.00	\$0.14	\$0.10	\$0.02	\$0.03	\$0.35
Connector 2, Suction Pipe Asm	\$0.00	\$0.25	\$0.00	\$0.00	\$0.00	\$0.56	\$0.02	\$0.10	\$0.93
Assemble Suction Pipe	\$0.15	\$0.00	\$0.00	\$0.00	\$0.78	\$0.00	\$0.03	\$0.10	\$1.07

# Suction Pipe Asm, Cooling Pack Line Bundle Passenge

## Detailed Summary

<b>Parts</b>	<b>11</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>11</b>
<b>Steps</b>	<b>128</b>
<b>Fastenings</b>	<b>9</b>
<b>Right First Time</b>	<b>98.64%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>2.75</b>
<b>Supplier Fab. Time (Min)</b>	<b>3.04</b>
<b>Total Weight (kg)</b>	<b>0.57</b>
<b>Purchased Part Cost</b>	<b>\$0.16</b>
<b>Material Cost</b>	<b>\$3.51</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$1.07</b>
<b>Supplier Fab. Cost</b>	<b>\$1.44</b>
<b>Q Burden</b>	<b>\$0.21</b>
<b>SG&amp;A</b>	<b>\$0.73</b>
<b>Manufacturing Cost*</b>	<b>\$7.11</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Connector 1 Asm, Suction Pipe Asm



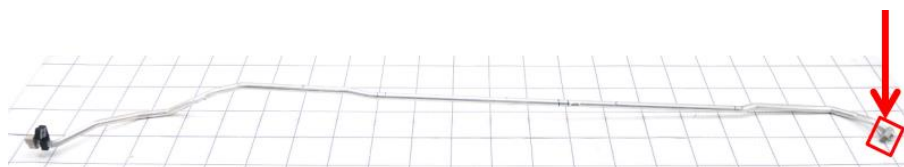
\...  
 \Cooling Pack Line Bundle Passenger Side Asm  
 \Suction Pipe Asm, Cooling Pack Line Bundle Passenge  
 \Connector 1 Asm, Suction Pipe Asm

## Assembly Summary

<b>Parts</b>	<b>4</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>4</b>
<b>Steps</b>	<b>50</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.68 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>1.41</b>
<b>Total Weight (kg)</b>	<b>0.04</b>

<b>Material Cost**</b>	<b>\$0.35</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.72</b>
<b>Q Burden</b>	<b>\$0.05</b>
<b>SG&amp;A</b>	<b>\$0.13</b>
<b>Manufacturing Cost*</b>	<b>\$1.24</b>

\* Excluding tooling, ER&D, logistics, and profit margin  
 \*\* Includes material cost and purchased parts cost



# Connector 1 Asm,Suction Pipe Asm



## Connector 1 Asm,Suction Pipe Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Connecting Block,Connector 2 Asm	1	1	0	32	0	99.88 %	0.00	0.00	0.00	0.89	0.0363
Sealing Ring,Connector 2Asm	1	2	0	10	0	99.96 %	0.00	0.00	0.00	0.17	0.0016
Assemble Connector 1	1	1	2	6	2	99.85 %	0.00	0.00	0.35	0.00	0.0007

## Connector 1 Asm,Suction Pipe Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Connecting Block,Connector 2 Asm	\$0.00	\$0.31	\$0.00	\$0.00	\$0.00	\$0.52	\$0.02	\$0.10	\$0.95
Sealing Ring,Connector 2Asm	\$0.00	\$0.03	\$0.00	\$0.00	\$0.00	\$0.05	\$0.01	\$0.01	\$0.10
Assemble Connector 1	\$0.01	\$0.00	\$0.00	\$0.00	\$0.15	\$0.00	\$0.02	\$0.02	\$0.20

## Detailed Summary

<b>Parts</b>	<b>4</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>4</b>
<b>Steps</b>	<b>50</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.68%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.35</b>
<b>Supplier Fab. Time (Min)</b>	<b>1.06</b>
<b>Total Weight (kg)</b>	<b>0.04</b>
<b>Purchased Part Cost</b>	<b>\$0.01</b>
<b>Material Cost</b>	<b>\$0.34</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.15</b>
<b>Supplier Fab. Cost</b>	<b>\$0.57</b>
<b>Q Burden</b>	<b>\$0.05</b>
<b>SG&amp;A</b>	<b>\$0.13</b>
<b>Manufacturing Cost*</b>	<b>\$1.24</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connecting Block, Connector 2 Asm



\...

- \Connector 1 Asm, Suction Pipe Asm
- \Connecting Block, Connector 2 Asm
- \Connecting Block Process

## Process Summary

Right First Time	99.88 %
Process Time (Sec)	53.59
Total Weight (kg)	0.04

Material Cost**	\$0.31
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.52
Q Burden	\$0.02
SG&A	\$0.10
Manufacturing Cost*	\$0.95

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connecting Block, Connector 2 Asm



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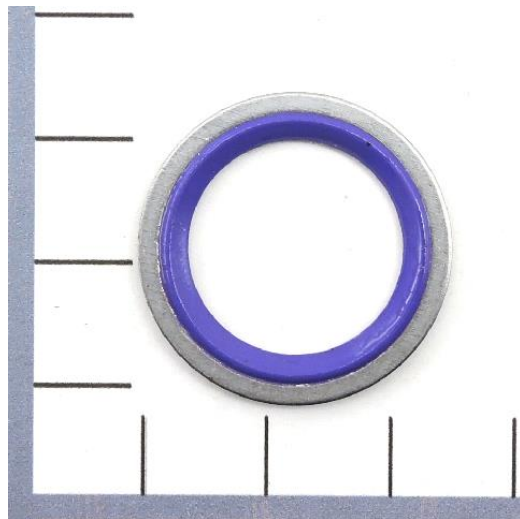
## Connecting Block Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.95	HUN	\$0.02	99.99 %	\$0.00
Deburr	4.00	1	0.25	22.62	HUN	\$0.03	99.99 %	\$0.00
CNC Machine	41.89	1	0.25	38.22	HUN	\$0.44	99.93 %	\$0.01
Cut Off	2.59	1	0.25	24.32	HUN	\$0.02	99.98 %	\$0.00
2200 Ton Extrusion Press	0.11	1	4.00	494.65	HUN	\$0.02	99.99 %	\$0.00

## Connecting Block Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Connecting Block	1	Aluminum 6061 - Billet Stock	\$2.80	0.0363	0.1107	\$0.00	\$0.31

# Sealing Ring, Connector 2 Asm



\...

- \Connector 1 Asm, Suction Pipe Asm
- \Sealing Ring, Connector 2 Asm
- \Sealing Ring Process

## Process Summary

<b>Right First Time</b>	<b>99.96 %</b>
<b>Process Time (Sec)</b>	<b>10.07</b>
<b>Total Weight (kg)</b>	<b>0.00</b>
<b>Material Cost**</b>	<b>\$0.03</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.05</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.01</b>
<b>Manufacturing Cost*</b>	<b>\$0.10</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Sealing Ring, Connector 2 Asm



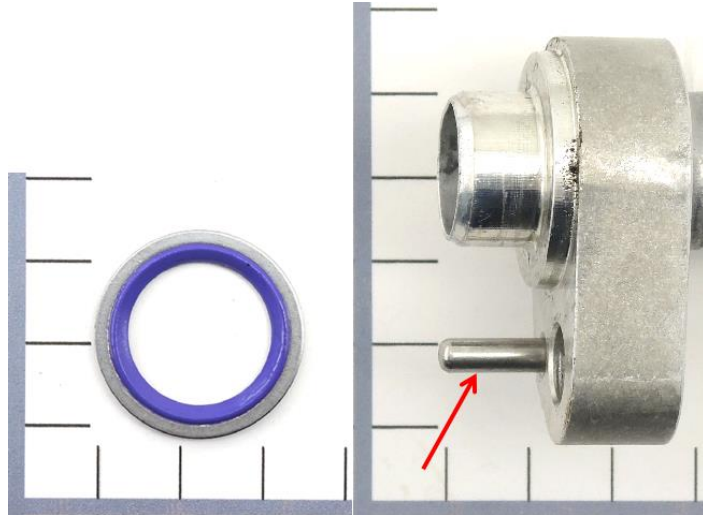
## Sealing Ring Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
55 Ton Injection Molding Press	35.76	8	0.25	23.26	HUN	\$0.03	99.99%	\$0.00
Wash	3.50	1	0.25	11.95	HUN	\$0.01	99.99%	\$0.00
Deburr	1.50	1	0.25	22.62	HUN	\$0.01	99.99%	\$0.00
25 Ton Stamping Press	0.60	1	0.25	14.05	HUN	\$0.00	99.99%	\$0.00

## Sealing Ring Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, O-Ring Seal	1	EPDM	\$4.04	0.0006	0.0006	\$0.00	\$0.01
Material, Outer Ring	1	Steel 1018 - Coil Stock	\$1.21	0.0010	0.0140	\$0.00	\$0.02

# Assemble Connector 1



\...  
 \Suction Pipe Asm,Cooling Pack Line Bundle Passenge  
 \Connector 1 Asm,Suction Pipe Asm  
 \Assemble Connector 1

## Process Summary

<b>Right First Time</b>	<b>99.85 %</b>
<b>Process Time (Sec)</b>	<b>21.00</b>
<b>Total Weight (kg)</b>	<b>0.00</b>

<b>Material Cost**</b>	<b>\$0.01</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.15</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.02</b>
<b>Manufacturing Cost*</b>	<b>\$0.20</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Assemble Connector 1

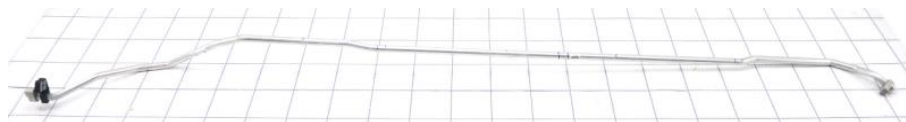
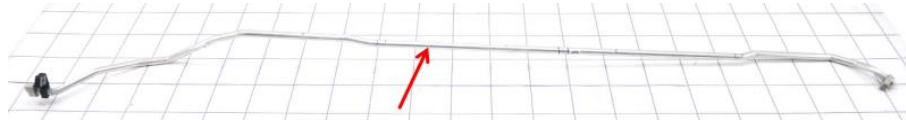
## Assemble Connector 1

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	21.00	1	1.00	24.91	HUN	\$0.15	99.85%	\$0.02

## Assemble Connector 1

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Guide Pin, Connector 2 Asm	1	Commodity Item	Purchased	0.0007	-	\$0.01	\$0.00

# Long Tube, Suction Pipe Asm



\...  
 \Suction Pipe Asm, Cooling Pack Line Bundle Passenge  
 \Long Tube, Suction Pipe Asm  
 \Long Tube Process

## Process Summary

<b>Right First Time</b>	<b>99.42 %</b>
<b>Process Time (Sec)</b>	<b>36.00</b>
<b>Total Weight (kg)</b>	<b>0.48</b>

<b>Material Cost**</b>	<b>\$2.87</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.20</b>
<b>Q Burden</b>	<b>\$0.09</b>
<b>SG&amp;A</b>	<b>\$0.37</b>
<b>Manufacturing Cost*</b>	<b>\$3.53</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Long Tube, Suction Pipe Asm



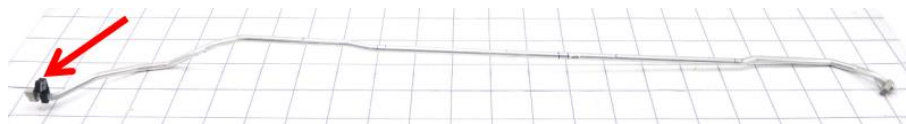
## Long Tube Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	16.00	1	0.25	11.95	HUN	\$0.05	99.98 %	\$0.00
Tube Bending	20.00	1	0.25	26.59	HUN	\$0.15	99.45 %	\$0.08

## Long Tube Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Long Tube	1	Aluminum 3003 - Seamless Tube	\$6.00	0.4789	0.4789	\$0.00	\$2.87

# Double Line Clip Asm, Suction Pipe Asm



- \...
- \Cooling Pack Line Bundle Passenger Side Asm
- \Suction Pipe Asm, Cooling Pack Line Bundle Passenge
- \Double Line Clip Asm, Suction Pipe Asm

## Assembly Summary

<b>Parts</b>	<b>3</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>12</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.86 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>0.75</b>
<b>Total Weight (kg)</b>	<b>0.01</b>

<b>Material Cost**</b>	<b>\$0.05</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.24</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.03</b>
<b>Manufacturing Cost*</b>	<b>\$0.35</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Double Line Clip Asm,Suction Pipe Asm



**MUNRO**  
& ASSOCIATES, INC.

## Double Line Clip Asm,Suction Pipe Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Double Line Clip,Double line Clip Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.05	0.0067
Isolator 1,Double Line Clip Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.18	0.0043
Isolator 2,Double Line Clip Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.18	0.0029
Assemble Double Line Clip Asm	1	0	2	6	2	99.89 %	0.00	0.00	0.33	0.00	0.0000

## Double Line Clip Asm,Suction Pipe Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Double Line Clip,Double line Clip Asm	\$0.00	\$0.03	\$0.00	\$0.00	\$0.00	\$0.01	\$0.00	\$0.00	\$0.05
Isolator 1,Double Line Clip Asm	\$0.00	\$0.01	\$0.00	\$0.00	\$0.00	\$0.05	\$0.00	\$0.01	\$0.06
Isolator 2,Double Line Clip Asm	\$0.00	\$0.01	\$0.00	\$0.00	\$0.00	\$0.05	\$0.00	\$0.01	\$0.06
Assemble Double Line Clip Asm	\$0.00	\$0.00	\$0.00	\$0.00	\$0.14	\$0.00	\$0.02	\$0.02	\$0.17

## Detailed Summary

<b>Parts</b>	<b>3</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>12</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.86%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.33</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.41</b>
<b>Total Weight (kg)</b>	<b>0.01</b>
<b>Purchased Part Cost</b>	<b>\$0.00</b>
<b>Material Cost</b>	<b>\$0.05</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.14</b>
<b>Supplier Fab. Cost</b>	<b>\$0.10</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.03</b>
<b>Manufacturing Cost*</b>	<b>\$0.35</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Double Line Clip, Double line Clip Asm



\...

- \Double Line Clip Asm, Suction Pipe Asm
- \Double Line Clip, Double line Clip Asm
- \Double Line Clip Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	2.74
Total Weight (kg)	0.01

Material Cost**	\$0.03
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.01
Q Burden	\$0.00
SG&A	\$0.00
Manufacturing Cost*	\$0.05

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Double Line Clip, Double line Clip Asm



## Double Line Clip Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
55Ton Injection Molding Press	16.44	6	0.25	14.89	HUN	\$0.01	99.99%	\$0.00

## Double Line Clip Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Double Line Clip	1	PA6	\$4.39	0.0067	0.0070	\$0.00	\$0.03



# Isolator 1, Double Line Clip Asm



\...

\Double Line Clip Asm,Suction Pipe Asm

\Isolator 1,Double Line Clip Asm

\Isolator 1 Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	11.06
Total Weight (kg)	0.00

Material Cost**	\$0.01
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.05
Q Burden	\$0.00
SG&A	\$0.01
Manufacturing Cost*	\$0.06

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Isolator 1, Double Line Clip Asm



## Isolator 1 Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
55 Ton Injection Molding Press	66.36	6	0.25	14.89	HUN	\$0.05	99.99%	\$0.00

## Isolator 1 Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Isolator 1	1	TPE	\$2.54	0.0043	0.0050	\$0.00	\$0.01

# Isolator 2, Double Line Clip Asm



\...

- \Double Line Clip Asm,Suction Pipe Asm
- \Isolator 2,Double Line Clip Asm
- \Isolator 2 Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	11.04
Total Weight (kg)	0.00

Material Cost**	\$0.01
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.05
Q Burden	\$0.00
SG&A	\$0.01
Manufacturing Cost*	\$0.06

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Isolator 2, Double Line Clip Asm



## Isolator 2 Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
55 Ton Injection Molding Press	66.24	6	0.25	14.89	HUN	\$0.05	99.99%	\$0.00

## Isolator 2 Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Isolator 2	1	TPE	\$2.54	0.0029	0.0030	\$0.00	\$0.01

No Commodity Items  
Required for This  
Process



\...  
 \Suction Pipe Asm,Cooling Pack Line Bundle Passenge  
 \Double Line Clip Asm,Suction Pipe Asm  
 \Assemble Double Line Clip Asm

## Process Summary

Right First Time	99.89 %
Process Time (Sec)	20.00
Total Weight (kg)	0.00
Material Cost**	\$0.00
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.14
Q Burden	\$0.02
SG&A	\$0.02
Manufacturing Cost*	\$0.17

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Double Line Clip Asm



## Assemble Double Line Clip Asm

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	20.00	1	1.00	24.91	HUN	\$0.14	99.89%	\$0.02

## Assemble Double Line Clip Asm

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Connector 2, Suction Pipe Asm

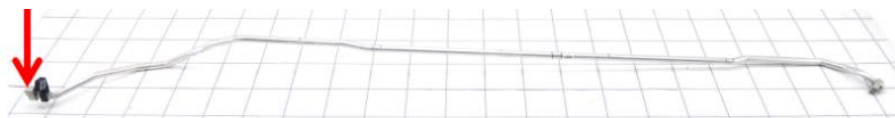


\...  
\Suction Pipe Asm, Cooling Pack Line Bundle Passenge  
\Connector 2, Suction Pipe Asm  
\Connector 2 Process

## Process Summary

Right First Time	99.89 %
Process Time (Sec)	58.04
Total Weight (kg)	0.03

Material Cost**	\$0.25
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.56
Q Burden	\$0.02
SG&A	\$0.10
Manufacturing Cost*	\$0.93



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connector 2, Suction Pipe Asm

## Connector 2 Process

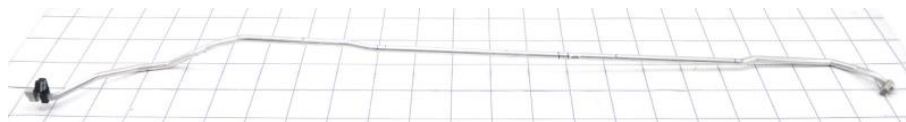
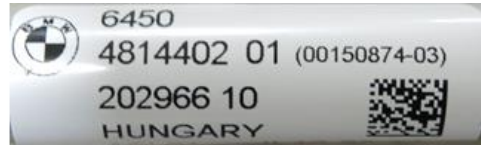
Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.95	HUN	\$0.02	99.99 %	\$0.00
Deburr	4.00	1	0.25	22.62	HUN	\$0.03	99.99 %	\$0.00
CNC Machine	46.37	1	0.25	38.22	HUN	\$0.49	99.95 %	\$0.01
Cut Off	2.59	1	0.25	24.32	HUN	\$0.02	99.98 %	\$0.00
2200 Ton Extrusion Press	0.08	1	4.00	494.65	HUN	\$0.01	99.99 %	\$0.00

## Connector 2 Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Connector 2	1	Aluminum 6061 - Bar Stock	\$3.06	0.0346	0.0820	\$0.00	\$0.25



# Assemble Suction Pipe



\...  
 \Cooling Pack Line Bundle Passenger Side Asm  
 \Suction Pipe Asm,Cooling Pack Line Bundle Passenge  
 \Assemble Suction Pipe

## Process Summary

<b>Right First Time</b>	<b>99.78 %</b>
<b>Process Time (Sec)</b>	<b>124.21</b>
<b>Total Weight (kg)</b>	<b>0.00</b>

<b>Material Cost**</b>	<b>\$0.15</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.78</b>
<b>Q Burden</b>	<b>\$0.03</b>
<b>SG&amp;A</b>	<b>\$0.10</b>
<b>Manufacturing Cost*</b>	<b>\$1.07</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Suction Pipe



## Assemble Suction Pipe

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Automated Asm	124.21	1	0.25	22.73	HUN	\$0.78	99.78 %	\$0.03

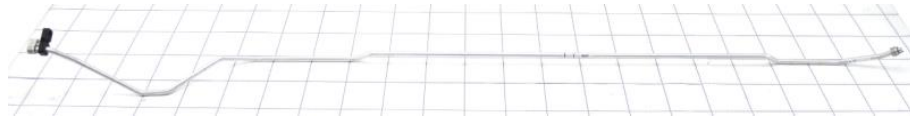
## Assemble Suction Pipe

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Bar Code Label,Cooling Tube 2 Asm	1	Commodity Item	Purchased	0.0001	-	\$0.05	\$0.00
QR Code Label,Cooling Tube 2 Asm	1	Commodity Item	Purchased	0.0001	-	\$0.10	\$0.00

# Compressor Suction Pipe Asm, Cooling Pack Line Bund



**MUNRO**  
& ASSOCIATES, INC.



\...  
 \Cooling Pack  
 \Cooling Pack Line Bundle Passenger Side Asm  
 \Compressor Suction Pipe Asm, Cooling Pack Line  
 Bund

## Assembly Summary

<b>Parts</b>	<b>11</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>11</b>
<b>Steps</b>	<b>130</b>
<b>Fastenings</b>	<b>9</b>
<b>Right First Time</b>	<b>98.68 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>5.33</b>
<b>Total Weight (kg)</b>	<b>0.35</b>

<b>Material Cost**</b>	<b>\$2.29</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$2.30</b>
<b>Q Burden</b>	<b>\$0.20</b>
<b>SG&amp;A</b>	<b>\$0.54</b>
<b>Manufacturing Cost*</b>	<b>\$5.33</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Compressor Suction Pipe Asm, Cooling Pack Line Bund



**MUNRO**  
& ASSOCIATES, INC.

## Compressor Suction Pipe Asm, Cooling Pack Line Bund

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Connector 1 Asm, Compressor Suction Pipe Asm	1	4	2	49	2	99.69 %	0.00	0.00	0.35	1.04	0.0286
Long Tube, Compressor Suction Pipe Asm	1	1	0	19	0	99.46 %	0.00	0.00	0.00	0.58	0.2806
Double Line Clip Asm, Compressor Suction Pipe Asm	1	3	2	12	2	99.86 %	0.00	0.00	0.33	0.41	0.0139
Connector 2, Cooling Tube 3 Asm	1	1	0	34	0	99.90 %	0.00	0.00	0.00	0.95	0.0253
Assemble Compressor Suction Pipe	1	2	5	12	5	99.77 %	0.00	0.00	1.66	0.00	0.0002

## Compressor Suction Pipe Asm, Cooling Pack Line Bund

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Connector 1 Asm, Compressor Suction Pipe Asm	\$0.01	\$0.25	\$0.00	\$0.00	\$0.15	\$0.54	\$0.05	\$0.11	\$1.11
Long Tube, Compressor Suction Pipe Asm	\$0.00	\$1.68	\$0.00	\$0.00	\$0.00	\$0.19	\$0.08	\$0.22	\$2.18
Double Line Clip Asm, Compressor Suction Pipe Asm	\$0.00	\$0.05	\$0.00	\$0.00	\$0.14	\$0.10	\$0.02	\$0.03	\$0.35
Connector 2, Cooling Tube 3 Asm	\$0.00	\$0.15	\$0.00	\$0.00	\$0.00	\$0.55	\$0.02	\$0.08	\$0.80
Assemble Compressor Suction Pipe	\$0.15	\$0.00	\$0.00	\$0.00	\$0.63	\$0.00	\$0.03	\$0.08	\$0.89

## Detailed Summary

<b>Parts</b>	<b>11</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>11</b>
<b>Steps</b>	<b>130</b>
<b>Fastenings</b>	<b>9</b>
<b>Right First Time</b>	<b>98.68%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>2.34</b>
<b>Supplier Fab. Time (Min)</b>	<b>2.98</b>
<b>Total Weight (kg)</b>	<b>0.35</b>
<b>Purchased Part Cost</b>	<b>\$0.16</b>
<b>Material Cost</b>	<b>\$2.13</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.91</b>
<b>Supplier Fab. Cost</b>	<b>\$1.39</b>
<b>Q Burden</b>	<b>\$0.20</b>
<b>SG&amp;A</b>	<b>\$0.54</b>
<b>Manufacturing Cost*</b>	<b>\$5.33</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connector 1 Asm, Compressor Suction Pipe Asm



\...  
 \Cooling Pack Line Bundle Passenger Side Asm  
 \Compressor Suction Pipe Asm, Cooling Pack Line Bund  
 \Connector 1 Asm, Compressor Suction Pipe Asm

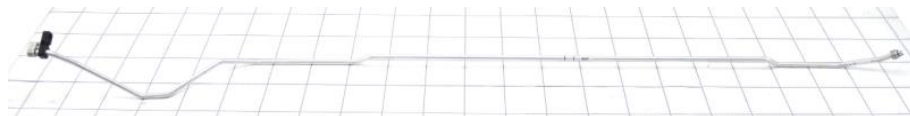
## Assembly Summary

<b>Parts</b>	<b>4</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>4</b>
<b>Steps</b>	<b>49</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.69 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>1.39</b>
<b>Total Weight (kg)</b>	<b>0.03</b>

<b>Material Cost**</b>	<b>\$0.26</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.69</b>
<b>Q Burden</b>	<b>\$0.05</b>
<b>SG&amp;A</b>	<b>\$0.11</b>
<b>Manufacturing Cost*</b>	<b>\$1.11</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Connector 1 Asm, Compressor Suction Pipe Asm



## Connector 1 Asm, Compressor Suction Pipe Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Connecting Block, Connector 3 Asm	1	1	0	31	0	99.88 %	0.00	0.00	0.00	0.85	0.0264
Sealing Ring, Connector 3 Asm	1	2	0	10	0	99.96 %	0.00	0.00	0.00	0.19	0.0015
Assemble Connector 1	1	1	2	6	2	99.85 %	0.00	0.00	0.35	0.00	0.0007

## Connector 1 Asm, Compressor Suction Pipe Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Connecting Block, Connector 3 Asm	\$0.00	\$0.22	\$0.00	\$0.00	\$0.00	\$0.48	\$0.02	\$0.08	\$0.81
Sealing Ring, Connector 3 Asm	\$0.00	\$0.03	\$0.00	\$0.00	\$0.00	\$0.06	\$0.01	\$0.01	\$0.11
Assemble Connector 1	\$0.01	\$0.00	\$0.00	\$0.00	\$0.15	\$0.00	\$0.02	\$0.02	\$0.20

## Detailed Summary

<b>Parts</b>	<b>4</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>4</b>
<b>Steps</b>	<b>49</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.69%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.35</b>
<b>Supplier Fab. Time (Min)</b>	<b>1.04</b>
<b>Total Weight (kg)</b>	<b>0.03</b>
<b>Purchased Part Cost</b>	<b>\$0.01</b>
<b>Material Cost</b>	<b>\$0.25</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.15</b>
<b>Supplier Fab. Cost</b>	<b>\$0.54</b>
<b>Q Burden</b>	<b>\$0.05</b>
<b>SG&amp;A</b>	<b>\$0.11</b>
<b>Manufacturing Cost*</b>	<b>\$1.11</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Connecting Block, Connector 3 Asm



\...

- \Connector 1 Asm, Compressor Suction Pipe Asm
- \Connecting Block, Connector 3 Asm
- \Connecting Block Process

## Process Summary

Right First Time	99.88 %
Process Time (Sec)	50.72
Total Weight (kg)	0.03

Material Cost**	\$0.22
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.48
Q Burden	\$0.02
SG&A	\$0.08
Manufacturing Cost*	\$0.81

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connecting Block, Connector 3 Asm



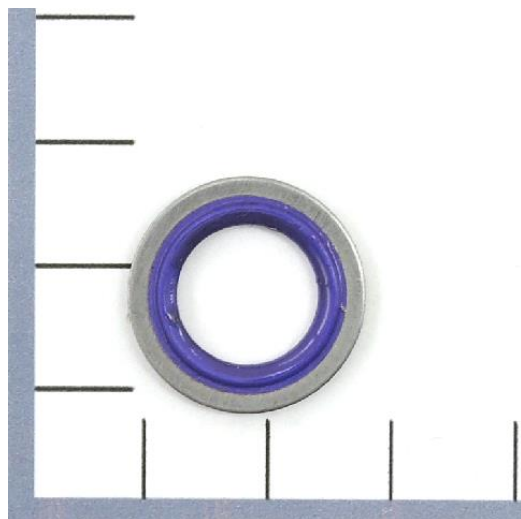
## Connecting Block Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.95	HUN	\$0.02	99.99 %	\$0.00
Deburr	4.00	1	0.25	22.62	HUN	\$0.03	99.99 %	\$0.00
CNC Machine	39.16	1	0.25	38.22	HUN	\$0.42	99.94 %	\$0.01
Cut Off	2.49	1	0.25	24.32	HUN	\$0.02	99.98 %	\$0.00
2200 Ton Extrusion Press	0.07	1	4.00	494.65	HUN	\$0.01	99.99 %	\$0.00

## Connecting Block Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Connecting Block	1	Aluminum 6061 - Bar Stock	\$3.06	0.0264	0.0704	\$0.00	\$0.22

# Sealing Ring, Connector 3 Asm



\...

\Connector 1 Asm, Compressor Suction Pipe Asm

\Sealing Ring, Connector 3 Asm

\Sealing Ring Process

## Process Summary

Right First Time	99.96 %
Process Time (Sec)	11.40
Total Weight (kg)	0.00

Material Cost**	\$0.03
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.06
Q Burden	\$0.01
SG&A	\$0.01
Manufacturing Cost*	\$0.11

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Sealing Ring, Connector 3 Asm

## Sealing Ring Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
55 Ton Injection Molding Press	46.40	8	0.25	23.26	HUN	\$0.04	99.99%	\$0.00
Wash	3.50	1	0.25	11.95	HUN	\$0.01	99.99%	\$0.00
Deburr	1.50	1	0.25	22.62	HUN	\$0.01	99.99%	\$0.00
25 Ton Stamping Press	0.60	1	0.25	14.05	HUN	\$0.00	99.99%	\$0.00

## Sealing Ring Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, O-Ring Seal	1	EPDM	\$4.04	0.0005	0.0005	\$0.00	\$0.01
Material, Outer Ring	1	Steel 1018 - Coil Stock	\$1.21	0.0010	0.0140	\$0.00	\$0.02

## No Commodity Items Required for This Process



\...

\Compressor Suction Pipe Asm, Cooling Pack Line Bund  
\Connector 1 Asm, Compressor Suction Pipe Asm  
\Assemble Connector 1

### Process Summary

<b>Right First Time</b>	<b>99.85 %</b>
<b>Process Time (Sec)</b>	<b>21.00</b>
<b>Total Weight (kg)</b>	<b>0.00</b>

<b>Material Cost**</b>	<b>\$0.01</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.15</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.02</b>
<b>Manufacturing Cost*</b>	<b>\$0.20</b>

\* Excluding tooling, ER&D, logistics, and profit margin

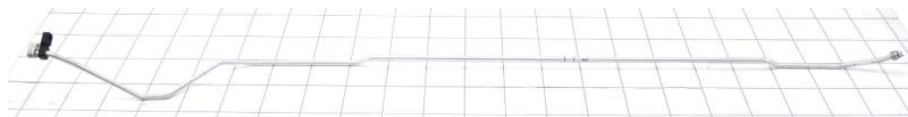
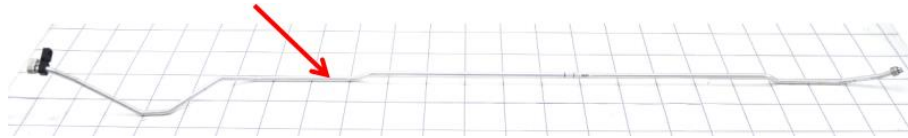
\*\* Includes material cost and purchased parts cost

# Assemble Connector 1



Assemble Connector 1									
Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden	
Supplier Manual Asm	21.00	1	1.00	24.91	HUN	\$0.15	99.85%	\$0.02	

Assemble Connector 1								
Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost	
Guide Pin, Connector 3 Asm	1	Commodity Item	Purchased	0.0007	-	\$0.01	\$0.00	



\...  
 \Compressor Suction Pipe Asm, Cooling Pack Line Bund  
 \Long Tube, Compressor Suction Pipe Asm  
 \Long Tube Process

## Process Summary

<b>Right First Time</b>	<b>99.46 %</b>
<b>Process Time (Sec)</b>	<b>35.00</b>
<b>Total Weight (kg)</b>	<b>0.28</b>

<b>Material Cost**</b>	<b>\$1.68</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.19</b>
<b>Q Burden</b>	<b>\$0.08</b>
<b>SG&amp;A</b>	<b>\$0.22</b>
<b>Manufacturing Cost*</b>	<b>\$2.18</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Long Tube, Compressor Suction Pipe Asm



## Long Tube Process

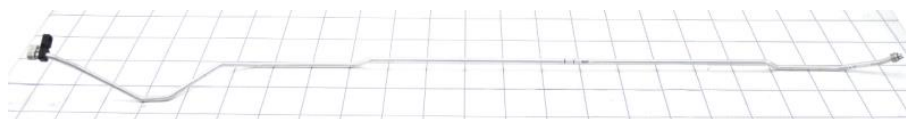
Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	16.00	1	0.25	11.95	HUN	\$0.05	99.98 %	\$0.00
Tube Bending	19.00	1	0.25	26.59	HUN	\$0.14	99.49 %	\$0.08

## Long Tube Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Long Tube	1	Aluminum 3003 - Seamless Tube	\$6.00	0.2806	0.2806	\$0.00	\$1.68



# Double Line Clip Asm, Compressor Suction Pipe Asm



- \...
- \Cooling Pack Line Bundle Passenger Side Asm
- \Compressor Suction Pipe Asm, Cooling Pack Line Bund
- \Double Line Clip Asm, Compressor Suction Pipe Asm

## Assembly Summary

<b>Parts</b>	<b>3</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>12</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.86 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>0.75</b>
<b>Total Weight (kg)</b>	<b>0.01</b>

<b>Material Cost**</b>	<b>\$0.05</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.24</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.03</b>
<b>Manufacturing Cost*</b>	<b>\$0.35</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Double Line Clip Asm, Compressor Suction Pipe Asm



**MUNRO**  
& ASSOCIATES, INC.

## Double Line Clip Asm, Compressor Suction Pipe Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Double Line Clip, Double line Clip Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.05	0.0067
Isolator 1, Double Line Clip Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.18	0.0043
Isolator 2, Double Line Clip Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.18	0.0029
Assemble Double Line Clip Asm	1	0	2	6	2	99.89 %	0.00	0.00	0.33	0.00	0.0000

## Double Line Clip Asm, Compressor Suction Pipe Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Double Line Clip, Double line Clip Asm	\$0.00	\$0.03	\$0.00	\$0.00	\$0.00	\$0.01	\$0.00	\$0.00	\$0.05
Isolator 1, Double Line Clip Asm	\$0.00	\$0.01	\$0.00	\$0.00	\$0.00	\$0.05	\$0.00	\$0.01	\$0.06
Isolator 2, Double Line Clip Asm	\$0.00	\$0.01	\$0.00	\$0.00	\$0.00	\$0.05	\$0.00	\$0.01	\$0.06
Assemble Double Line Clip Asm	\$0.00	\$0.00	\$0.00	\$0.00	\$0.14	\$0.00	\$0.02	\$0.02	\$0.17

# Double Line Clip Asm, Compressor Suction Pipe Asm



**MUNRO**  
& ASSOCIATES, INC.

## Detailed Summary

<b>Parts</b>	<b>3</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>12</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.86%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.33</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.41</b>
<b>Total Weight (kg)</b>	<b>0.01</b>
<b>Purchased Part Cost</b>	<b>\$0.00</b>
<b>Material Cost</b>	<b>\$0.05</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.14</b>
<b>Supplier Fab. Cost</b>	<b>\$0.10</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.03</b>
<b>Manufacturing Cost*</b>	<b>\$0.35</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Double Line Clip, Double line Clip Asm



\...

- \Double Line Clip Asm, Compressor Suction Pipe Asm
- \Double Line Clip, Double line Clip Asm
- \Double Line Clip Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	2.74
Total Weight (kg)	0.01

Material Cost**	\$0.03
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.01
Q Burden	\$0.00
SG&A	\$0.00
Manufacturing Cost*	\$0.05

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Double Line Clip, Double line Clip Asm



## Double Line Clip Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
55Ton Injection Molding Press	16.44	6	0.25	14.89	HUN	\$0.01	99.99%	\$0.00

## Double Line Clip Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Double Line Clip	1	PA6	\$4.39	0.0067	0.0070	\$0.00	\$0.03

# Isolator 1, Double Line Clip Asm



\...

\Double Line Clip Asm, Compressor Suction Pipe Asm

\Isolator 1, Double Line Clip Asm

\Isolator 1 Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	11.06
Total Weight (kg)	0.00

Material Cost**	\$0.01
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.05
Q Burden	\$0.00
SG&A	\$0.01
Manufacturing Cost*	\$0.06

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Isolator 1, Double Line Clip Asm



## Isolator 1 Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
55Ton Injection Molding Press	66.36	6	0.25	14.89	HUN	\$0.05	99.99%	\$0.00

## Isolator 1 Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Isolator 1	1	TPE	\$2.54	0.0043	0.0050	\$0.00	\$0.01

# Isolator 2, Double Line Clip Asm



\...

\Double Line Clip Asm, Compressor Suction Pipe Asm

\Isolator 2, Double Line Clip Asm

\Isolator 2 Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	11.04
Total Weight (kg)	0.00

Material Cost**	\$0.01
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.05
Q Burden	\$0.00
SG&A	\$0.01
Manufacturing Cost*	\$0.06

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Isolator 2, Double Line Clip Asm



## Isolator 2 Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
55 Ton Injection Molding Press	66.24	6	0.25	14.89	HUN	\$0.05	99.99%	\$0.00

## Isolator 2 Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Isolator 2	1	TPE	\$2.54	0.0029	0.0030	\$0.00	\$0.01

No Commodity Items  
Required for This  
Process



- \...
- \Compressor Suction Pipe Asm, Cooling Pack Line Bund
- \Double Line Clip Asm, Compressor Suction Pipe Asm
- \Assemble Double Line Clip Asm

## Process Summary

Right First Time	99.89 %
Process Time (Sec)	20.00
Total Weight (kg)	0.00
Material Cost**	\$0.00
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.14
Q Burden	\$0.02
SG&A	\$0.02
Manufacturing Cost*	\$0.17

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Double Line Clip Asm



## Assemble Double Line Clip Asm

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	20.00	1	1.00	24.91	HUN	\$0.14	99.89%	\$0.02

## Assemble Double Line Clip Asm

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Connector 2, Cooling Tube 3 Asm



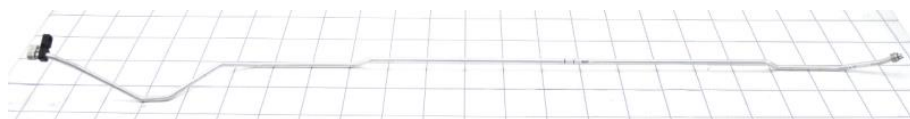
\...

- \Compressor Suction Pipe Asm, Cooling Pack Line Bund
- \Connector 2, Cooling Tube 3 Asm
- \Connector 2 Process

## Process Summary

<b>Right First Time</b>	<b>99.90 %</b>
<b>Process Time (Sec)</b>	<b>57.02</b>
<b>Total Weight (kg)</b>	<b>0.03</b>

<b>Material Cost**</b>	<b>\$0.15</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.55</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.08</b>
<b>Manufacturing Cost*</b>	<b>\$0.80</b>



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connector 2, Cooling Tube 3 Asm



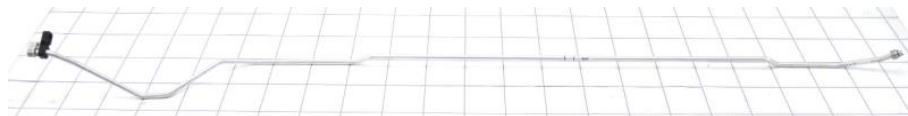
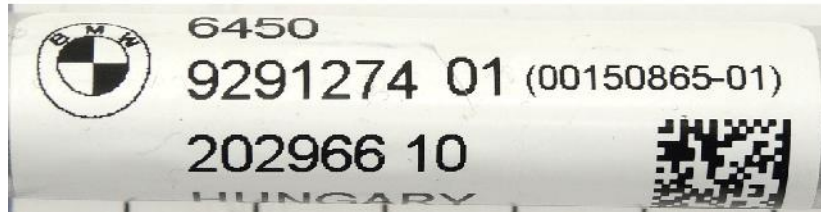
## Connector 2 Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.95	HUN	\$0.02	99.99 %	\$0.00
Deburr	4.00	1	0.25	22.62	HUN	\$0.03	99.99 %	\$0.00
CNC Machine	45.22	1	0.25	38.22	HUN	\$0.48	99.95 %	\$0.01
Cut Off	2.75	1	0.25	24.32	HUN	\$0.02	99.98 %	\$0.00
2200 Ton Extrusion Press	0.05	1	4.00	494.65	HUN	\$0.01	99.99 %	\$0.00

## Connector 2 Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Connector 2	1	Aluminum 6061 - Billet Stock	\$2.80	0.0253	0.0542	\$0.00	\$0.15

# Assemble Compressor Suction Pipe



\...

- \Cooling Pack Line Bundle Passenger Side Asm
- \Compressor Suction Pipe Asm, Cooling Pack Line Bund
- \Assemble Compressor Suction Pipe

## Process Summary

Right First Time	99.77 %
Process Time (Sec)	99.62
Total Weight (kg)	0.00

Material Cost**	\$0.15
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.63
Q Burden	\$0.03
SG&A	\$0.08
Manufacturing Cost*	\$0.89

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Compressor Suction Pipe



## Assemble Compressor Suction Pipe

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Automated Asm	99.62	1	0.25	22.73	HUN	\$0.63	99.77%	\$0.03

## Assemble Compressor Suction Pipe

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Bar Code Label,Cooling Tube 3 Asm	1	Commodity Item	Purchased	0.0001	-	\$0.05	\$0.00
QR Code Label,Cooling Tube 3 Asm	1	Commodity Item	Purchased	0.0001	-	\$0.10	\$0.00

# Coolant Feed Line Asm, Cooling Pack Line Bundle Pa



\...  
 \Cooling Pack  
 \Cooling Pack Line Bundle Passenger Side Asm  
 \Coolant Feed Line Asm, Cooling Pack Line Bundle Pa  
**Assembly Summary**

<b>Parts</b>	<b>23</b>
<b>Fasteners</b>	<b>3</b>
<b>Part Numbers</b>	<b>18</b>
<b>Steps</b>	<b>85</b>
<b>Fastenings</b>	<b>18</b>
<b>Right First Time</b>	<b>98.64 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>5.37</b>
<b>Total Weight (kg)</b>	<b>0.81</b>

<b>Material Cost**</b>	<b>\$5.24</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$2.42</b>
<b>Q Burden</b>	<b>\$0.21</b>
<b>SG&amp;A</b>	<b>\$0.83</b>
<b>Manufacturing Cost*</b>	<b>\$8.69</b>

\* Excluding tooling, ER&D, logistics, and profit margin  
 \*\* Includes material cost and purchased parts cost



# Coolant Feed Line Asm, Cooling Pack Line Bundle Pa



**MUNRO**  
& ASSOCIATES, INC.

## Coolant Feed Line Asm, Cooling Pack Line Bundle Pa

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Bending Refrigerant Return Pipe Asm, Coolant Feed L	1	6	2	19	2	99.63 %	0.00	0.00	0.40	1.01	0.4657
Straight Tube Asm, Coolant Feed Line Asm	1	6	4	26	4	99.65 %	0.00	0.00	1.59	0.44	0.2285
22mm-ID Short Hose, Coolant Feed Line Asm	1	3	0	3	0	99.97 %	0.00	0.00	0.00	0.03	0.0322
End Connector Asm, Coolant Feed Line Asm	1	2	1	6	1	99.95 %	0.00	0.00	0.13	0.14	0.0257
ID-30mm Tube Isolator, Coolant Feed Line Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.01	0.0137
Assemble Coolant Feed Line	1	5	11	25	11	99.45 %	0.00	0.00	1.62	0.00	0.0392

## Coolant Feed Line Asm, Cooling Pack Line Bundle Pa

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Bending Refrigerant Return Pipe Asm, Coolant Feed L	\$0.65	\$2.10	\$0.00	\$0.00	\$0.18	\$0.53	\$0.06	\$0.36	\$3.87
Straight Tube Asm, Coolant Feed Line Asm	\$0.00	\$1.77	\$0.00	\$0.00	\$0.70	\$0.18	\$0.05	\$0.32	\$3.01
22mm-ID Short Hose, Coolant Feed Line Asm	\$0.00	\$0.17	\$0.00	\$0.00	\$0.00	\$0.03	\$0.00	\$0.02	\$0.23
End Connector Asm, Coolant Feed Line Asm	\$0.04	\$0.10	\$0.00	\$0.00	\$0.06	\$0.03	\$0.01	\$0.02	\$0.27
ID-30mm Tube Isolator, Coolant Feed Line Asm	\$0.00	\$0.06	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.01	\$0.07
Assemble Coolant Feed Line	\$0.35	\$0.00	\$0.00	\$0.00	\$0.71	\$0.00	\$0.08	\$0.10	\$1.24

## Detailed Summary

<b>Parts</b>	<b>23</b>
<b>Fasteners</b>	<b>3</b>
<b>Part Numbers</b>	<b>18</b>
<b>Steps</b>	<b>85</b>
<b>Fastenings</b>	<b>18</b>
<b>Right First Time</b>	<b>98.64%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>3.74</b>
<b>Supplier Fab. Time (Min)</b>	<b>1.63</b>
<b>Total Weight (kg)</b>	<b>0.81</b>
<b>Purchased Part Cost</b>	
	<b>\$1.04</b>
<b>Material Cost</b>	
	<b>\$4.20</b>
<b>OEM Asm. Cost</b>	
	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	
	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	
	<b>\$1.64</b>
<b>Supplier Fab. Cost</b>	
	<b>\$0.78</b>
<b>Q Burden</b>	
	<b>\$0.21</b>
<b>SG&amp;A</b>	
	<b>\$0.83</b>
<b>Manufacturing Cost*</b>	
	<b>\$8.69</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Bending Refrigerant Return Pipe Asm, Coolant Feed L



\...

- \Cooling Pack Line Bundle Passenger Side Asm
- \Coolant Feed Line Asm, Cooling Pack Line Bundle Pa
- \Bending Refrigerant Return Pipe Asm, Coolant Feed L

## Assembly Summary

<b>Parts</b>	<b>6</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>6</b>
<b>Steps</b>	<b>19</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.63 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>1.41</b>
<b>Total Weight (kg)</b>	<b>0.47</b>

<b>Material Cost**</b>	<b>\$2.75</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.71</b>
<b>Q Burden</b>	<b>\$0.06</b>
<b>SG&amp;A</b>	<b>\$0.36</b>
<b>Manufacturing Cost*</b>	<b>\$3.87</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Bending Refrigerant Return Pipe Asm,Coolant Feed L



## Bending Refrigerant Return Pipe Asm,Coolant Feed L

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Plastic Tube,Bending Tube Asm	1	1	0	7	0	99.83 %	0.00	0.00	0.00	0.48	0.1996
26mm-ID Hose,Bending Refrigerant Return Pi	1	3	0	3	0	99.97 %	0.00	0.00	0.00	0.16	0.2439
Assemble Bending Tube	1	2	2	7	2	99.84 %	0.00	0.00	0.40	0.36	0.0222

## Bending Refrigerant Return Pipe Asm,Coolant Feed L

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Plastic Tube,Bending Tube Asm	\$0.00	\$0.82	\$0.00	\$0.00	\$0.00	\$0.21	\$0.03	\$0.12	\$1.18
26mm-ID Hose,Bending Refrigerant Return Pi	\$0.00	\$1.24	\$0.00	\$0.00	\$0.00	\$0.19	\$0.00	\$0.17	\$1.60
Assemble Bending Tube	\$0.65	\$0.04	\$0.00	\$0.00	\$0.18	\$0.14	\$0.02	\$0.06	\$1.09

# Bending Refrigerant Return Pipe Asm, Coolant Feed L

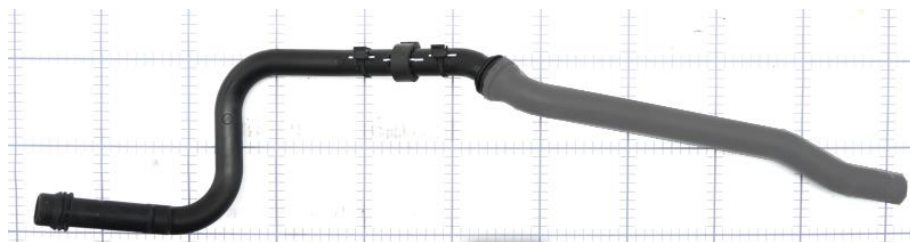
## Detailed Summary

<b>Parts</b>	<b>6</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>6</b>
<b>Steps</b>	<b>19</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.63%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.40</b>
<b>Supplier Fab. Time (Min)</b>	<b>1.01</b>
<b>Total Weight (kg)</b>	<b>0.47</b>
<b>Purchased Part Cost</b>	<b>\$0.65</b>
<b>Material Cost</b>	<b>\$2.10</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.18</b>
<b>Supplier Fab. Cost</b>	<b>\$0.53</b>
<b>Q Burden</b>	<b>\$0.06</b>
<b>SG&amp;A</b>	<b>\$0.36</b>
<b>Manufacturing Cost*</b>	<b>\$3.87</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Plastic Tube, Bending Tube Asm



\...

- \Bending Refrigerant Return Pipe Asm, Coolant Feed L
- \Plastic Tube, Bending Tube Asm
- \Plastic Tube Process

## Process Summary

<b>Right First Time</b>	<b>99.83 %</b>
<b>Process Time (Sec)</b>	<b>28.94</b>
<b>Total Weight (kg)</b>	<b>0.20</b>

<b>Material Cost**</b>	<b>\$0.82</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.21</b>
<b>Q Burden</b>	<b>\$0.03</b>
<b>SG&amp;A</b>	<b>\$0.12</b>
<b>Manufacturing Cost*</b>	<b>\$1.18</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Plastic Tube, Bending Tube Asm



## Plastic Tube Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Tube Bending	10.00	1	0.25	26.04	POL	\$0.07	99.84 %	\$0.02
300 Ton Injection Molding Press	37.88	2	0.25	26.59	POL	\$0.14	99.99 %	\$0.00

## Plastic Tube Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Plastic Tube	1	PA66 GF25+GB5	\$3.82	0.1996	0.2150	\$0.00	\$0.82

# 26mm-ID Hose,Bending Refrigerant Return Pi



\...

\Bending Refrigerant Return Pipe Asm,Coolant Feed L  
\26mm-ID Hose,Bending Refrigerant Return Pi  
\26mm-ID Hose Process

## Process Summary

Right First Time	99.97 %
Process Time (Sec)	9.89
Total Weight (kg)	0.24

Material Cost**	\$1.24
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.19
Q Burden	\$0.00
SG&A	\$0.17
Manufacturing Cost*	\$1.60

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# 26mm-ID Hose, Bending Refrigerant Return Pi



## 26mm-ID Hose Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Extrusion:45mm 2 Layer & Reinf	9.89	1	0.50	67.49	POL	\$0.19	99.97%	\$0.00

## 26mm-ID Hose Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material,Inner Layer,26mm-ID Hose	1	EPDM (Extrusion Grade)	\$4.43	0.1260	0.1260	\$0.00	\$0.56
Material,Reinforcement Layer,26mm-ID Hose	1	PA Thread w/PVC Coating	By Area	0.0197	-	\$0.00	\$0.24
Material,Outer Layer,26mm-ID Hose	1	EPDM (Extrusion Grade)	\$4.43	0.0982	0.0982	\$0.00	\$0.44

# Assemble Bending Tube



\...  
\Coolant Feed Line Asm, Cooling Pack Line Bundle Pa  
\Bending Refrigerant Return Pipe Asm,Coolant Feed L  
\Assemble Bending Tube

## Process Summary

Right First Time	99.84 %
Process Time (Sec)	45.83
Total Weight (kg)	0.02

Material Cost**	\$0.69
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.31
Q Burden	\$0.02
SG&A	\$0.06
Manufacturing Cost*	\$1.09

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Bending Tube



## Assemble Bending Tube

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Overmold, 55 Ton Injection Molding Press	43.66	2	0.25	22.38	POL	\$0.14	99.99%	\$0.00
Supplier Manual Asm	24.00	1	1.00	26.36	POL	\$0.18	99.85%	\$0.02

## Assemble Bending Tube

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Plastic Hoop, Bending Tube Asm	1	PA66 GF25	\$4.06	0.0082	0.0090	\$0.00	\$0.04
Sleeve, Bending Tube Asm	1	Commodity Item	Purchased	0.0140	-	\$0.65	\$0.00

# Straight Tube Asm, Coolant Feed Line Asm



\...

- \Cooling Pack Line Bundle Passenger Side Asm
- \Coolant Feed Line Asm, Cooling Pack Line Bundle Pa
- \Straight Tube Asm, Coolant Feed Line Asm

## Assembly Summary

<b>Parts</b>	<b>6</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>26</b>
<b>Fastenings</b>	<b>4</b>
<b>Right First Time</b>	<b>99.65 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>2.03</b>
<b>Total Weight (kg)</b>	<b>0.23</b>

<b>Material Cost**</b>	<b>\$1.77</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.87</b>
<b>Q Burden</b>	<b>\$0.05</b>
<b>SG&amp;A</b>	<b>\$0.32</b>
<b>Manufacturing Cost*</b>	<b>\$3.01</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Straight Tube Asm,Coolant Feed Line Asm



**MUNRO**  
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## Straight Tube Asm,Coolant Feed Line Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Straight Tube,Straight Tube Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.23	0.1284
End Connector,Straight Tube Asm	2	1	0	1	0	99.99 %	0.00	0.00	0.00	0.08	0.0352
Rubber Tube Sleeve,Straight Tube Asm	3	1	0	1	0	99.99 %	0.00	0.00	0.00	0.01	0.0099
Assemble Straight Tube	1	0	4	14	4	99.71 %	0.00	0.00	1.59	0.00	0.0000

## Straight Tube Asm,Coolant Feed Line Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Straight Tube,Straight Tube Asm	\$0.00	\$1.35	\$0.00	\$0.00	\$0.00	\$0.12	\$0.00	\$0.18	\$1.64
End Connector,Straight Tube Asm	\$0.00	\$0.15	\$0.00	\$0.00	\$0.00	\$0.02	\$0.00	\$0.02	\$0.19
Rubber Tube Sleeve,Straight Tube Asm	\$0.00	\$0.04	\$0.00	\$0.00	\$0.00	\$0.01	\$0.00	\$0.01	\$0.05
Assemble Straight Tube	\$0.00	\$0.00	\$0.00	\$0.00	\$0.70	\$0.00	\$0.04	\$0.08	\$0.82

## Detailed Summary

<b>Parts</b>	<b>6</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>26</b>
<b>Fastenings</b>	<b>4</b>
<b>Right First Time</b>	<b>99.65%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>1.59</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.44</b>
<b>Total Weight (kg)</b>	<b>0.23</b>
<b>Purchased Part Cost</b>	
	<b>\$0.00</b>
<b>Material Cost</b>	
	<b>\$1.77</b>
<b>OEM Asm. Cost</b>	
	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	
	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	
	<b>\$0.70</b>
<b>Supplier Fab. Cost</b>	
	<b>\$0.18</b>
<b>Q Burden</b>	
	<b>\$0.05</b>
<b>SG&amp;A</b>	
	<b>\$0.32</b>
<b>Manufacturing Cost*</b>	
	<b>\$3.01</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

\...  
 \Straight Tube Asm, Coolant Feed Line Asm  
 \Straight Tube, Straight Tube Asm  
 \Straight Tube Process



## Process Summary

<b>Right First Time</b>	<b>99.99 %</b>
<b>Process Time (Sec)</b>	<b>13.97</b>
<b>Total Weight (kg)</b>	<b>0.13</b>

<b>Material Cost**</b>	<b>\$1.35</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.12</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.18</b>
<b>Manufacturing Cost*</b>	<b>\$1.64</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Straight Tube, Straight Tube Asm



## Straight Tube Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Extrude: 32mm, 1 Layer	13.97	1	0.50	30.22	POL	\$0.12	99.99%	\$0.00

## Straight Tube Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Straight Tube	1	PA12 (Extrusion Grade)	\$10.50	0.1284	0.1285	\$0.00	\$1.35



# End Connector, Straight Tube Asm



\...

- \Straight Tube Asm, Coolant Feed Line Asm
- \End Connector, Straight Tube Asm
- \End Connector Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	5.06
Total Weight (kg)	0.04

Material Cost**	\$0.15
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.02
Q Burden	\$0.00
SG&A	\$0.02
Manufacturing Cost*	\$0.19



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# End Connector, Straight Tube Asm

## End Connector Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
55Ton Injection Molding Press	30.36	6	0.25	14.28	POL	\$0.02	99.99%	\$0.00

## End Connector Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, End Connector	1	PA66 GF25	\$4.06	0.0352	0.0380	\$0.00	\$0.15

# Rubber Tube Sleeve, Straight Tube Asm



- \...
- \Straight Tube Asm, Coolant Feed Line Asm
- \Rubber Tube Sleeve, Straight Tube Asm
- \Straight Tube Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	0.77
Total Weight (kg)	0.01

Material Cost**	\$0.04
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.01
Q Burden	\$0.00
SG&A	\$0.01
Manufacturing Cost*	\$0.05



\* Excluding tooling, ER&D, logistics, and profit margin  
 \*\* Includes material cost and purchased parts cost

# Rubber Tube Sleeve, Straight Tube Asm



**MUNRO**  
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## Straight Tube Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Extrude: 32mm, 1 Layer	0.77	1	0.50	30.22	POL	\$0.01	99.99%	\$0.00

## Straight Tube Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Rubber Tube Sleeve	1	EPDM (Extrusion Grade)	\$4.43	0.0099	0.0100	\$0.00	\$0.04

No Commodity Items  
Required for This  
Process



\...

\Coolant Feed Line Asm, Cooling Pack Line Bundle Pa  
\Straight Tube Asm, Coolant Feed Line Asm  
\Assemble Straight Tube

## Process Summary

<b>Right First Time</b>	<b>99.71 %</b>
<b>Process Time (Sec)</b>	<b>95.13</b>
<b>Total Weight (kg)</b>	<b>0.00</b>
<b>Material Cost**</b>	<b>\$0.00</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.70</b>
<b>Q Burden</b>	<b>\$0.04</b>
<b>SG&amp;A</b>	<b>\$0.08</b>
<b>Manufacturing Cost*</b>	<b>\$0.82</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Straight Tube



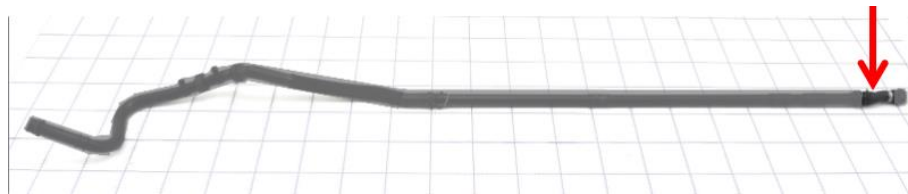
## Assemble Straight Tube

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	95.13	1	1.00	26.36	POL	\$0.70	99.71 %	\$0.04

## Assemble Straight Tube

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# 22mm-ID Short Hose, Coolant Feed Line Asm



\...

- \Coolant Feed Line Asm, Cooling Pack Line Bundle Pa
- \22mm-ID Short Hose, Coolant Feed Line Asm
- \22mm-ID Short Hose Process

## Process Summary

Right First Time	99.97 %
Process Time (Sec)	1.54
Total Weight (kg)	0.03

Material Cost**	\$0.17
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.03
Q Burden	\$0.00
SG&A	\$0.02
Manufacturing Cost*	\$0.23

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# 22mm-ID Short Hose, Coolant Feed Line Asm



## 22mm-ID Short Hose Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Extrusion:32mm 2 Layer&Reinf	1.54	1	0.50	65.82	POL	\$0.03	99.97%	\$0.00

## 22mm-ID Short Hose Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material,Inner Layer,26mm-ID Short Hose	1	EPDM (Extrusion Grade)	\$4.43	0.0164	0.0164	\$0.00	\$0.07
Material,Reinforcement Layer,26mm-ID ShortHose	1	PA Thread w/PVC Coating	By Area	0.0032	-	\$0.00	\$0.04
Material,Outer Layer,26mm-ID ShortHose	1	EPDM (Extrusion Grade)	\$4.43	0.0126	0.0126	\$0.00	\$0.06



# End Connector Asm, Coolant Feed Line Asm



\...

- \Cooling Pack Line Bundle Passenger Side Asm
- \Coolant Feed Line Asm, Cooling Pack Line Bundle Pa
- \End Connector Asm, Coolant Feed Line Asm

## Assembly Summary

<b>Parts</b>	<b>2</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>2</b>
<b>Steps</b>	<b>6</b>
<b>Fastenings</b>	<b>1</b>
<b>Right First Time</b>	<b>99.95 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>0.28</b>
<b>Total Weight (kg)</b>	<b>0.03</b>

<b>Material Cost**</b>	<b>\$0.14</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.09</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.02</b>
<b>Manufacturing Cost*</b>	<b>\$0.27</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# End Connector Asm, Coolant Feed Line Asm



## End Connector Asm, Coolant Feed Line Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Connector,End Connector Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.14	0.0244
Assemble Connector	1	1	1	4	1	99.96 %	0.00	0.00	0.13	0.00	0.0013

## End Connector Asm, Coolant Feed Line Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Connector,End Connector Asm	\$0.00	\$0.10	\$0.00	\$0.00	\$0.00	\$0.03	\$0.00	\$0.02	\$0.15
Assemble Connector	\$0.04	\$0.00	\$0.00	\$0.00	\$0.06	\$0.00	\$0.01	\$0.01	\$0.11

## Detailed Summary

<b>Parts</b>	<b>2</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>2</b>
<b>Steps</b>	<b>6</b>
<b>Fastenings</b>	<b>1</b>
<b>Right First Time</b>	<b>99.95%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.13</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.14</b>
<b>Total Weight (kg)</b>	<b>0.03</b>
<b>Purchased Part Cost</b>	<b>\$0.04</b>
<b>Material Cost</b>	<b>\$0.10</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.06</b>
<b>Supplier Fab. Cost</b>	<b>\$0.03</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.02</b>
<b>Manufacturing Cost*</b>	<b>\$0.27</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connector, End Connector Asm



\...  
\End Connector Asm, Coolant Feed Line Asm  
\Connector, End Connector Asm  
\Connector Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	8.69
Total Weight (kg)	0.02

Material Cost**	\$0.10
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.03
Q Burden	\$0.00
SG&A	\$0.02
Manufacturing Cost*	\$0.15

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connector, End Connector Asm



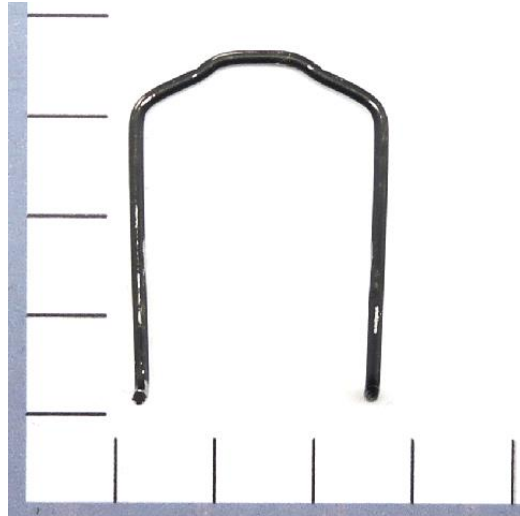
## Connector Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
55 Ton Injection Molding Press	52.14	6	0.25	14.28	POL	\$0.03	99.99%	\$0.00

## Connector Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Connector	1	PA66 GF30	\$3.95	0.0244	0.0260	\$0.00	\$0.10

# Assemble Connector



\...

- \Coolant Feed Line Asm, Cooling Pack Line Bundle Pa
- \End Connector Asm, Coolant Feed Line Asm
- \Assemble Connector

## Process Summary

Right First Time	99.96 %
Process Time (Sec)	8.00
Total Weight (kg)	0.00

Material Cost**	\$0.04
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.06
Q Burden	\$0.01
SG&A	\$0.01
Manufacturing Cost*	\$0.11

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Connector

## Assemble Connector

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	8.00	1	1.00	26.36	POL	\$0.06	99.96%	\$0.01

## Assemble Connector

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Connector Retention Ring	1	Commodity Item	Purchased	0.0013	-	\$0.04	\$0.00

# ID-30mm Tube Isolator, Coolant Feed Line Asm



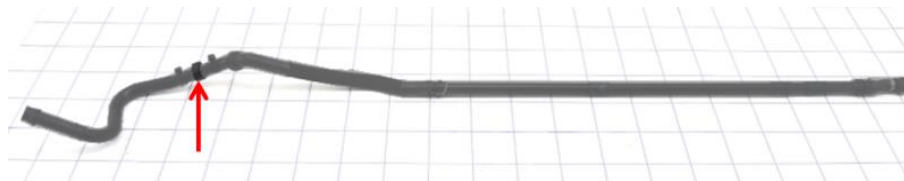
\...

\Coolant Feed Line Asm, Cooling Pack Line Bundle Pa  
\ID-30mm Tube Isolator, Coolant Feed Line Asm  
\Tube Isolator Process

## Process Summary

<b>Right First Time</b>	<b>99.99 %</b>
<b>Process Time (Sec)</b>	<b>0.49</b>
<b>Total Weight (kg)</b>	<b>0.01</b>

<b>Material Cost**</b>	<b>\$0.06</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.00</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.01</b>
<b>Manufacturing Cost*</b>	<b>\$0.07</b>



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# ID-30mm Tube Isolator, Coolant Feed Line Asm



## Tube Isolator Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Extrude: 32mm, 1 Layer	0.49	1	0.50	30.22	POL	\$0.00	99.99%	\$0.00

## Tube Isolator Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, ID-30mm Tube Isolator	1	EPDM (Extrusion Grade)	\$4.43	0.0137	0.0137	\$0.00	\$0.06

# Assemble Coolant Feed Line



\...

- \Cooling Pack Line Bundle Passenger Side Asm
- \Coolant Feed Line Asm, Cooling Pack Line Bundle Pa
- \Assemble Coolant Feed Line

## Process Summary

<b>Right First Time</b>	<b>99.45 %</b>
<b>Process Time (Sec)</b>	<b>97.00</b>
<b>Total Weight (kg)</b>	<b>0.04</b>

<b>Material Cost**</b>	<b>\$0.35</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.71</b>
<b>Q Burden</b>	<b>\$0.08</b>
<b>SG&amp;A</b>	<b>\$0.10</b>
<b>Manufacturing Cost*</b>	<b>\$1.24</b>



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Coolant Feed Line



## Assemble Coolant Feed Line

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	97.00	1	1.00	26.36	POL	\$0.71	99.45%	\$0.08

## Assemble Coolant Feed Line

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
30mm Hose Clamp	2	Commodity Item	Purchased	0.0141	-	\$0.14	\$0.00
34mm Hose Clamp	1	Commodity Item	Purchased	0.0066	-	\$0.05	\$0.00
Wire Tie,Coolant Hose Line Asm	2	Commodity Item	Purchased	0.0022	-	\$0.01	\$0.00

# Assemble Cooling Pack Bundle Passenger Side Asm

No Commodity Items  
Required for This  
Process

\...

\Cooling Pack

\Cooling Pack Line Bundle Passenger Side Asm

\Assemble Cooling Pack Bundle Passenger Side Asm

## Process Summary

Right First Time	99.70 %
Process Time (Sec)	82.00
Total Weight (kg)	0.00

Material Cost**	\$0.00
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.57
Q Burden	\$0.05
SG&A	\$0.07
Manufacturing Cost*	\$0.68



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Cooling Pack Bundle Passenger Side Asm



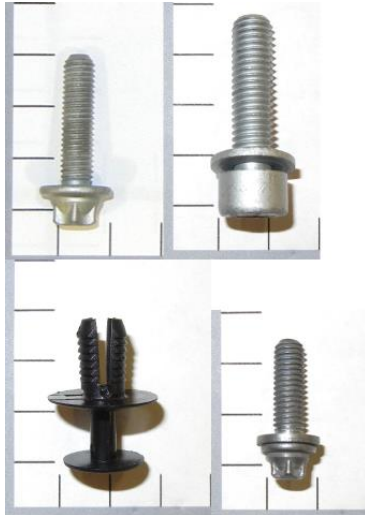
## Assemble Cooling Pack Bundle Passenger Side Asm

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	82.00	1	1.00	24.91	HUN	\$0.57	99.70%	\$0.05

## Assemble Cooling Pack Bundle Passenger Side Asm

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Cooling Pack Line Bundle Installation



\...

\Zone 6 Cooling Pack & HVAC

\Cooling Pack

\Cooling Pack Line Bundle Installation

## Process Summary

Right First Time	97.99 %
Process Time (Sec)	191.00
Total Weight (kg)	0.08

Material Cost**	\$0.40
OEM Process Cost	\$4.85
Supplier Process Cost	\$0.00
Q Burden	\$0.30
SG&A	\$0.59
Manufacturing Cost*	\$6.15



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Cooling Pack Line Bundle Installation



## Cooling Pack Line Bundle Installation

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
OEM Manual Asm	191.00	1	1.00	91.41	GER	\$4.85	97.99%	\$0.30

## Cooling Pack Line Bundle Installation

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
M6x18mm-SEMS Torx Bolt	3	Commodity Item	Purchased	0.0067	-	\$0.04	\$0.00
Short Two Stage Push Pin	3	Commodity Item	Purchased	0.0012	-	\$0.03	\$0.00
M6x25mm-Ext Torx Bolt	1	Commodity Item	Purchased	0.0085	-	\$0.03	\$0.00
M8x28mm-Socket Head SEMS Screw	1	Commodity Item	Purchased	0.0175	-	\$0.05	\$0.00
M6x25mm-Ext Torx Bolt	2	Commodity Item	Purchased	0.0085	-	\$0.03	\$0.00
M8x28mm-Socket Head SEMS Screw	1	Commodity Item	Purchased	0.0175	-	\$0.05	\$0.00

# Lower Radiator Hose Asm



- \...
- \Zone 6 Cooling Pack & HVAC
- \Cooling Pack
- \Lower Radiator Hose Asm

## Assembly Summary

<b>Parts</b>	<b>25</b>
<b>Fasteners</b>	<b>3</b>
<b>Part Numbers</b>	<b>23</b>
<b>Steps</b>	<b>78</b>
<b>Fastenings</b>	<b>18</b>
<b>Right First Time</b>	<b>98.31 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>4.51</b>
<b>Total Weight (kg)</b>	<b>0.59</b>

<b>Material Cost**</b>	<b>\$3.88</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$3.89</b>
<b>Q Burden</b>	<b>\$0.26</b>
<b>SG&amp;A</b>	<b>\$0.81</b>
<b>Manufacturing Cost*</b>	<b>\$8.84</b>

\* Excluding tooling, ER&D, logistics, and profit margin  
 \*\* Includes material cost and purchased parts cost



# Lower Radiator Hose Asm



## Lower Radiator Hose Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
30 Degree End Connector Asm,Lower Radiator Hose As	1	2	1	6	1	99.95 %	0.00	0.00	0.18	0.11	0.0463
Short 32mm-ID Hose,Lower Radiator Hose Asm	1	3	0	3	0	99.97 %	0.00	0.00	0.00	0.01	0.0213
Middle Connector,Lower Radiator Hose Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.16	0.0376
29mm-ID Hose Asm,Lower Radiator Hose Asm	1	4	2	9	2	99.82 %	0.00	0.00	0.23	0.07	0.1260
End Straight Connector Asm,Lower Radiator Hose Asm	1	2	1	6	1	99.95 %	0.00	0.00	0.18	0.08	0.0374
Branch Hose Asm,Lower Radiator Hose Asm	1	6	4	13	4	99.65 %	0.00	0.00	0.59	0.35	0.2625
Branch 90 Degree Connector Asm,Lower Radiator Hose	1	2	1	6	1	99.95 %	0.00	0.00	0.18	0.08	0.0193
Assemble Lower Radiator Hose	1	5	9	27	9	99.05 %	0.00	0.00	1.65	0.62	0.0396

## Lower Radiator Hose Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
30 Degree End Connector Asm,Lower Radiator Hose As	\$0.07	\$0.18	\$0.00	\$0.00	\$0.17	\$0.05	\$0.01	\$0.05	\$0.52
Short 32mm-ID Hose,Lower Radiator Hose Asm	\$0.00	\$0.11	\$0.00	\$0.00	\$0.00	\$0.02	\$0.00	\$0.02	\$0.15
Middle Connector,Lower Radiator Hose Asm	\$0.00	\$0.16	\$0.00	\$0.00	\$0.00	\$0.07	\$0.00	\$0.03	\$0.26
29mm-ID Hose Asm,Lower Radiator Hose Asm	\$0.33	\$0.58	\$0.00	\$0.00	\$0.21	\$0.11	\$0.03	\$0.12	\$1.37
End Straight Connector Asm,Lower Radiator Hose Asm	\$0.06	\$0.15	\$0.00	\$0.00	\$0.17	\$0.04	\$0.01	\$0.04	\$0.47
Branch Hose Asm,Lower Radiator Hose Asm	\$0.70	\$1.23	\$0.00	\$0.00	\$0.54	\$0.50	\$0.05	\$0.29	\$3.32
Branch 90 Degree Connector Asm,Lower Radiator Hose	\$0.02	\$0.08	\$0.00	\$0.00	\$0.17	\$0.03	\$0.01	\$0.03	\$0.34
Assemble Lower Radiator Hose	\$0.14	\$0.07	\$0.00	\$0.00	\$1.49	\$0.34	\$0.14	\$0.23	\$2.41

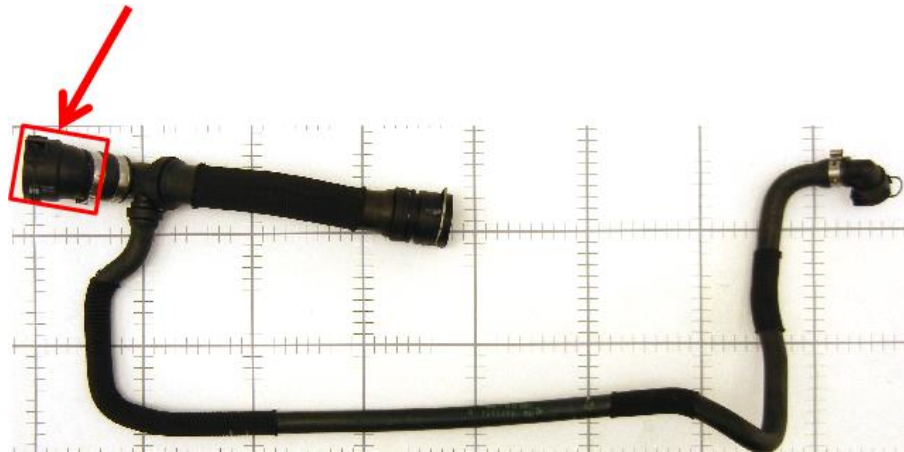
## Detailed Summary

<b>Parts</b>	<b>25</b>
<b>Fasteners</b>	<b>3</b>
<b>Part Numbers</b>	<b>23</b>
<b>Steps</b>	<b>78</b>
<b>Fastenings</b>	<b>18</b>
<b>Right First Time</b>	<b>98.31%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>3.02</b>
<b>Supplier Fab. Time (Min)</b>	<b>1.48</b>
<b>Total Weight (kg)</b>	<b>0.59</b>
<b>Purchased Part Cost</b>	<b>\$1.32</b>
<b>Material Cost</b>	<b>\$2.56</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$2.74</b>
<b>Supplier Fab. Cost</b>	<b>\$1.15</b>
<b>Q Burden</b>	<b>\$0.26</b>
<b>SG&amp;A</b>	<b>\$0.81</b>
<b>Manufacturing Cost*</b>	<b>\$8.84</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# 30 Degree End Connector Asm, Lower Radiator Hose As



\...  
 \Cooling Pack  
 \Lower Radiator Hose Asm  
 \30 Degree End Connector Asm, Lower Radiator Hose  
 As **Assembly Summary**

<b>Parts</b>	<b>2</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>2</b>
<b>Steps</b>	<b>6</b>
<b>Fastenings</b>	<b>1</b>
<b>Right First Time</b>	<b>99.95 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>0.29</b>
<b>Total Weight (kg)</b>	<b>0.05</b>

<b>Material Cost**</b>	<b>\$0.25</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.21</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.05</b>
<b>Manufacturing Cost*</b>	<b>\$0.52</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# 30 Degree End Connector Asm, Lower Radiator Hose As



## 30 Degree End Connector Asm, Lower Radiator Hose As

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Connector, 30 Degree End Connector Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.11	0.0431
Assemble 30 Degree End Connector	1	1	1	4	1	99.96 %	0.00	0.00	0.18	0.00	0.0032

## 30 Degree End Connector Asm, Lower Radiator Hose As

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Connector, 30 Degree End Connector Asm	\$0.00	\$0.18	\$0.00	\$0.00	\$0.00	\$0.05	\$0.00	\$0.03	\$0.26
Assemble 30 Degree End Connector	\$0.07	\$0.00	\$0.00	\$0.00	\$0.17	\$0.00	\$0.01	\$0.02	\$0.26

# 30 Degree End Connector Asm, Lower Radiator Hose As

## Detailed Summary

<b>Parts</b>	<b>2</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>2</b>
<b>Steps</b>	<b>6</b>
<b>Fastenings</b>	<b>1</b>
<b>Right First Time</b>	<b>99.95%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.18</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.11</b>
<b>Total Weight (kg)</b>	<b>0.05</b>
<b>Purchased Part Cost</b>	<b>\$0.07</b>
<b>Material Cost</b>	<b>\$0.18</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.17</b>
<b>Supplier Fab. Cost</b>	<b>\$0.05</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.05</b>
<b>Manufacturing Cost*</b>	<b>\$0.52</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connector,30 Degree End Connector Asm



\...

\30 Degree End Connector Asm,Lower Radiator Hose As  
 \Connector,30 Degree End Connector Asm  
 \Connector Process

## Process Summary

<b>Right First Time</b>	<b>99.99 %</b>
<b>Process Time (Sec)</b>	<b>6.37</b>
<b>Total Weight (kg)</b>	<b>0.04</b>

<b>Material Cost**</b>	<b>\$0.18</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.05</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.03</b>
<b>Manufacturing Cost*</b>	<b>\$0.26</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connector,30 Degree End Connector Asm



## Connector Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
110 Ton Injection Molding Press	38.22	6	0.25	26.65	GER	\$0.05	99.99%	\$0.00

## Connector Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material,End Connector 1	1	PA66 GF30	\$3.95	0.0431	0.0460	\$0.00	\$0.18

# Assemble 30 Degree End Connector



\...  
\Lower Radiator Hose Asm  
\30 Degree End Connector Asm, Lower Radiator Hose  
As \Assemble 30 Degree End Connector

## Process Summary

<b>Right First Time</b>	<b>99.96 %</b>
<b>Process Time (Sec)</b>	<b>11.00</b>
<b>Total Weight (kg)</b>	<b>0.00</b>

<b>Material Cost**</b>	<b>\$0.07</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.17</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.02</b>
<b>Manufacturing Cost*</b>	<b>\$0.26</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost




# Assemble 30 Degree End Connector



## Assemble 30 Degree End Connector

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
<a href="#">Supplier Manual Asm</a>	11.00	1	1.00	54.32	GER	\$0.17	99.96%	\$0.01

## Assemble 30 Degree End Connector

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
 Connector Retention Clip,End Connector 1 Asm	1	Commodity Item	Purchased	0.0032	-	\$0.07	\$0.00

# Short 32mm-ID Hose, Lower Radiator Hose Asm



\...

\Lower Radiator Hose Asm

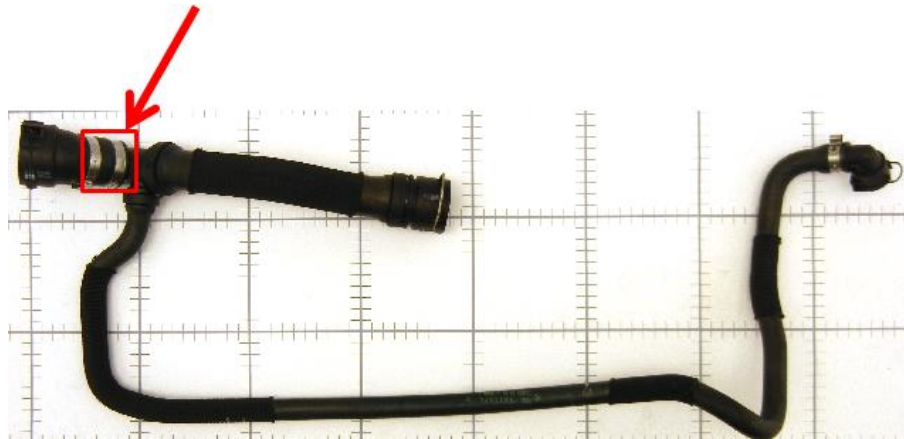
\Short 32mm-ID Hose, Lower Radiator Hose Asm

\Short 32mm-ID Hose Process

## Process Summary

Right First Time	99.97 %
Process Time (Sec)	0.70
Total Weight (kg)	0.02

Material Cost**	\$0.11
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.02
Q Burden	\$0.00
SG&A	\$0.02
Manufacturing Cost*	\$0.15



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Short 32mm-ID Hose, Lower Radiator Hose Asm



## Short 32mm-ID Hose Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Extrusion:45mm 2 Layer&Reinf	0.70	1	0.50	89.47	GER	\$0.02	99.97%	\$0.00

## Short 32mm-ID Hose Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material,Inner Layer,Short 32mm-ID Hose	1	EPDM (Extrusion Grade)	\$4.43	0.0118	0.0118	\$0.00	\$0.05
Material,Reinforcement Layer,Short 32mm-ID Hose	1	PA Thread w/PVC Coating	By Area	0.0015	-	\$0.00	\$0.02
Material,Outer Layer,Short 32mm-ID Hose	1	EPDM (Extrusion Grade)	\$4.43	0.0080	0.0080	\$0.00	\$0.04

# Middle Connector, Lower Radiator Hose Asm



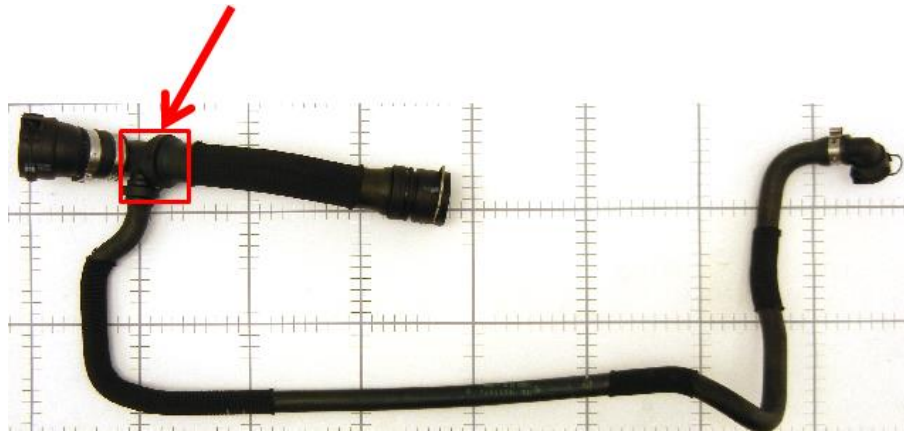
\...

- \Lower Radiator Hose Asm
- \Middle Connector, Lower Radiator Hose Asm
- \End Connector 1 Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	9.61
Total Weight (kg)	0.04

Material Cost**	\$0.16
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.07
Q Burden	\$0.00
SG&A	\$0.03
Manufacturing Cost*	\$0.26



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Middle Connector, Lower Radiator Hose Asm



## End Connector 1 Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
110 Ton Injection Molding Press	57.66	6	0.25	26.65	GER	\$0.07	99.99%	\$0.00

## End Connector 1 Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Middle Connector	1	PA66 GF30	\$3.95	0.0376	0.0400	\$0.00	\$0.16

# 29mm-ID Hose Asm, Lower Radiator Hose Asm



\...  
 \Cooling Pack  
 \Lower Radiator Hose Asm  
 \29mm-ID Hose Asm, Lower Radiator Hose Asm  
**Assembly Summary**

<b>Parts</b>	<b>4</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>4</b>
<b>Steps</b>	<b>9</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.82 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>0.30</b>
<b>Total Weight (kg)</b>	<b>0.13</b>

<b>Material Cost**</b>	<b>\$0.91</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.32</b>
<b>Q Burden</b>	<b>\$0.03</b>
<b>SG&amp;A</b>	<b>\$0.12</b>
<b>Manufacturing Cost*</b>	<b>\$1.37</b>

\* Excluding tooling, ER&D, logistics, and profit margin  
 \*\* Includes material cost and purchased parts cost

# 29mm-ID Hose Asm, Lower Radiator Hose Asm



## 29mm-ID Hose Asm, Lower Radiator Hose Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
29mm-ID Hose, 29mm-ID Hose Asm	1	3	0	3	0	99.97 %	0.00	0.00	0.00	0.07	0.1187
Assemble 30mm-ID Hose	1	1	2	5	2	99.85 %	0.00	0.00	0.23	0.00	0.0072

## 29mm-ID Hose Asm, Lower Radiator Hose Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
29mm-ID Hose, 29mm-ID Hose Asm	\$0.00	\$0.58	\$0.00	\$0.00	\$0.00	\$0.11	\$0.00	\$0.08	\$0.78
Assemble 30mm-ID Hose	\$0.33	\$0.00	\$0.00	\$0.00	\$0.21	\$0.00	\$0.02	\$0.03	\$0.60

# 29mm-ID Hose Asm, Lower Radiator Hose Asm

## Detailed Summary

<b>Parts</b>	<b>4</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>4</b>
<b>Steps</b>	<b>9</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.82%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.23</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.07</b>
<b>Total Weight (kg)</b>	<b>0.13</b>
<b>Purchased Part Cost</b>	
	<b>\$0.33</b>
<b>Material Cost</b>	
	<b>\$0.58</b>
<b>OEM Asm. Cost</b>	
	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	
	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	
	<b>\$0.21</b>
<b>Supplier Fab. Cost</b>	
	<b>\$0.11</b>
<b>Q Burden</b>	
	<b>\$0.03</b>
<b>SG&amp;A</b>	
	<b>\$0.12</b>
<b>Manufacturing Cost*</b>	
	<b>\$1.37</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# 29mm-ID Hose,29mm-ID Hose Asm



\...

\29mm-ID Hose Asm,Lower Radiator Hose Asm

\29mm-ID Hose,29mm-ID Hose Asm

\29mm-ID Hose Process

## Process Summary

Right First Time	99.97 %
Process Time (Sec)	4.42
Total Weight (kg)	0.12

Material Cost**	\$0.58
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.11
Q Burden	\$0.00
SG&A	\$0.08
Manufacturing Cost*	\$0.78

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# 29mm-ID Hose, 29mm-ID Hose Asm



## 29mm-ID Hose Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Extrusion: 45mm 2 Layer & Reinf	4.42	1	0.50	89.47	GER	\$0.11	99.97%	\$0.00

## 29mm-ID Hose Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Inner Layer, 29mm-ID Hose	1	EPDM (Extrusion Grade)	\$4.43	0.0575	0.0575	\$0.00	\$0.25
Material, Reinforcement Layer, 29mm-ID Hose	1	PA Thread w/PVC Coating	By Area	0.0111	-	\$0.00	\$0.11
Material, Outer Layer, 29mm-ID Hose	1	EPDM (Extrusion Grade)	\$4.43	0.0501	0.0501	\$0.00	\$0.22

# Assemble 30mm-ID Hose



\...

\Lower Radiator Hose Asm

\29mm-ID Hose Asm, Lower Radiator Hose Asm

\Assemble 30mm-ID Hose

## Process Summary

Right First Time	99.85 %
Process Time (Sec)	13.76
Total Weight (kg)	0.01

Material Cost**	\$0.33
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.21
Q Burden	\$0.02
SG&A	\$0.03
Manufacturing Cost*	\$0.60

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble 30mm-ID Hose



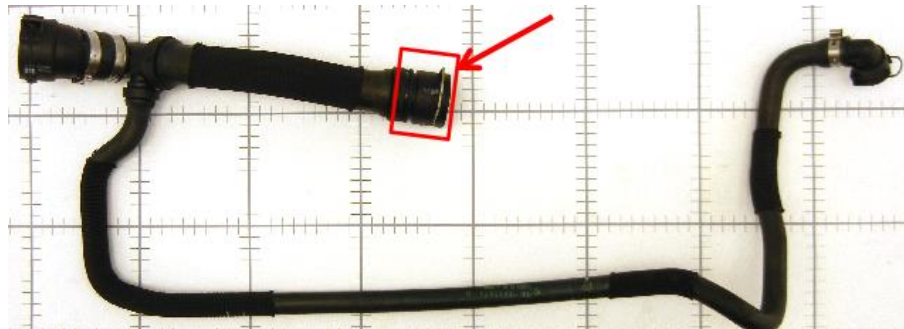
## Assemble 30mm-ID Hose

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	13.76	1	1.00	54.32	GER	\$0.21	99.85%	\$0.02

## Assemble 30mm-ID Hose

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Hose Sleeve,29mm-ID Hose Asm	1	Commodity Item	Purchased	0.0072	-	\$0.33	\$0.00

# End Straight Connector Asm, Lower Radiator Hose Asm



\...  
 \Cooling Pack  
 \Lower Radiator Hose Asm  
 \End Straight Connector Asm, Lower Radiator Hose  
 Asm

## Assembly Summary

<b>Parts</b>	<b>2</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>2</b>
<b>Steps</b>	<b>6</b>
<b>Fastenings</b>	<b>1</b>
<b>Right First Time</b>	<b>99.95 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>0.27</b>
<b>Total Weight (kg)</b>	<b>0.04</b>

<b>Material Cost**</b>	<b>\$0.21</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.20</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.04</b>
<b>Manufacturing Cost*</b>	<b>\$0.47</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# End Straight Connector Asm, Lower Radiator Hose Asm



## End Straight Connector Asm, Lower Radiator Hose Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Straight Connector, End Straight Connector Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.08	0.0345
Assemble End Straight Connector	1	1	1	4	1	99.96 %	0.00	0.00	0.18	0.00	0.0029

## End Straight Connector Asm, Lower Radiator Hose Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Straight Connector, End Straight Connector Asm	\$0.00	\$0.15	\$0.00	\$0.00	\$0.00	\$0.04	\$0.00	\$0.02	\$0.21
Assemble End Straight Connector	\$0.06	\$0.00	\$0.00	\$0.00	\$0.17	\$0.00	\$0.01	\$0.02	\$0.25

# End Straight Connector Asm, Lower Radiator Hose Asm

## Detailed Summary

<b>Parts</b>	<b>2</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>2</b>
<b>Steps</b>	<b>6</b>
<b>Fastenings</b>	<b>1</b>
<b>Right First Time</b>	<b>99.95%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.18</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.08</b>
<b>Total Weight (kg)</b>	<b>0.04</b>
<b>Purchased Part Cost</b>	
	<b>\$0.06</b>
<b>Material Cost</b>	
	<b>\$0.15</b>
<b>OEM Asm. Cost</b>	
	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	
	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	
	<b>\$0.17</b>
<b>Supplier Fab. Cost</b>	
	<b>\$0.04</b>
<b>Q Burden</b>	
	<b>\$0.01</b>
<b>SG&amp;A</b>	
	<b>\$0.04</b>
<b>Manufacturing Cost*</b>	
	<b>\$0.47</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Straight Connector, End Straight Connector Asm



\...  
\End Straight Connector Asm, Lower Radiator Hose Asm  
\Straight Connector, End Straight Connector Asm  
\Straight Connector Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	5.01
Total Weight (kg)	0.03

Material Cost**	\$0.15
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.04
Q Burden	\$0.00
SG&A	\$0.02
Manufacturing Cost*	\$0.21

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Straight Connector, End Straight Connector Asm



**MUNRO**  
& ASSOCIATES, INC.

## Straight Connector Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
110 Ton Injection Molding Press	30.06	6	0.25	26.65	GER	\$0.04	99.99%	\$0.00

## Straight Connector Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Straight Connector	1	PA66 GF30	\$3.95	0.0345	0.0370	\$0.00	\$0.15

# Assemble End Straight Connector



\...

\Lower Radiator Hose Asm

\End Straight Connector Asm, Lower Radiator Hose Asm

\Assemble End Straight Connector

## Process Summary

Right First Time	99.96 %
Process Time (Sec)	11.00
Total Weight (kg)	0.00

Material Cost**	\$0.06
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.17
Q Burden	\$0.01
SG&A	\$0.02
Manufacturing Cost*	\$0.25

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble End Straight Connector



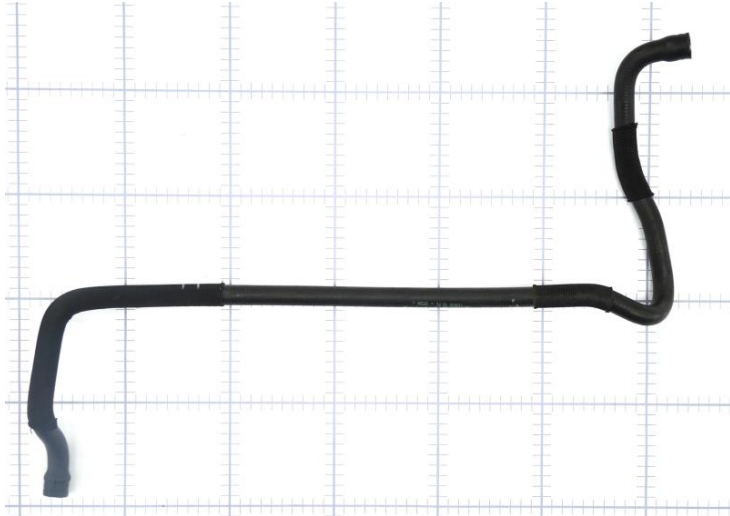
## Assemble End Straight Connector

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	11.00	1	1.00	54.32	GER	\$0.17	99.96%	\$0.01

## Assemble End Straight Connector

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Connector Retention Clip,End Connector 2 Asm	1	Commodity Item	Purchased	0.0029	-	\$0.06	\$0.00

# Branch Hose Asm, Lower Radiator Hose Asm



- \...
  - \Cooling Pack
  - \Lower Radiator Hose Asm
  - \Branch Hose Asm, Lower Radiator Hose Asm
- ## Assembly Summary

<b>Parts</b>	<b>6</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>5</b>
<b>Steps</b>	<b>13</b>
<b>Fastenings</b>	<b>4</b>
<b>Right First Time</b>	<b>99.65 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>0.94</b>
<b>Total Weight (kg)</b>	<b>0.26</b>

<b>Material Cost**</b>	<b>\$1.93</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$1.04</b>
<b>Q Burden</b>	<b>\$0.05</b>
<b>SG&amp;A</b>	<b>\$0.29</b>
<b>Manufacturing Cost*</b>	<b>\$3.32</b>

\* Excluding tooling, ER&D, logistics, and profit margin  
 \*\* Includes material cost and purchased parts cost

# Branch Hose Asm, Lower Radiator Hose Asm



## Branch Hose Asm, Lower Radiator Hose Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
17mm-ID Branch Hose, Branch Hose Asm	1	3	0	3	0	99.97 %	0.00	0.00	0.00	0.35	0.2492
Assemble Branch Hose	1	3	4	9	4	99.68 %	0.00	0.00	0.59	0.00	0.0133

## Branch Hose Asm, Lower Radiator Hose Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
17mm-ID Branch Hose, Branch Hose Asm	\$0.00	\$1.23	\$0.00	\$0.00	\$0.00	\$0.50	\$0.00	\$0.21	\$1.94
Assemble Branch Hose	\$0.70	\$0.00	\$0.00	\$0.00	\$0.54	\$0.00	\$0.05	\$0.09	\$1.37

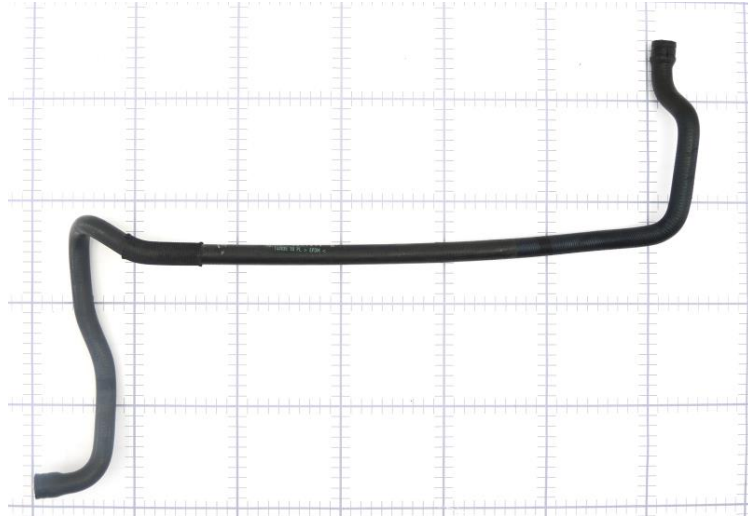
## Detailed Summary

<b>Parts</b>	<b>6</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>5</b>
<b>Steps</b>	<b>13</b>
<b>Fastenings</b>	<b>4</b>
<b>Right First Time</b>	<b>99.65%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.59</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.35</b>
<b>Total Weight (kg)</b>	<b>0.26</b>
<b>Purchased Part Cost</b>	<b>\$0.70</b>
<b>Material Cost</b>	<b>\$1.23</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.54</b>
<b>Supplier Fab. Cost</b>	<b>\$0.50</b>
<b>Q Burden</b>	<b>\$0.05</b>
<b>SG&amp;A</b>	<b>\$0.29</b>
<b>Manufacturing Cost*</b>	<b>\$3.32</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# 17mm-ID Branch Hose, Branch Hose Asm



\...

\Branch Hose Asm, Lower Radiator Hose Asm

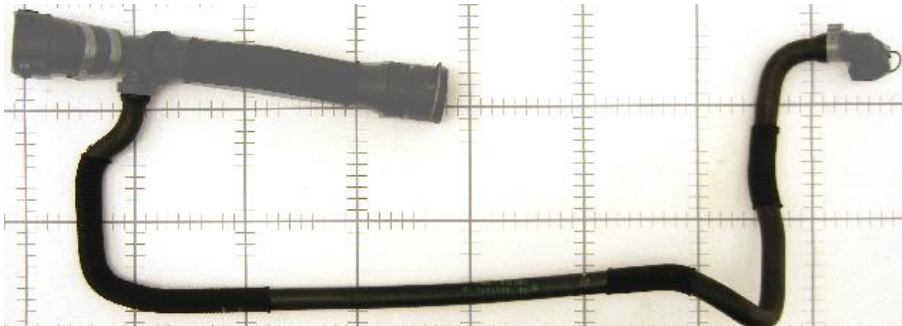
\17mm-ID Branch Hose, Branch Hose Asm

\17mm-ID Hose Process

## Process Summary

Right First Time	99.97 %
Process Time (Sec)	20.74
Total Weight (kg)	0.25

Material Cost**	\$1.23
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.50
Q Burden	\$0.00
SG&A	\$0.21
Manufacturing Cost*	\$1.94



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# 17mm-ID Branch Hose, Branch Hose Asm



## 17mm-ID Hose Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Extrusion:32mm 2 Layer&Reinf	20.74	1	0.50	86.95	GER	\$0.50	99.97%	\$0.00

## 17mm-ID Hose Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material,Inner Layer,17mm-ID Hose	1	EPDM (Extrusion Grade)	\$4.43	0.1088	0.1088	\$0.00	\$0.48
Material,Reinforcement Layer,17mm-ID Hose	1	PA Thread w/PVC Coating	By Area	0.0304	-	\$0.00	\$0.26
Material,Outer Layer,17mm-ID Hose	1	EPDM (Extrusion Grade)	\$4.43	0.1100	0.1100	\$0.00	\$0.49



# Assemble Branch Hose



\...

- \Lower Radiator Hose Asm
- \Branch Hose Asm, Lower Radiator Hose Asm
- \Assemble Branch Hose

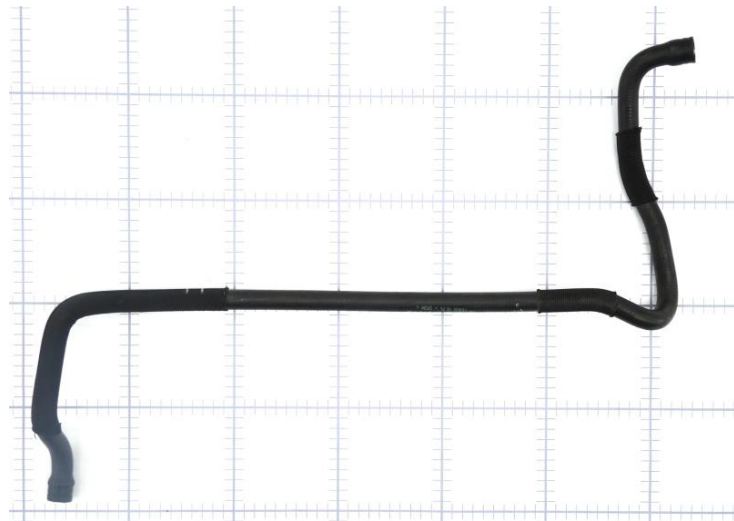
## Process Summary

Right First Time	99.68 %
Process Time (Sec)	35.68
Total Weight (kg)	0.01

Material Cost**	\$0.70
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.54
Q Burden	\$0.05
SG&A	\$0.09
Manufacturing Cost*	\$1.37

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Assemble Branch Hose



## Assemble Branch Hose

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	35.68	1	1.00	54.32	GER	\$0.54	99.68 %	\$0.05

## Assemble Branch Hose

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Branch Hose Long Sleeve, Branch Hose Asm	1	Commodity Item	Purchased	0.0087	-	\$0.46	\$0.00
Branch Hose Short Sleeve, Branch Hose Asm	2	Commodity Item	Purchased	0.0023	-	\$0.12	\$0.00

# Branch 90 Degree Connector Asm, Lower Radiator Hose



\...  
 \Cooling Pack  
 \Lower Radiator Hose Asm  
 \Branch 90 Degree Connector Asm, Lower Radiator  
 Hose

## Assembly Summary

<b>Parts</b>	<b>2</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>2</b>
<b>Steps</b>	<b>6</b>
<b>Fastenings</b>	<b>1</b>
<b>Right First Time</b>	<b>99.95 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>0.26</b>
<b>Total Weight (kg)</b>	<b>0.02</b>

<b>Material Cost**</b>	<b>\$0.10</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.20</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.03</b>
<b>Manufacturing Cost*</b>	<b>\$0.34</b>

\* Excluding tooling, ER&D, logistics, and profit margin  
 \*\* Includes material cost and purchased parts cost



# Branch 90 Degree Connector Asm, Lower Radiator Hose



## Branch 90 Degree Connector Asm, Lower Radiator Hose

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
90 Degree Connector, Branch End Connector Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.08	0.0183
Assemble Branch 90 Degree Connector	1	1	1	4	1	99.96 %	0.00	0.00	0.18	0.00	0.0010

## Branch 90 Degree Connector Asm, Lower Radiator Hose

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
90 Degree Connector, Branch End Connector Asm	\$0.00	\$0.08	\$0.00	\$0.00	\$0.00	\$0.03	\$0.00	\$0.01	\$0.13
Assemble Branch 90 Degree Connector	\$0.02	\$0.00	\$0.00	\$0.00	\$0.17	\$0.00	\$0.01	\$0.02	\$0.21

## Detailed Summary

<b>Parts</b>	<b>2</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>2</b>
<b>Steps</b>	<b>6</b>
<b>Fastenings</b>	<b>1</b>
<b>Right First Time</b>	<b>99.95%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.18</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.08</b>
<b>Total Weight (kg)</b>	<b>0.02</b>
<b>Purchased Part Cost</b>	<b>\$0.02</b>
<b>Material Cost</b>	<b>\$0.08</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.17</b>
<b>Supplier Fab. Cost</b>	<b>\$0.03</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.03</b>
<b>Manufacturing Cost*</b>	<b>\$0.34</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# 90 Degree Connector, Branch End Connector Asm



\...  
 \Branch 90 Degree Connector Asm, Lower Radiator Hose  
 \90 Degree Connector, Branch End Connector Asm  
 \90 Degree Connector Process

## Process Summary

<b>Right First Time</b>	<b>99.99 %</b>
<b>Process Time (Sec)</b>	<b>4.88</b>
<b>Total Weight (kg)</b>	<b>0.02</b>

<b>Material Cost**</b>	<b>\$0.08</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.03</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.01</b>
<b>Manufacturing Cost*</b>	<b>\$0.13</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# 90 Degree Connector, Branch End Connector Asm

## 90 Degree Connector Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
55Ton Injection Molding Press	29.28	6	0.25	23.71	GER	\$0.03	99.99%	\$0.00

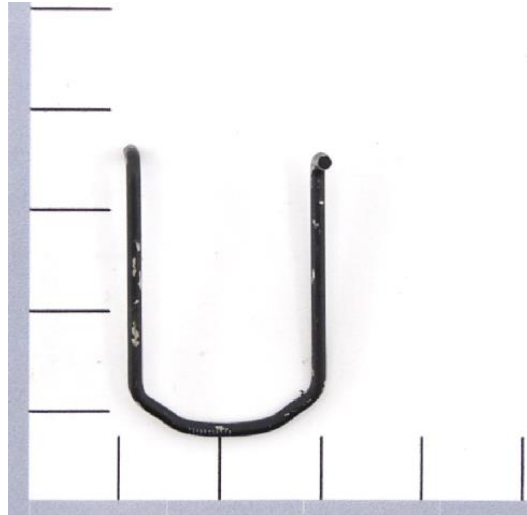
## 90 Degree Connector Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, 90 Degree Connector	1	PA66 GF30	\$3.95	0.0183	0.0200	\$0.00	\$0.08

# Assemble Branch 90 Degree Connector



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\...  
\Lower Radiator Hose Asm  
\Branch 90 Degree Connector Asm, Lower Radiator  
Hose \Assemble Branch 90 Degree Connector

## Process Summary

<b>Right First Time</b>	<b>99.96 %</b>
<b>Process Time (Sec)</b>	<b>11.00</b>
<b>Total Weight (kg)</b>	<b>0.00</b>

<b>Material Cost**</b>	<b>\$0.02</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.17</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.02</b>
<b>Manufacturing Cost*</b>	<b>\$0.21</b>



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Assemble Branch 90 Degree Connector



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## Assemble Branch 90 Degree Connector

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	11.00	1	1.00	54.32	GER	\$0.17	99.96%	\$0.01

## Assemble Branch 90 Degree Connector

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Connector Retention Clip, Branch 90 Degree Connecto	1	Commodity Item	Purchased	0.0010	-	\$0.02	\$0.00

# Assemble Lower Radiator Hose



\...

- \Cooling Pack
- \Lower Radiator Hose Asm
- \Assemble Lower Radiator Hose

## Process Summary

<b>Right First Time</b>	<b>99.05 %</b>
<b>Process Time (Sec)</b>	<b>136.19</b>
<b>Total Weight (kg)</b>	<b>0.04</b>

<b>Material Cost**</b>	<b>\$0.21</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$1.83</b>
<b>Q Burden</b>	<b>\$0.14</b>
<b>SG&amp;A</b>	<b>\$0.23</b>
<b>Manufacturing Cost*</b>	<b>\$2.41</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Lower Radiator Hose



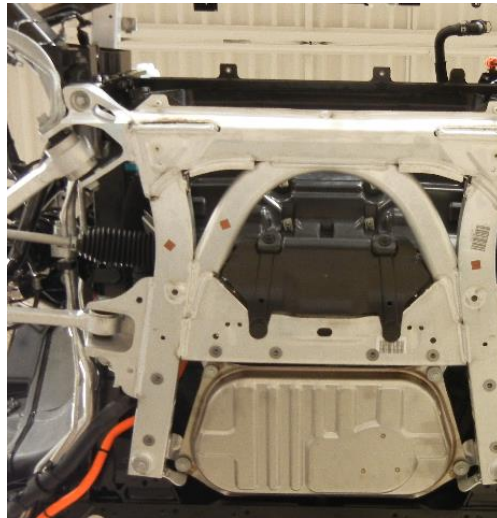
## Assemble Lower Radiator Hose

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	59.00	1	1.00	54.32	GER	\$0.89	99.43 %	\$0.09
Overmold, 55 Ton Injection Molding Press	39.98	2	0.25	32.44	GER	\$0.18	99.99 %	\$0.00
Supplier Manual Asm	27.00	1	1.00	54.32	GER	\$0.41	99.77 %	\$0.03
Overmold, 55 Ton Injection Molding Press	34.40	2	0.25	32.44	GER	\$0.15	99.99 %	\$0.00
Supplier Manual Asm	13.00	1	1.00	54.32	GER	\$0.20	99.87 %	\$0.02

## Assemble Lower Radiator Hose

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
38mm Hose Locking Clamp	2	Commodity Item	Purchased	0.0086	-	\$0.05	\$0.00
22mm Hose Locking Clamp	1	Commodity Item	Purchased	0.0059	-	\$0.04	\$0.00
Combination Plastic Hoop, Lower Radiator Hose Asm	1	PA66 GF25	\$4.06	0.0094	0.0100	\$0.00	\$0.04
OD-45mm Plastic Hoop, Lower Radiator Hose Asm	1	PA66 GF25	\$4.06	0.0071	0.0080	\$0.00	\$0.03

## No Commodity Items Required for This Process



- \...
- \Zone 6 Cooling Pack & HVAC
- \Cooling Pack
- \Lower Radiator Hose Installation

### Process Summary

<b>Right First Time</b>	<b>99.87 %</b>
<b>Process Time (Sec)</b>	<b>30.50</b>
<b>Total Weight (kg)</b>	<b>0.00</b>
<b>Material Cost**</b>	<b>\$0.00</b>
<b>OEM Process Cost</b>	<b>\$0.77</b>
<b>Supplier Process Cost</b>	<b>\$0.00</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.09</b>
<b>Manufacturing Cost*</b>	<b>\$0.89</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Lower Radiator Hose Installation



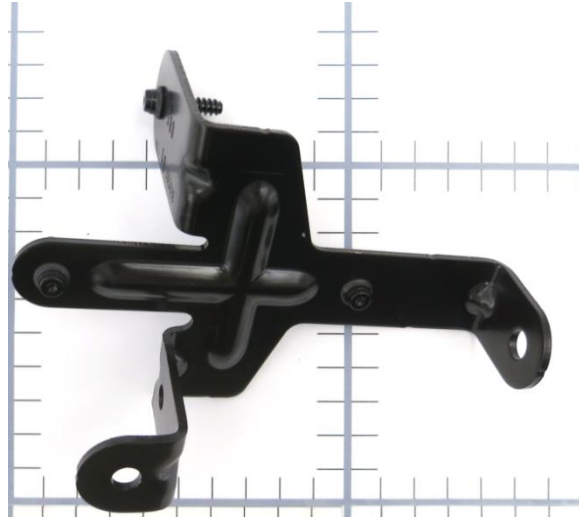
## Lower Radiator Hose Installation

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
OEM Manual Asm	30.50	1	1.00	91.41	GER	\$0.77	99.87%	\$0.02

## Lower Radiator Hose Installation

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Cooling Pack Bundle Bracket Driver Side Asm



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\Zone 6 Cooling Pack & HVAC

\Cooling Pack

\Cooling Pack Bundle Bracket Driver Side Asm

## Assembly Summary

<b>Parts</b>	<b>5</b>
<b>Fasteners</b>	<b>3</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>22</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.73 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>0.59</b>
<b>Total Weight (kg)</b>	<b>0.07</b>

<b>Material Cost**</b>	<b>\$0.51</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.14</b>
<b>Q Burden</b>	<b>\$0.04</b>
<b>SG&amp;A</b>	<b>\$0.06</b>
<b>Manufacturing Cost*</b>	<b>\$0.76</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Cooling Pack Bundle Bracket Driver Side Asm



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## Cooling Pack Bundle Bracket Driver Side Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Bracket, Cooling Pack Line Bundle Bracket DS Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.01	0.0549
Assemble Bracket	1	4	2	20	2	99.74 %	0.00	0.00	0.14	0.44	0.0105

## Cooling Pack Bundle Bracket Driver Side Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Bracket, Cooling Pack Line Bundle Bracket DS Asm	\$0.00	\$0.34	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.04	\$0.39
Assemble Bracket	\$0.15	\$0.02	\$0.00	\$0.00	\$0.04	\$0.10	\$0.04	\$0.02	\$0.37

# Cooling Pack Bundle Bracket Driver Side Asm



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## Detailed Summary

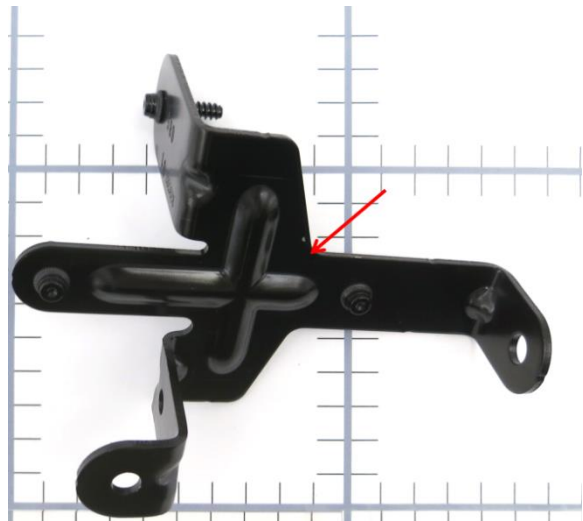
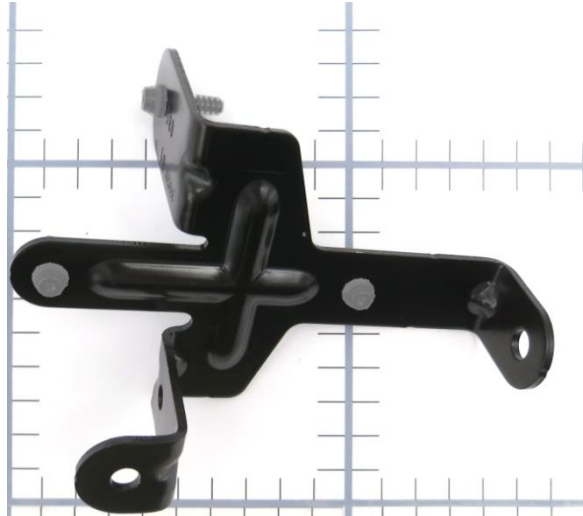
<b>Parts</b>	<b>5</b>
<b>Fasteners</b>	<b>3</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>22</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.73%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.14</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.45</b>
<b>Total Weight (kg)</b>	<b>0.07</b>
<b>Purchased Part Cost</b>	
	<b>\$0.15</b>
<b>Material Cost</b>	
	<b>\$0.36</b>
<b>OEM Asm. Cost</b>	
	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	
	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	
	<b>\$0.04</b>
<b>Supplier Fab. Cost</b>	
	<b>\$0.10</b>
<b>Q Burden</b>	
	<b>\$0.04</b>
<b>SG&amp;A</b>	
	<b>\$0.06</b>
<b>Manufacturing Cost*</b>	
	<b>\$0.76</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Bracket, Cooling Pack Line Bundle Bracket DS Asm



\...

- \Cooling Pack Bundle Bracket Driver Side Asm
- \Bracket, Cooling Pack Line Bundle Bracket DS Asm
- \Bracket Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	0.67
Total Weight (kg)	0.05

Material Cost**	\$0.34
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.00
Q Burden	\$0.00
SG&A	\$0.04
Manufacturing Cost*	\$0.39

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Bracket, Cooling Pack Line Bundle Bracket DS Asm



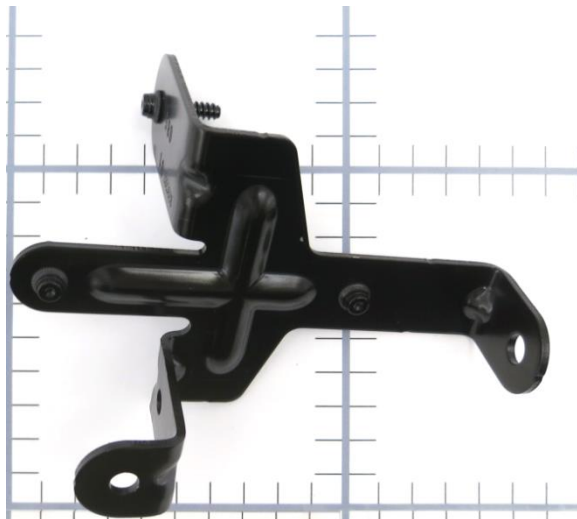
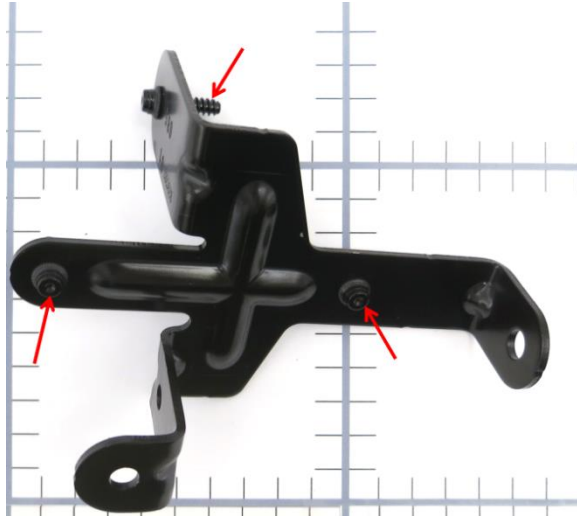
## Bracket Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
60 Ton Stamping Press	0.67	1	0.25	17.46	HUN	\$0.00	99.99%	\$0.00

## Bracket Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Bracket	1	Aluminum 6061 - Coil Stock	\$2.80	0.0549	0.1200	\$0.00	\$0.34

# Assemble Bracket



\...

- \Cooling Pack
- \Cooling Pack Bundle Bracket Driver Side Asm
- \Assemble Bracket

## Process Summary

Right First Time	99.74 %
Process Time (Sec)	34.98
Total Weight (kg)	0.01

Material Cost**	\$0.17
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.14
Q Burden	\$0.04
SG&A	\$0.02
Manufacturing Cost*	\$0.37

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Bracket



## Assemble Bracket

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Cure	10.30	1	0.25	9.58	HUN	\$0.03	99.97 %	\$0.01
Dip Painting Line	2.18	1	0.25	31.47	HUN	\$0.02	99.99 %	\$0.00
Wash	7.00	1	0.25	21.64	HUN	\$0.04	99.99 %	\$0.00
Deburr	7.00	1	0.25	4.86	HUN	\$0.01	99.99 %	\$0.00
Supplier Automated Asm	8.50	1	0.25	17.59	HUN	\$0.04	99.82 %	\$0.03

## Assemble Bracket

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Paint,Bracket Asm	1	E-Coat	By Area	0.0000	-	\$0.00	\$0.02
M5x18-Press-in Screw	3	Commodity Item	Purchased	0.0035	-	\$0.05	\$0.00

# Cooling Pack Bundle Bracket DS Installation



\...

\Zone 6 Cooling Pack & HVAC

\Cooling Pack

\Cooling Pack Bundle Bracket DS Installation

## Process Summary

Right First Time	99.76 %
Process Time (Sec)	29.00
Total Weight (kg)	0.01

Material Cost**	\$0.07
OEM Process Cost	\$0.74
Supplier Process Cost	\$0.00
Q Burden	\$0.04
SG&A	\$0.09
Manufacturing Cost*	\$0.93



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Cooling Pack Bundle Bracket DS Installation

## Cooling Pack Bundle Bracket DS Installation

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
OEM Manual Asm	29.00	1	1.00	91.41	GER	\$0.74	99.76%	\$0.04

## Cooling Pack Bundle Bracket DS Installation

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
M6x18mm-SEMS Torx Bolt	1	Commodity Item	Purchased	0.0067	-	\$0.04	\$0.00
Short Two Stage Push Pin	1	Commodity Item	Purchased	0.0012	-	\$0.03	\$0.00



\...  
 \Zone 6 Cooling Pack & HVAC  
 \Cooling Pack  
 \Cooling Pack Line Bundle Driver Side Asm  
**Assembly Summary**

<b>Parts</b>	<b>16</b>
<b>Fasteners</b>	<b>1</b>
<b>Part Numbers</b>	<b>11</b>
<b>Steps</b>	<b>70</b>
<b>Fastenings</b>	<b>14</b>
<b>Right First Time</b>	<b>98.95 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>4.70</b>
<b>Total Weight (kg)</b>	<b>0.63</b>

<b>Material Cost**</b>	<b>\$3.55</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$1.98</b>
<b>Q Burden</b>	<b>\$0.16</b>
<b>SG&amp;A</b>	<b>\$0.65</b>
<b>Manufacturing Cost*</b>	<b>\$6.34</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Cooling Pack Line Bundle Driver Side Asm



**MUNRO**  
& ASSOCIATES, INC.

## Cooling Pack Line Bundle Driver Side Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Bending Tube Asm,Coolant Pack Line Bundle Driver S	1	5	1	19	1	99.64 %	0.00	0.00	0.27	1.26	0.3562
Straight Tube Asm,Cooling Pack line Bundle Driver	1	6	4	26	4	99.65 %	0.00	0.00	1.59	0.44	0.2285
ID-30mm Tube Isolator,Coolant Hose Line Asm	2	1	0	1	0	99.99 %	0.00	0.00	0.00	0.01	0.0137
Assemble Cooling Pack Line Bundle Driver Side	1	3	9	19	9	99.68 %	0.00	0.00	1.13	0.00	0.0185

## Cooling Pack Line Bundle Driver Side Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Bending Tube Asm,Coolant Pack Line Bundle Driver S	\$0.00	\$1.50	\$0.00	\$0.00	\$0.12	\$0.58	\$0.05	\$0.26	\$2.51
Straight Tube Asm,Cooling Pack line Bundle Driver	\$0.00	\$1.77	\$0.00	\$0.00	\$0.60	\$0.18	\$0.05	\$0.31	\$2.91
ID-30mm Tube Isolator,Coolant Hose Line Asm	\$0.00	\$0.06	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.01	\$0.07
Assemble Cooling Pack Line Bundle Driver Side	\$0.16	\$0.00	\$0.00	\$0.00	\$0.50	\$0.00	\$0.05	\$0.06	\$0.77



## Detailed Summary

<b>Parts</b>	<b>16</b>
<b>Fasteners</b>	<b>1</b>
<b>Part Numbers</b>	<b>11</b>
<b>Steps</b>	<b>70</b>
<b>Fastenings</b>	<b>14</b>
<b>Right First Time</b>	<b>98.95%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>2.99</b>
<b>Supplier Fab. Time (Min)</b>	<b>1.71</b>
<b>Total Weight (kg)</b>	<b>0.63</b>
<b>Purchased Part Cost</b>	
	<b>\$0.16</b>
<b>Material Cost</b>	
	<b>\$3.39</b>
<b>OEM Asm. Cost</b>	
	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	
	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	
	<b>\$1.22</b>
<b>Supplier Fab. Cost</b>	
	<b>\$0.76</b>
<b>Q Burden</b>	
	<b>\$0.16</b>
<b>SG&amp;A</b>	
	<b>\$0.65</b>
<b>Manufacturing Cost*</b>	
	<b>\$6.34</b>

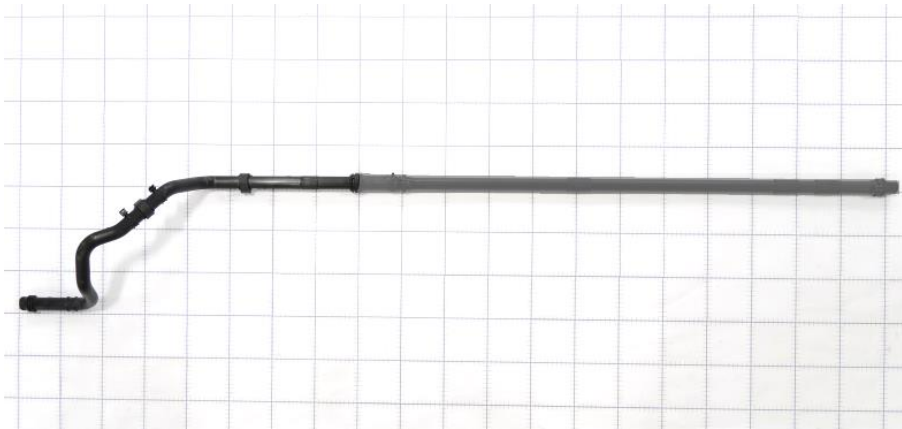
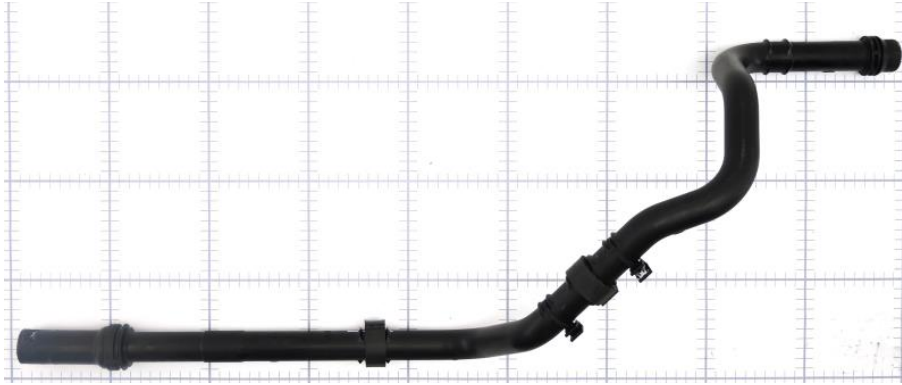
\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Bending Tube Asm, Coolant Pack Line Bundle Driver S



**MUNRO**  
& ASSOCIATES, INC.



\...  
 \Cooling Pack  
 \Cooling Pack Line Bundle Driver Side Asm  
 \Bending Tube Asm, Coolant Pack Line Bundle Driver S  
**Assembly Summary**

<b>Parts</b>	<b>5</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>5</b>
<b>Steps</b>	<b>19</b>
<b>Fastenings</b>	<b>1</b>
<b>Right First Time</b>	<b>99.64 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>1.53</b>
<b>Total Weight (kg)</b>	<b>0.36</b>

<b>Material Cost**</b>	<b>\$1.50</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.69</b>
<b>Q Burden</b>	<b>\$0.05</b>
<b>SG&amp;A</b>	<b>\$0.26</b>
<b>Manufacturing Cost*</b>	<b>\$2.51</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Bending Tube Asm, Coolant Pack Line Bundle Driver S



## Bending Tube Asm, Coolant Pack Line Bundle Driver S

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Plastic Tube, Bending Tube Asm	1	1	0	9	0	99.75 %	0.00	0.00	0.00	0.50	0.3109
26mm-ID Hose, Bending Tube Asm	1	3	0	3	0	99.97 %	0.00	0.00	0.00	0.03	0.0371
Assemble Bending Tube	1	1	1	5	1	99.92 %	0.00	0.00	0.27	0.73	0.0082

## Bending Tube Asm, Coolant Pack Line Bundle Driver S

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Plastic Tube, Bending Tube Asm	\$0.00	\$1.26	\$0.00	\$0.00	\$0.00	\$0.27	\$0.04	\$0.18	\$1.75
26mm-ID Hose, Bending Tube Asm	\$0.00	\$0.20	\$0.00	\$0.00	\$0.00	\$0.04	\$0.00	\$0.03	\$0.27
Assemble Bending Tube	\$0.00	\$0.04	\$0.00	\$0.00	\$0.12	\$0.27	\$0.01	\$0.05	\$0.49

# Bending Tube Asm, Coolant Pack Line Bundle Driver S



**MUNRO**  
& ASSOCIATES, INC.

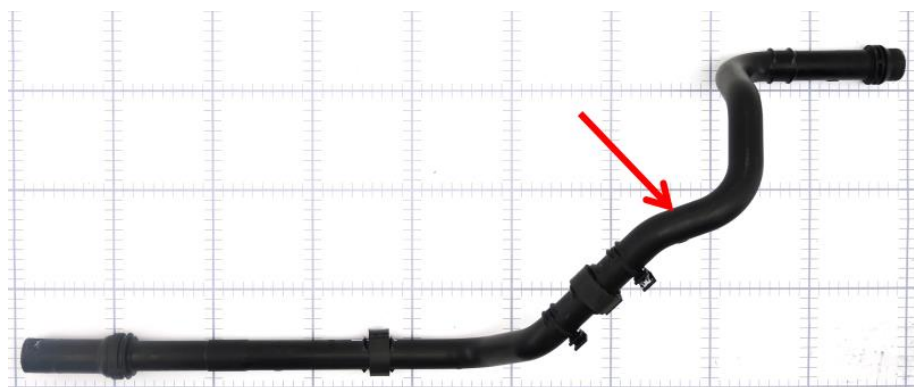
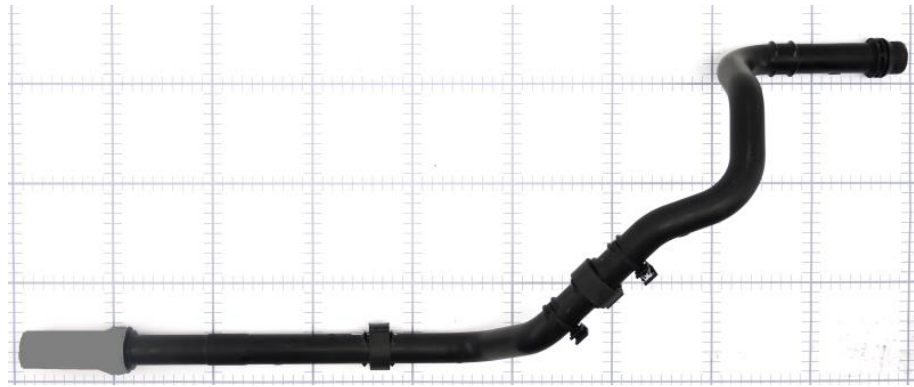
## Detailed Summary

<b>Parts</b>	<b>5</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>5</b>
<b>Steps</b>	<b>19</b>
<b>Fastenings</b>	<b>1</b>
<b>Right First Time</b>	<b>99.64%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.27</b>
<b>Supplier Fab. Time (Min)</b>	<b>1.26</b>
<b>Total Weight (kg)</b>	<b>0.36</b>
<b>Purchased Part Cost</b>	<b>\$0.00</b>
<b>Material Cost</b>	<b>\$1.50</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.12</b>
<b>Supplier Fab. Cost</b>	<b>\$0.58</b>
<b>Q Burden</b>	<b>\$0.05</b>
<b>SG&amp;A</b>	<b>\$0.26</b>
<b>Manufacturing Cost*</b>	<b>\$2.51</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Plastic Tube, Bending Tube Asm



\...

\Bending Tube Asm, Coolant Pack Line Bundle Driver S

\Plastic Tube, Bending Tube Asm

\Plastic Tube Process

## Process Summary

Right First Time	99.75 %
Process Time (Sec)	30.05
Total Weight (kg)	0.31

Material Cost**	\$1.26
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.27
Q Burden	\$0.04
SG&A	\$0.18
Manufacturing Cost*	\$1.75

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Plastic Tube, Bending Tube Asm



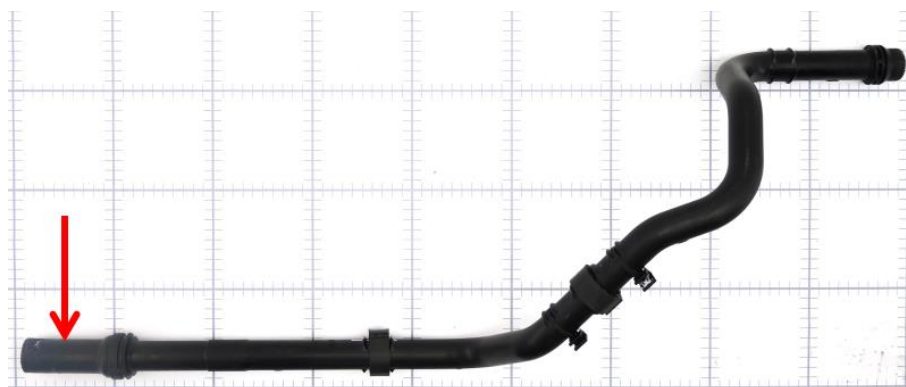
## Plastic Tube Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Tube Bending	11.00	1	0.25	26.04	POL	\$0.08	99.76 %	\$0.04
390 Ton Injection Molding Press	38.10	2	0.25	36.09	POL	\$0.19	99.99 %	\$0.00

## Plastic Tube Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Plastic Tube	1	PA66 GF25+GB5	\$3.82	0.3109	0.3300	\$0.00	\$1.26

# 26mm-ID Hose, Bending Tube Asm



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\Bending Tube Asm, Coolant Pack Line Bundle Driver S

\26mm-ID Hose, Bending Tube Asm

\26mm-ID Hose Process

## Process Summary

Right First Time	99.97 %
Process Time (Sec)	1.92
Total Weight (kg)	0.04

Material Cost**	\$0.20
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.04
Q Burden	\$0.00
SG&A	\$0.03
Manufacturing Cost*	\$0.27

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# 26mm-ID Hose, Bending Tube Asm

## 26mm-ID Hose Process

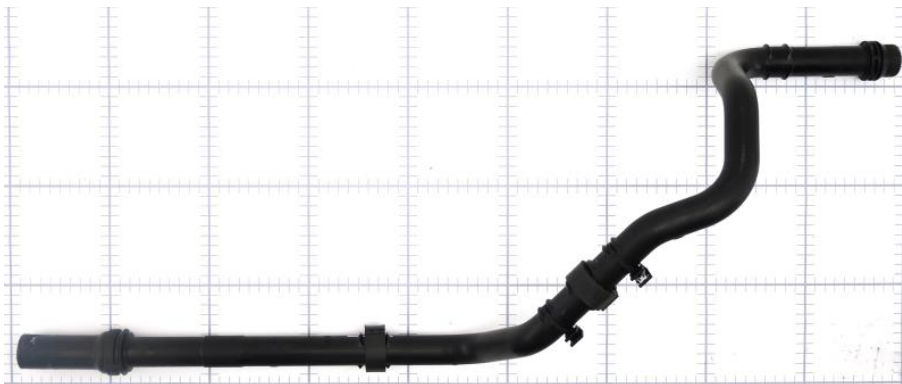
Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Extrusion:45mm 2 Layer&Reinf	1.92	1	0.50	67.49	POL	\$0.04	99.97%	\$0.00

## 26mm-ID Hose Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material,Inner Layer,26mm-ID Hose	1	EPDM (Extrusion Grade)	\$4.43	0.0201	0.0201	\$0.00	\$0.09
Material,Reinforcement Layer,26mm-ID Hose	1	PA Thread w/PVC Coating	By Area	0.0030	-	\$0.00	\$0.05
Material,Outer Layer,Water Pump Connection Hose	1	EPDM (Extrusion Grade)	\$4.43	0.0140	0.0140	\$0.00	\$0.06



# Assemble Bending Tube



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- \Cooling Pack Line Bundle Driver Side Asm
- \Bending Tube Asm,Coolant Pack Line Bundle Driver S
- \Assemble Bending Tube

## Process Summary

Right First Time	99.92 %
Process Time (Sec)	59.53
Total Weight (kg)	0.01

Material Cost**	\$0.04
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.39
Q Burden	\$0.01
SG&A	\$0.05
Manufacturing Cost*	\$0.49

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Bending Tube



## Assemble Bending Tube

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Overmold, 55 Ton Injection Molding Press	87.06	2	0.25	22.38	POL	\$0.27	99.99%	\$0.00
Supplier Manual Asm	16.00	1	1.00	26.36	POL	\$0.12	99.93%	\$0.01

## Assemble Bending Tube

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
OD-40mm Plastic Hoop, Bending Tube Asm	1	PA66 GF25	\$4.06	0.0082	0.0090	\$0.00	\$0.04

# Straight Tube Asm, Cooling Pack line Bundle Driver



**MUNRO**  
& ASSOCIATES, INC.



\...

\Cooling Pack

\Cooling Pack Line Bundle Driver Side Asm

\Straight Tube Asm, Cooling Pack line Bundle Driver

## Assembly Summary

<b>Parts</b>	<b>6</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>26</b>
<b>Fastenings</b>	<b>4</b>
<b>Right First Time</b>	<b>99.65 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>2.03</b>
<b>Total Weight (kg)</b>	<b>0.23</b>

<b>Material Cost**</b>	<b>\$1.77</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.78</b>
<b>Q Burden</b>	<b>\$0.05</b>
<b>SG&amp;A</b>	<b>\$0.31</b>
<b>Manufacturing Cost*</b>	<b>\$2.91</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Straight Tube Asm, Cooling Pack line Bundle Driver



**MUNRO**  
& ASSOCIATES, INC.

## Straight Tube Asm, Cooling Pack line Bundle Driver

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Straight Tube, Straight Tube Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.23	0.1284
End Connector, Straight Tube Asm	2	1	0	1	0	99.99 %	0.00	0.00	0.00	0.08	0.0352
Rubber Tube Sleeve, Straight Tube Asm	3	1	0	1	0	99.99 %	0.00	0.00	0.00	0.01	0.0099
Assemble Straight Tube	1	0	4	14	4	99.71 %	0.00	0.00	1.59	0.00	0.0000

## Straight Tube Asm, Cooling Pack line Bundle Driver

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Straight Tube, Straight Tube Asm	\$0.00	\$1.35	\$0.00	\$0.00	\$0.00	\$0.12	\$0.00	\$0.18	\$1.64
End Connector, Straight Tube Asm	\$0.00	\$0.15	\$0.00	\$0.00	\$0.00	\$0.02	\$0.00	\$0.02	\$0.19
Rubber Tube Sleeve, Straight Tube Asm	\$0.00	\$0.04	\$0.00	\$0.00	\$0.00	\$0.01	\$0.00	\$0.01	\$0.05
Assemble Straight Tube	\$0.00	\$0.00	\$0.00	\$0.00	\$0.60	\$0.00	\$0.04	\$0.07	\$0.72

# Straight Tube Asm, Cooling Pack line Bundle Driver



**MUNRO**  
& ASSOCIATES, INC.

## Detailed Summary

<b>Parts</b>	<b>6</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>26</b>
<b>Fastenings</b>	<b>4</b>
<b>Right First Time</b>	<b>99.65%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>1.59</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.44</b>
<b>Total Weight (kg)</b>	<b>0.23</b>
<b>Purchased Part Cost</b>	
	<b>\$0.00</b>
<b>Material Cost</b>	
	<b>\$1.77</b>
<b>OEM Asm. Cost</b>	
	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	
	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	
	<b>\$0.60</b>
<b>Supplier Fab. Cost</b>	
	<b>\$0.18</b>
<b>Q Burden</b>	
	<b>\$0.05</b>
<b>SG&amp;A</b>	
	<b>\$0.31</b>
<b>Manufacturing Cost*</b>	
	<b>\$2.91</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Straight Tube, Straight Tube Asm



\...

- \Straight Tube Asm, Cooling Pack line Bundle Driver
- \Straight Tube, Straight Tube Asm
- \Straight Tube Process

## Process Summary

<b>Right First Time</b>	<b>99.99 %</b>
<b>Process Time (Sec)</b>	<b>13.97</b>
<b>Total Weight (kg)</b>	<b>0.13</b>

<b>Material Cost**</b>	<b>\$1.35</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.12</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.18</b>
<b>Manufacturing Cost*</b>	<b>\$1.64</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Straight Tube, Straight Tube Asm



## Straight Tube Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Extrusion: 32mm, 1 layer	13.97	1	0.50	30.22	POL	\$0.12	99.99%	\$0.00

## Straight Tube Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Straight Tube	1	PA12 (Extrusion Grade)	\$10.50	0.1284	0.1285	\$0.00	\$1.35

# End Connector, Straight Tube Asm



\...

- \Straight Tube Asm, Cooling Pack line Bundle Driver
- \End Connector, Straight Tube Asm
- \End Connector Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	5.06
Total Weight (kg)	0.04

Material Cost**	\$0.15
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.02
Q Burden	\$0.00
SG&A	\$0.02
Manufacturing Cost*	\$0.19



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# End Connector, Straight Tube Asm



## End Connector Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
55Ton Injection Molding Press	30.36	6	0.25	14.28	POL	\$0.02	99.99%	\$0.00

## End Connector Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, End Connector	1	PA66 GF25	\$4.06	0.0352	0.0380	\$0.00	\$0.15

# Rubber Tube Sleeve, Straight Tube Asm



\...  
 \Straight Tube Asm, Cooling Pack line Bundle Driver  
 \Rubber Tube Sleeve, Straight Tube Asm  
 \Straight Tube Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	0.77
Total Weight (kg)	0.01

Material Cost**	\$0.04
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.01
Q Burden	\$0.00
SG&A	\$0.01
Manufacturing Cost*	\$0.05



\* Excluding tooling, ER&D, logistics, and profit margin  
 \*\* Includes material cost and purchased parts cost

# Rubber Tube Sleeve, Straight Tube Asm



**MUNRO**  
& ASSOCIATES, INC.

## Straight Tube Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Extrude: 32mm, 1 Layer	0.77	1	0.50	30.22	POL	\$0.01	99.99%	\$0.00

## Straight Tube Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Rubber Tube Sleeve	1	EPDM (Extrusion Grade)	\$4.43	0.0099	0.0100	\$0.00	\$0.04

No Commodity Items  
Required for This  
Process



\...

\Cooling Pack Line Bundle Driver Side Asm  
\Straight Tube Asm,Cooling Pack line Bundle Driver  
\Assemble Straight Tube

## Process Summary

<b>Right First Time</b>	<b>99.71 %</b>
<b>Process Time (Sec)</b>	<b>95.13</b>
<b>Total Weight (kg)</b>	<b>0.00</b>
<b>Material Cost**</b>	<b>\$0.00</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.60</b>
<b>Q Burden</b>	<b>\$0.04</b>
<b>SG&amp;A</b>	<b>\$0.07</b>
<b>Manufacturing Cost*</b>	<b>\$0.72</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Straight Tube



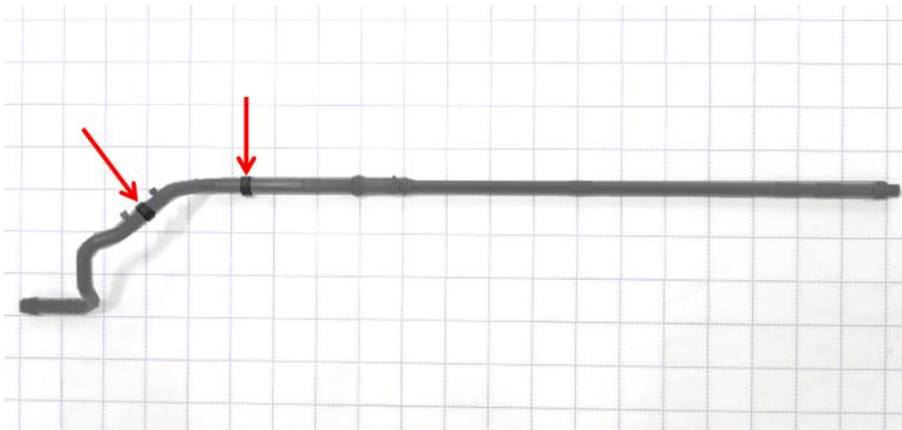
## Assemble Straight Tube

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	95.13	1	0.25	22.88	POL	\$0.60	99.71 %	\$0.04

## Assemble Straight Tube

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# ID-30mm Tube Isolator, Coolant Hose Line Asm



\...

\Cooling Pack Line Bundle Driver Side Asm

\ID-30mm Tube Isolator, Coolant Hose Line Asm

\Tube Isolator Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	0.49
Total Weight (kg)	0.01

Material Cost**	\$0.06
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.00
Q Burden	\$0.00
SG&A	\$0.01
Manufacturing Cost*	\$0.07

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# ID-30mm Tube Isolator, Coolant Hose Line Asm



## Tube Isolator Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Extrude: 32mm, 1 Layer	0.49	1	0.50	30.22	POL	\$0.00	99.99%	\$0.00

## Tube Isolator Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, ID-30mm Tube Isolator	1	EPDM (Extrusion Grade)	\$4.43	0.0137	0.0137	\$0.00	\$0.06

# Assemble Cooling Pack Line Bundle Driver Side



\...  
\Cooling Pack  
\Cooling Pack Line Bundle Driver Side Asm  
\Assemble Cooling Pack Line Bundle Driver Side

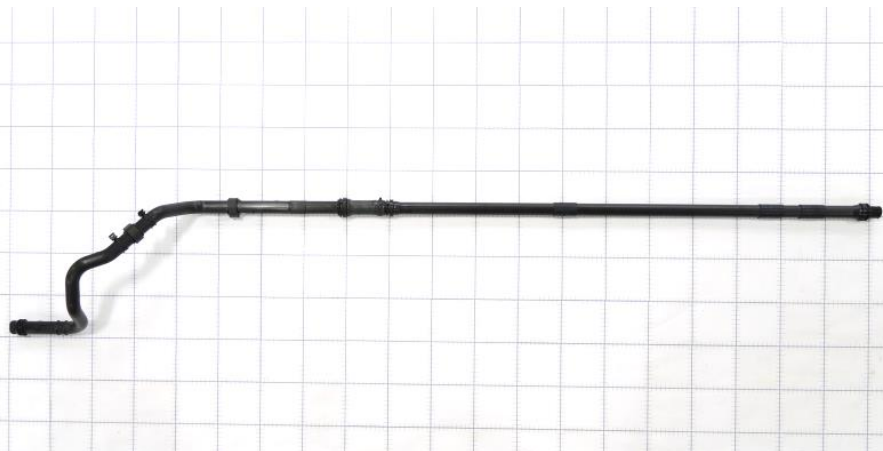
## Process Summary

Right First Time	99.68 %
Process Time (Sec)	68.00
Total Weight (kg)	0.02

Material Cost**	\$0.16
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.50
Q Burden	\$0.05
SG&A	\$0.06
Manufacturing Cost*	\$0.77

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost





# Assemble Cooling Pack Line Bundle Driver Side



## Assemble Cooling Pack Line Bundle Driver Side

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	68.00	1	1.00	26.36	POL	\$0.50	99.68 %	\$0.05

## Assemble Cooling Pack Line Bundle Driver Side

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
30mm Hose Clamp	1	Commodity Item	Purchased	0.0141	-	\$0.14	\$0.00
Wire Tie, Coolant Hose Line Asm	2	Commodity Item	Purchased	0.0022	-	\$0.01	\$0.00

# Cooling Pack Line Bundle DS Installation



\...

\Zone 6 Cooling Pack & HVAC

\Cooling Pack

\Cooling Pack Line Bundle DS Installation

## Process Summary

<b>Right First Time</b>	<b>99.87 %</b>
<b>Process Time (Sec)</b>	<b>36.00</b>
<b>Total Weight (kg)</b>	<b>0.02</b>

<b>Material Cost**</b>	<b>\$0.30</b>
<b>OEM Process Cost</b>	<b>\$0.91</b>
<b>Supplier Process Cost</b>	<b>\$0.00</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.12</b>
<b>Manufacturing Cost*</b>	<b>\$1.35</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Cooling Pack Line Bundle DS Installation

## Cooling Pack Line Bundle DS Installation

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
OEM Manual Asm	36.00	1	1.00	91.41	GER	\$0.91	99.87%	\$0.02

## Cooling Pack Line Bundle DS Installation

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Clamp, Coolant Tube	3	Commodity Item	Purchased	0.0080	-	\$0.10	\$0.00

# Upper Radiator Hose Asm



\...  
 \Zone 6 Cooling Pack & HVAC  
 \Cooling Pack  
 \Upper Radiator Hose Asm

## Assembly Summary

<b>Parts</b>	<b>16</b>
<b>Fasteners</b>	<b>2</b>
<b>Part Numbers</b>	<b>15</b>
<b>Steps</b>	<b>54</b>
<b>Fastenings</b>	<b>15</b>
<b>Right First Time</b>	<b>99.18 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>2.56</b>
<b>Total Weight (kg)</b>	<b>0.40</b>

<b>Material Cost**</b>	<b>\$2.92</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$2.39</b>
<b>Q Burden</b>	<b>\$0.12</b>
<b>SG&amp;A</b>	<b>\$0.53</b>
<b>Manufacturing Cost*</b>	<b>\$5.96</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Upper Radiator Hose Asm



**MUNRO**  
& ASSOCIATES, INC.

## Upper Radiator Hose Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Combination Connector Asm,Upper Radiator Hose Asm	1	2	1	6	1	99.95 %	0.00	0.00	0.18	0.11	0.0531
30mm-ID Hose Asm,UpperRadiator Hose Asm	1	4	2	9	2	99.82 %	0.00	0.00	0.27	0.11	0.1945
End Connector Asm,Upper Radiator Hose Asm	1	2	1	6	1	99.95 %	0.00	0.00	0.18	0.08	0.0374
Branch Hose Asm,Upper Radiator Hose Asm	1	6	5	15	5	99.78 %	0.00	0.00	0.61	0.16	0.1010
Assemble Upper Radiator Hose	1	2	6	14	6	99.69 %	0.00	0.00	0.85	0.00	0.0172

## Upper Radiator Hose Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Combination Connector Asm,Upper Radiator Hose Asm	\$0.07	\$0.21	\$0.00	\$0.00	\$0.17	\$0.05	\$0.01	\$0.05	\$0.56
30mm-ID Hose Asm,UpperRadiator Hose Asm	\$0.62	\$0.90	\$0.00	\$0.00	\$0.24	\$0.17	\$0.03	\$0.18	\$2.13
End Connector Asm,Upper Radiator Hose Asm	\$0.06	\$0.15	\$0.00	\$0.00	\$0.17	\$0.04	\$0.01	\$0.04	\$0.47
Branch Hose Asm,Upper Radiator Hose Asm	\$0.36	\$0.45	\$0.00	\$0.00	\$0.66	\$0.23	\$0.03	\$0.16	\$1.79
Assemble Upper Radiator Hose	\$0.10	\$0.00	\$0.00	\$0.00	\$0.77	\$0.00	\$0.05	\$0.10	\$1.01

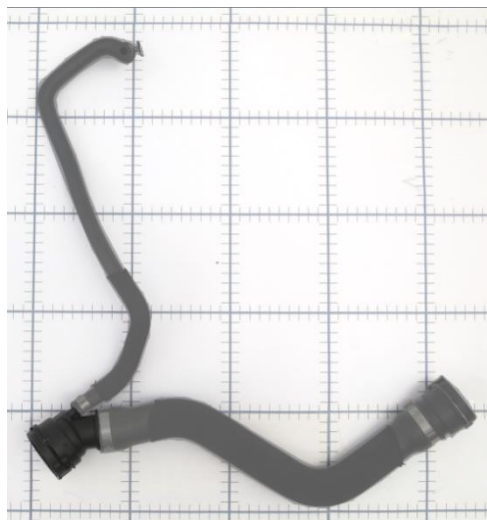
## Detailed Summary

<b>Parts</b>	<b>16</b>
<b>Fasteners</b>	<b>2</b>
<b>Part Numbers</b>	<b>15</b>
<b>Steps</b>	<b>54</b>
<b>Fastenings</b>	<b>15</b>
<b>Right First Time</b>	<b>99.18%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>2.10</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.46</b>
<b>Total Weight (kg)</b>	<b>0.40</b>
<b>Purchased Part Cost</b>	
	<b>\$1.21</b>
<b>Material Cost</b>	
	<b>\$1.71</b>
<b>OEM Asm. Cost</b>	
	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	
	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	
	<b>\$1.90</b>
<b>Supplier Fab. Cost</b>	
	<b>\$0.49</b>
<b>Q Burden</b>	
	<b>\$0.12</b>
<b>SG&amp;A</b>	
	<b>\$0.53</b>
<b>Manufacturing Cost*</b>	
	<b>\$5.96</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Combination Connector Asm, Upper Radiator Hose Asm



\...  
 \Cooling Pack  
 \Upper Radiator Hose Asm  
 \Combination Connector Asm, Upper Radiator Hose  
 Asm

## Assembly Summary

<b>Parts</b>	<b>2</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>2</b>
<b>Steps</b>	<b>6</b>
<b>Fastenings</b>	<b>1</b>
<b>Right First Time</b>	<b>99.95 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>0.29</b>
<b>Total Weight (kg)</b>	<b>0.05</b>

<b>Material Cost**</b>	<b>\$0.28</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.22</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.05</b>
<b>Manufacturing Cost*</b>	<b>\$0.56</b>

\* Excluding tooling, ER&D, logistics, and profit margin  
 \*\* Includes material cost and purchased parts cost

# Combination Connector Asm, Upper Radiator Hose Asm



**MUNRO**  
& ASSOCIATES, INC.

## Combination Connector Asm, Upper Radiator Hose Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Combination Connector, Combination Connector Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.11	0.0499
Assemble Combination Connector	1	1	1	4	1	99.96 %	0.00	0.00	0.18	0.00	0.0032

## Combination Connector Asm, Upper Radiator Hose Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Combination Connector, Combination Connector Asm	\$0.00	\$0.21	\$0.00	\$0.00	\$0.00	\$0.05	\$0.00	\$0.03	\$0.29
Assemble Combination Connector	\$0.07	\$0.00	\$0.00	\$0.00	\$0.17	\$0.00	\$0.01	\$0.02	\$0.26



# Combination Connector Asm, Upper Radiator Hose Asm



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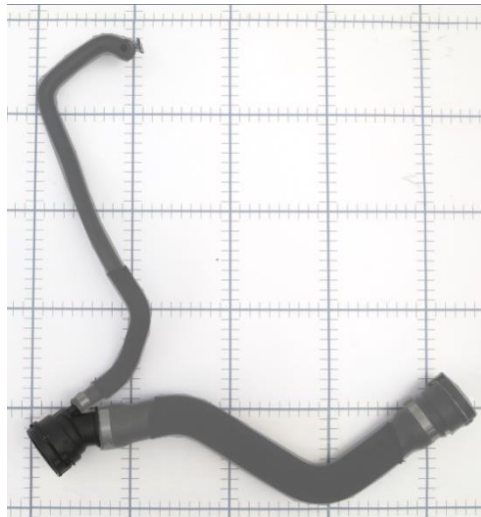
## Detailed Summary

<b>Parts</b>	<b>2</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>2</b>
<b>Steps</b>	<b>6</b>
<b>Fastenings</b>	<b>1</b>
<b>Right First Time</b>	<b>99.95%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.18</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.11</b>
<b>Total Weight (kg)</b>	<b>0.05</b>
<b>Purchased Part Cost</b>	<b>\$0.07</b>
<b>Material Cost</b>	<b>\$0.21</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.17</b>
<b>Supplier Fab. Cost</b>	<b>\$0.05</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.05</b>
<b>Manufacturing Cost*</b>	<b>\$0.56</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Combination Connector, Combination Connector Asm



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- \Combination Connector Asm, Upper Radiator Hose Asm
- \Combination Connector, Combination Connector Asm
- \Combination Connector Process

## Process Summary

<b>Right First Time</b>	<b>99.99 %</b>
<b>Process Time (Sec)</b>	<b>6.37</b>
<b>Total Weight (kg)</b>	<b>0.05</b>

<b>Material Cost**</b>	<b>\$0.21</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.05</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.03</b>
<b>Manufacturing Cost*</b>	<b>\$0.29</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Combination Connector, Combination Connector Asm



## Combination Connector Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
150 Ton Injection Molding Press	38.22	6	0.25	27.82	GER	\$0.05	99.99%	\$0.00

## Combination Connector Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Combination Connector	1	PA66 GF30	\$3.95	0.0499	0.0540	\$0.00	\$0.21

# Assemble Combination Connector



\...

\Upper Radiator Hose Asm

\Combination Connector Asm, Upper Radiator Hose Asm

\Assemble Combination Connector

## Process Summary

Right First Time	99.96 %
Process Time (Sec)	11.00
Total Weight (kg)	0.00

Material Cost**	\$0.07
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.17
Q Burden	\$0.01
SG&A	\$0.02
Manufacturing Cost*	\$0.26

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Combination Connector



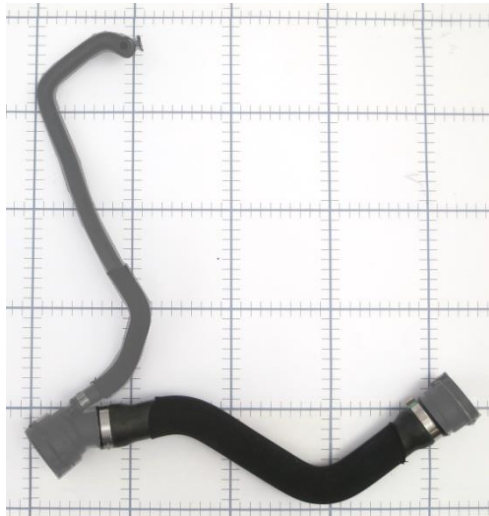
## Assemble Combination Connector

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	11.00	1	1.00	54.32	GER	\$0.17	99.96%	\$0.01

## Assemble Combination Connector

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Connector Retention Clip,Combination Connector Asm	1	Commodity Item	Purchased	0.0032	-	\$0.07	\$0.00

# 30mm-ID Hose Asm, Upper Radiator Hose Asm



\...  
 \Cooling Pack  
 \Upper Radiator Hose Asm  
 \30mm-ID Hose Asm, Upper Radiator Hose Asm

## Assembly Summary

<b>Parts</b>	<b>4</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>4</b>
<b>Steps</b>	<b>9</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.82 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>0.38</b>
<b>Total Weight (kg)</b>	<b>0.19</b>

<b>Material Cost**</b>	<b>\$1.52</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.41</b>
<b>Q Burden</b>	<b>\$0.03</b>
<b>SG&amp;A</b>	<b>\$0.18</b>
<b>Manufacturing Cost*</b>	<b>\$2.13</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# 30mm-ID Hose Asm, Upper Radiator Hose Asm



## 30mm-ID Hose Asm, Upper Radiator Hose Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
30mm-ID Hose, 30mm-ID Hose Asm	1	3	0	3	0	99.97 %	0.00	0.00	0.00	0.11	0.1819
Assemble 30mm-ID Hose	1	1	2	5	2	99.85 %	0.00	0.00	0.27	0.00	0.0126

## 30mm-ID Hose Asm, Upper Radiator Hose Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
30mm-ID Hose, 30mm-ID Hose Asm	\$0.00	\$0.90	\$0.00	\$0.00	\$0.00	\$0.17	\$0.00	\$0.13	\$1.20
Assemble 30mm-ID Hose	\$0.62	\$0.00	\$0.00	\$0.00	\$0.24	\$0.00	\$0.02	\$0.05	\$0.93

# 30mm-ID Hose Asm, Upper Radiator Hose Asm

## Detailed Summary

<b>Parts</b>	<b>4</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>4</b>
<b>Steps</b>	<b>9</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.82%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.27</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.11</b>
<b>Total Weight (kg)</b>	<b>0.19</b>
<hr/>	
<b>Purchased Part Cost</b>	<b>\$0.62</b>
<b>Material Cost</b>	<b>\$0.90</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.24</b>
<b>Supplier Fab. Cost</b>	<b>\$0.17</b>
<b>Q Burden</b>	<b>\$0.03</b>
<b>SG&amp;A</b>	<b>\$0.18</b>
<b>Manufacturing Cost*</b>	<b>\$2.13</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# 30mm-ID Hose,30mm-ID Hose Asm



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\30mm-ID Hose Asm,Upper Radiator Hose Asm

\30mm-ID Hose,30mm-ID Hose Asm

\30mm-ID Hose Process

## Process Summary

<b>Right First Time</b>	<b>99.97 %</b>
<b>Process Time (Sec)</b>	<b>6.72</b>
<b>Total Weight (kg)</b>	<b>0.18</b>

<b>Material Cost**</b>	<b>\$0.90</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.17</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.13</b>
<b>Manufacturing Cost*</b>	<b>\$1.20</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# 30mm-ID Hose, 30mm-ID Hose Asm



## 30mm-ID Hose Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Extrusion:45mm 2 Layer&Reinf	6.72	1	0.50	89.47	GER	\$0.17	99.97%	\$0.00

## 30mm-ID Hose Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material,Inner Layer,30mm-ID Hose	1	EPDM (Extrusion Grade)	\$4.43	0.0850	0.0850	\$0.00	\$0.38
Material,Reinforcement Layer,30mm-ID Hose	1	PA Thread w/PVC Coating	By Area	0.0147	-	\$0.00	\$0.16
Material,Outer Layer,30mm-ID Hose	1	EPDM (Extrusion Grade)	\$4.43	0.0822	0.0822	\$0.00	\$0.36

# Assemble 30mm-ID Hose



\...

\Upper Radiator Hose Asm

\30mm-ID Hose Asm, Upper Radiator Hose Asm

\Assemble 30mm-ID Hose

## Process Summary

<b>Right First Time</b>	<b>99.85 %</b>
<b>Process Time (Sec)</b>	<b>16.12</b>
<b>Total Weight (kg)</b>	<b>0.01</b>

<b>Material Cost**</b>	<b>\$0.62</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.24</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.05</b>
<b>Manufacturing Cost*</b>	<b>\$0.93</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble 30mm-ID Hose



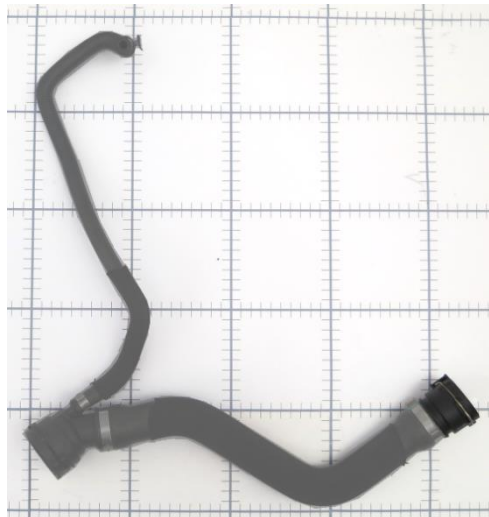
## Assemble 30mm-ID Hose

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	16.12	1	1.00	54.32	GER	\$0.24	99.85%	\$0.02

## Assemble 30mm-ID Hose

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Hose Sleeve,30mm-ID Hose Asm	1	Commodity Item	Purchased	0.0126	-	\$0.62	\$0.00

# End Connector Asm, Upper Radiator Hose Asm



\...  
 \Cooling Pack  
 \Upper Radiator Hose Asm  
 \End Connector Asm, Upper Radiator Hose Asm

## Assembly Summary

<b>Parts</b>	<b>2</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>2</b>
<b>Steps</b>	<b>6</b>
<b>Fastenings</b>	<b>1</b>
<b>Right First Time</b>	<b>99.95 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>0.27</b>
<b>Total Weight (kg)</b>	<b>0.04</b>

<b>Material Cost**</b>	<b>\$0.21</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.20</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.04</b>
<b>Manufacturing Cost*</b>	<b>\$0.47</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# End Connector Asm, Upper Radiator Hose Asm



## End Connector Asm, Upper Radiator Hose Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
End Connector, End Connector Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.08	0.0345
Assemble End Connector	1	1	1	4	1	99.96 %	0.00	0.00	0.18	0.00	0.0029

## End Connector Asm, Upper Radiator Hose Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
End Connector, End Connector Asm	\$0.00	\$0.15	\$0.00	\$0.00	\$0.00	\$0.04	\$0.00	\$0.02	\$0.21
Assemble End Connector	\$0.06	\$0.00	\$0.00	\$0.00	\$0.17	\$0.00	\$0.01	\$0.02	\$0.25

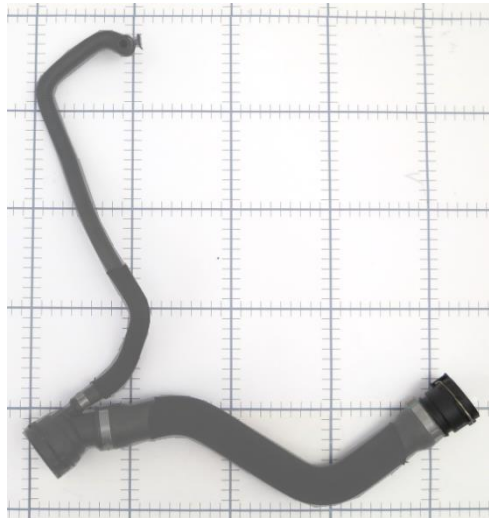
## Detailed Summary

<b>Parts</b>	<b>2</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>2</b>
<b>Steps</b>	<b>6</b>
<b>Fastenings</b>	<b>1</b>
<b>Right First Time</b>	<b>99.95%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.18</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.08</b>
<b>Total Weight (kg)</b>	<b>0.04</b>
<b>Purchased Part Cost</b>	<b>\$0.06</b>
<b>Material Cost</b>	<b>\$0.15</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.17</b>
<b>Supplier Fab. Cost</b>	<b>\$0.04</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.04</b>
<b>Manufacturing Cost*</b>	<b>\$0.47</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# End Connector,End Connector Asm



\...

- \End Connector Asm,Upper Radiator Hose Asm
- \End Connector,End Connector Asm
- \End Connector Process

## Process Summary

<b>Right First Time</b>	<b>99.99 %</b>
<b>Process Time (Sec)</b>	<b>5.01</b>
<b>Total Weight (kg)</b>	<b>0.03</b>
<b>Material Cost**</b>	<b>\$0.15</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.04</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.02</b>
<b>Manufacturing Cost*</b>	<b>\$0.21</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# End Connector,End Connector Asm



## End Connector Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
110 Ton Injection Molding Press	30.06	6	0.25	26.65	GER	\$0.04	99.99%	\$0.00

## End Connector Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material,End Connector	1	PA66 GF30	\$3.95	0.0345	0.0370	\$0.00	\$0.15

# Assemble End Connector



\...

\Upper Radiator Hose Asm

\End Connector Asm, Upper Radiator Hose Asm

\Assemble End Connector

## Process Summary

<b>Right First Time</b>	<b>99.96 %</b>
<b>Process Time (Sec)</b>	<b>11.00</b>
<b>Total Weight (kg)</b>	<b>0.00</b>

<b>Material Cost**</b>	<b>\$0.06</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.17</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.02</b>
<b>Manufacturing Cost*</b>	<b>\$0.25</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble End Connector



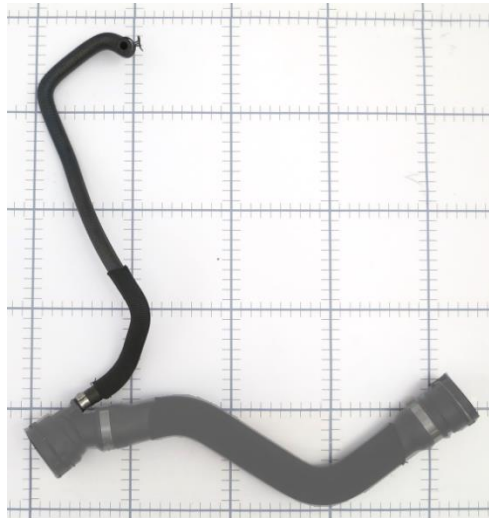
## Assemble End Connector

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	11.00	1	1.00	54.32	GER	\$0.17	99.96%	\$0.01

## Assemble End Connector

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Connector Retention Clip,End Connector Asm	1	Commodity Item	Purchased	0.0029	-	\$0.06	\$0.00

# Branch Hose Asm, Upper Radiator Hose Asm



\...

\Cooling Pack

\Upper Radiator Hose Asm

\Branch Hose Asm, Upper Radiator Hose Asm

## Assembly Summary

<b>Parts</b>	<b>6</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>6</b>
<b>Steps</b>	<b>15</b>
<b>Fastenings</b>	<b>5</b>
<b>Right First Time</b>	<b>99.78 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>0.77</b>
<b>Total Weight (kg)</b>	<b>0.10</b>

<b>Material Cost**</b>	<b>\$0.81</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.79</b>
<b>Q Burden</b>	<b>\$0.03</b>
<b>SG&amp;A</b>	<b>\$0.16</b>
<b>Manufacturing Cost*</b>	<b>\$1.79</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Branch Hose Asm, Upper Radiator Hose Asm



## Branch Hose Asm, Upper Radiator Hose Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
7.5mm-ID Branch Hose, Branch Hose Asm	1	3	0	3	0	99.97 %	0.00	0.00	0.00	0.16	0.0888
Assemble Branch Hose	1	3	5	11	5	99.81 %	0.00	0.00	0.61	0.00	0.0122

## Branch Hose Asm, Upper Radiator Hose Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
7.5mm-ID Branch Hose, Branch Hose Asm	\$0.00	\$0.45	\$0.00	\$0.00	\$0.00	\$0.23	\$0.00	\$0.08	\$0.77
Assemble Branch Hose	\$0.36	\$0.00	\$0.00	\$0.00	\$0.56	\$0.00	\$0.03	\$0.08	\$1.02

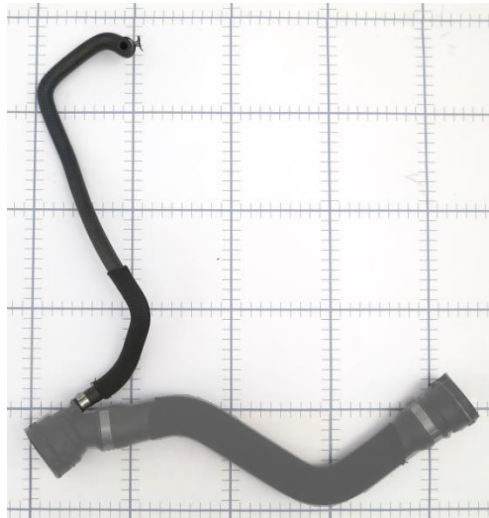
## Detailed Summary

<b>Parts</b>	<b>6</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>6</b>
<b>Steps</b>	<b>15</b>
<b>Fastenings</b>	<b>5</b>
<b>Right First Time</b>	<b>99.78%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.61</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.16</b>
<b>Total Weight (kg)</b>	<b>0.10</b>
<hr/>	
<b>Purchased Part Cost</b>	<b>\$0.36</b>
<b>Material Cost</b>	<b>\$0.45</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.56</b>
<b>Supplier Fab. Cost</b>	<b>\$0.23</b>
<b>Q Burden</b>	<b>\$0.03</b>
<b>SG&amp;A</b>	<b>\$0.16</b>
<b>Manufacturing Cost*</b>	<b>\$1.79</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# 7.5mm-ID Branch Hose, Branch Hose Asm



\...

- \Branch Hose Asm, Upper Radiator Hose Asm
- \7.5mm-ID Branch Hose, Branch Hose Asm
- \7.5mm-ID Hose Process

## Process Summary

Right First Time	99.97 %
Process Time (Sec)	9.60
Total Weight (kg)	0.09

Material Cost**	\$0.45
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.23
Q Burden	\$0.00
SG&A	\$0.08
Manufacturing Cost*	\$0.77

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# 7.5mm-ID Branch Hose, Branch Hose Asm



## 7.5mm-ID Hose Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Extrusion:32mm 2 Layer&Reinf	9.60	1	0.50	86.95	GER	\$0.23	99.97%	\$0.00

## 7.5mm-ID Hose Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material,Inner Layer,7.5mm-ID Hose	1	EPDM (Extrusion Grade)	\$4.43	0.0481	0.0481	\$0.00	\$0.21
Material,Reinforcement Layer,7.5mm-ID Hose	1	PA Thread w/PVC Coating	By Area	0.0082	-	\$0.00	\$0.10
Material,Outer Layer,7.5mm-ID Hose	1	EPDM (Extrusion Grade)	\$4.43	0.0325	0.0325	\$0.00	\$0.14



# Assemble Branch Hose



\...

- \Upper Radiator Hose Asm
- \Branch Hose Asm, Upper Radiator Hose Asm
- \Assemble Branch Hose

## Process Summary

<b>Right First Time</b>	<b>99.81 %</b>
<b>Process Time (Sec)</b>	<b>36.86</b>
<b>Total Weight (kg)</b>	<b>0.01</b>
<b>Material Cost**</b>	<b>\$0.36</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.56</b>
<b>Q Burden</b>	<b>\$0.03</b>
<b>SG&amp;A</b>	<b>\$0.08</b>
<b>Manufacturing Cost*</b>	<b>\$1.02</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Branch Hose



## Assemble Branch Hose

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	36.86	1	1.00	54.32	GER	\$0.56	99.81 %	\$0.03

## Assemble Branch Hose

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Branch Hose Sleeve, Branch Hose Asm	1	Commodity Item	Purchased	0.0047	-	\$0.27	\$0.00
12.5mm-ID Locking Hose Clamp	1	Commodity Item	Purchased	0.0035	-	\$0.04	\$0.00
15mm-ID Hose Clamp	1	Commodity Item	Purchased	0.0040	-	\$0.05	\$0.00

# Assemble Upper Radiator Hose



\...

- \Cooling Pack
- \Upper Radiator Hose Asm
- \Assemble Upper Radiator Hose

## Process Summary

Right First Time	99.69 %
Process Time (Sec)	51.00
Total Weight (kg)	0.02

Material Cost**	\$0.10
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.77
Q Burden	\$0.05
SG&A	\$0.10
Manufacturing Cost*	\$1.01



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Upper Radiator Hose



## Assemble Upper Radiator Hose

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	51.00	1	1.00	54.32	GER	\$0.77	99.69%	\$0.05

## Assemble Upper Radiator Hose

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
38mm Hose Locking Clamp	2	Commodity Item	Purchased	0.0086	-	\$0.05	\$0.00

## No Commodity Items Required for This Process



\...  
\Zone 6 Cooling Pack & HVAC  
\Cooling Pack  
\Upper Radiator Hose Installation

### Process Summary

<b>Right First Time</b>	<b>99.91 %</b>
<b>Process Time (Sec)</b>	<b>25.50</b>
<b>Total Weight (kg)</b>	<b>0.00</b>

<b>Material Cost**</b>	<b>\$0.00</b>
<b>OEM Process Cost</b>	<b>\$0.65</b>
<b>Supplier Process Cost</b>	<b>\$0.00</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.08</b>
<b>Manufacturing Cost*</b>	<b>\$0.74</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Upper Radiator Hose Installation



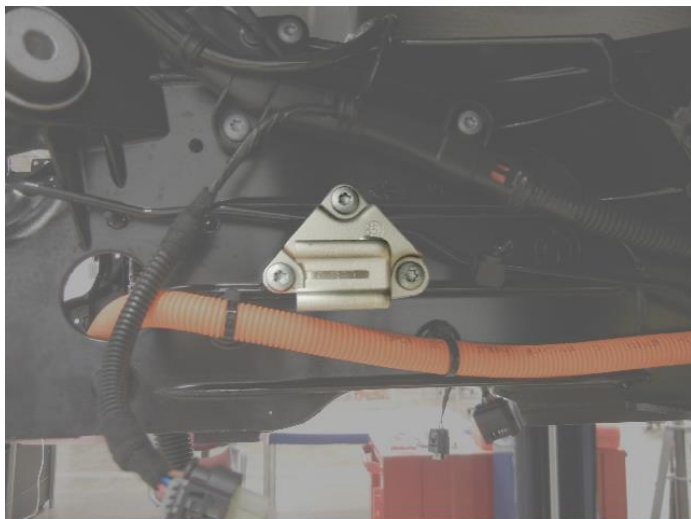
## Upper Radiator Hose Installation

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
OEM Manual Asm	25.50	1	1.00	91.41	GER	\$0.65	99.91 %	\$0.01

## Upper Radiator Hose Installation

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Coolant Pump Bracket Asm



\...  
 \Zone 6 Cooling Pack & HVAC  
 \Cooling Pack  
 \Coolant Pump Bracket Asm

## Assembly Summary

<b>Parts</b>	<b>3</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>28</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.78 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>0.35</b>
<b>Total Weight (kg)</b>	<b>0.06</b>

<b>Material Cost**</b>	<b>\$0.16</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.14</b>
<b>Q Burden</b>	<b>\$0.03</b>
<b>SG&amp;A</b>	<b>\$0.04</b>
<b>Manufacturing Cost*</b>	<b>\$0.37</b>

\* Excluding tooling, ER&D, logistics, and profit margin  
 \*\* Includes material cost and purchased parts cost

# Coolant Pump Bracket Asm

## Coolant Pump Bracket Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Fixed Mount,Coolant Pump Bracket Asm	1	1	0	7	0	99.97 %	0.00	0.00	0.00	0.09	0.0359
L Bracket,Coolant Pump Bracket Asm	1	1	0	7	0	99.97 %	0.00	0.00	0.00	0.09	0.0198
Assemble Coolant Pump Bracket	1	1	2	12	2	99.84 %	0.00	0.00	0.07	0.09	0.0000

## Coolant Pump Bracket Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Fixed Mount,Coolant Pump Bracket Asm	\$0.00	\$0.10	\$0.00	\$0.00	\$0.00	\$0.03	\$0.00	\$0.02	\$0.15
L Bracket,Coolant Pump Bracket Asm	\$0.00	\$0.05	\$0.00	\$0.00	\$0.00	\$0.03	\$0.00	\$0.01	\$0.09
Assemble Coolant Pump Bracket	\$0.00	\$0.01	\$0.00	\$0.00	\$0.05	\$0.04	\$0.02	\$0.01	\$0.13



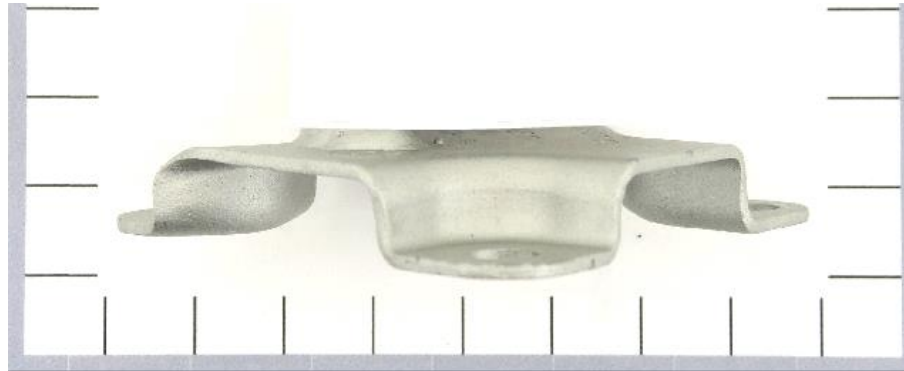
## Detailed Summary

<b>Parts</b>	<b>3</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>28</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.78%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.07</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.28</b>
<b>Total Weight (kg)</b>	<b>0.06</b>
<b>Purchased Part Cost</b>	<b>\$0.00</b>
<b>Material Cost</b>	<b>\$0.16</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.05</b>
<b>Supplier Fab. Cost</b>	<b>\$0.10</b>
<b>Q Burden</b>	<b>\$0.03</b>
<b>SG&amp;A</b>	<b>\$0.04</b>
<b>Manufacturing Cost*</b>	<b>\$0.37</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Fixed Mount, Coolant Pump Bracket Asm



\...  
 \Coolant Pump Bracket Asm  
 \Fixed Mount, Coolant Pump Bracket Asm  
 \Fixed Mount Process

## Process Summary

<b>Right First Time</b>	<b>99.97 %</b>
<b>Process Time (Sec)</b>	<b>5.60</b>
<b>Total Weight (kg)</b>	<b>0.04</b>

<b>Material Cost**</b>	<b>\$0.10</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.03</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.02</b>
<b>Manufacturing Cost*</b>	<b>\$0.15</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Fixed Mount, Coolant Pump Bracket Asm

## Fixed Mount Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	3.50	1	0.25	20.00	GER	\$0.02	99.99%	\$0.00
Deburr	1.50	1	0.25	12.36	GER	\$0.01	99.99%	\$0.00
25 Ton Stamping Press	0.60	1	0.25	21.63	GER	\$0.00	99.99%	\$0.00

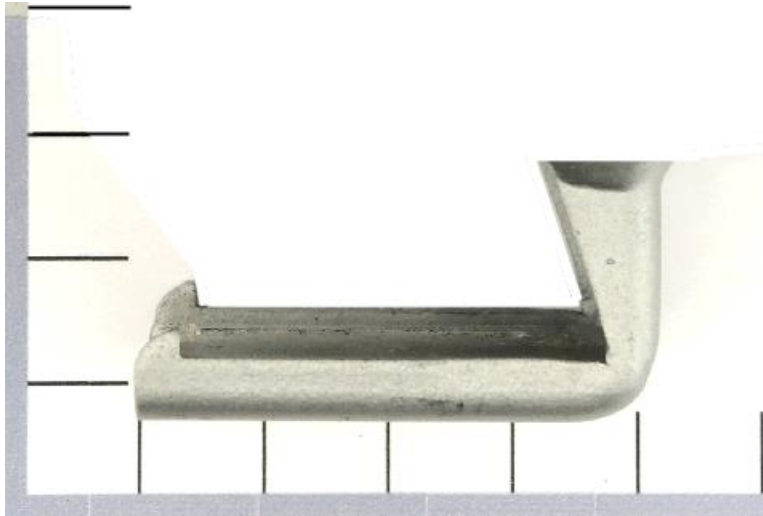
## Fixed Mount Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Fixed Mount	1	Steel 1018 - Coil Stock	\$1.21	0.0359	0.0840	\$0.00	\$0.10

# L Bracket, Coolant Pump Bracket Asm

\...

- \Coolant Pump Bracket Asm
- \L Bracket, Coolant Pump Bracket Asm
- \Fixed Mount Process



## Process Summary

Right First Time	99.97 %
Process Time (Sec)	5.60
Total Weight (kg)	0.02

Material Cost**	\$0.05
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.03
Q Burden	\$0.00
SG&A	\$0.01
Manufacturing Cost*	\$0.09

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# L Bracket, Coolant Pump Bracket Asm



## Fixed Mount Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	3.50	1	0.25	20.00	GER	\$0.02	99.99%	\$0.00
Deburr	1.50	1	0.25	12.36	GER	\$0.01	99.99%	\$0.00
25 Ton Stamping Press	0.60	1	0.25	21.63	GER	\$0.00	99.99%	\$0.00

## Fixed Mount Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, L Bracket	1	Steel 1018 - Coil Stock	\$1.21	0.0198	0.0370	\$0.00	\$0.05

No Commodity Items  
Required for This  
Process



\...  
\Cooling Pack  
\Coolant Pump Bracket Asm  
\Assemble Coolant Pump Bracket

## Process Summary

Right First Time	99.84 %
Process Time (Sec)	9.78
Total Weight (kg)	0.00
Material Cost**	\$0.01
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.09
Q Burden	\$0.02
SG&A	\$0.01
Manufacturing Cost*	\$0.13

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Coolant Pump Bracket



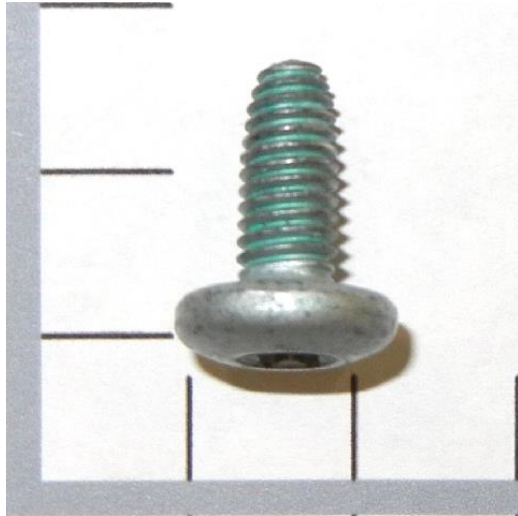
## Assemble Coolant Pump Bracket

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Cure	3.50	1	0.25	17.08	GER	\$0.02	99.97 %	\$0.01
Dip Painting Line	2.06	1	0.25	40.99	GER	\$0.02	99.99 %	\$0.00
Supplier Robotic Mig Weld	4.22	1	0.25	40.12	GER	\$0.05	99.89 %	\$0.02

## Assemble Coolant Pump Bracket

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Paint,Coolant Pump Bracket Asm	1	E-Coat	By Area	0.0000	-	\$0.00	\$0.01

# Coolant Pump Bracket Installation



\...

\Zone 6 Cooling Pack & HVAC

\Cooling Pack

\Coolant Pump Bracket Installation

## Process Summary

Right First Time	99.37 %
Process Time (Sec)	43.00
Total Weight (kg)	0.01

Material Cost**	\$0.15
OEM Process Cost	\$1.09
Supplier Process Cost	\$0.00
Q Burden	\$0.10
SG&A	\$0.14
Manufacturing Cost*	\$1.47



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Coolant Pump Bracket Installation

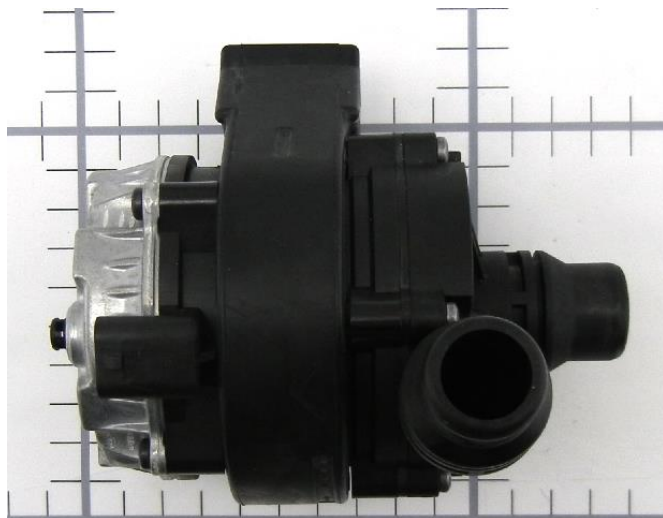


## Coolant Pump Bracket Installation

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
OEM Manual Asm	43.00	1	1.00	91.41	GER	\$1.09	99.37%	\$0.10

## Coolant Pump Bracket Installation

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
M6x14 Button Head Torx Bolt	3	Commodity Item	Purchased	0.0048	-	\$0.05	\$0.00



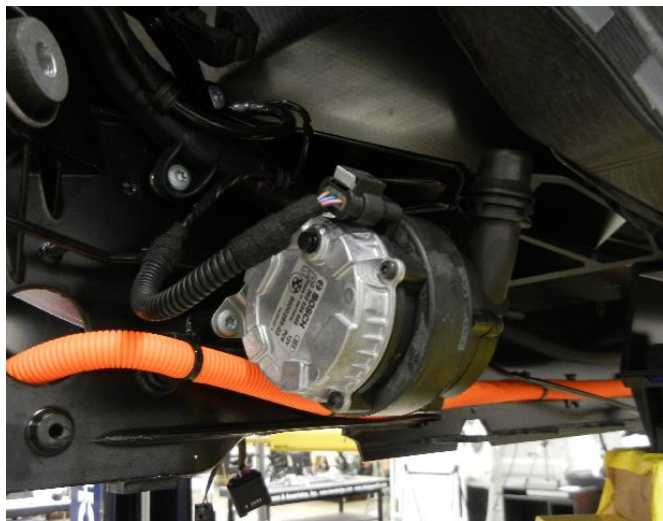
\...

- \Zone 6 Cooling Pack & HVAC
- \Cooling Pack
- \Coolant Pump Installation

## Process Summary

Right First Time	99.98 %
Process Time (Sec)	8.50
Total Weight (kg)	0.71

Material Cost**	\$37.50
OEM Process Cost	\$0.22
Supplier Process Cost	\$0.00
Q Burden	\$0.00
SG&A	\$1.15
Manufacturing Cost*	\$38.87



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Coolant Pump Installation



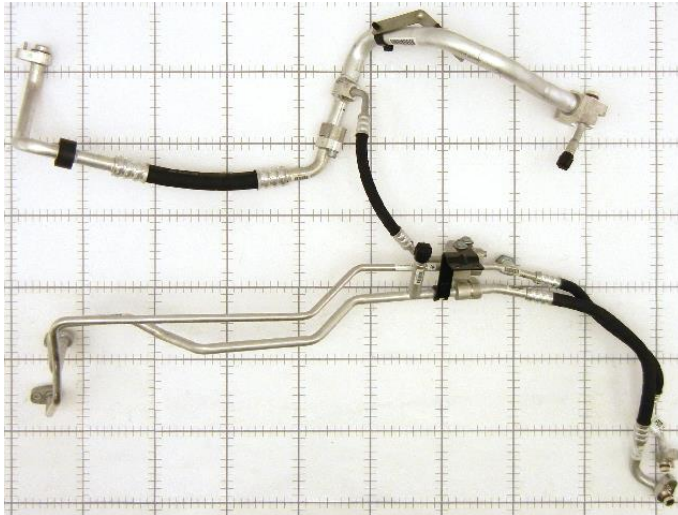
## Coolant Pump Installation

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
OEM Manual Asm	8.50	1	1.00	91.41	GER	\$0.22	99.98 %	\$0.00

## Coolant Pump Installation

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Coolant Pump Asm	1	Commodity Item	Purchased	0.7120	-	\$37.50	\$0.00

# Front Refrigerant Line Bundle Asm



- \...
- \Zone 6 Cooling Pack & HVAC
- \Cooling Pack
- \Front Refrigerant Line Bundle Asm

## Assembly Summary

<b>Parts</b>	<b>113</b>
<b>Fasteners</b>	<b>10</b>
<b>Part Numbers</b>	<b>81</b>
<b>Steps</b>	<b>1,308</b>
<b>Fastenings</b>	<b>120</b>
<b>Right First Time</b>	<b>87.87 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>58.50</b>
<b>Total Weight (kg)</b>	<b>1.76</b>

<b>Material Cost**</b>	<b>\$15.25</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$25.89</b>
<b>Q Burden</b>	<b>\$1.94</b>
<b>SG&amp;A</b>	<b>\$4.45</b>
<b>Manufacturing Cost*</b>	<b>\$47.52</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Front Refrigerant Line Bundle Asm



## Front Refrigerant Line Bundle Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Line 1 Asm, Front Refrigerant Line Bundle Asm	1	48	54	572	54	94.75 %	0.00	0.00	19.71	8.50	0.9912
Line 2 Asm, Front Refrigerant Line Bundle Asm	1	32	31	342	31	96.50 %	0.00	0.00	9.07	5.49	0.4046
Line 3 Asm, Front Refrigerant Line Bundle Asm	1	30	30	377	30	96.79 %	0.00	0.00	8.33	6.33	0.3400
Assemble Front Refrigerant Line Bundle	1	3	5	14	5	99.29 %	0.00	0.00	1.07	0.00	0.0245

## Front Refrigerant Line Bundle Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Line 1 Asm, Front Refrigerant Line Bundle Asm	\$1.23	\$5.74	\$0.00	\$0.00	\$7.83	\$4.40	\$0.81	\$2.19	\$22.20
Line 2 Asm, Front Refrigerant Line Bundle Asm	\$1.14	\$2.27	\$0.00	\$0.00	\$3.68	\$2.74	\$0.53	\$1.08	\$11.44
Line 3 Asm, Front Refrigerant Line Bundle Asm	\$2.97	\$1.81	\$0.00	\$0.00	\$3.40	\$3.40	\$0.49	\$1.12	\$13.18
Assemble Front Refrigerant Line Bundle	\$0.09	\$0.00	\$0.00	\$0.00	\$0.44	\$0.00	\$0.11	\$0.06	\$0.69

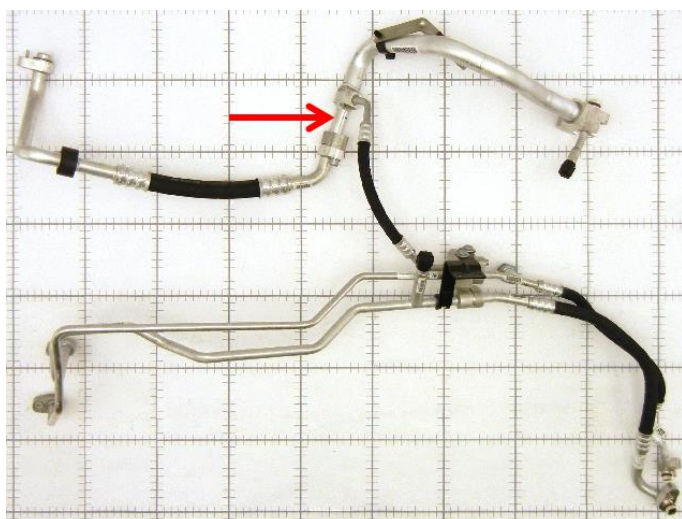
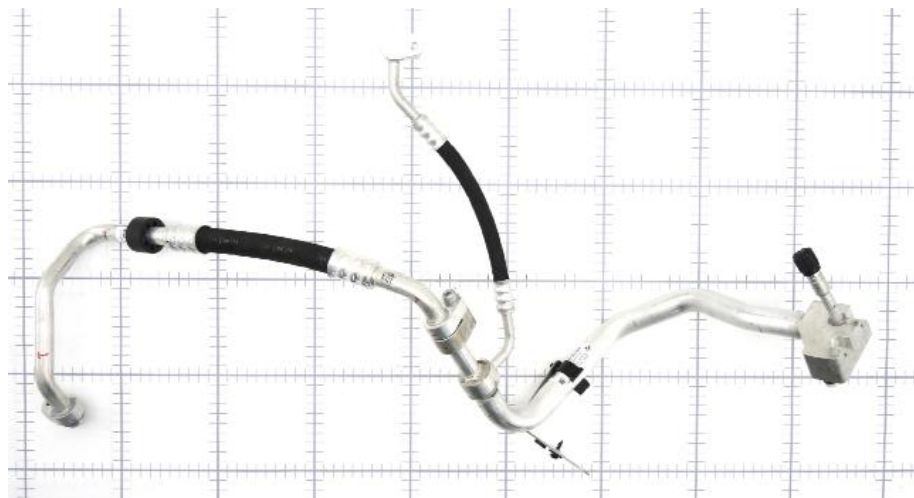
## Detailed Summary

<b>Parts</b>	<b>113</b>
<b>Fasteners</b>	<b>10</b>
<b>Part Numbers</b>	<b>81</b>
<b>Steps</b>	<b>1,308</b>
<b>Fastenings</b>	<b>120</b>
<b>Right First Time</b>	<b>87.87%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>38.17</b>
<b>Supplier Fab. Time (Min)</b>	<b>20.33</b>
<b>Total Weight (kg)</b>	<b>1.76</b>
<b>Purchased Part Cost</b>	
	<b>\$5.43</b>
<b>Material Cost</b>	
	<b>\$9.82</b>
<b>OEM Asm. Cost</b>	
	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	
	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	
	<b>\$15.35</b>
<b>Supplier Fab. Cost</b>	
	<b>\$10.54</b>
<b>Q Burden</b>	
	<b>\$1.94</b>
<b>SG&amp;A</b>	
	<b>\$4.45</b>
<b>Manufacturing Cost*</b>	
	<b>\$47.52</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Line 1 Asm, Front Refrigerant Line Bundle Asm



- \...
  - \Cooling Pack
  - \Front Refrigerant Line Bundle Asm
  - \Line 1 Asm, Front Refrigerant Line Bundle Asm
- ## Assembly Summary

<b>Parts</b>	<b>48</b>
<b>Fasteners</b>	<b>3</b>
<b>Part Numbers</b>	<b>40</b>
<b>Steps</b>	<b>572</b>
<b>Fastenings</b>	<b>54</b>
<b>Right First Time</b>	<b>94.75 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>28.21</b>
<b>Total Weight (kg)</b>	<b>0.99</b>

<b>Material Cost**</b>	<b>\$6.97</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$12.23</b>
<b>Q Burden</b>	<b>\$0.81</b>
<b>SG&amp;A</b>	<b>\$2.19</b>
<b>Manufacturing Cost*</b>	<b>\$22.20</b>

\* Excluding tooling, ER&D, logistics, and profit margin  
 \*\* Includes material cost and purchased parts cost

# Line 1 Asm, Front Refrigerant Line Bundle Asm



## Line 1 Asm, Front Refrigerant Line Bundle Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Section 1 Asm,Line 1 Asm	1	25	30	335	30	97.08 %	0.00	0.00	10.32	5.50	0.6432
Section 2 Asm,Line 1 Asm	1	17	17	207	17	98.02 %	0.00	0.00	8.26	2.84	0.2733
L Bracket Asm,Line 1 Asm	1	3	3	15	3	99.89 %	0.00	0.00	0.32	0.16	0.0529
Assemble Line 1	1	3	4	12	4	99.67 %	0.00	0.00	0.81	0.00	0.0218

## Line 1 Asm, Front Refrigerant Line Bundle Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Section 1 Asm,Line 1 Asm	\$0.97	\$3.87	\$0.00	\$0.00	\$4.00	\$2.94	\$0.44	\$1.33	\$13.55
Section 2 Asm,Line 1 Asm	\$0.02	\$1.74	\$0.00	\$0.00	\$3.37	\$1.43	\$0.30	\$0.79	\$7.65
L Bracket Asm,Line 1 Asm	\$0.06	\$0.13	\$0.00	\$0.00	\$0.13	\$0.03	\$0.02	\$0.04	\$0.40
Assemble Line 1	\$0.18	\$0.00	\$0.00	\$0.00	\$0.33	\$0.00	\$0.05	\$0.05	\$0.61



# Line 1 Asm, Front Refrigerant Line Bundle Asm

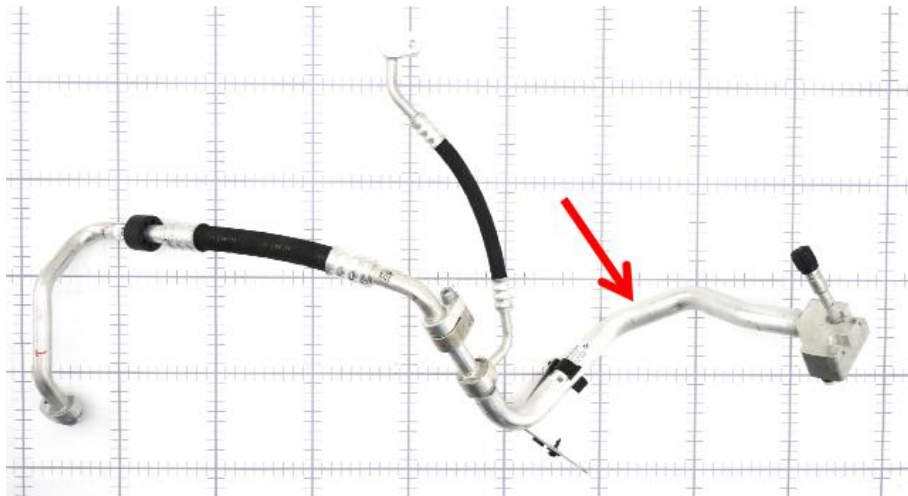
## Detailed Summary

<b>Parts</b>	<b>48</b>
<b>Fasteners</b>	<b>3</b>
<b>Part Numbers</b>	<b>40</b>
<b>Steps</b>	<b>572</b>
<b>Fastenings</b>	<b>54</b>
<b>Right First Time</b>	<b>94.75%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>19.71</b>
<b>Supplier Fab. Time (Min)</b>	<b>8.50</b>
<b>Total Weight (kg)</b>	<b>0.99</b>
<b>Purchased Part Cost</b>	
	<b>\$1.23</b>
<b>Material Cost</b>	
	<b>\$5.74</b>
<b>OEM Asm. Cost</b>	
	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	
	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	
	<b>\$7.83</b>
<b>Supplier Fab. Cost</b>	
	<b>\$4.40</b>
<b>Q Burden</b>	
	<b>\$0.81</b>
<b>SG&amp;A</b>	
	<b>\$2.19</b>
<b>Manufacturing Cost*</b>	
	<b>\$22.20</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Section 1 Asm, Line 1 Asm



\...

\Front Refrigerant Line Bundle Asm

\Line 1 Asm, Front Refrigerant Line Bundle Asm

\Section 1 Asm, Line 1 Asm

## Assembly Summary

<b>Parts</b>	<b>25</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>23</b>
<b>Steps</b>	<b>335</b>
<b>Fastenings</b>	<b>30</b>
<b>Right First Time</b>	<b>97.08 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>15.82</b>
<b>Total Weight (kg)</b>	<b>0.64</b>

<b>Material Cost**</b>	<b>\$4.84</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$6.94</b>
<b>Q Burden</b>	<b>\$0.44</b>
<b>SG&amp;A</b>	<b>\$1.33</b>
<b>Manufacturing Cost*</b>	<b>\$13.55</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Section 1 Asm,Line 1 Asm



## Section 1 Asm,Line 1 Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Expansion Valve Asm, Section 1 Asm	1	8	9	100	9	99.10 %	0.00	0.00	1.90	1.95	0.2012
Multi-Channel Tube,Section 1 Asm	1	1	0	12	0	99.78 %	0.00	0.00	0.00	0.32	0.2739
Hose Branch Asm,Section 1 Asm	1	13	12	168	12	98.66 %	0.00	0.00	3.94	2.26	0.1219
Connector Asm,Section 1 Asm	1	2	2	36	2	99.74 %	0.00	0.00	1.16	0.97	0.0460
Assemble Section 1	1	1	7	15	7	99.77 %	0.00	0.00	3.32	0.00	0.0001

## Section 1 Asm,Line 1 Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Expansion Valve Asm, Section 1 Asm	\$0.82	\$1.17	\$0.00	\$0.00	\$0.73	\$1.15	\$0.13	\$0.39	\$4.40
Multi-Channel Tube,Section 1 Asm	\$0.00	\$1.64	\$0.00	\$0.00	\$0.00	\$0.13	\$0.03	\$0.21	\$2.02
Hose Branch Asm,Section 1 Asm	\$0.01	\$0.81	\$0.00	\$0.00	\$1.54	\$1.10	\$0.20	\$0.41	\$4.08
Connector Asm,Section 1 Asm	\$0.04	\$0.25	\$0.00	\$0.00	\$0.48	\$0.56	\$0.04	\$0.16	\$1.53
Assemble Section 1	\$0.10	\$0.00	\$0.00	\$0.00	\$1.25	\$0.00	\$0.03	\$0.15	\$1.53

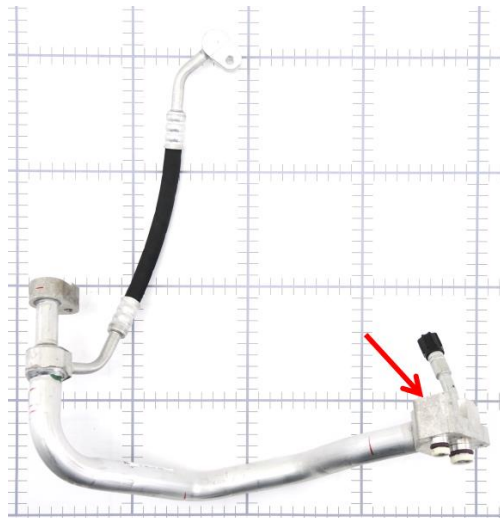
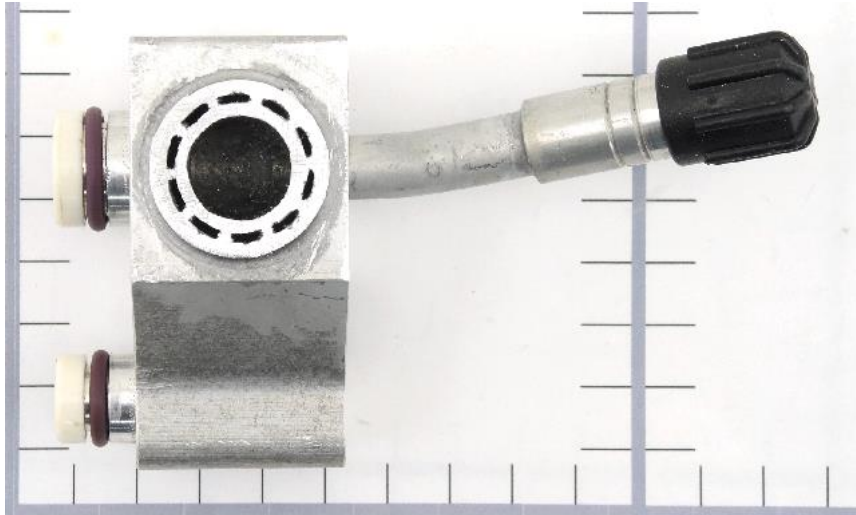
## Detailed Summary

<b>Parts</b>	<b>25</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>23</b>
<b>Steps</b>	<b>335</b>
<b>Fastenings</b>	<b>30</b>
<b>Right First Time</b>	<b>97.08%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>10.32</b>
<b>Supplier Fab. Time (Min)</b>	<b>5.50</b>
<b>Total Weight (kg)</b>	<b>0.64</b>
<b>Purchased Part Cost</b>	<b>\$0.97</b>
<b>Material Cost</b>	<b>\$3.87</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$4.00</b>
<b>Supplier Fab. Cost</b>	<b>\$2.94</b>
<b>Q Burden</b>	<b>\$0.44</b>
<b>SG&amp;A</b>	<b>\$1.33</b>
<b>Manufacturing Cost*</b>	<b>\$13.55</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Expansion Valve Asm, Section 1 Asm



\...

\Line 1 Asm, Front Refrigerant Line Bundle Asm

\Section 1 Asm, Line 1 Asm

\Expansion Valve Asm, Section 1 Asm

## Assembly Summary

<b>Parts</b>	<b>8</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>8</b>
<b>Steps</b>	<b>100</b>
<b>Fastenings</b>	<b>9</b>
<b>Right First Time</b>	<b>99.10 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>3.85</b>
<b>Total Weight (kg)</b>	<b>0.20</b>

<b>Material Cost**</b>	<b>\$1.99</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$1.88</b>
<b>Q Burden</b>	<b>\$0.13</b>
<b>SG&amp;A</b>	<b>\$0.39</b>
<b>Manufacturing Cost*</b>	<b>\$4.40</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Expansion Valve Asm, Section 1 Asm



## Expansion Valve Asm, Section 1 Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Expansion Valve Connector Asm,Expansion Valve Asm	1	5	4	75	4	99.48 %	0.00	0.00	0.57	1.77	0.1860
Connecting Tube,Expansion Valve Asm	1	1	0	9	0	99.90 %	0.00	0.00	0.00	0.16	0.0038
Cap,Expansion Valve Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.03	0.0032
Assemble Expansion Valve	1	1	5	12	5	99.74 %	0.00	0.00	1.33	0.00	0.0082

## Expansion Valve Asm, Section 1 Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Expansion Valve Connector Asm,Expansion Valve Asm	\$0.07	\$1.13	\$0.00	\$0.00	\$0.23	\$1.10	\$0.08	\$0.30	\$2.91
Connecting Tube,Expansion Valve Asm	\$0.00	\$0.02	\$0.00	\$0.00	\$0.00	\$0.05	\$0.02	\$0.01	\$0.09
Cap,Expansion Valve Asm	\$0.00	\$0.02	\$0.00	\$0.00	\$0.00	\$0.01	\$0.00	\$0.00	\$0.03
Assemble Expansion Valve	\$0.75	\$0.00	\$0.00	\$0.00	\$0.50	\$0.00	\$0.04	\$0.08	\$1.37

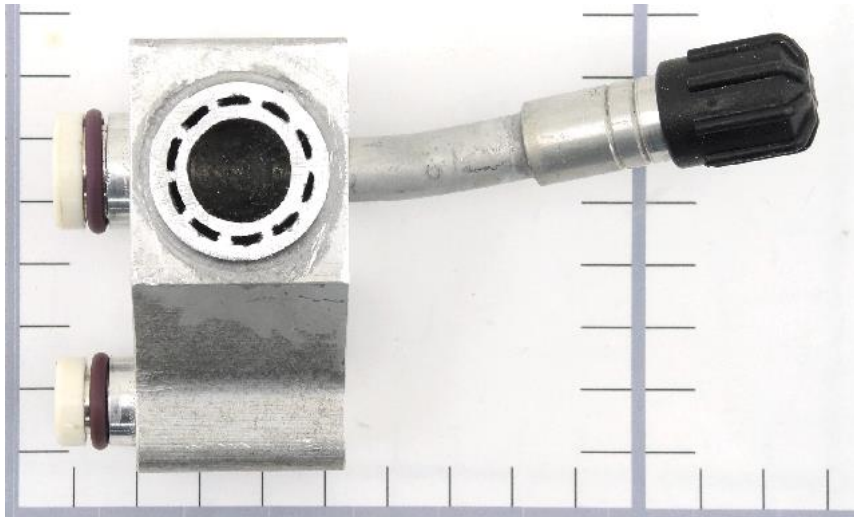
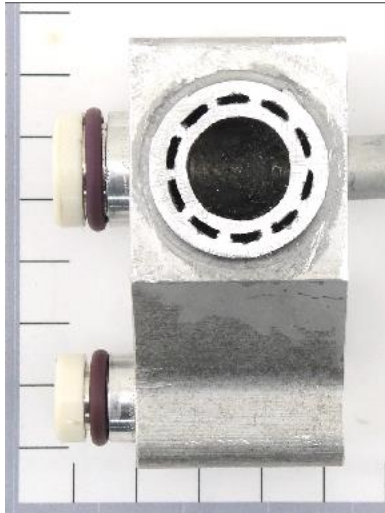
## Detailed Summary

<b>Parts</b>	<b>8</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>8</b>
<b>Steps</b>	<b>100</b>
<b>Fastenings</b>	<b>9</b>
<b>Right First Time</b>	<b>99.1%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>1.90</b>
<b>Supplier Fab. Time (Min)</b>	<b>1.95</b>
<b>Total Weight (kg)</b>	<b>0.20</b>
<b>Purchased Part Cost</b>	
	<b>\$0.82</b>
<b>Material Cost</b>	
	<b>\$1.17</b>
<b>OEM Asm. Cost</b>	
	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	
	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	
	<b>\$0.73</b>
<b>Supplier Fab. Cost</b>	
	<b>\$1.15</b>
<b>Q Burden</b>	
	<b>\$0.13</b>
<b>SG&amp;A</b>	
	<b>\$0.39</b>
<b>Manufacturing Cost*</b>	
	<b>\$4.40</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Expansion Valve Connector Asm, Expansion Valve Asm



\...  
 \Section 1 Asm, Line 1 Asm  
 \Expansion Valve Asm, Section 1 Asm  
 \Expansion Valve Connector Asm, Expansion Valve  
 Asm

## Assembly Summary

<b>Parts</b>	<b>5</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>5</b>
<b>Steps</b>	<b>75</b>
<b>Fastenings</b>	<b>4</b>
<b>Right First Time</b>	<b>99.48 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>2.33</b>
<b>Total Weight (kg)</b>	<b>0.19</b>

<b>Material Cost**</b>	<b>\$1.20</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$1.33</b>
<b>Q Burden</b>	<b>\$0.08</b>
<b>SG&amp;A</b>	<b>\$0.30</b>
<b>Manufacturing Cost*</b>	<b>\$2.91</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Expansion Valve Connector Asm,Expansion Valve Asm



## Expansion Valve Connector Asm,Expansion Valve Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Connecting Block,Expansion Valve Connector Asm	1	1	0	60	0	99.78 %	0.00	0.00	0.00	1.74	0.1848
Low Pressure Chanel Cap,Expansion Valve Connec	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.01	0.0004
End Cap,Connector 1 Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.01	0.0003
Assemble Expansion Valve Connector	1	2	4	10	4	99.72 %	0.00	0.00	0.57	0.00	0.0005

## Expansion Valve Connector Asm,Expansion Valve Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Connecting Block,Expansion Valve Connector Asm	\$0.00	\$1.11	\$0.00	\$0.00	\$0.00	\$1.09	\$0.03	\$0.26	\$2.50
Low Pressure Chanel Cap,Expansion Valve Connec	\$0.00	\$0.01	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.02
End Cap,Connector 1 Asm	\$0.00	\$0.01	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.02
Assemble Expansion Valve Connector	\$0.07	\$0.00	\$0.00	\$0.00	\$0.23	\$0.00	\$0.04	\$0.03	\$0.37

# Expansion Valve Connector Asm, Expansion Valve Asm

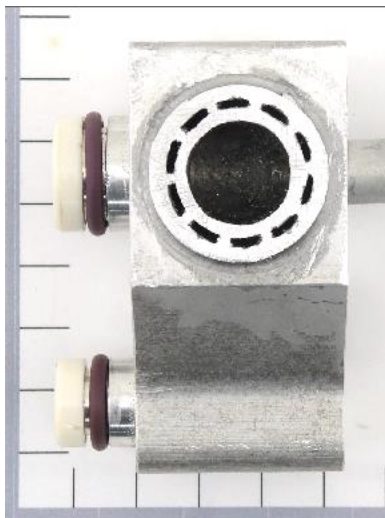
## Detailed Summary

<b>Parts</b>	<b>5</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>5</b>
<b>Steps</b>	<b>75</b>
<b>Fastenings</b>	<b>4</b>
<b>Right First Time</b>	<b>99.48%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.57</b>
<b>Supplier Fab. Time (Min)</b>	<b>1.77</b>
<b>Total Weight (kg)</b>	<b>0.19</b>
<b>Purchased Part Cost</b>	<b>\$0.07</b>
<b>Material Cost</b>	<b>\$1.13</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.23</b>
<b>Supplier Fab. Cost</b>	<b>\$1.10</b>
<b>Q Burden</b>	<b>\$0.08</b>
<b>SG&amp;A</b>	<b>\$0.30</b>
<b>Manufacturing Cost*</b>	<b>\$2.91</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connecting Block, Expansion Valve Connector Asm



\...

- \Expansion Valve Connector Asm, Expansion Valve Asm
- \Connecting Block, Expansion Valve Connector Asm
- \Connecting Block Process

## Process Summary

Right First Time	99.78 %
Process Time (Sec)	104.22
Total Weight (kg)	0.18

Material Cost**	\$1.11
OEM Process Cost	\$0.00
Supplier Process Cost	\$1.09
Q Burden	\$0.03
SG&A	\$0.26
Manufacturing Cost*	\$2.50

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connecting Block, Expansion Valve Connector Asm



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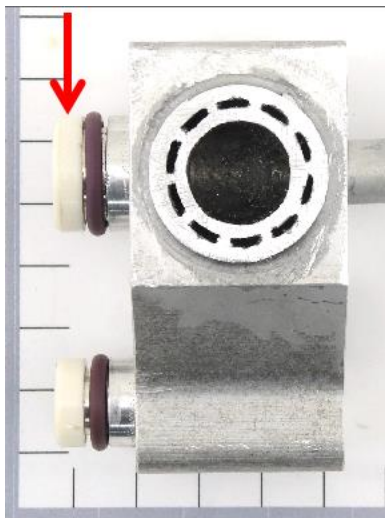
## Connecting Block Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	7.00	1	0.25	21.76	CZE	\$0.04	99.99 %	\$0.00
Deburr	7.00	1	0.25	22.72	CZE	\$0.04	99.99 %	\$0.00
CNC Machine	86.84	1	0.25	38.73	CZE	\$0.93	99.84 %	\$0.02
Cut Off	2.98	1	0.25	16.76	CZE	\$0.01	99.98 %	\$0.00
2200 Ton Extrusion Press	0.39	1	4.00	523.11	CZE	\$0.06	99.99 %	\$0.00

## Connecting Block Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Connecting Block	1	Aluminum 6061 - Billet Stock	\$2.80	0.1848	0.3958	\$0.00	\$1.11

# Low Pressure Chanel Cap, Expansion Valve Connec



\...

- \Expansion Valve Connector Asm, Expansion Valve Asm
- \Low Pressure Chanel Cap, Expansion Valve Connec
- \Low Pressure Chanel Cap Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	0.89
Total Weight (kg)	0.00

Material Cost**	\$0.01
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.00
Q Burden	\$0.00
SG&A	\$0.00
Manufacturing Cost*	\$0.02

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Low Pressure Chanel Cap, Expansion Valve Connec



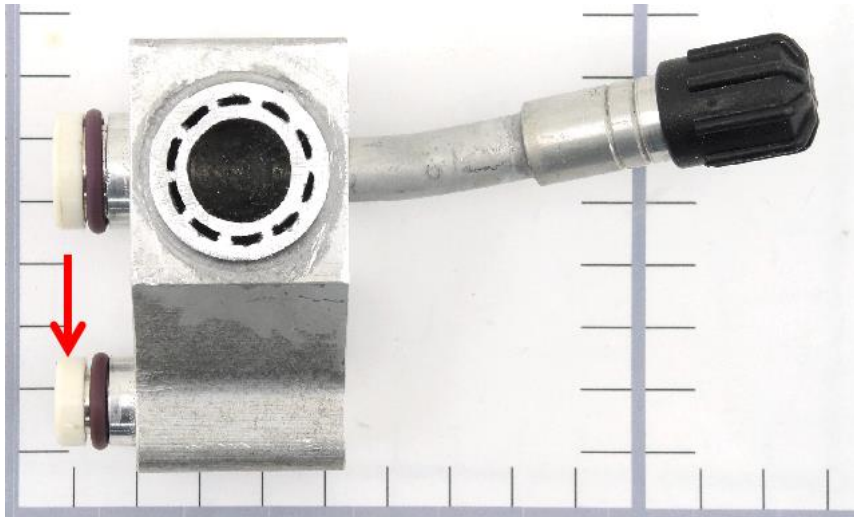
## Low Pressure Chanel Cap Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
55Ton Injection Molding Press	7.12	8	0.25	14.88	CZE	\$0.00	99.99%	\$0.00

## Low Pressure Chanel Cap Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Low Pressure Chanel Cap	1	PBT	\$3.06	0.0004	0.0004	\$0.00	\$0.01

# End Cap, Connector 1 Asm



\...

- \Expansion Valve Connector Asm, Expansion Valve Asm
- \End Cap, Connector 1 Asm
- \End Cap Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	0.83
Total Weight (kg)	0.00

Material Cost**	\$0.01
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.00
Q Burden	\$0.00
SG&A	\$0.00
Manufacturing Cost*	\$0.02

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# End Cap, Connector 1 Asm



## End Cap Process

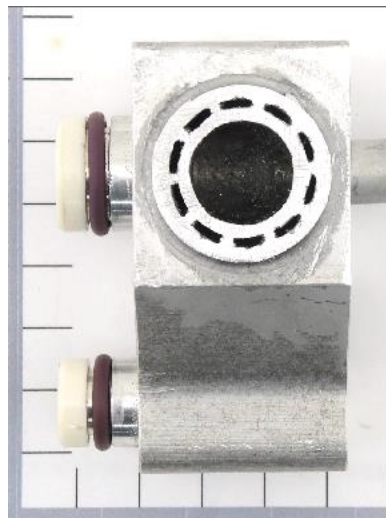
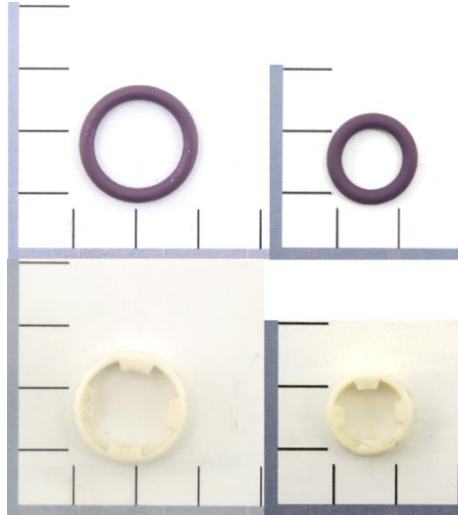
Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
55 Ton Injection Molding Press	6.64	8	0.25	14.88	CZE	\$0.00	99.99%	\$0.00

## End Cap Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, End Cap	1	PBT	\$3.06	0.0003	0.0003	\$0.00	\$0.01



# Assemble Expansion Valve Connector



\...

- \Expansion Valve Asm, Section 1 Asm
- \Expansion Valve Connector Asm, Expansion Valve Asm
- \Assemble Expansion Valve Connector

## Process Summary

Right First Time	99.72 %
Process Time (Sec)	34.00
Total Weight (kg)	0.00
Material Cost**	\$0.07
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.23
Q Burden	\$0.04
SG&A	\$0.03
Manufacturing Cost*	\$0.37

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Expansion Valve Connector



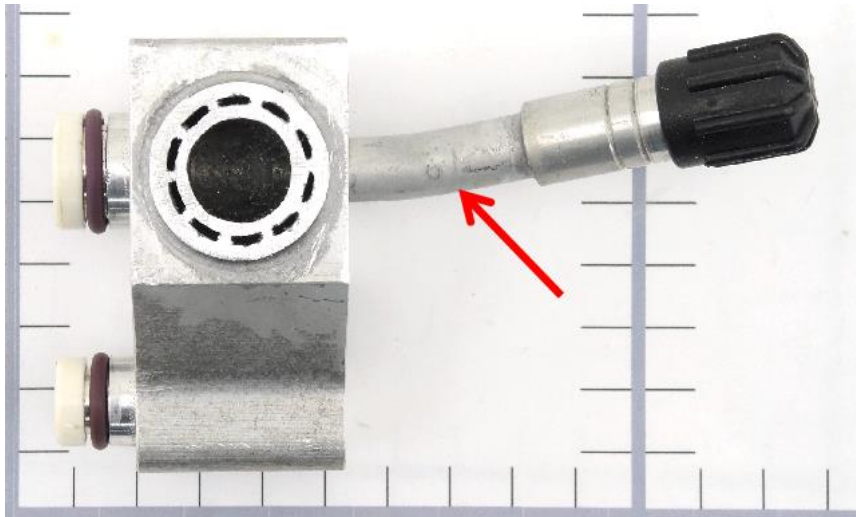
## Assemble Expansion Valve Connector

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	34.00	1	1.00	24.59	CZE	\$0.23	99.72 %	\$0.04

## Assemble Expansion Valve Connector

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
14mm Low Pressure Chanel O-Ring,Expansion Valve Co	1	Commodity Item	Purchased	0.0003	-	\$0.04	\$0.00
10mm O-Ring,Connector 1.Asm	1	Commodity Item	Purchased	0.0002	-	\$0.03	\$0.00

# Connecting Tube, Expansion Valve Asm



\...

- \Expansion Valve Asm, Section 1 Asm
- \Connecting Tube, Expansion Valve Asm
- \Connecting Tube Process

## Process Summary

Right First Time	99.90 %
Process Time (Sec)	9.40
Total Weight (kg)	0.00

Material Cost**	\$0.02
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.05
Q Burden	\$0.02
SG&A	\$0.01
Manufacturing Cost*	\$0.09

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connecting Tube, Expansion Valve Asm



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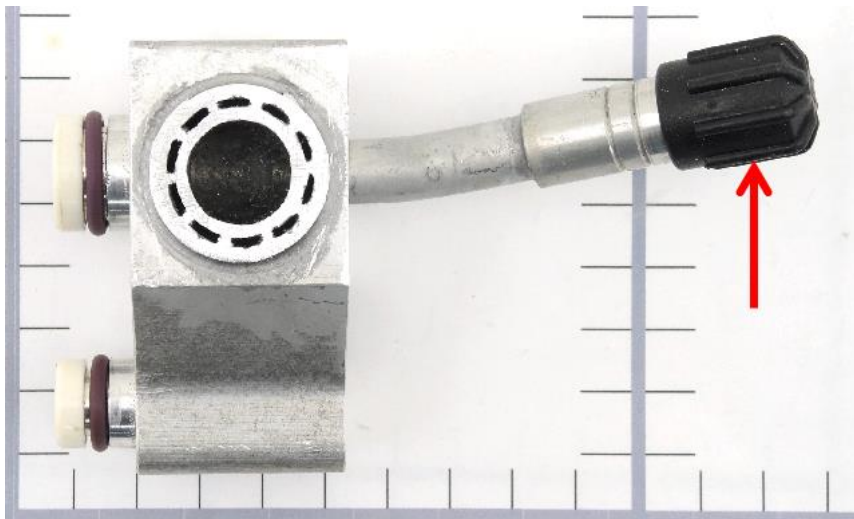
## Connecting Tube Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.94	CZE	\$0.02	99.99%	\$0.00
Tube Bending	4.40	1	0.25	26.08	CZE	\$0.03	99.91%	\$0.01

## Connecting Tube Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Connecting Tube	1	Aluminum 3003 - Clad Seamless Tube	\$5.00	0.0038	0.0038	\$0.00	\$0.02

# Cap, Expansion Valve Asm



\...  
\Expansion Valve Asm, Section 1 Asm  
\Cap, Expansion Valve Asm  
\Cap Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	1.59
Total Weight (kg)	0.00

Material Cost**	\$0.02
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.01
Q Burden	\$0.00
SG&A	\$0.00
Manufacturing Cost*	\$0.03

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Cap, Expansion Valve Asm

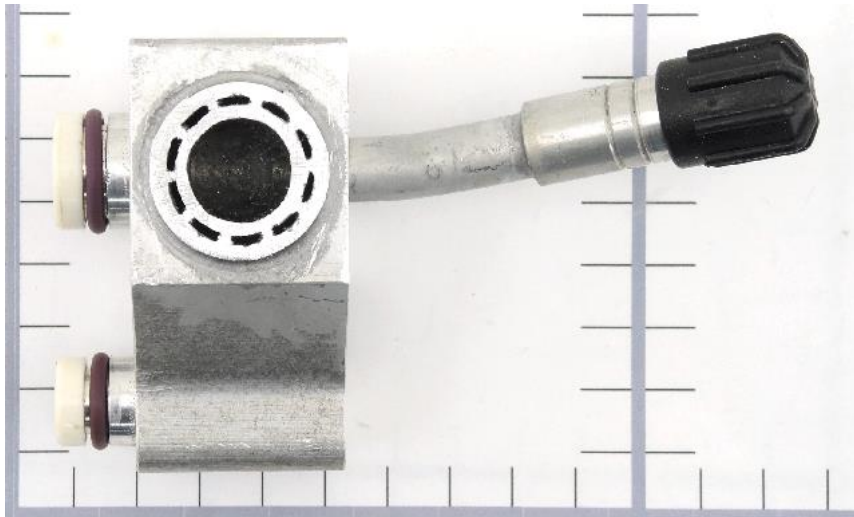
## Cap Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
55 Ton Injection Molding Press	12.72	8	0.25	14.88	CZE	\$0.01	99.99%	\$0.00

## Cap Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Cap	1	PA6	\$4.39	0.0032	0.0034	\$0.00	\$0.02

## No Commodity Items Required for This Process



\...

\Section 1 Asm,Line 1 Asm

\Expansion Valve Asm, Section 1 Asm

\Assemble Expansion Valve

### Process Summary

Right First Time	99.74 %
Process Time (Sec)	79.80
Total Weight (kg)	0.01

Material Cost**	\$0.75
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.50
Q Burden	\$0.04
SG&A	\$0.08
Manufacturing Cost*	\$1.37

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Expansion Valve



## Assemble Expansion Valve

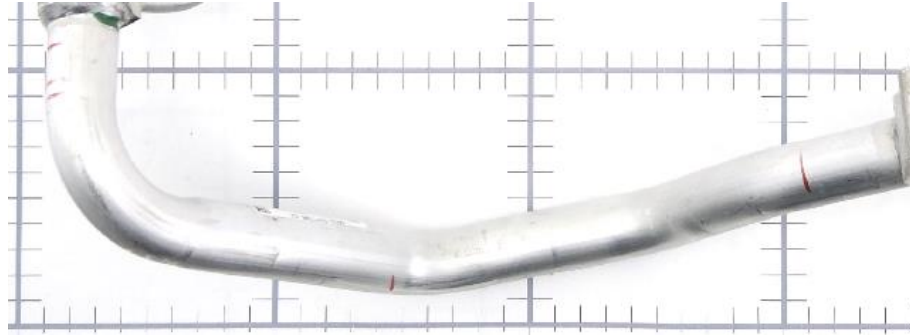
Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Automated Asm	79.80	1	0.25	22.49	CZE	\$0.50	99.74 %	\$0.04

## Assemble Expansion Valve

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Expansion Valve,Expansion Valve Asm	1	Commodity Item	Purchased	0.0082	-	\$0.75	\$0.00



# Multi-Channel Tube, Section 1 Asm



\...

\Section 1 Asm, Line 1 Asm

\Multi-Channel Tube, Section 1 Asm

\Main Tube Process

## Process Summary

Right First Time	99.78 %
Process Time (Sec)	19.40
Total Weight (kg)	0.27

Material Cost**	\$1.64
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.13
Q Burden	\$0.03
SG&A	\$0.21
Manufacturing Cost*	\$2.02

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Multi-Channel Tube, Section 1 Asm



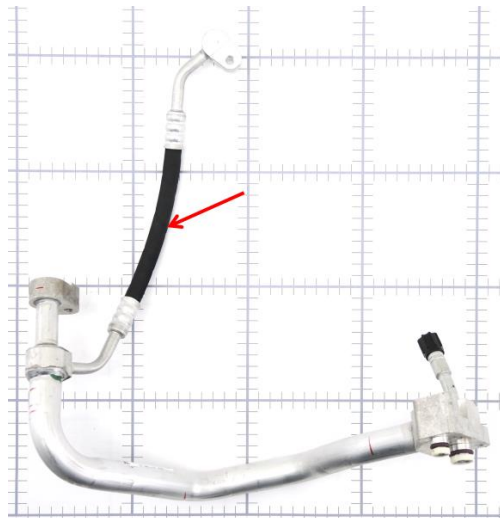
## Main Tube Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	9.00	1	0.25	21.76	CZE	\$0.05	99.99%	\$0.00
Tube Bending	10.40	1	0.25	26.08	CZE	\$0.08	99.79%	\$0.03

## Main Tube Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Main Tube	1	Aluminum 3003 - Seamless Tube	\$6.00	0.2739	0.2739	\$0.00	\$1.64

# Hose Branch Asm, Section 1 Asm



\...

\Line 1 Asm, Front Refrigerant Line Bundle Asm

\Section 1 Asm, Line 1 Asm

\Hose Branch Asm, Section 1 Asm

## Assembly Summary

<b>Parts</b>	<b>13</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>11</b>
<b>Steps</b>	<b>168</b>
<b>Fastenings</b>	<b>12</b>
<b>Right First Time</b>	<b>98.66 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>6.20</b>
<b>Total Weight (kg)</b>	<b>0.12</b>

<b>Material Cost**</b>	<b>\$0.82</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$2.64</b>
<b>Q Burden</b>	<b>\$0.20</b>
<b>SG&amp;A</b>	<b>\$0.41</b>
<b>Manufacturing Cost*</b>	<b>\$4.08</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Hose Branch Asm, Section 1 Asm



## Hose Branch Asm, Section 1 Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Connector Asm, Hose Branch Asm	1	6	5	91	5	99.34 %	0.00	0.00	1.91	1.40	0.0483
14mm-OD Wrapped Hose, Hose Tube Asm	1	4	0	4	0	99.96 %	0.00	0.00	0.00	0.06	0.0273
Branch Connector Asm, Hose Branch Asm	1	3	3	62	3	99.57 %	0.00	0.00	1.66	0.79	0.0463
Assemble Hose Branch	1	0	4	8	4	99.79 %	0.00	0.00	0.37	0.00	0.0000

## Hose Branch Asm, Section 1 Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Connector Asm, Hose Branch Asm	\$0.01	\$0.34	\$0.00	\$0.00	\$0.75	\$0.68	\$0.10	\$0.21	\$2.10
14mm-OD Wrapped Hose, Hose Tube Asm	\$0.00	\$0.16	\$0.00	\$0.00	\$0.00	\$0.07	\$0.01	\$0.03	\$0.26
Branch Connector Asm, Hose Branch Asm	\$0.00	\$0.31	\$0.00	\$0.00	\$0.65	\$0.35	\$0.07	\$0.16	\$1.53
Assemble Hose Branch	\$0.00	\$0.00	\$0.00	\$0.00	\$0.14	\$0.00	\$0.03	\$0.02	\$0.19

## Detailed Summary

<b>Parts</b>	<b>13</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>11</b>
<b>Steps</b>	<b>168</b>
<b>Fastenings</b>	<b>12</b>
<b>Right First Time</b>	<b>98.66%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>3.94</b>
<b>Supplier Fab. Time (Min)</b>	<b>2.26</b>
<b>Total Weight (kg)</b>	<b>0.12</b>
<b>Purchased Part Cost</b>	<b>\$0.01</b>
<b>Material Cost</b>	<b>\$0.81</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$1.54</b>
<b>Supplier Fab. Cost</b>	<b>\$1.10</b>
<b>Q Burden</b>	<b>\$0.20</b>
<b>SG&amp;A</b>	<b>\$0.41</b>
<b>Manufacturing Cost*</b>	<b>\$4.08</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connector Asm, Hose Branch Asm



\...  
 \Section 1 Asm, Line 1 Asm  
 \Hose Branch Asm, Section 1 Asm  
 \Connector Asm, Hose Branch Asm  
**Assembly Summary**

<b>Parts</b>	<b>6</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>6</b>
<b>Steps</b>	<b>91</b>
<b>Fastenings</b>	<b>5</b>
<b>Right First Time</b>	<b>99.34 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>3.32</b>
<b>Total Weight (kg)</b>	<b>0.05</b>

<b>Material Cost**</b>	<b>\$0.35</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$1.43</b>
<b>Q Burden</b>	<b>\$0.10</b>
<b>SG&amp;A</b>	<b>\$0.21</b>
<b>Manufacturing Cost*</b>	<b>\$2.10</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connector Asm,Hose Branch Asm



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## Connector Asm,Hose Branch Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Connecting Tube	1	1	0	9	0	99.90 %	0.00	0.00	0.00	0.16	0.0098
Connecting Block,Connector Asm	1	1	0	36	0	99.87 %	0.00	0.00	0.00	0.89	0.0254
8.5mm Sealing Ring,Connector Asm	1	2	0	8	0	99.96 %	0.00	0.00	0.00	0.18	0.0010
Assemble Connector 1	1	1	4	9	4	99.77 %	0.00	0.00	0.95	0.00	0.0007
Hose Crimp Fitting, Hose Asm	1	1	0	21	0	99.93 %	0.00	0.00	0.27	0.17	0.0114
Assemble Hose Crimp	1	0	1	4	1	99.92 %	0.00	0.00	0.70	0.00	0.0000

## Connector Asm,Hose Branch Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Connecting Tube	\$0.00	\$0.05	\$0.00	\$0.00	\$0.00	\$0.05	\$0.02	\$0.01	\$0.13
Connecting Block,Connector Asm	\$0.00	\$0.20	\$0.00	\$0.00	\$0.00	\$0.51	\$0.02	\$0.09	\$0.82
8.5mm Sealing Ring,Connector Asm	\$0.00	\$0.02	\$0.00	\$0.00	\$0.00	\$0.06	\$0.01	\$0.01	\$0.09
Assemble Connector 1	\$0.01	\$0.00	\$0.00	\$0.00	\$0.39	\$0.00	\$0.04	\$0.05	\$0.48
Hose Crimp Fitting, Hose Asm	\$0.00	\$0.07	\$0.00	\$0.00	\$0.08	\$0.06	\$0.01	\$0.03	\$0.25
Assemble Hose Crimp	\$0.00	\$0.00	\$0.00	\$0.00	\$0.29	\$0.00	\$0.01	\$0.03	\$0.33

## Detailed Summary

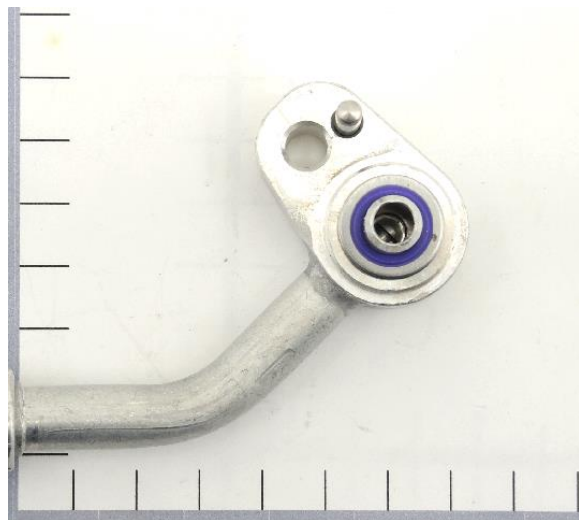
<b>Parts</b>	<b>6</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>6</b>
<b>Steps</b>	<b>91</b>
<b>Fastenings</b>	<b>5</b>
<b>Right First Time</b>	<b>99.34%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>1.91</b>
<b>Supplier Fab. Time (Min)</b>	<b>1.40</b>
<b>Total Weight (kg)</b>	<b>0.05</b>
<b>Purchased Part Cost</b>	
	<b>\$0.01</b>
<b>Material Cost</b>	
	<b>\$0.34</b>
<b>OEM Asm. Cost</b>	
	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	
	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	
	<b>\$0.75</b>
<b>Supplier Fab. Cost</b>	
	<b>\$0.68</b>
<b>Q Burden</b>	
	<b>\$0.10</b>
<b>SG&amp;A</b>	
	<b>\$0.21</b>
<b>Manufacturing Cost*</b>	
	<b>\$2.10</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Connecting Tube



\...

- \Connector Asm,Hose Branch Asm
- \Connecting Tube
- \Connecting Tube Process

## Process Summary

Right First Time	99.90 %
Process Time (Sec)	9.40
Total Weight (kg)	0.01
Material Cost**	\$0.05
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.05
Q Burden	\$0.02
SG&A	\$0.01
Manufacturing Cost*	\$0.13

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connecting Tube

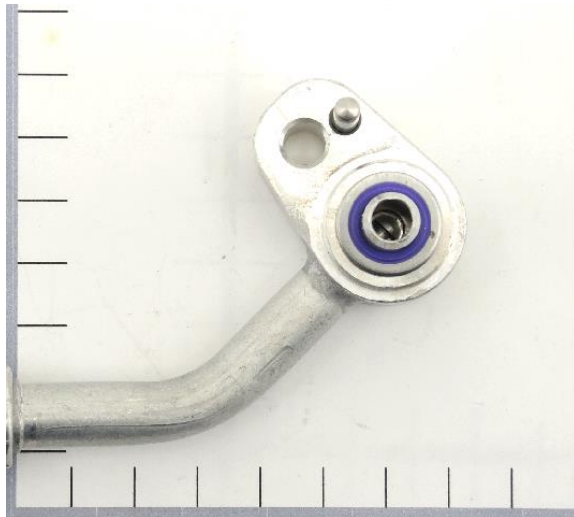
## Connecting Tube Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.94	CZE	\$0.02	99.99%	\$0.00
Tube Bending	4.40	1	0.25	26.08	CZE	\$0.03	99.91%	\$0.01

## Connecting Tube Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Connecting Tube	1	Aluminum 3003 - Clad Seamless Tube	\$5.00	0.0098	0.0098	\$0.00	\$0.05

# Connecting Block, Connector Asm



\...  
\Connector Asm,Hose Branch Asm  
\Connecting Block,Connector Asm  
\Connecting Block Process

## Process Summary

Right First Time	99.87 %
Process Time (Sec)	53.59
Total Weight (kg)	0.03
Material Cost**	\$0.20
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.51
Q Burden	\$0.02
SG&A	\$0.09
Manufacturing Cost*	\$0.82

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connecting Block, Connector Asm



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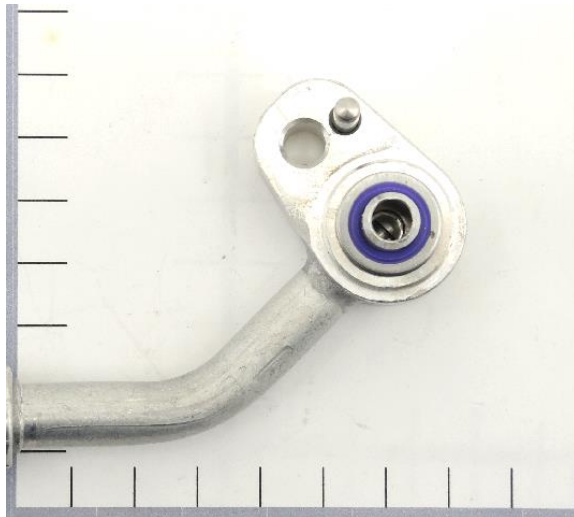
## Connecting Block Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.94	CZE	\$0.02	99.99 %	\$0.00
Deburr	4.00	1	0.25	22.72	CZE	\$0.03	99.99 %	\$0.00
CNC Machine	41.78	1	0.25	38.73	CZE	\$0.45	99.93 %	\$0.01
Cut Off	2.75	1	0.25	16.76	CZE	\$0.01	99.98 %	\$0.00
2200 Ton Extrusion Press	0.07	1	4.00	523.11	CZE	\$0.01	99.99 %	\$0.00

## Connecting Block Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Connecting Block	1	Aluminum 6061 - Billet Stock	\$2.80	0.0254	0.0718	\$0.00	\$0.20

# 8.5mm Sealing Ring, Connector Asm



\...

\Connector Asm,Hose Branch Asm  
\8.5mm Sealing Ring,Connector Asm  
\8.5mm Sealing Ring Process

## Process Summary

<b>Right First Time</b>	<b>99.96 %</b>
<b>Process Time (Sec)</b>	<b>10.90</b>
<b>Total Weight (kg)</b>	<b>0.00</b>

<b>Material Cost**</b>	<b>\$0.02</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.06</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.01</b>
<b>Manufacturing Cost*</b>	<b>\$0.09</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# 8.5mm Sealing Ring, Connector Asm



## 8.5mm Sealing Ring Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
55 Ton Injection Molding Press	42.40	8	0.25	23.19	CZE	\$0.03	99.99%	\$0.00
Wash	3.50	1	0.25	11.94	CZE	\$0.01	99.99%	\$0.00
Deburr	1.50	1	0.25	22.72	CZE	\$0.01	99.99%	\$0.00
25 Ton Stamping Press	0.60	1	0.25	13.85	CZE	\$0.00	99.99%	\$0.00

## 8.5mm Sealing Ring Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, O-Ring Seal	1	EPDM	\$4.04	0.0003	0.0003	\$0.00	\$0.01
Material, Outer Ring	1	Steel 1018 - Coil Stock	\$1.21	0.0007	0.0008	\$0.00	\$0.01

# Assemble Connector 1



\...  
\Hose Branch Asm,Section 1 Asm  
\Connector Asm,Hose Branch Asm  
\Assemble Connector 1

## Process Summary

Right First Time	99.77 %
Process Time (Sec)	56.90
Total Weight (kg)	0.00

Material Cost**	\$0.01
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.39
Q Burden	\$0.04
SG&A	\$0.05
Manufacturing Cost*	\$0.48

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Connector 1



## Assemble Connector 1

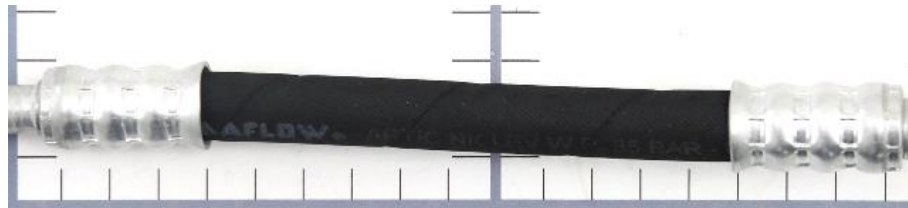
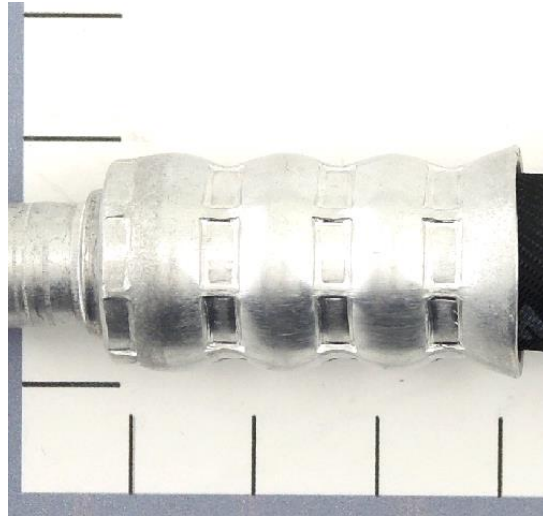
Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	56.90	1	1.00	24.59	CZE	\$0.39	99.77 %	\$0.04

## Assemble Connector 1

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Guide Pin, Connector Asm	1	Commodity Item	Purchased	0.0007	-	\$0.01	\$0.00



# Hose Crimp Fitting, Hose Asm



\...

- \Connector Asm,Hose Branch Asm
- \Hose Crimp Fitting, Hose Asm
- \Hose Crimp Fitting Process

## Process Summary

Right First Time	99.93 %
Process Time (Sec)	26.32
Total Weight (kg)	0.01

Material Cost**	\$0.07
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.14
Q Burden	\$0.01
SG&A	\$0.03
Manufacturing Cost*	\$0.25

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Hose Crimp Fitting, Hose Asm



Hose Crimp Fitting Process									
Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden	
Supplier Automated Asm	16.00	1	0.25	17.86	CZE	\$0.08	99.98 %	\$0.00	
Wash	5.00	1	0.25	21.76	CZE	\$0.03	99.99 %	\$0.00	
Deburr	3.00	1	0.25	22.72	CZE	\$0.02	99.99 %	\$0.00	
Circular Saw	2.32	1	0.25	16.76	CZE	\$0.01	99.97 %	\$0.01	

Hose Crimp Fitting Process								
Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost	
Material, Refeferant Hose Crimp Fitting	1	Aluminum 3003 - Seamless Tube	\$6.00	0.0114	0.0114	\$0.00	\$0.07	

## No Commodity Items Required for This Process



\...  
\Hose Branch Asm,Section 1 Asm  
\Connector Asm,Hose Branch Asm  
\Assemble Hose Crimp

### Process Summary

<b>Right First Time</b>	<b>99.92 %</b>
<b>Process Time (Sec)</b>	<b>41.90</b>
<b>Total Weight (kg)</b>	<b>0.00</b>
<b>Material Cost**</b>	<b>\$0.00</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.29</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.03</b>
<b>Manufacturing Cost*</b>	<b>\$0.33</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Hose Crimp



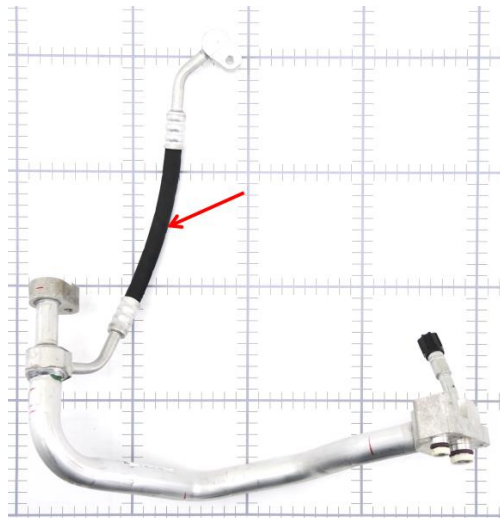
## Assemble Hose Crimp

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	41.90	1	1.00	24.59	CZE	\$0.29	99.92 %	\$0.01

## Assemble Hose Crimp

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# 14mm-OD Wrapped Hose, Hose Tube Asm



\...

\Hose Branch Asm,Section 1 Asm

\14mm-OD Wrapped Hose, Hose Tube Asm

\14mm-OD Wrapped Hose Process

## Process Summary

Right First Time	99.96 %
Process Time (Sec)	3.71
Total Weight (kg)	0.03

Material Cost**	\$0.16
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.07
Q Burden	\$0.01
SG&A	\$0.03
Manufacturing Cost*	\$0.26

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# 14mm-OD Wrapped Hose, Hose Tube Asm

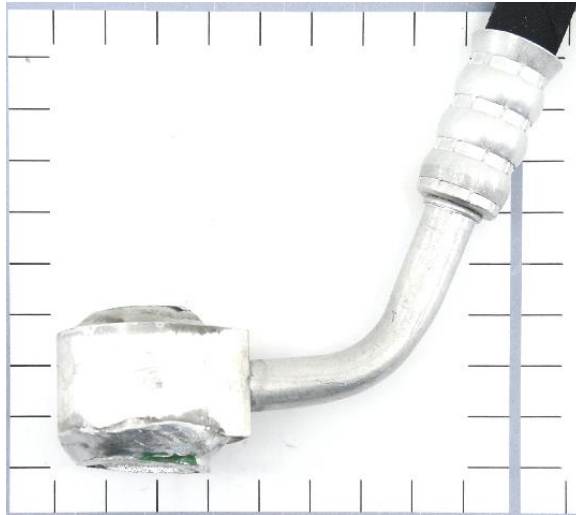
## 14mm-OD Wrapped Hose Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Extrusion:32mm 2 Layer&Reinf	3.71	1	0.50	67.84	CZE	\$0.07	99.96%	\$0.01

## 14mm-OD Wrapped Hose Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material,Inner Rubber Layer,14mm-OD Wrapped Hose	1	EPDM (Extrusion Grade)	\$4.43	0.0126	0.0126	\$0.00	\$0.06
Material,Reinforcement Layer,14mm-OD Wrapped Hose	1	PA Thread w/PVC Coating	By Area	0.0023	-	\$0.00	\$0.03
Material,Outer Rubber Layer,14mm-OD Wrapped Hose	1	EPDM (Extrusion Grade)	\$4.43	0.0109	0.0109	\$0.00	\$0.05
Material,Outer EPDM Covering,14mm-OD Wrapped Hose	1	EPDM Covering	By Area	0.0015	-	\$0.00	\$0.02

# Branch Connector Asm, Hose Branch Asm



\...

\Section 1 Asm,Line 1 Asm

\Hose Branch Asm,Section 1 Asm

\Branch Connector Asm,Hose Branch Asm

## Assembly Summary

Parts	3
Fasteners	0
Part Numbers	3
Steps	62
Fastenings	3
Right First Time	99.57 %
OEM Process Time (Min)	0.00
Supplier Process Time (Min)	2.46
Total Weight (kg)	0.05

Material Cost**	\$0.31
OEM Process Cost	\$0.00
Supplier Process Cost	\$1.00
Q Burden	\$0.07
SG&A	\$0.16
Manufacturing Cost*	\$1.53

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Branch Connector Asm,Hose Branch Asm



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## Branch Connector Asm,Hose Branch Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Connecting Tube	1	1	0	9	0	99.90 %	0.00	0.00	0.00	0.16	0.0098
Branch Connector Block,Hose Branch Asm	1	1	0	20	0	99.92 %	0.00	0.00	0.00	0.46	0.0251
Assemble Branch Connector	1	0	2	5	2	99.91 %	0.00	0.00	0.70	0.00	0.0000
Hose Crimp Fitting,Hose Asm	1	1	0	21	0	99.93 %	0.00	0.00	0.27	0.17	0.0114
Assemble Hose Crimp	1	0	1	4	1	99.92 %	0.00	0.00	0.70	0.00	0.0000

## Branch Connector Asm,Hose Branch Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Connecting Tube	\$0.00	\$0.05	\$0.00	\$0.00	\$0.00	\$0.05	\$0.02	\$0.01	\$0.13
Branch Connector Block,Hose Branch Asm	\$0.00	\$0.19	\$0.00	\$0.00	\$0.00	\$0.24	\$0.01	\$0.05	\$0.49
Assemble Branch Connector	\$0.00	\$0.00	\$0.00	\$0.00	\$0.29	\$0.00	\$0.01	\$0.03	\$0.33
Hose Crimp Fitting,Hose Asm	\$0.00	\$0.07	\$0.00	\$0.00	\$0.08	\$0.06	\$0.01	\$0.03	\$0.25
Assemble Hose Crimp	\$0.00	\$0.00	\$0.00	\$0.00	\$0.29	\$0.00	\$0.01	\$0.03	\$0.33



## Detailed Summary

<b>Parts</b>	<b>3</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>62</b>
<b>Fastenings</b>	<b>3</b>
<b>Right First Time</b>	<b>99.57%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>1.66</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.79</b>
<b>Total Weight (kg)</b>	<b>0.05</b>
<b>Purchased Part Cost</b>	<b>\$0.00</b>
<b>Material Cost</b>	<b>\$0.31</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.65</b>
<b>Supplier Fab. Cost</b>	<b>\$0.35</b>
<b>Q Burden</b>	<b>\$0.07</b>
<b>SG&amp;A</b>	<b>\$0.16</b>
<b>Manufacturing Cost*</b>	<b>\$1.53</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connecting Tube



\...

- \Branch Connector Asm,Hose Branch Asm
- \Connecting Tube
- \Connecting Tube Process

## Process Summary

<b>Right First Time</b>	<b>99.90 %</b>
<b>Process Time (Sec)</b>	<b>9.40</b>
<b>Total Weight (kg)</b>	<b>0.01</b>

<b>Material Cost**</b>	<b>\$0.05</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.05</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.01</b>
<b>Manufacturing Cost*</b>	<b>\$0.13</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connecting Tube

## Connecting Tube Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.94	CZE	\$0.02	99.99%	\$0.00
Tube Bending	4.40	1	0.25	26.08	CZE	\$0.03	99.91%	\$0.01

## Connecting Tube Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Connecting Tube	1	Aluminum 3003 - Clad Seamless Tube	\$5.00	0.0098	0.0098	\$0.00	\$0.05

# Branch Connector Block, Hose Branch Asm



\...

- \Branch Connector Asm, Hose Branch Asm
- \Branch Connector Block, Hose Branch Asm
- \Branch Connecting Block Process

## Process Summary

Right First Time	99.92 %
Process Time (Sec)	27.85
Total Weight (kg)	0.03
Material Cost**	\$0.19
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.24
Q Burden	\$0.01
SG&A	\$0.05
Manufacturing Cost*	\$0.49

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Branch Connector Block, Hose Branch Asm



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## Branch Connecting Block Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.94	CZE	\$0.02	99.99 %	\$0.00
Deburr	4.00	1	0.25	22.72	CZE	\$0.03	99.99 %	\$0.00
CNC Machine	16.10	1	0.25	38.73	CZE	\$0.17	99.97 %	\$0.00
Cut Off	2.69	1	0.25	16.76	CZE	\$0.01	99.98 %	\$0.00
2200 Ton Extrusion Press	0.07	1	4.00	523.11	CZE	\$0.01	99.99 %	\$0.00

## Branch Connecting Block Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Branch Connecting Block	1	Aluminum 6061 - Billet Stock	\$2.80	0.0251	0.0665	\$0.00	\$0.19

## No Commodity Items Required for This Process



\...  
 \Hose Branch Asm,Section 1 Asm  
 \Branch Connector Asm,Hose Branch Asm  
 \Assemble Branch Connector

### Process Summary

<b>Right First Time</b>	<b>99.91 %</b>
<b>Process Time (Sec)</b>	<b>41.90</b>
<b>Total Weight (kg)</b>	<b>0.00</b>
<b>Material Cost**</b>	<b>\$0.00</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.29</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.03</b>
<b>Manufacturing Cost*</b>	<b>\$0.33</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Branch Connector



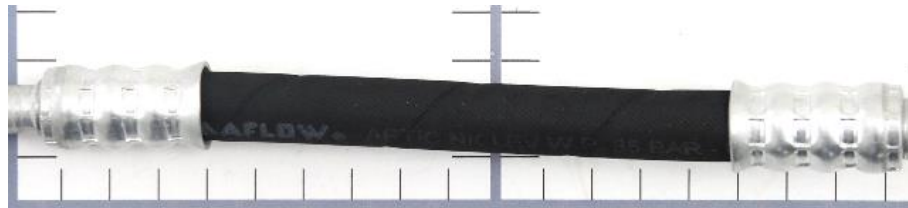
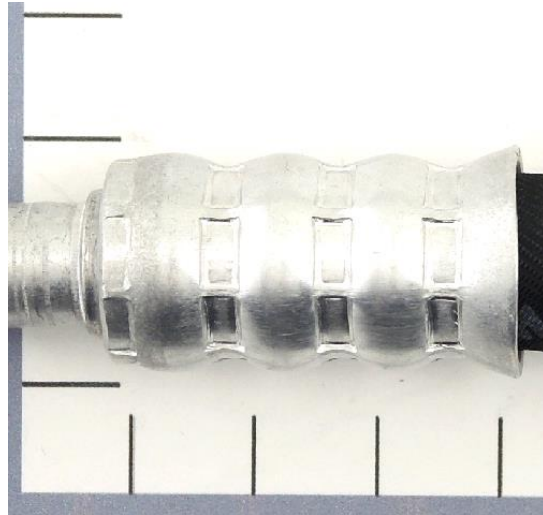
## Assemble Branch Connector

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
<a href="#">Supplier Manual Asm</a>	41.90	1	1.00	24.59	CZE	\$0.29	99.91 %	\$0.01

## Assemble Branch Connector

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Hose Crimp Fitting, Hose Asm



\...

\Branch Connector Asm,Hose Branch Asm

\Hose Crimp Fitting, Hose Asm

\Hose Crimp Fitting Process

## Process Summary

Right First Time	99.93 %
Process Time (Sec)	26.32
Total Weight (kg)	0.01

Material Cost**	\$0.07
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.14
Q Burden	\$0.01
SG&A	\$0.03
Manufacturing Cost*	\$0.25

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Hose Crimp Fitting, Hose Asm



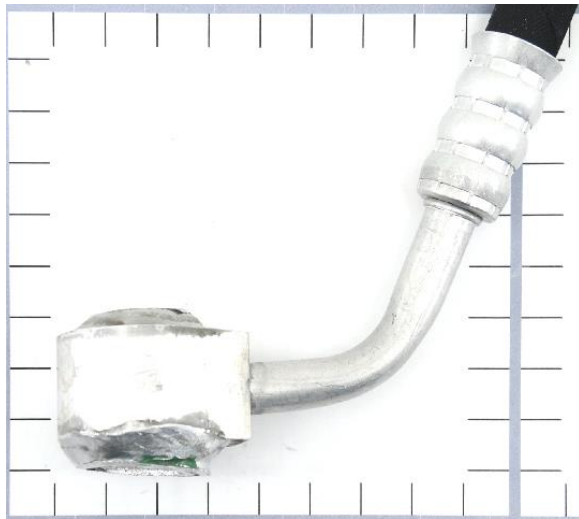
## Hose Crimp Fitting Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Automated Asm	16.00	1	0.25	17.86	CZE	\$0.08	99.98 %	\$0.00
Wash	5.00	1	0.25	21.76	CZE	\$0.03	99.99 %	\$0.00
Debur	3.00	1	0.25	22.72	CZE	\$0.02	99.99 %	\$0.00
Circular Saw	2.32	1	0.25	16.76	CZE	\$0.01	99.97 %	\$0.01

## Hose Crimp Fitting Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Refeferant Hose Crimp Fitting	1	Aluminum 3003 - Seamless Tube	\$6.00	0.0114	0.0114	\$0.00	\$0.07

## No Commodity Items Required for This Process



\...

\Hose Branch Asm,Section 1 Asm  
\Branch Connector Asm,Hose Branch Asm  
\Assemble Hose Crimp

### Process Summary

<b>Right First Time</b>	<b>99.92 %</b>
<b>Process Time (Sec)</b>	<b>41.90</b>
<b>Total Weight (kg)</b>	<b>0.00</b>

<b>Material Cost**</b>	<b>\$0.00</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.29</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.03</b>
<b>Manufacturing Cost*</b>	<b>\$0.33</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Hose Crimp



## Assemble Hose Crimp

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	41.90	1	1.00	24.59	CZE	\$0.29	99.92 %	\$0.01

## Assemble Hose Crimp

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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No Commodity Items  
Required for This  
Process



\...

\Section 1 Asm,Line 1 Asm

\Hose Branch Asm,Section 1 Asm

\Assemble Hose Branch

## Process Summary

Right First Time	99.79 %
Process Time (Sec)	22.00
Total Weight (kg)	0.00

Material Cost**	\$0.00
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.14
Q Burden	\$0.03
SG&A	\$0.02
Manufacturing Cost*	\$0.19

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Hose Branch



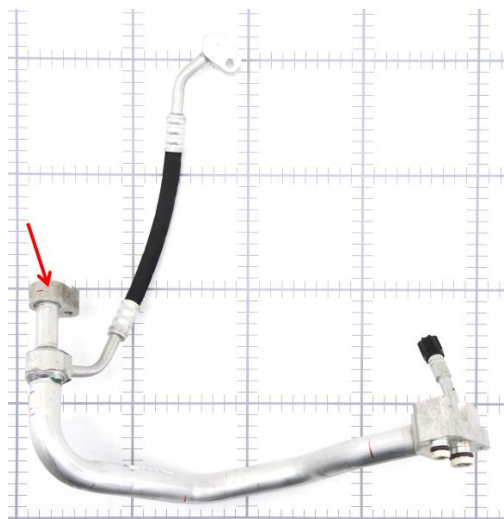
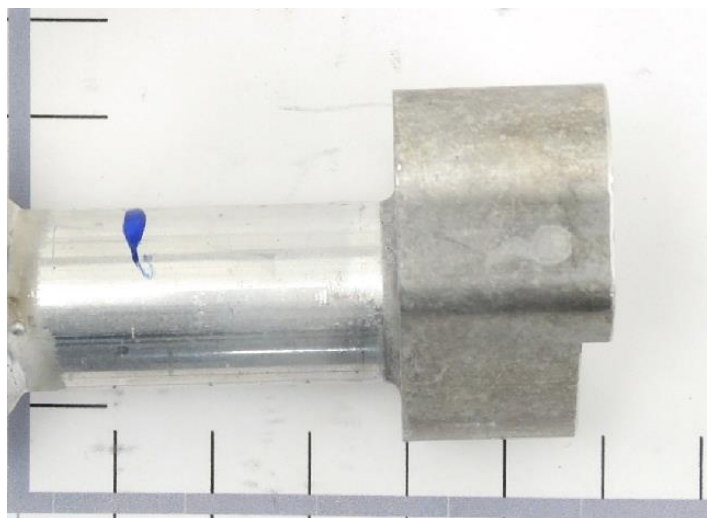
## Assemble Hose Branch

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Automated Asm	22.00	1	0.25	22.49	CZE	\$0.14	99.79%	\$0.03

## Assemble Hose Branch

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Connector Asm, Section 1 Asm



\...  
 \Line 1 Asm, Front Refrigerant Line Bundle Asm  
 \Section 1 Asm, Line 1 Asm  
 \Connector Asm, Section 1 Asm

## Assembly Summary

<b>Parts</b>	<b>2</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>2</b>
<b>Steps</b>	<b>36</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.74 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>2.13</b>
<b>Total Weight (kg)</b>	<b>0.05</b>

<b>Material Cost**</b>	<b>\$0.29</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$1.04</b>
<b>Q Burden</b>	<b>\$0.04</b>
<b>SG&amp;A</b>	<b>\$0.16</b>
<b>Manufacturing Cost*</b>	<b>\$1.53</b>

\* Excluding tooling, ER&D, logistics, and profit margin  
 \*\* Includes material cost and purchased parts cost

# Connector Asm, Section 1 Asm



## Connector Asm, Section 1 Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Connector Block, Connector Asm	1	1	0	30	0	99.89 %	0.00	0.00	0.00	0.97	0.0346
Assemble Connector	1	1	2	5	2	99.85 %	0.00	0.00	1.16	0.00	0.0114

## Connector Asm, Section 1 Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Connector Block, Connector Asm	\$0.00	\$0.25	\$0.00	\$0.00	\$0.00	\$0.56	\$0.02	\$0.10	\$0.93
Assemble Connector	\$0.04	\$0.00	\$0.00	\$0.00	\$0.48	\$0.00	\$0.02	\$0.06	\$0.60

## Detailed Summary

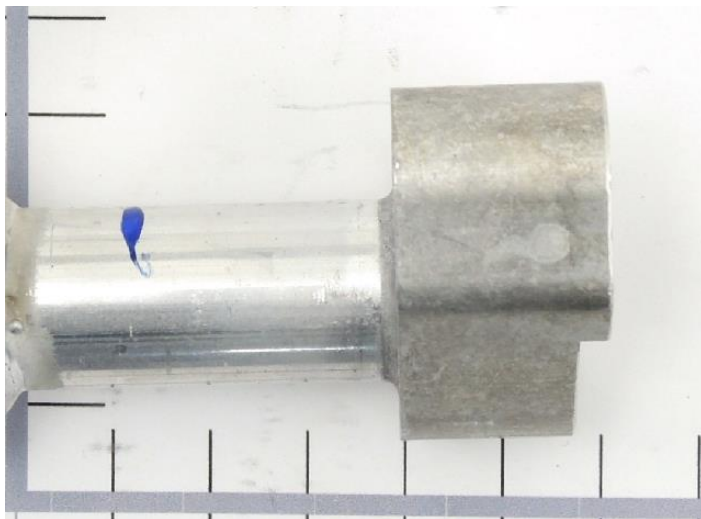
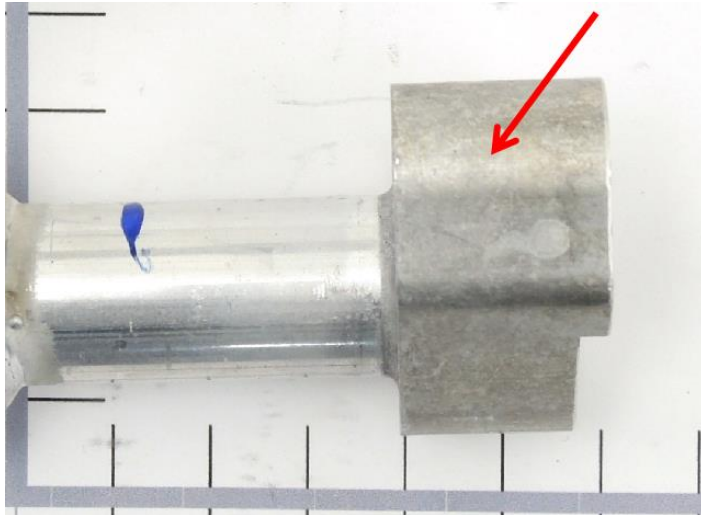
<b>Parts</b>	<b>2</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>2</b>
<b>Steps</b>	<b>36</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.74%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>1.16</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.97</b>
<b>Total Weight (kg)</b>	<b>0.05</b>
<b>Purchased Part Cost</b>	<b>\$0.04</b>
<b>Material Cost</b>	<b>\$0.25</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.48</b>
<b>Supplier Fab. Cost</b>	<b>\$0.56</b>
<b>Q Burden</b>	<b>\$0.04</b>
<b>SG&amp;A</b>	<b>\$0.16</b>
<b>Manufacturing Cost*</b>	<b>\$1.53</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Connector Block, Connector Asm



\...  
 \Connector Asm,Section 1 Asm  
 \Connector Block,Connector Asm  
 \Connector Block Process

## Process Summary

<b>Right First Time</b>	<b>99.89 %</b>
<b>Process Time (Sec)</b>	<b>58.04</b>
<b>Total Weight (kg)</b>	<b>0.03</b>

<b>Material Cost**</b>	<b>\$0.25</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.56</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.10</b>
<b>Manufacturing Cost*</b>	<b>\$0.93</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connector Block, Connector Asm



**MUNRO**  
& ASSOCIATES, INC.

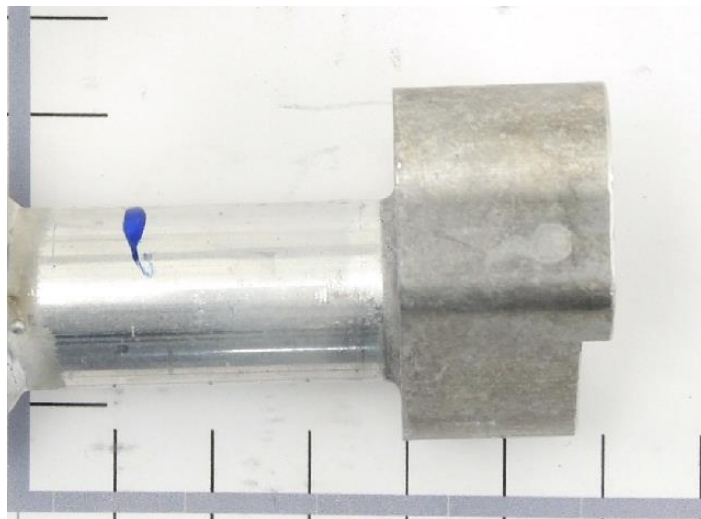
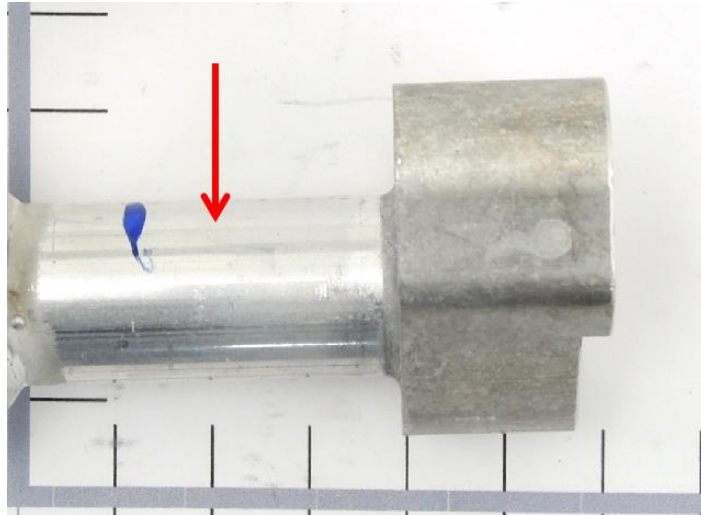
## Connector Block Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.94	CZE	\$0.02	99.99 %	\$0.00
Deburr	4.00	1	0.25	22.72	CZE	\$0.03	99.99 %	\$0.00
CNC Machine	46.37	1	0.25	38.73	CZE	\$0.50	99.95 %	\$0.01
Cut Off	2.59	1	0.25	16.76	CZE	\$0.01	99.98 %	\$0.00
2200 Ton Extrusion Press	0.08	1	4.00	523.11	CZE	\$0.01	99.99 %	\$0.00

## Connector Block Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Connector 2	1	Aluminum 6061 - Bar Stock	\$3.06	0.0346	0.0820	\$0.00	\$0.25

# Assemble Connector



\...  
 \Section 1 Asm,Line 1 Asm  
 \Connector Asm,Section 1 Asm  
 \Assemble Connector

## Process Summary

<b>Right First Time</b>	<b>99.85 %</b>
<b>Process Time (Sec)</b>	<b>69.60</b>
<b>Total Weight (kg)</b>	<b>0.01</b>
<b>Material Cost**</b>	<b>\$0.04</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.48</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.06</b>
<b>Manufacturing Cost*</b>	<b>\$0.60</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Connector



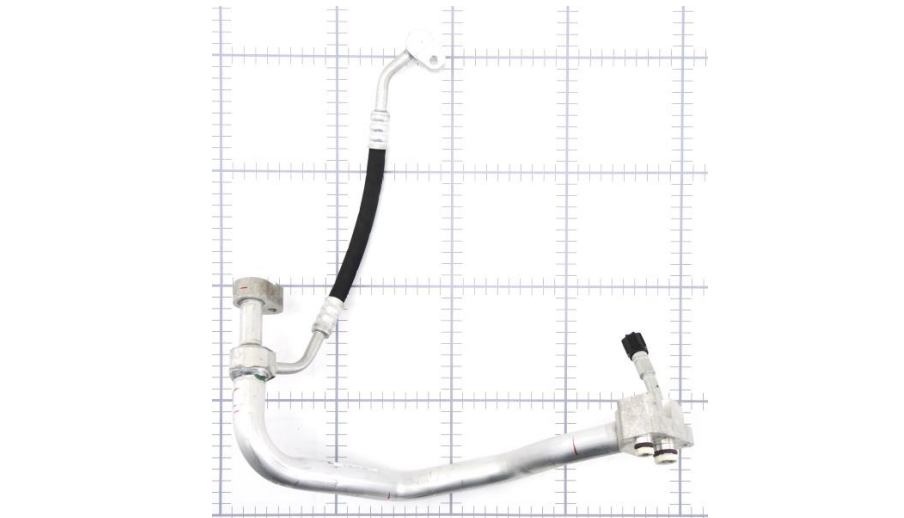
## Assemble Connector

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	69.60	1	1.00	24.59	CZE	\$0.48	99.85%	\$0.02

## Assemble Connector

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Connecting Tube,Connector Asm	1	Commodity Item	Purchased	0.0114	-	\$0.04	\$0.00

# Assemble Section 1



\...  
 \Line 1 Asm, Front Refrigerant Line Bundle Asm  
 \Section 1 Asm,Line 1 Asm  
 \Assemble Section 1

## Process Summary

<b>Right First Time</b>	<b>99.77 %</b>
<b>Process Time (Sec)</b>	<b>199.47</b>
<b>Total Weight (kg)</b>	<b>0.00</b>

<b>Material Cost**</b>	<b>\$0.10</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$1.25</b>
<b>Q Burden</b>	<b>\$0.03</b>
<b>SG&amp;A</b>	<b>\$0.15</b>
<b>Manufacturing Cost*</b>	<b>\$1.53</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Section 1



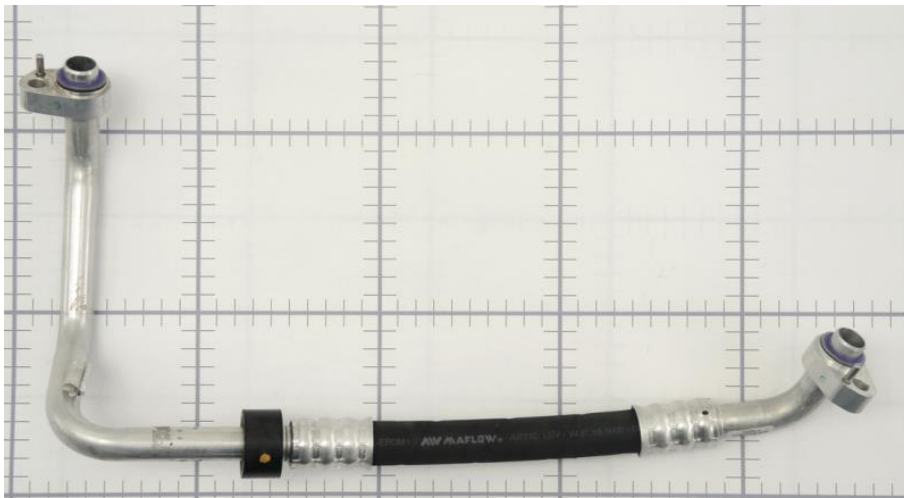
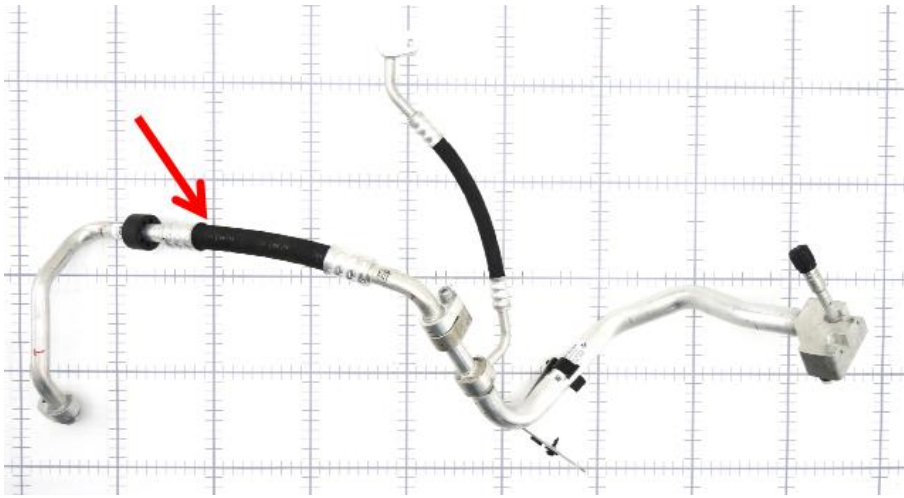
## Assemble Section 1

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Automated Asm	199.47	1	0.25	22.49	CZE	\$1.25	99.77%	\$0.03

## Assemble Section 1

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Label, Bar Code	1	Commodity Item	Purchased	0.0001	-	\$0.10	\$0.00

# Section 2 Asm, Line 1 Asm



- \...
- \Front Refrigerant Line Bundle Asm
- \Line 1 Asm, Front Refrigerant Line Bundle Asm
- \Section 2 Asm, Line 1 Asm

## Assembly Summary

<b>Parts</b>	<b>17</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>12</b>
<b>Steps</b>	<b>207</b>
<b>Fastenings</b>	<b>17</b>
<b>Right First Time</b>	<b>98.02 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>11.10</b>
<b>Total Weight (kg)</b>	<b>0.27</b>

<b>Material Cost**</b>	<b>\$1.76</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$4.80</b>
<b>Q Burden</b>	<b>\$0.30</b>
<b>SG&amp;A</b>	<b>\$0.79</b>
<b>Manufacturing Cost*</b>	<b>\$7.65</b>

\* Excluding tooling, ER&D, logistics, and profit margin  
 \*\* Includes material cost and purchased parts cost

# Section 2 Asm, Line 1 Asm



**Section 2 Asm, Line 1 Asm**

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Connector 2 Asm, Section 2 Asm	1	6	6	94	6	99.14 %	0.00	0.00	3.82	1.40	0.1157
23mm-OD Wrapped Hose, Section 2 Asm	1	4	0	4	0	99.96 %	0.00	0.00	0.00	0.07	0.0665
Connector 1 Asm, Section 2 Asm	1	6	6	94	6	99.22 %	0.00	0.00	3.81	1.36	0.0780
Isolator, Section 2 Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.01	0.0131
Assemble Hose Branch	1	0	5	10	5	99.70 %	0.00	0.00	0.63	0.00	0.0000

**Section 2 Asm, Line 1 Asm**

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Connector 2 Asm, Section 2 Asm	\$0.01	\$0.80	\$0.00	\$0.00	\$1.56	\$0.68	\$0.13	\$0.37	\$3.55
23mm-OD Wrapped Hose, Section 2 Asm	\$0.00	\$0.33	\$0.00	\$0.00	\$0.00	\$0.08	\$0.01	\$0.05	\$0.47
Connector 1 Asm, Section 2 Asm	\$0.01	\$0.55	\$0.00	\$0.00	\$1.55	\$0.67	\$0.12	\$0.33	\$3.23
Isolator, Section 2 Asm	\$0.00	\$0.06	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.01	\$0.07
Assemble Hose Branch	\$0.00	\$0.00	\$0.00	\$0.00	\$0.26	\$0.00	\$0.05	\$0.03	\$0.34



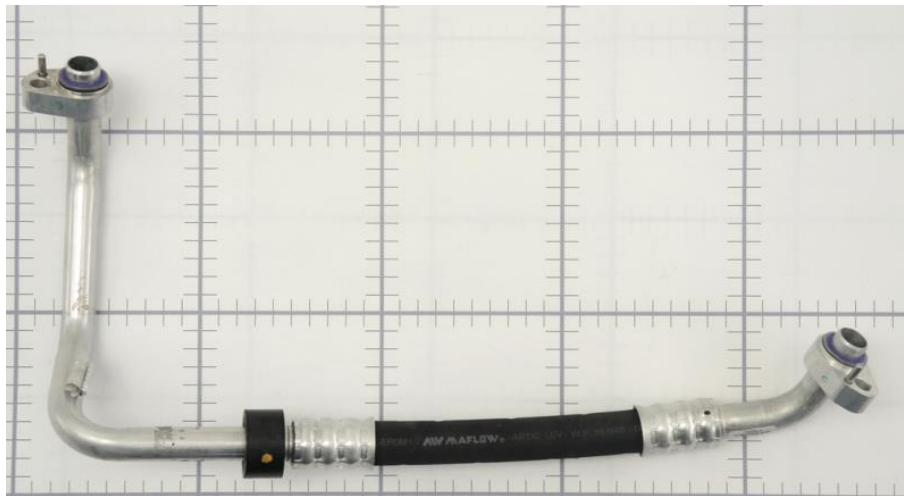
## Detailed Summary

<b>Parts</b>	<b>17</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>12</b>
<b>Steps</b>	<b>207</b>
<b>Fastenings</b>	<b>17</b>
<b>Right First Time</b>	<b>98.02%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>8.26</b>
<b>Supplier Fab. Time (Min)</b>	<b>2.84</b>
<b>Total Weight (kg)</b>	<b>0.27</b>
<b>Purchased Part Cost</b>	<b>\$0.02</b>
<b>Material Cost</b>	<b>\$1.74</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$3.37</b>
<b>Supplier Fab. Cost</b>	<b>\$1.43</b>
<b>Q Burden</b>	<b>\$0.30</b>
<b>SG&amp;A</b>	<b>\$0.79</b>
<b>Manufacturing Cost*</b>	<b>\$7.65</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connector 2 Asm, Section 2 Asm



\...

\Line 1 Asm, Front Refrigerant Line Bundle Asm

\Section 2 Asm, Line 1 Asm

\Connector 2 Asm, Section 2 Asm

## Assembly Summary

<b>Parts</b>	<b>6</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>6</b>
<b>Steps</b>	<b>94</b>
<b>Fastenings</b>	<b>6</b>
<b>Right First Time</b>	<b>99.14 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>5.23</b>
<b>Total Weight (kg)</b>	<b>0.12</b>

<b>Material Cost**</b>	<b>\$0.81</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$2.24</b>
<b>Q Burden</b>	<b>\$0.13</b>
<b>SG&amp;A</b>	<b>\$0.37</b>
<b>Manufacturing Cost*</b>	<b>\$3.55</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connector 2 Asm, Section 2 Asm



## Connector 2 Asm, Section 2 Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Connector Block Asm, Connector 2 Asm	1	2	1	38	1	99.77 %	0.00	0.00	0.27	0.86	0.0370
Connecting Tube, Connector 2 Asm	1	1	0	11	0	99.82 %	0.00	0.00	0.00	0.21	0.0525
Sealing Ring, Connector 1 Asm	1	2	0	8	0	99.96 %	0.00	0.00	0.00	0.16	0.0016
Assemble Connector 1	1	0	4	8	4	99.75 %	0.00	0.00	2.19	0.00	0.0000
Hose Crimp Fitting, Section 2 Asm	1	1	0	21	0	99.93 %	0.00	0.00	0.27	0.17	0.0230
Assemble Hose Crimp	1	0	1	4	1	99.92 %	0.00	0.00	1.10	0.00	0.0000

## Connector 2 Asm, Section 2 Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Connector Block Asm, Connector 2 Asm	\$0.01	\$0.31	\$0.00	\$0.00	\$0.11	\$0.50	\$0.03	\$0.11	\$1.07
Connecting Tube, Connector 2 Asm	\$0.00	\$0.32	\$0.00	\$0.00	\$0.00	\$0.07	\$0.03	\$0.05	\$0.47
Sealing Ring, Connector 1 Asm	\$0.00	\$0.03	\$0.00	\$0.00	\$0.00	\$0.05	\$0.01	\$0.01	\$0.09
Assemble Connector 1	\$0.00	\$0.00	\$0.00	\$0.00	\$0.91	\$0.00	\$0.04	\$0.11	\$1.05
Hose Crimp Fitting, Section 2 Asm	\$0.00	\$0.14	\$0.00	\$0.00	\$0.08	\$0.06	\$0.01	\$0.03	\$0.33
Assemble Hose Crimp	\$0.00	\$0.00	\$0.00	\$0.00	\$0.46	\$0.00	\$0.01	\$0.05	\$0.52

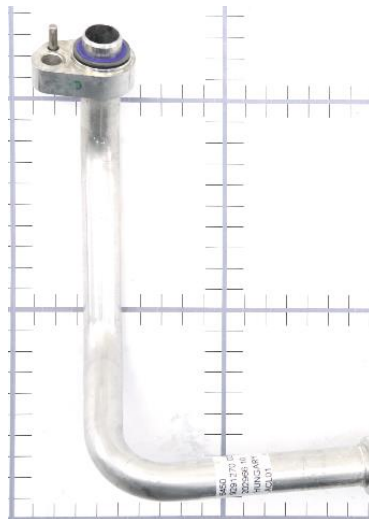
## Detailed Summary

<b>Parts</b>	<b>6</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>6</b>
<b>Steps</b>	<b>94</b>
<b>Fastenings</b>	<b>6</b>
<b>Right First Time</b>	<b>99.14%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>3.82</b>
<b>Supplier Fab. Time (Min)</b>	<b>1.40</b>
<b>Total Weight (kg)</b>	<b>0.12</b>
<b>Purchased Part Cost</b>	
	<b>\$0.01</b>
<b>Material Cost</b>	
	<b>\$0.80</b>
<b>OEM Asm. Cost</b>	
	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	
	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	
	<b>\$1.56</b>
<b>Supplier Fab. Cost</b>	
	<b>\$0.68</b>
<b>Q Burden</b>	
	<b>\$0.13</b>
<b>SG&amp;A</b>	
	<b>\$0.37</b>
<b>Manufacturing Cost*</b>	
	<b>\$3.55</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connector Block Asm, Connector 2 Asm



\...

\Section 2 Asm, Line 1 Asm

\Connector 2 Asm, Section 2 Asm

\Connector Block Asm, Connector 2 Asm

## Assembly Summary

<b>Parts</b>	<b>2</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>2</b>
<b>Steps</b>	<b>38</b>
<b>Fastenings</b>	<b>1</b>
<b>Right First Time</b>	<b>99.77 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>1.13</b>
<b>Total Weight (kg)</b>	<b>0.04</b>

<b>Material Cost**</b>	<b>\$0.32</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.61</b>
<b>Q Burden</b>	<b>\$0.03</b>
<b>SG&amp;A</b>	<b>\$0.11</b>
<b>Manufacturing Cost*</b>	<b>\$1.07</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connector Block Asm, Connector 2 Asm



## Connector Block Asm, Connector 2 Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Connecting Block, Connector 2 Asm	1	1	0	33	0	99.88 %	0.00	0.00	0.00	0.86	0.0363
Assemble Connector 1	1	1	1	4	1	99.89 %	0.00	0.00	0.27	0.00	0.0007

## Connector Block Asm, Connector 2 Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Connecting Block, Connector 2 Asm	\$0.00	\$0.31	\$0.00	\$0.00	\$0.00	\$0.50	\$0.02	\$0.10	\$0.92
Assemble Connector 1	\$0.01	\$0.00	\$0.00	\$0.00	\$0.11	\$0.00	\$0.02	\$0.01	\$0.15

## Detailed Summary

<b>Parts</b>	<b>2</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>2</b>
<b>Steps</b>	<b>38</b>
<b>Fastenings</b>	<b>1</b>
<b>Right First Time</b>	<b>99.77%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.27</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.86</b>
<b>Total Weight (kg)</b>	<b>0.04</b>
<hr/>	
<b>Purchased Part Cost</b>	<b>\$0.01</b>
<b>Material Cost</b>	<b>\$0.31</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.11</b>
<b>Supplier Fab. Cost</b>	<b>\$0.50</b>
<b>Q Burden</b>	<b>\$0.03</b>
<b>SG&amp;A</b>	<b>\$0.11</b>
<b>Manufacturing Cost*</b>	<b>\$1.07</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connecting Block, Connector 2 Asm



\...

\Connector Block Asm, Connector 2 Asm

\Connecting Block, Connector 2 Asm

\Connecting Block Process

## Process Summary

Right First Time	99.88 %
Process Time (Sec)	51.65
Total Weight (kg)	0.04

Material Cost**	\$0.31
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.50
Q Burden	\$0.02
SG&A	\$0.10
Manufacturing Cost*	\$0.92

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Connecting Block, Connector 2 Asm



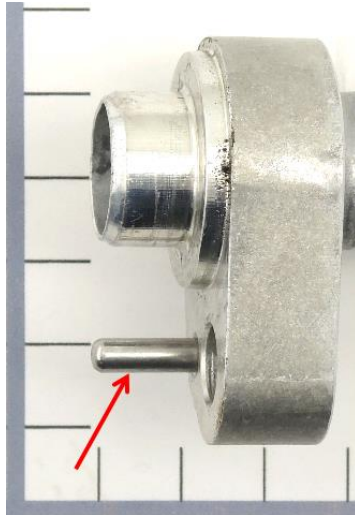
## Connecting Block Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.95	HUN	\$0.02	99.99 %	\$0.00
Deburr	4.00	1	0.25	22.62	HUN	\$0.03	99.99 %	\$0.00
CNC Machine	39.73	1	0.25	38.22	HUN	\$0.42	99.94 %	\$0.01
Cut Off	2.81	1	0.25	24.32	HUN	\$0.02	99.98 %	\$0.00
2200 Ton Extrusion Press	0.11	1	4.00	494.65	HUN	\$0.02	99.99 %	\$0.00

## Connecting Block Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Connecting Block	1	Aluminum 6061 - Billet Stock	\$2.80	0.0363	0.1107	\$0.00	\$0.31

# Assemble Connector 1



- \...
- \Connector 2 Asm, Section 2 Asm
- \Connector Block Asm, Connector 2 Asm
- \Assemble Connector 1

## Process Summary

<b>Right First Time</b>	<b>99.89 %</b>
<b>Process Time (Sec)</b>	<b>16.00</b>
<b>Total Weight (kg)</b>	<b>0.00</b>

<b>Material Cost**</b>	<b>\$0.01</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.11</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.01</b>
<b>Manufacturing Cost*</b>	<b>\$0.15</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Connector 1



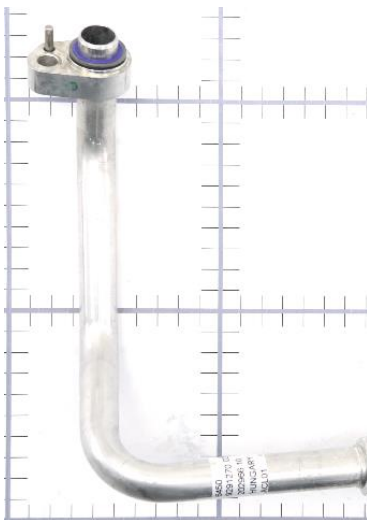
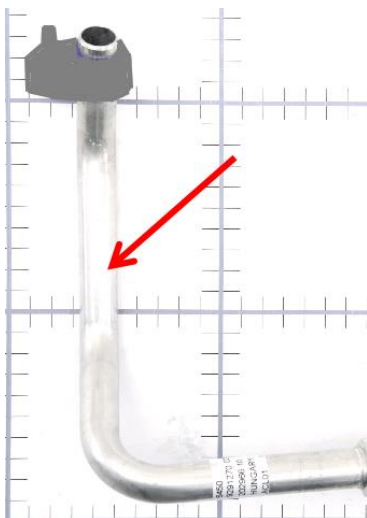
## Assemble Connector 1

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	16.00	1	1.00	24.91	HUN	\$0.11	99.89%	\$0.02

## Assemble Connector 1

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Guide Pin, Connector 2 Asm	1	Commodity Item	Purchased	0.0007	-	\$0.01	\$0.00

# Connecting Tube, Connector 2 Asm



\...  
 \Connector 2 Asm,Section 2 Asm  
 \Connecting Tube,Connector 2 Asm  
 \Connecting Tube Process

## Process Summary

<b>Right First Time</b>	<b>99.82 %</b>
<b>Process Time (Sec)</b>	<b>12.72</b>
<b>Total Weight (kg)</b>	<b>0.05</b>
<b>Material Cost**</b>	<b>\$0.32</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.07</b>
<b>Q Burden</b>	<b>\$0.03</b>
<b>SG&amp;A</b>	<b>\$0.05</b>
<b>Manufacturing Cost*</b>	<b>\$0.47</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connecting Tube, Connector 2 Asm



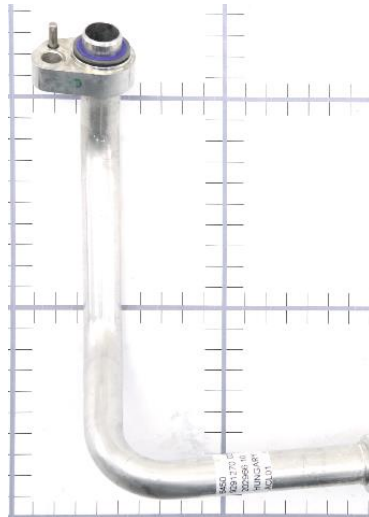
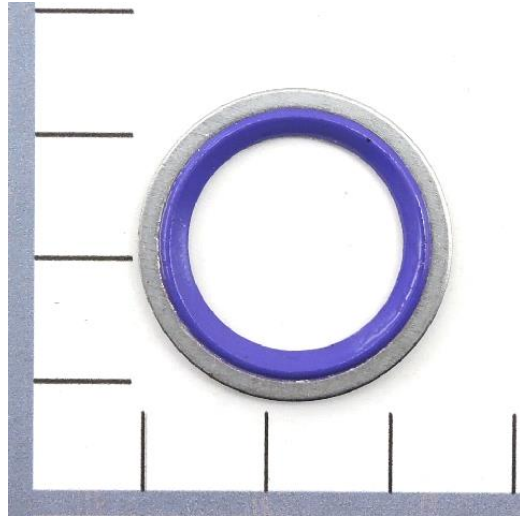
## Connecting Tube Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.95	HUN	\$0.02	99.99%	\$0.00
Tube Bending	7.72	1	0.25	26.59	HUN	\$0.06	99.83%	\$0.03

## Connecting Tube Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Connecting Tube	1	Aluminum 3003 - Seamless Tube	\$6.00	0.0525	0.0525	\$0.00	\$0.32

# Sealing Ring, Connector 1 Asm



\...  
\Connector 2 Asm, Section 2 Asm  
\Sealing Ring, Connector 1 Asm  
\Sealing Ring Process

## Process Summary

Right First Time	99.96 %
Process Time (Sec)	9.57
Total Weight (kg)	0.00

Material Cost**	\$0.03
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.05
Q Burden	\$0.01
SG&A	\$0.01
Manufacturing Cost*	\$0.09

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Sealing Ring, Connector 1 Asm



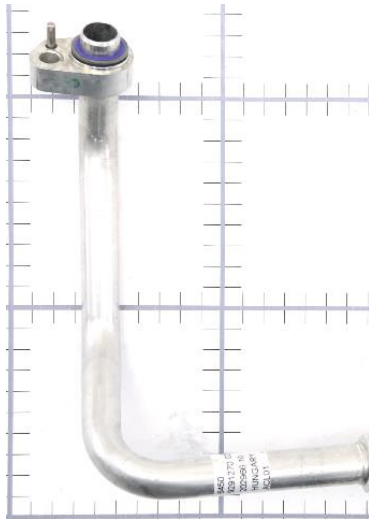
## Sealing Ring Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
55 Ton Injection Molding Press	31.76	8	0.25	23.26	HUN	\$0.03	99.99%	\$0.00
Wash	3.50	1	0.25	11.95	HUN	\$0.01	99.99%	\$0.00
Deburr	1.50	1	0.25	22.62	HUN	\$0.01	99.99%	\$0.00
25 Ton Stamping Press	0.60	1	0.25	14.05	HUN	\$0.00	99.99%	\$0.00

## Sealing Ring Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, O-Ring Seal	1	EPDM	\$4.04	0.0006	0.0006	\$0.00	\$0.01
Material, Outer Ring	1	Steel 1018 - Coil Stock	\$1.21	0.0010	0.0140	\$0.00	\$0.02

## No Commodity Items Required for This Process



\...  
 \Section 2 Asm,Line 1 Asm  
 \Connector 2 Asm,Section 2 Asm  
 \Assemble Connector 1

### Process Summary

<b>Right First Time</b>	<b>99.75 %</b>
<b>Process Time (Sec)</b>	<b>131.21</b>
<b>Total Weight (kg)</b>	<b>0.00</b>
<b>Material Cost**</b>	<b>\$0.00</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.91</b>
<b>Q Burden</b>	<b>\$0.04</b>
<b>SG&amp;A</b>	<b>\$0.11</b>
<b>Manufacturing Cost*</b>	<b>\$1.05</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Assemble Connector 1



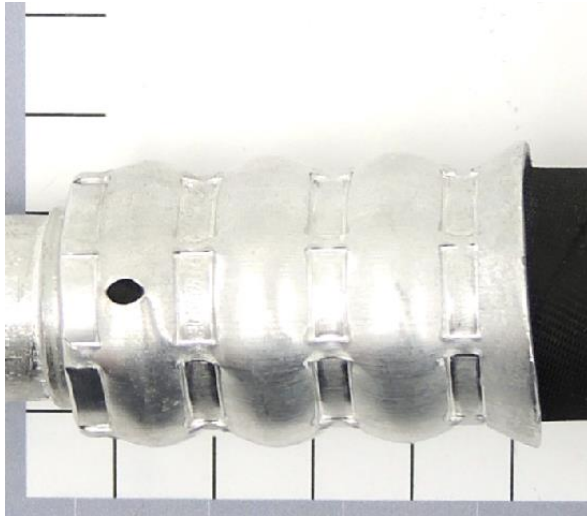
## Assemble Connector 1

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	131.21	1	1.00	24.91	HUN	\$0.91	99.75%	\$0.04

## Assemble Connector 1

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Hose Crimp Fitting, Section 2 Asm



\...

\Connector 2 Asm, Section 2 Asm

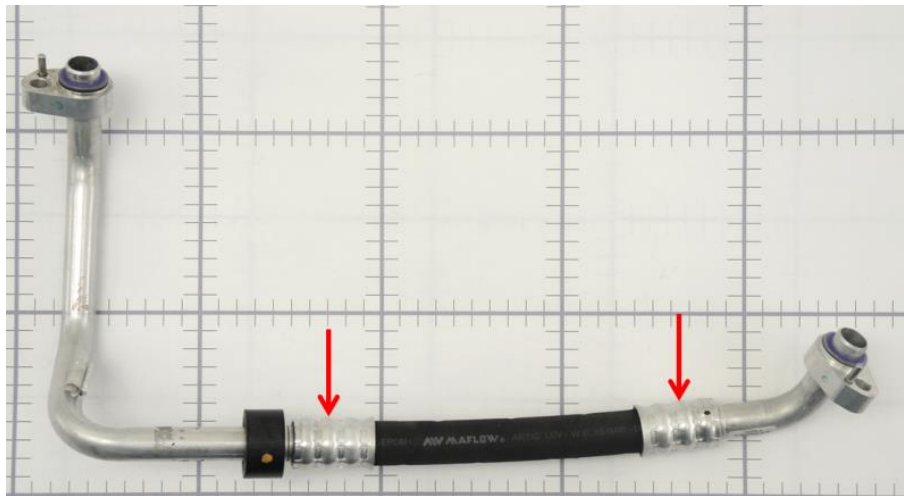
\Hose Crimp Fitting, Section 2 Asm

\Hose Crimp Fitting Process

## Process Summary

Right First Time	99.93 %
Process Time (Sec)	26.32
Total Weight (kg)	0.02

Material Cost**	\$0.14
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.15
Q Burden	\$0.01
SG&A	\$0.03
Manufacturing Cost*	\$0.33



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Hose Crimp Fitting, Section 2 Asm



Hose Crimp Fitting Process									
Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden	
Supplier Automated Asm	16.00	1	0.25	18.11	HUN	\$0.08	99.98 %	\$0.00	
Wash	5.00	1	0.25	21.64	HUN	\$0.03	99.99 %	\$0.00	
Debur	3.00	1	0.25	22.62	HUN	\$0.02	99.99 %	\$0.00	
Circular Saw	2.32	1	0.25	24.32	HUN	\$0.02	99.97 %	\$0.01	

Hose Crimp Fitting Process								
Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost	
Material, Hose Crimp Fitting	1	Aluminum 3003 - Seamless Tube	\$6.00	0.0230	0.0230	\$0.00	\$0.14	

## No Commodity Items Required for This Process



\...

\Section 2 Asm,Line 1 Asm

\Connector 2 Asm,Section 2 Asm

\Assemble Hose Crimp

### Process Summary

<b>Right First Time</b>	<b>99.92 %</b>
<b>Process Time (Sec)</b>	<b>66.10</b>
<b>Total Weight (kg)</b>	<b>0.00</b>
<b>Material Cost**</b>	<b>\$0.00</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.46</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.05</b>
<b>Manufacturing Cost*</b>	<b>\$0.52</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Hose Crimp



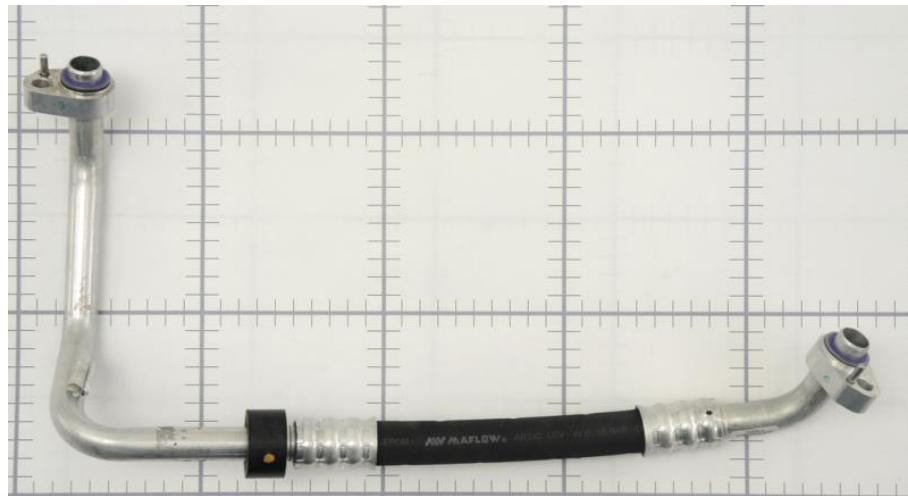
## Assemble Hose Crimp

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	66.10	1	1.00	24.91	HUN	\$0.46	99.92%	\$0.01

## Assemble Hose Crimp

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# 23mm-OD Wrapped Hose, Section 2 Asm



\...

\Section 2 Asm,Line 1 Asm

\23mm-OD Wrapped Hose, Section 2 Asm

\23mm-OD Wrapped Hose Process

## Process Summary

Right First Time	99.96 %
Process Time (Sec)	4.23
Total Weight (kg)	0.07

Material Cost**	\$0.33
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.08
Q Burden	\$0.01
SG&A	\$0.05
Manufacturing Cost*	\$0.47

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# 23mm-OD Wrapped Hose, Section 2 Asm

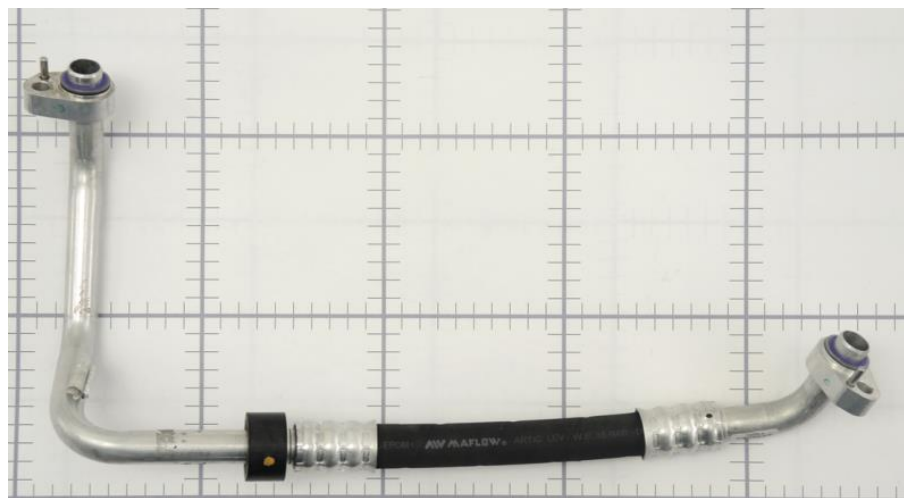
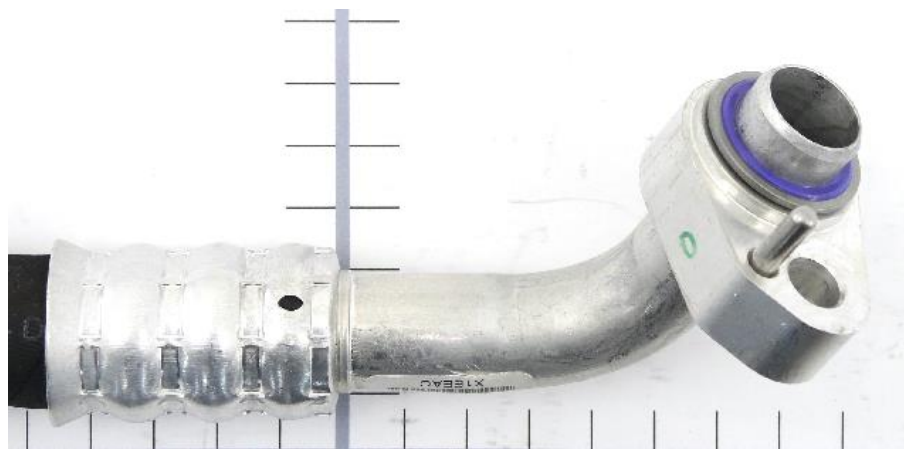
## 23mm-OD Wrapped Hose Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Extrusion:32mm 2 Layer & Reinf	4.23	1	0.50	67.99	HUN	\$0.08	99.96%	\$0.01

## 23mm-OD Wrapped Hose Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material,Inner Rubber Layer,23mm-OD Wrapped Hose	1	EPDM (Extrusion Grade)	\$4.43	0.0293	0.0293	\$0.00	\$0.13
Material,Reinforcement Layer,23mm-OD Wrapped Hose	1	PA Thread w/PVC Coating	By Area	0.0054	-	\$0.00	\$0.06
Material,Outer Rubber Layer,23mm-OD Wrapped Hose	1	EPDM (Extrusion Grade)	\$4.43	0.0234	0.0234	\$0.00	\$0.10
Material,Outer EPDM Covering,23mm-OD Wrapped Hose	1	EPDM Covering	By Area	0.0084	-	\$0.00	\$0.04

# Connector 1 Asm, Section 2 Asm



\...

\Line 1 Asm, Front Refrigerant Line Bundle Asm

\Section 2 Asm, Line 1 Asm

\Connector 1 Asm, Section 2 Asm

## Assembly Summary

<b>Parts</b>	<b>6</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>6</b>
<b>Steps</b>	<b>94</b>
<b>Fastenings</b>	<b>6</b>
<b>Right First Time</b>	<b>99.22 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>5.17</b>
<b>Total Weight (kg)</b>	<b>0.08</b>

<b>Material Cost**</b>	<b>\$0.56</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$2.22</b>
<b>Q Burden</b>	<b>\$0.12</b>
<b>SG&amp;A</b>	<b>\$0.33</b>
<b>Manufacturing Cost*</b>	<b>\$3.23</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Connector 1 Asm, Section 2 Asm



## Connector 1 Asm, Section 2 Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Connector Block Asm, Connector 1 Asm	1	2	1	38	1	99.77 %	0.00	0.00	0.25	0.86	0.0370
Connecting Tube, Connector 1 Asm	1	1	0	9	0	99.90 %	0.00	0.00	0.00	0.16	0.0148
Sealing Ring, Connector 1 Asm	1	2	0	10	0	99.96 %	0.00	0.00	0.00	0.17	0.0016
Assemble Connector 1	1	0	4	8	4	99.75 %	0.00	0.00	2.19	0.00	0.0000
Hose Crimp Fitting, Section 2 Asm	1	1	0	21	0	99.93 %	0.00	0.00	0.27	0.17	0.0230
Assemble Hose Crimp	1	0	1	4	1	99.92 %	0.00	0.00	1.10	0.00	0.0000

## Connector 1 Asm, Section 2 Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Connector Block Asm, Connector 1 Asm	\$0.01	\$0.31	\$0.00	\$0.00	\$0.10	\$0.50	\$0.03	\$0.11	\$1.07
Connecting Tube, Connector 1 Asm	\$0.00	\$0.07	\$0.00	\$0.00	\$0.00	\$0.05	\$0.02	\$0.01	\$0.15
Sealing Ring, Connector 1 Asm	\$0.00	\$0.03	\$0.00	\$0.00	\$0.00	\$0.05	\$0.01	\$0.01	\$0.10
Assemble Connector 1	\$0.00	\$0.00	\$0.00	\$0.00	\$0.91	\$0.00	\$0.04	\$0.11	\$1.05
Hose Crimp Fitting, Section 2 Asm	\$0.00	\$0.14	\$0.00	\$0.00	\$0.08	\$0.06	\$0.01	\$0.03	\$0.33
Assemble Hose Crimp	\$0.00	\$0.00	\$0.00	\$0.00	\$0.46	\$0.00	\$0.01	\$0.05	\$0.52

## Detailed Summary

<b>Parts</b>	<b>6</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>6</b>
<b>Steps</b>	<b>94</b>
<b>Fastenings</b>	<b>6</b>
<b>Right First Time</b>	<b>99.22%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>3.81</b>
<b>Supplier Fab. Time (Min)</b>	<b>1.36</b>
<b>Total Weight (kg)</b>	<b>0.08</b>
<b>Purchased Part Cost</b>	
	<b>\$0.01</b>
<b>Material Cost</b>	
	<b>\$0.55</b>
<b>OEM Asm. Cost</b>	
	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	
	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	
	<b>\$1.55</b>
<b>Supplier Fab. Cost</b>	
	<b>\$0.67</b>
<b>Q Burden</b>	
	<b>\$0.12</b>
<b>SG&amp;A</b>	
	<b>\$0.33</b>
<b>Manufacturing Cost*</b>	
	<b>\$3.23</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connector Block Asm, Connector 1 Asm



\...  
 \Section 2 Asm, Line 1 Asm  
 \Connector 1 Asm, Section 2 Asm  
 \Connector Block Asm, Connector 1 Asm

## Assembly Summary

<b>Parts</b>	<b>2</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>2</b>
<b>Steps</b>	<b>38</b>
<b>Fastenings</b>	<b>1</b>
<b>Right First Time</b>	<b>99.77 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>1.11</b>
<b>Total Weight (kg)</b>	<b>0.04</b>

<b>Material Cost**</b>	<b>\$0.32</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.60</b>
<b>Q Burden</b>	<b>\$0.03</b>
<b>SG&amp;A</b>	<b>\$0.11</b>
<b>Manufacturing Cost*</b>	<b>\$1.07</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Connector Block Asm, Connector 1 Asm



## Connector Block Asm, Connector 1 Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Connecting Block, Connector 1 Asm	1	1	0	33	0	99.88 %	0.00	0.00	0.00	0.86	0.0363
Assemble Connector 1	1	1	1	4	1	99.89 %	0.00	0.00	0.25	0.00	0.0007

## Connector Block Asm, Connector 1 Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Connecting Block, Connector 1 Asm	\$0.00	\$0.31	\$0.00	\$0.00	\$0.00	\$0.50	\$0.02	\$0.10	\$0.92
Assemble Connector 1	\$0.01	\$0.00	\$0.00	\$0.00	\$0.10	\$0.00	\$0.02	\$0.01	\$0.14

## Detailed Summary

<b>Parts</b>	<b>2</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>2</b>
<b>Steps</b>	<b>38</b>
<b>Fastenings</b>	<b>1</b>
<b>Right First Time</b>	<b>99.77%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.25</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.86</b>
<b>Total Weight (kg)</b>	<b>0.04</b>
<b>Purchased Part Cost</b>	<b>\$0.01</b>
<b>Material Cost</b>	<b>\$0.31</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.10</b>
<b>Supplier Fab. Cost</b>	<b>\$0.50</b>
<b>Q Burden</b>	<b>\$0.03</b>
<b>SG&amp;A</b>	<b>\$0.11</b>
<b>Manufacturing Cost*</b>	<b>\$1.07</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connecting Block, Connector 1 Asm



\...

\Connector Block Asm, Connector 1 Asm

\Connecting Block, Connector 1 Asm

\Connecting Block Process

## Process Summary

<b>Right First Time</b>	<b>99.88 %</b>
<b>Process Time (Sec)</b>	<b>51.65</b>
<b>Total Weight (kg)</b>	<b>0.04</b>

<b>Material Cost**</b>	<b>\$0.31</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.50</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.10</b>
<b>Manufacturing Cost*</b>	<b>\$0.92</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connecting Block, Connector 1 Asm



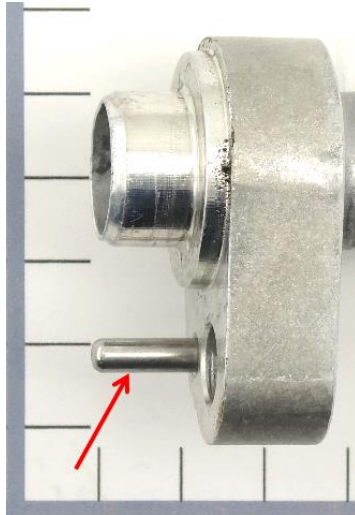
## Connecting Block Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.95	HUN	\$0.02	99.99 %	\$0.00
Deburr	4.00	1	0.25	22.62	HUN	\$0.03	99.99 %	\$0.00
CNC Machine	39.73	1	0.25	38.22	HUN	\$0.42	99.94 %	\$0.01
Cut Off	2.81	1	0.25	24.32	HUN	\$0.02	99.98 %	\$0.00
2200 Ton Extrusion Press	0.11	1	4.00	494.65	HUN	\$0.02	99.99 %	\$0.00

## Connecting Block Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Connecting Block	1	Aluminum 6061 - Billet Stock	\$2.80	0.0363	0.1107	\$0.00	\$0.31

# Assemble Connector 1



- \...
- \Connector 1 Asm, Section 2 Asm
- \Connector Block Asm, Connector 1 Asm
- \Assemble Connector 1

## Process Summary

<b>Right First Time</b>	<b>99.89 %</b>
<b>Process Time (Sec)</b>	<b>15.00</b>
<b>Total Weight (kg)</b>	<b>0.00</b>

<b>Material Cost**</b>	<b>\$0.01</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.10</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.01</b>
<b>Manufacturing Cost*</b>	<b>\$0.14</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Assemble Connector 1

## Assemble Connector 1

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	15.00	1	1.00	24.91	HUN	\$0.10	99.89%	\$0.02

## Assemble Connector 1

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Guide Pin, Connector 1 Asm	1	Commodity Item	Purchased	0.0007	-	\$0.01	\$0.00

# Connecting Tube, Connector 1 Asm



\...  
\Connector 1 Asm, Section 2 Asm  
\Connecting Tube, Connector 1 Asm  
\Connecting Tube Process

## Process Summary

Right First Time	99.90 %
Process Time (Sec)	9.72
Total Weight (kg)	0.01
Material Cost**	\$0.07
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.05
Q Burden	\$0.02
SG&A	\$0.01
Manufacturing Cost*	\$0.15

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connecting Tube, Connector 1 Asm



## Connecting Tube Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.95	HUN	\$0.02	99.99%	\$0.00
Tube Bending	4.72	1	0.25	26.59	HUN	\$0.03	99.91%	\$0.01

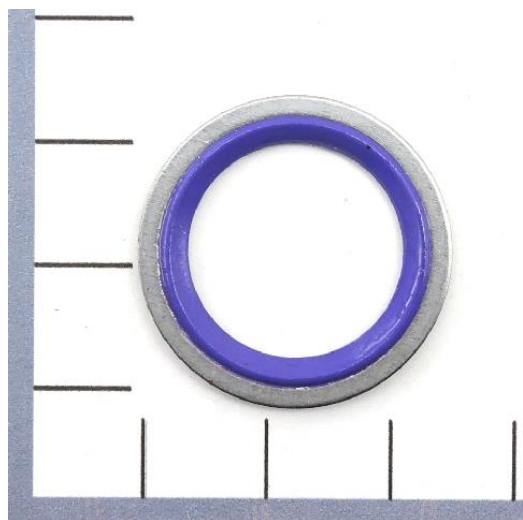
## Connecting Tube Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Connecting Tube	1	Aluminum 3003 - Clad Seamless Tube	\$5.00	0.0148	0.0148	\$0.00	\$0.07

# Sealing Ring, Connector 1 Asm



**MUNRO**  
& ASSOCIATES, INC.



\...

\Connector 1 Asm, Section 2 Asm

\Sealing Ring, Connector 1 Asm

\Sealing Ring Process

## Process Summary

Right First Time	99.96 %
Process Time (Sec)	10.07
Total Weight (kg)	0.00

Material Cost**	\$0.03
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.05
Q Burden	\$0.01
SG&A	\$0.01
Manufacturing Cost*	\$0.10



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Sealing Ring, Connector 1 Asm



## Sealing Ring Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
55 Ton Injection Molding Press	35.76	8	0.25	23.26	HUN	\$0.03	99.99%	\$0.00
Wash	3.50	1	0.25	11.95	HUN	\$0.01	99.99%	\$0.00
Deburr	1.50	1	0.25	22.62	HUN	\$0.01	99.99%	\$0.00
25 Ton Stamping Press	0.60	1	0.25	14.05	HUN	\$0.00	99.99%	\$0.00

## Sealing Ring Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, O-Ring Seal	1	EPDM	\$4.04	0.0006	0.0006	\$0.00	\$0.01
Material, Outer Ring	1	Steel 1018 - Coil Stock	\$1.21	0.0010	0.0140	\$0.00	\$0.02

No Commodity Items  
Required for This  
Process



\...  
\Section 2 Asm,Line 1 Asm  
\Connector 1 Asm,Section 2 Asm  
\Assemble Connector 1

## Process Summary

Right First Time	99.75 %
Process Time (Sec)	131.21
Total Weight (kg)	0.00
Material Cost**	\$0.00
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.91
Q Burden	\$0.04
SG&A	\$0.11
Manufacturing Cost*	\$1.05

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Connector 1



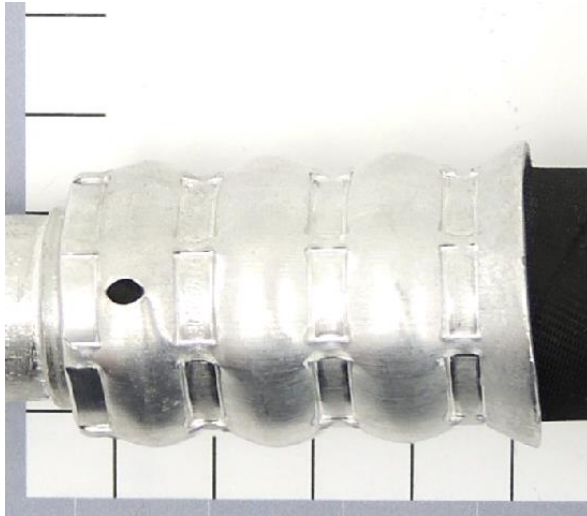
## Assemble Connector 1

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	131.21	1	1.00	24.91	HUN	\$0.91	99.75%	\$0.04

## Assemble Connector 1

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Hose Crimp Fitting, Section 2 Asm



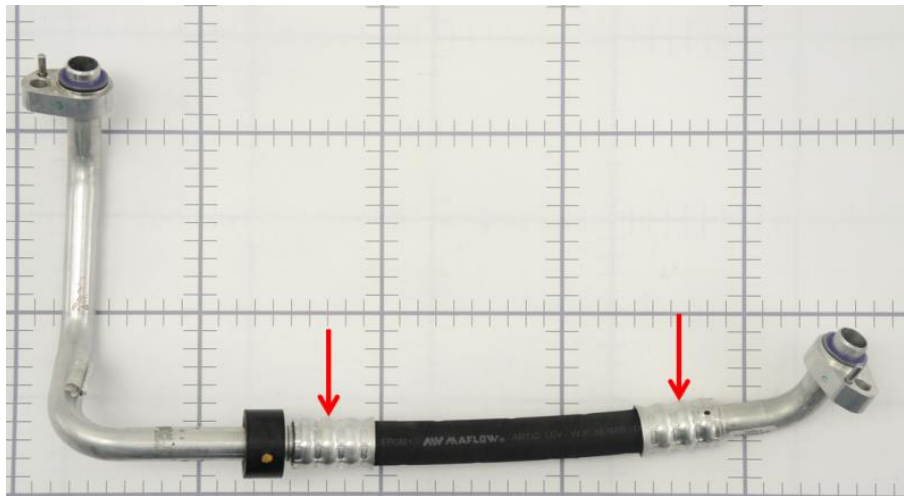
\...

- \Connector 1 Asm, Section 2 Asm
- \Hose Crimp Fitting, Section 2 Asm
- \Hose Crimp Fitting Process

## Process Summary

Right First Time	99.93 %
Process Time (Sec)	26.32
Total Weight (kg)	0.02

Material Cost**	\$0.14
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.15
Q Burden	\$0.01
SG&A	\$0.03
Manufacturing Cost*	\$0.33



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



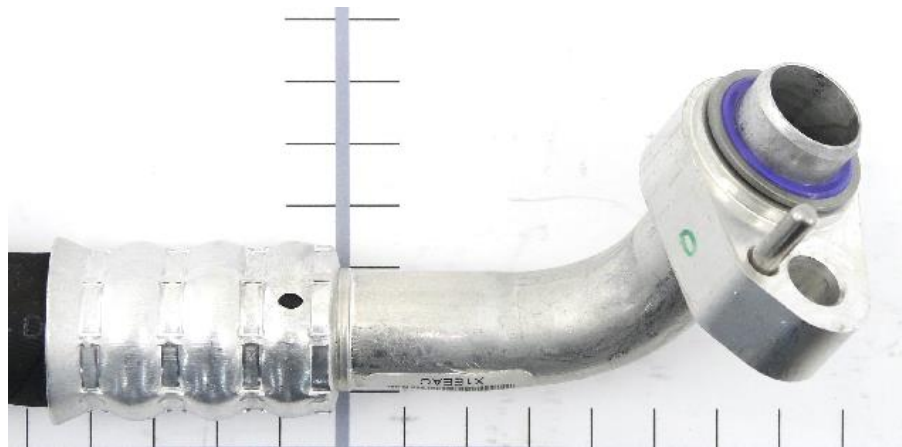
# Hose Crimp Fitting, Section 2 Asm



Hose Crimp Fitting Process									
Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden	
Supplier Automated Asm	16.00	1	0.25	18.11	HUN	\$0.08	99.98 %	\$0.00	
Wash	5.00	1	0.25	21.64	HUN	\$0.03	99.99 %	\$0.00	
Debur	3.00	1	0.25	22.62	HUN	\$0.02	99.99 %	\$0.00	
Circular Saw	2.32	1	0.25	24.32	HUN	\$0.02	99.97 %	\$0.01	

Hose Crimp Fitting Process								
Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost	
Material, Hose Crimp Fitting	1	Aluminum 3003 - Seamless Tube	\$6.00	0.0230	0.0230	\$0.00	\$0.14	

## No Commodity Items Required for This Process



\...

\Section 2 Asm,Line 1 Asm

\Connector 1 Asm,Section 2 Asm

\Assemble Hose Crimp

### Process Summary

Right First Time	99.92 %
Process Time (Sec)	66.10
Total Weight (kg)	0.00
Material Cost**	\$0.00
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.46
Q Burden	\$0.01
SG&A	\$0.05
Manufacturing Cost*	\$0.52

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Hose Crimp



## Assemble Hose Crimp

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	66.10	1	1.00	24.91	HUN	\$0.46	99.92%	\$0.01

## Assemble Hose Crimp

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Isolator, Section 2 Asm

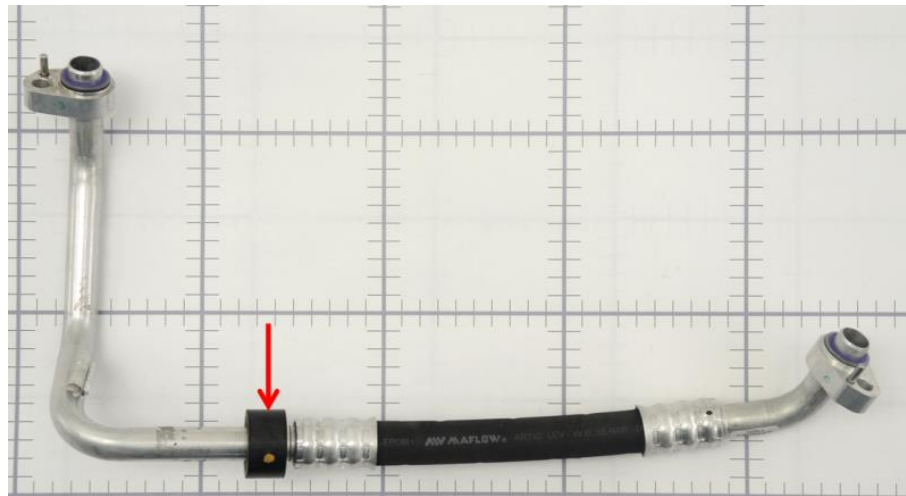


\...  
\Section 2 Asm, Line 1 Asm  
\Isolator, Section 2 Asm  
\Isolator Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	0.31
Total Weight (kg)	0.01

Material Cost**	\$0.06
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.00
Q Burden	\$0.00
SG&A	\$0.01
Manufacturing Cost*	\$0.07



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Isolator, Section 2 Asm

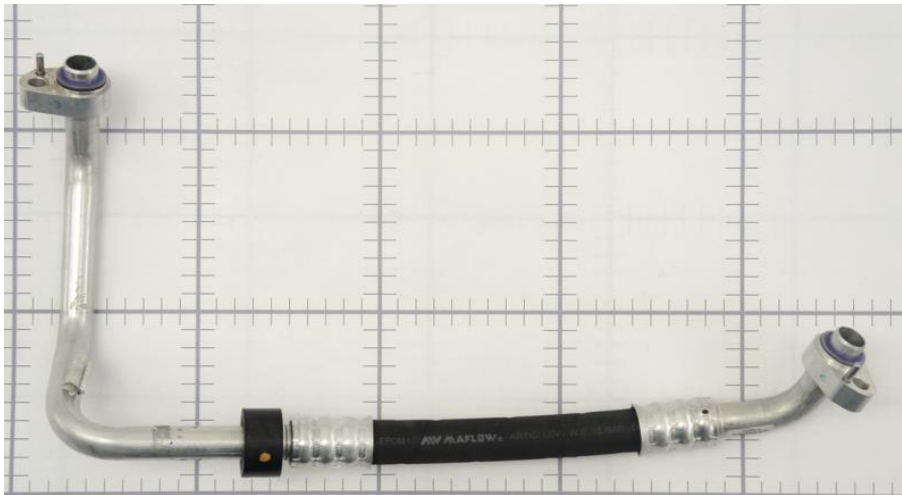
## Isolator Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Extrude: 32mm, 1 Layer	0.31	1	0.50	31.32	HUN	\$0.00	99.99%	\$0.00

## Isolator Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Isolator	1	EPDM (Extrusion Grade)	\$4.43	0.0131	0.0131	\$0.00	\$0.06

## No Commodity Items Required for This Process



\...

\Line 1 Asm, Front Refrigerant Line Bundle Asm  
\Section 2 Asm, Line 1 Asm  
\Assemble Hose Branch

### Process Summary

Right First Time	99.70 %
Process Time (Sec)	38.00
Total Weight (kg)	0.00
Material Cost**	\$0.00
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.26
Q Burden	\$0.05
SG&A	\$0.03
Manufacturing Cost*	\$0.34

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Hose Branch



## Assemble Hose Branch

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	38.00	1	1.00	24.91	HUN	\$0.26	99.70%	\$0.05

## Assemble Hose Branch

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# L Bracket Asm, Line 1 Asm



\...

- \Front Refrigerant Line Bundle Asm
- \Line 1 Asm, Front Refrigerant Line Bundle Asm
- \L Bracket Asm, Line 1 Asm

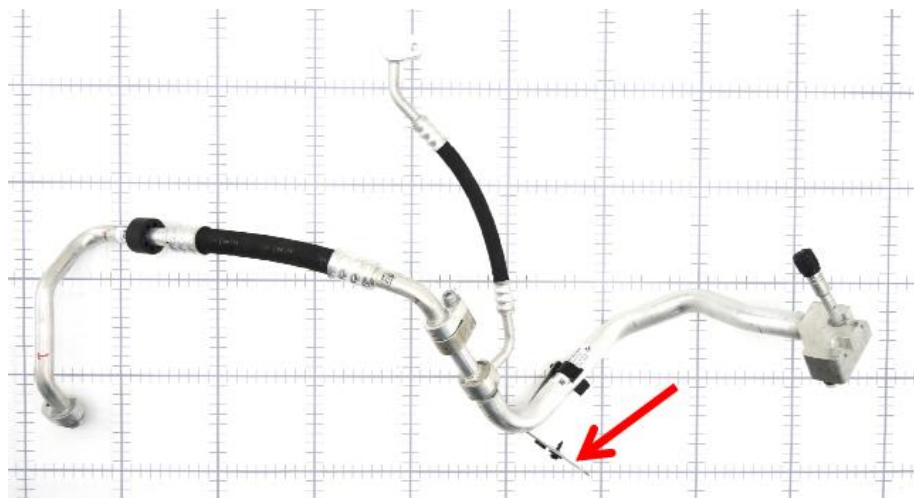
## Assembly Summary

<b>Parts</b>	<b>3</b>
<b>Fasteners</b>	<b>1</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>15</b>
<b>Fastenings</b>	<b>3</b>
<b>Right First Time</b>	<b>99.89 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>0.48</b>
<b>Total Weight (kg)</b>	<b>0.05</b>

<b>Material Cost**</b>	<b>\$0.19</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.16</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.04</b>
<b>Manufacturing Cost*</b>	<b>\$0.40</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost





# L Bracket Asm, Line 1 Asm



## L Bracket Asm, Line 1 Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
L Bracket, L Bracket Asm	1	1	0	7	0	99.97 %	0.00	0.00	0.00	0.16	0.0479
Assemble L Bracket	1	2	3	7	3	99.92 %	0.00	0.00	0.32	0.00	0.0050

## L Bracket Asm, Line 1 Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
L Bracket, L Bracket Asm	\$0.00	\$0.13	\$0.00	\$0.00	\$0.00	\$0.03	\$0.00	\$0.02	\$0.18
Assemble L Bracket	\$0.06	\$0.00	\$0.00	\$0.00	\$0.13	\$0.00	\$0.01	\$0.02	\$0.22

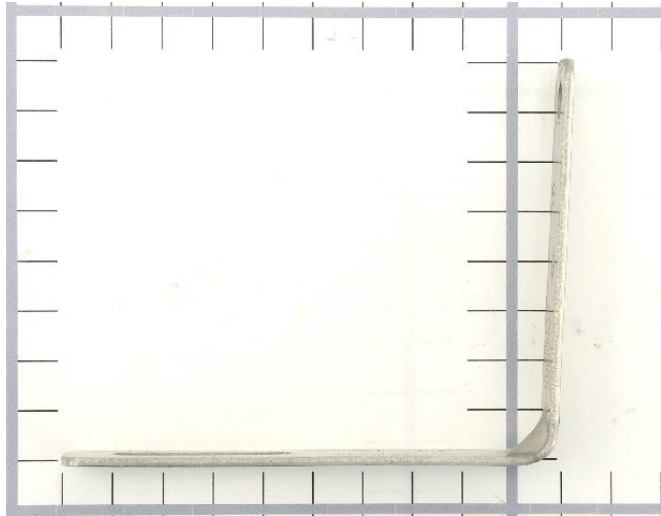
## Detailed Summary

<b>Parts</b>	<b>3</b>
<b>Fasteners</b>	<b>1</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>15</b>
<b>Fastenings</b>	<b>3</b>
<b>Right First Time</b>	<b>99.89%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.32</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.16</b>
<b>Total Weight (kg)</b>	<b>0.05</b>
<hr/>	
<b>Purchased Part Cost</b>	<b>\$0.06</b>
<b>Material Cost</b>	<b>\$0.13</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.13</b>
<b>Supplier Fab. Cost</b>	<b>\$0.03</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.04</b>
<b>Manufacturing Cost*</b>	<b>\$0.40</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# L Bracket,L Bracket Asm



\...

- \L Bracket Asm,Line 1 Asm
- \L Bracket,L Bracket Asm
- \L Bracket Process

## Process Summary

Right First Time	99.97 %
Process Time (Sec)	9.67
Total Weight (kg)	0.05

Material Cost**	\$0.13
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.03
Q Burden	\$0.00
SG&A	\$0.02
Manufacturing Cost*	\$0.18

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# L Bracket,L Bracket Asm

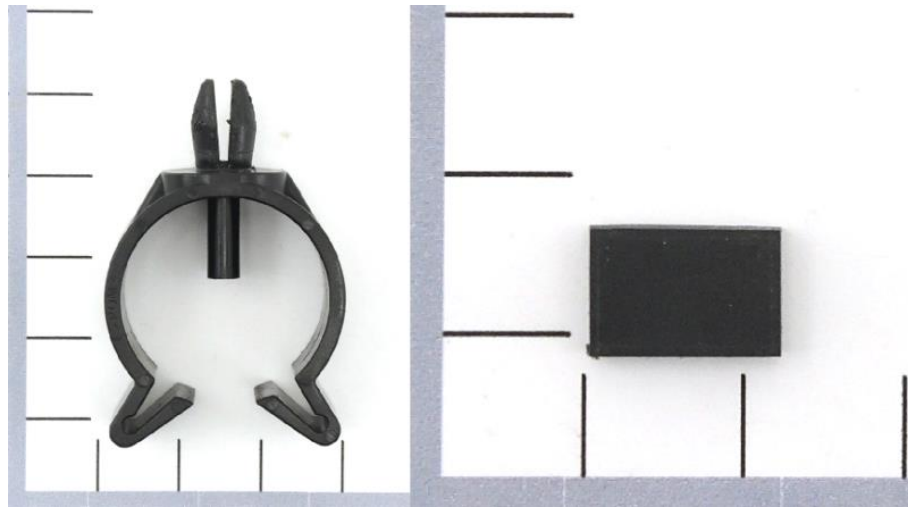
## L Bracket Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.94	CZE	\$0.02	99.99%	\$0.00
Deburr	4.00	1	0.25	4.79	CZE	\$0.01	99.99%	\$0.00
60 Ton Stamping Press	0.67	1	0.25	17.32	CZE	\$0.00	99.99%	\$0.00

## L Bracket Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material,L Bracket	1	Steel 1040 - Coil Stock	\$1.43	0.0479	0.0900	\$0.00	\$0.13

# Assemble L Bracket



\...

\Line 1 Asm, Front Refrigerant Line Bundle Asm  
 \L Bracket Asm,Line 1 Asm  
 \Assemble L Bracket

## Process Summary

<b>Right First Time</b>	<b>99.92 %</b>
<b>Process Time (Sec)</b>	<b>19.13</b>
<b>Total Weight (kg)</b>	<b>0.01</b>
<b>Material Cost**</b>	<b>\$0.06</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.13</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.02</b>
<b>Manufacturing Cost*</b>	<b>\$0.22</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble L Bracket



## Assemble L Bracket

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	19.13	1	1.00	24.59	CZE	\$0.13	99.92 %	\$0.01

## Assemble L Bracket

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Anchor Clip,L Bracket.Asm	1	Commodity Item	Purchased	0.0046	-	\$0.05	\$0.00
Isolation Block,L Bracket.Asm	1	Commodity Item	Purchased	0.0004	-	\$0.01	\$0.00



\...  
 \Front Refrigerant Line Bundle Asm  
 \Line 1 Asm, Front Refrigerant Line Bundle Asm  
 \Assemble Line 1

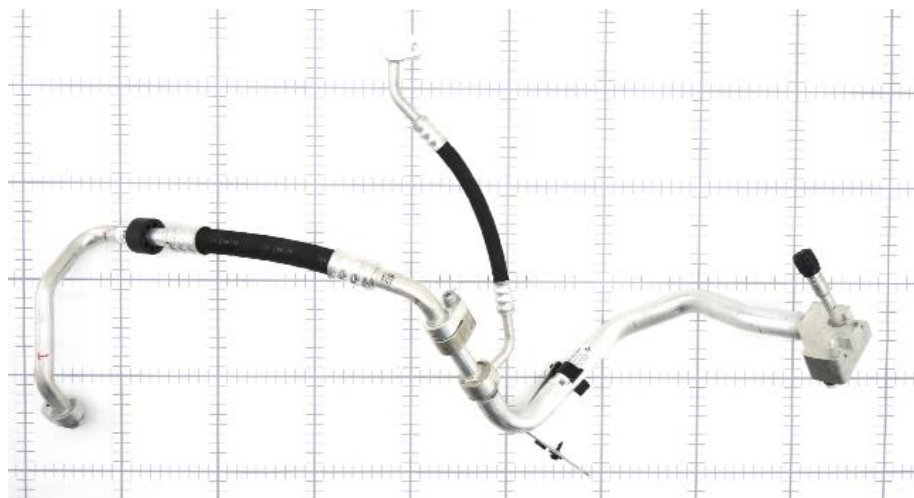
## Process Summary

<b>Right First Time</b>	<b>99.67 %</b>
<b>Process Time (Sec)</b>	<b>48.35</b>
<b>Total Weight (kg)</b>	<b>0.02</b>

<b>Material Cost**</b>	<b>\$0.18</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.33</b>
<b>Q Burden</b>	<b>\$0.05</b>
<b>SG&amp;A</b>	<b>\$0.05</b>
<b>Manufacturing Cost*</b>	<b>\$0.61</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Assemble Line 1



## Assemble Line 1

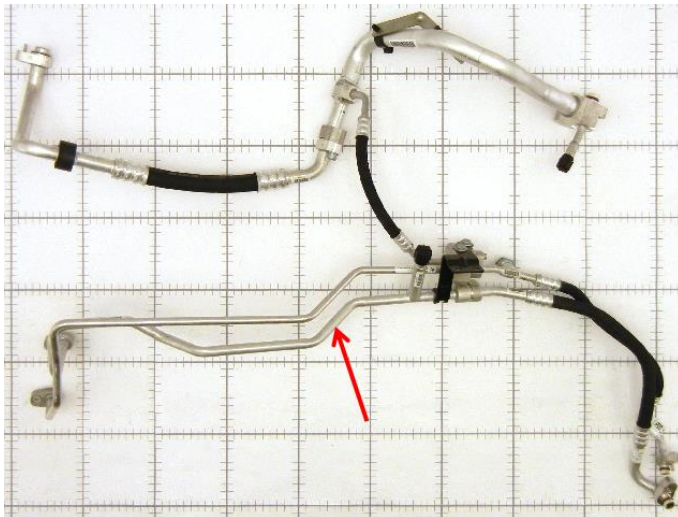
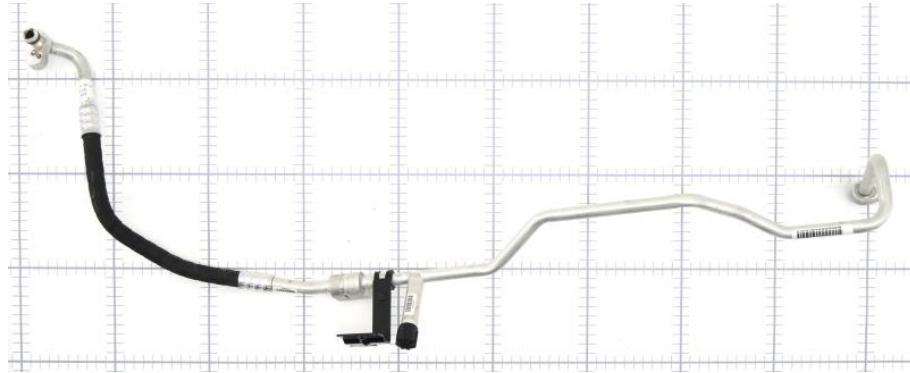
Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	48.35	1	1.00	24.91	HUN	\$0.33	99.67%	\$0.05

## Assemble Line 1

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
M8x28-Socket Head SEMS Screw	1	Commodity Item	Purchased	0.0175	-	\$0.05	\$0.00
Label, QR Code	1	Commodity Item	Purchased	0.0001	-	\$0.10	\$0.00
M5x16 Torx Screw/Wahsers	1	Commodity Item	Purchased	0.0042	-	\$0.03	\$0.00



# Line 2 Asm, Front Refrigerant Line Bundle Asm



\...  
 \Cooling Pack  
 \Front Refrigerant Line Bundle Asm  
 \Line 2 Asm, Front Refrigerant Line Bundle Asm  
**Assembly Summary**

<b>Parts</b>	<b>32</b>
<b>Fasteners</b>	<b>3</b>
<b>Part Numbers</b>	<b>26</b>
<b>Steps</b>	<b>342</b>
<b>Fastenings</b>	<b>31</b>
<b>Right First Time</b>	<b>96.50 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>14.56</b>
<b>Total Weight (kg)</b>	<b>0.40</b>

<b>Material Cost**</b>	<b>\$3.41</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$6.42</b>
<b>Q Burden</b>	<b>\$0.53</b>
<b>SG&amp;A</b>	<b>\$1.08</b>
<b>Manufacturing Cost*</b>	<b>\$11.44</b>

\* Excluding tooling, ER&D, logistics, and profit margin  
 \*\* Includes material cost and purchased parts cost

# Line 2 Asm, Front Refrigerant Line Bundle Asm



## Line 2 Asm, Front Refrigerant Line Bundle Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Section 1 Asm,Line 2 Asm	1	14	14	144	14	98.25 %	0.00	0.00	3.94	2.76	0.2458
Hose Section Asm,Line2 Asm	1	16	14	187	14	98.51 %	0.00	0.00	4.65	2.74	0.1502
Assemble Line 2	1	2	3	9	3	99.70 %	0.00	0.00	0.48	0.00	0.0086

## Line 2 Asm, Front Refrigerant Line Bundle Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Section 1 Asm,Line 2 Asm	\$0.96	\$1.20	\$0.00	\$0.00	\$1.62	\$1.34	\$0.26	\$0.53	\$5.92
Hose Section Asm,Line2 Asm	\$0.05	\$1.07	\$0.00	\$0.00	\$1.86	\$1.40	\$0.23	\$0.52	\$5.12
Assemble Line 2	\$0.13	\$0.00	\$0.00	\$0.00	\$0.20	\$0.00	\$0.05	\$0.03	\$0.40

# Line 2 Asm, Front Refrigerant Line Bundle Asm

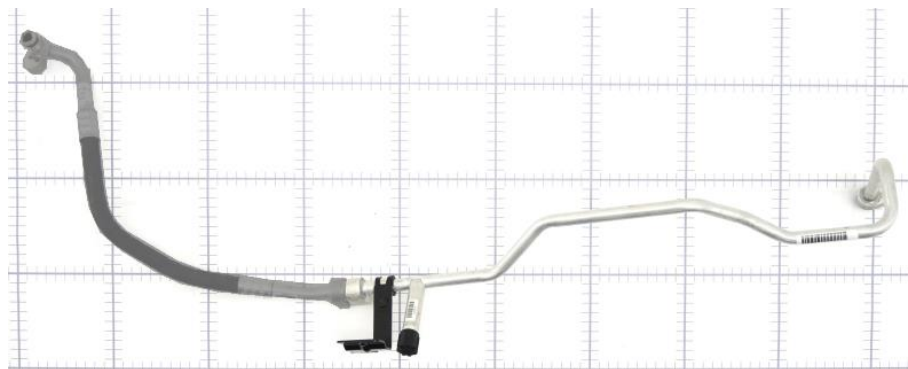
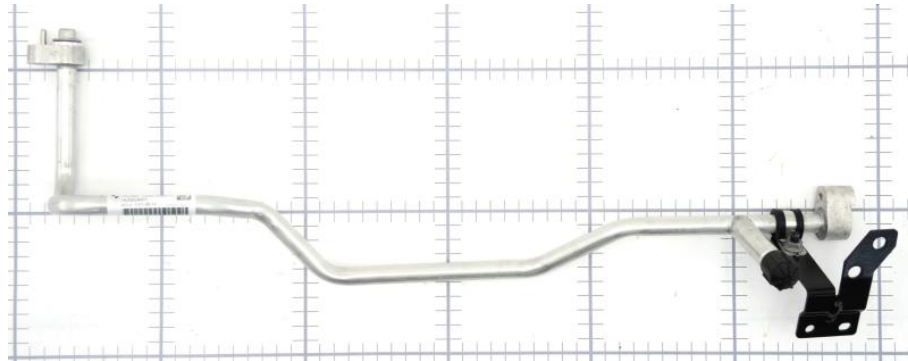
## Detailed Summary

<b>Parts</b>	<b>32</b>
<b>Fasteners</b>	<b>3</b>
<b>Part Numbers</b>	<b>26</b>
<b>Steps</b>	<b>342</b>
<b>Fastenings</b>	<b>31</b>
<b>Right First Time</b>	<b>96.5%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>9.07</b>
<b>Supplier Fab. Time (Min)</b>	<b>5.49</b>
<b>Total Weight (kg)</b>	<b>0.40</b>
<b>Purchased Part Cost</b>	
	<b>\$1.14</b>
<b>Material Cost</b>	
	<b>\$2.27</b>
<b>OEM Asm. Cost</b>	
	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	
	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	
	<b>\$3.68</b>
<b>Supplier Fab. Cost</b>	
	<b>\$2.74</b>
<b>Q Burden</b>	
	<b>\$0.53</b>
<b>SG&amp;A</b>	
	<b>\$1.08</b>
<b>Manufacturing Cost*</b>	
	<b>\$11.44</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Section 1 Asm, Line 2 Asm



\...

- \Front Refrigerant Line Bundle Asm
- \Line 2 Asm, Front Refrigerant Line Bundle Asm
- \Section 1 Asm, Line 2 Asm

## Assembly Summary

<b>Parts</b>	<b>14</b>
<b>Fasteners</b>	<b>2</b>
<b>Part Numbers</b>	<b>14</b>
<b>Steps</b>	<b>144</b>
<b>Fastenings</b>	<b>14</b>
<b>Right First Time</b>	<b>98.25 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>6.69</b>
<b>Total Weight (kg)</b>	<b>0.25</b>

<b>Material Cost**</b>	<b>\$2.16</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$2.97</b>
<b>Q Burden</b>	<b>\$0.26</b>
<b>SG&amp;A</b>	<b>\$0.53</b>
<b>Manufacturing Cost*</b>	<b>\$5.92</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Section 1 Asm,Line 2 Asm



## Section 1 Asm,Line 2 Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Connector 1 Asm,Section 1 Asm	1	4	2	48	2	99.70 %	0.00	0.00	0.37	1.05	0.0286
Connector 2,Section 1Asm	1	1	0	34	0	99.90 %	0.00	0.00	0.00	0.95	0.0253
Tube,Section 1 Asm	1	1	0	16	0	99.62 %	0.00	0.00	0.00	0.41	0.1030
Bracket Asm,Section 1 Asm	1	3	1	18	1	99.83 %	0.00	0.00	0.08	0.32	0.0556
Cap,Expansion Valve 2Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.02	0.0044
Assemble Section 1	1	4	11	22	11	99.21 %	0.00	0.00	3.49	0.00	0.0227

## Section 1 Asm,Line 2 Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Connector 1 Asm,Section 1 Asm	\$0.01	\$0.25	\$0.00	\$0.00	\$0.15	\$0.55	\$0.05	\$0.11	\$1.13
Connector 2,Section 1Asm	\$0.00	\$0.15	\$0.00	\$0.00	\$0.00	\$0.55	\$0.02	\$0.08	\$0.80
Tube,Section 1 Asm	\$0.00	\$0.62	\$0.00	\$0.00	\$0.00	\$0.17	\$0.06	\$0.09	\$0.94
Bracket Asm,Section 1 Asm	\$0.02	\$0.16	\$0.00	\$0.00	\$0.03	\$0.06	\$0.03	\$0.03	\$0.33
Cap,Expansion Valve 2Asm	\$0.00	\$0.02	\$0.00	\$0.00	\$0.00	\$0.01	\$0.00	\$0.00	\$0.03
Assemble Section 1	\$0.93	\$0.00	\$0.00	\$0.00	\$1.45	\$0.00	\$0.12	\$0.20	\$2.70

## Detailed Summary

<b>Parts</b>	<b>14</b>
<b>Fasteners</b>	<b>2</b>
<b>Part Numbers</b>	<b>14</b>
<b>Steps</b>	<b>144</b>
<b>Fastenings</b>	<b>14</b>
<b>Right First Time</b>	<b>98.25%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>3.94</b>
<b>Supplier Fab. Time (Min)</b>	<b>2.76</b>
<b>Total Weight (kg)</b>	<b>0.25</b>
<b>Purchased Part Cost</b>	<b>\$0.96</b>
<b>Material Cost</b>	<b>\$1.20</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$1.62</b>
<b>Supplier Fab. Cost</b>	<b>\$1.34</b>
<b>Q Burden</b>	<b>\$0.26</b>
<b>SG&amp;A</b>	<b>\$0.53</b>
<b>Manufacturing Cost*</b>	<b>\$5.92</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connector 1 Asm, Section 1 Asm



\...  
 \Line 2 Asm, Front Refrigerant Line Bundle Asm  
 \Section 1 Asm, Line 2 Asm  
 \Connector 1 Asm, Section 1 Asm

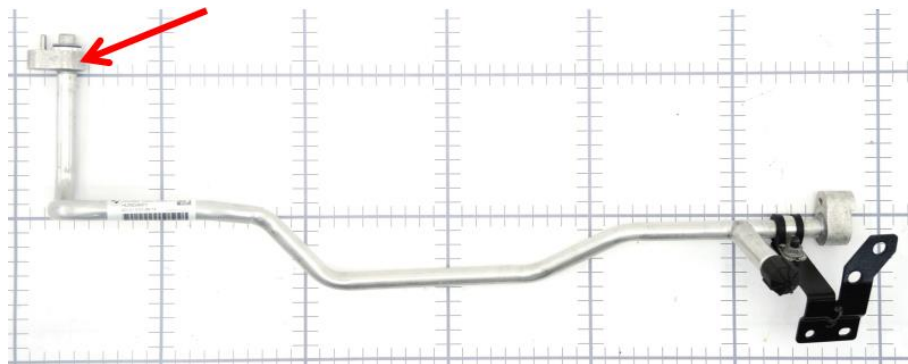
## Assembly Summary

<b>Parts</b>	<b>4</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>4</b>
<b>Steps</b>	<b>48</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.70 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>1.41</b>
<b>Total Weight (kg)</b>	<b>0.03</b>

<b>Material Cost**</b>	<b>\$0.26</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.71</b>
<b>Q Burden</b>	<b>\$0.05</b>
<b>SG&amp;A</b>	<b>\$0.11</b>
<b>Manufacturing Cost*</b>	<b>\$1.13</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Connector 1 Asm, Section 1 Asm



## Connector 1 Asm, Section 1 Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Connecting Block, Connector 3 Asm	1	1	0	30	0	99.90 %	0.00	0.00	0.00	0.86	0.0264
Sealing Ring, Connector 3 Asm	1	2	0	10	0	99.96 %	0.00	0.00	0.00	0.19	0.0015
Assemble Connector 1	1	1	2	6	2	99.85 %	0.00	0.00	0.37	0.00	0.0007

## Connector 1 Asm, Section 1 Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Connecting Block, Connector 3 Asm	\$0.00	\$0.22	\$0.00	\$0.00	\$0.00	\$0.49	\$0.02	\$0.09	\$0.81
Sealing Ring, Connector 3 Asm	\$0.00	\$0.03	\$0.00	\$0.00	\$0.00	\$0.06	\$0.01	\$0.01	\$0.11
Assemble Connector 1	\$0.01	\$0.00	\$0.00	\$0.00	\$0.15	\$0.00	\$0.02	\$0.02	\$0.20



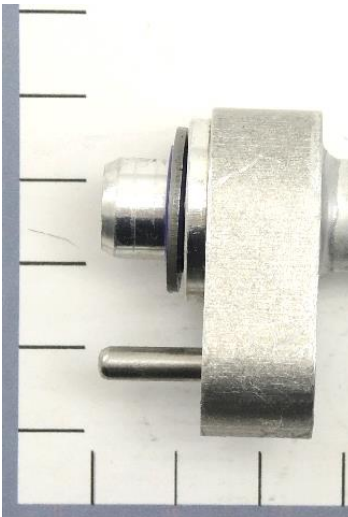
## Detailed Summary

<b>Parts</b>	<b>4</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>4</b>
<b>Steps</b>	<b>48</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.7%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.37</b>
<b>Supplier Fab. Time (Min)</b>	<b>1.05</b>
<b>Total Weight (kg)</b>	<b>0.03</b>
<b>Purchased Part Cost</b>	
	<b>\$0.01</b>
<b>Material Cost</b>	
	<b>\$0.25</b>
<b>OEM Asm. Cost</b>	
	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	
	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	
	<b>\$0.15</b>
<b>Supplier Fab. Cost</b>	
	<b>\$0.55</b>
<b>Q Burden</b>	
	<b>\$0.05</b>
<b>SG&amp;A</b>	
	<b>\$0.11</b>
<b>Manufacturing Cost*</b>	
	<b>\$1.13</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connecting Block, Connector 3 Asm



\...

- \Connector 1 Asm, Section 1 Asm
- \Connecting Block, Connector 3 Asm
- \Connecting Block Process

## Process Summary

<b>Right First Time</b>	<b>99.90 %</b>
<b>Process Time (Sec)</b>	<b>51.50</b>
<b>Total Weight (kg)</b>	<b>0.03</b>

<b>Material Cost**</b>	<b>\$0.22</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.49</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.09</b>
<b>Manufacturing Cost*</b>	<b>\$0.81</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connecting Block, Connector 3 Asm



## Connecting Block Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.95	HUN	\$0.02	99.99 %	\$0.00
Deburr	4.00	1	0.25	22.62	HUN	\$0.03	99.99 %	\$0.00
CNC Machine	39.61	1	0.25	38.22	HUN	\$0.42	99.95 %	\$0.01
Cut Off	2.81	1	0.25	24.32	HUN	\$0.02	99.98 %	\$0.00
2200 Ton Extrusion Press	0.08	1	4.00	494.65	HUN	\$0.01	99.99 %	\$0.00

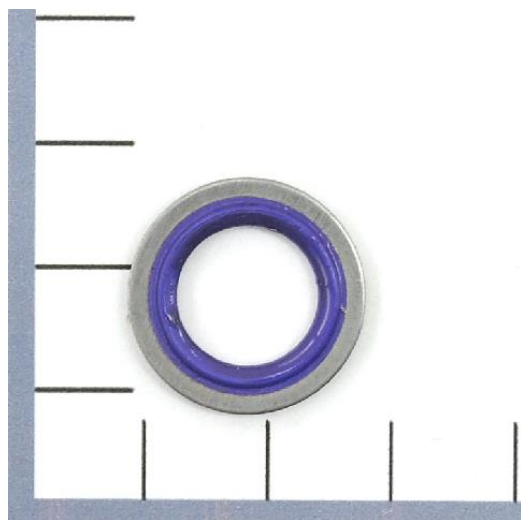
## Connecting Block Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Connecting Block	1	Aluminum 6061 - Bar Stock	\$3.06	0.0264	0.0704	\$0.00	\$0.22

# Sealing Ring, Connector 3 Asm



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& ASSOCIATES, INC.



\...

\Connector 1 Asm, Section 1 Asm

\Sealing Ring, Connector 3 Asm

\Sealing Ring Process

## Process Summary

<b>Right First Time</b>	<b>99.96 %</b>
<b>Process Time (Sec)</b>	<b>11.40</b>
<b>Total Weight (kg)</b>	<b>0.00</b>
<b>Material Cost**</b>	<b>\$0.03</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.06</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.01</b>
<b>Manufacturing Cost*</b>	<b>\$0.11</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Sealing Ring, Connector 3 Asm

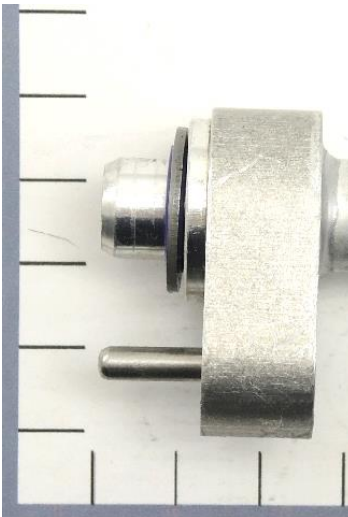
## Sealing Ring Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
55 Ton Injection Molding Press	46.40	8	0.25	23.26	HUN	\$0.04	99.99%	\$0.00
Wash	3.50	1	0.25	11.95	HUN	\$0.01	99.99%	\$0.00
Deburr	1.50	1	0.25	22.62	HUN	\$0.01	99.99%	\$0.00
25 Ton Stamping Press	0.60	1	0.25	14.05	HUN	\$0.00	99.99%	\$0.00

## Sealing Ring Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, O-Ring Seal	1	EPDM	\$4.04	0.0005	0.0005	\$0.00	\$0.01
Material, Outer Ring	1	Steel 1018 - Coil Stock	\$1.21	0.0010	0.0140	\$0.00	\$0.02

# Assemble Connector 1



\...  
 \Section 1 Asm,Line 2 Asm  
 \Connector 1 Asm,Section 1 Asm  
 \Assemble Connector 1

## Process Summary

<b>Right First Time</b>	<b>99.85 %</b>
<b>Process Time (Sec)</b>	<b>22.00</b>
<b>Total Weight (kg)</b>	<b>0.00</b>

<b>Material Cost**</b>	<b>\$0.01</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.15</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.02</b>
<b>Manufacturing Cost*</b>	<b>\$0.20</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Connector 1



## Assemble Connector 1

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	22.00	1	1.00	24.91	HUN	\$0.15	99.85%	\$0.02

## Assemble Connector 1

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Guide Pin, Connector 3 Asm	1	Commodity Item	Purchased	0.0007	-	\$0.01	\$0.00

# Connector 2, Section 1 Asm

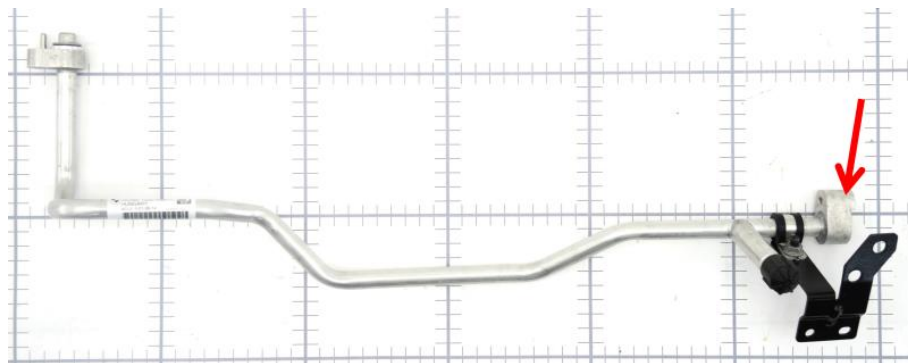


\...  
\Section 1 Asm, Line 2 Asm  
\Connector 2, Section 1 Asm  
\Connector 2 Process

## Process Summary

Right First Time	99.90 %
Process Time (Sec)	57.02
Total Weight (kg)	0.03

Material Cost**	\$0.15
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.55
Q Burden	\$0.02
SG&A	\$0.08
Manufacturing Cost*	\$0.80



\* Excluding tooling, ER&D, logistics, and profit margin  
\*\* Includes material cost and purchased parts cost



# Connector 2, Section 1 Asm

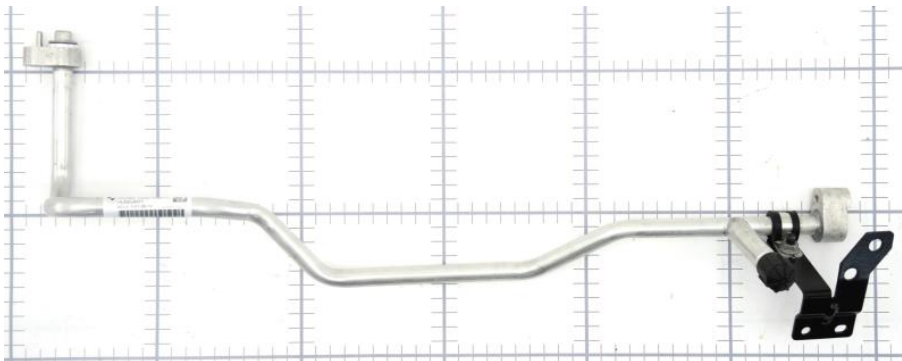
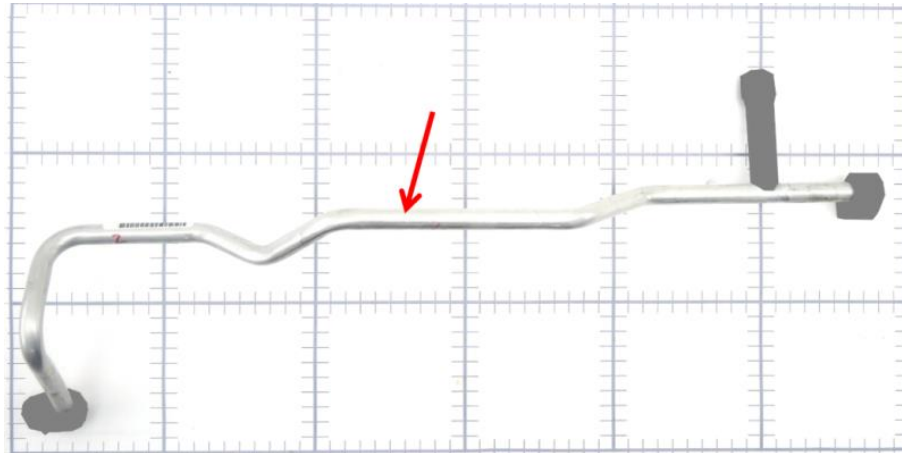
## Connector 2 Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.95	HUN	\$0.02	99.99 %	\$0.00
Deburr	4.00	1	0.25	22.62	HUN	\$0.03	99.99 %	\$0.00
CNC Machine	45.22	1	0.25	38.22	HUN	\$0.48	99.95 %	\$0.01
Cut Off	2.75	1	0.25	24.32	HUN	\$0.02	99.98 %	\$0.00
2200 Ton Extrusion Press	0.05	1	4.00	494.65	HUN	\$0.01	99.99 %	\$0.00

## Connector 2 Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Connector 2	1	Aluminum 6061 - Billet Stock	\$2.80	0.0253	0.0542	\$0.00	\$0.15

# Tube, Section 1 Asm



\...  
\Section 1 Asm, Line 2 Asm  
\Tube, Section 1 Asm  
\Tube Process

## Process Summary

Right First Time	99.62 %
Process Time (Sec)	24.80
Total Weight (kg)	0.10

Material Cost**	\$0.62
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.17
Q Burden	\$0.06
SG&A	\$0.09
Manufacturing Cost*	\$0.94

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Tube, Section 1 Asm

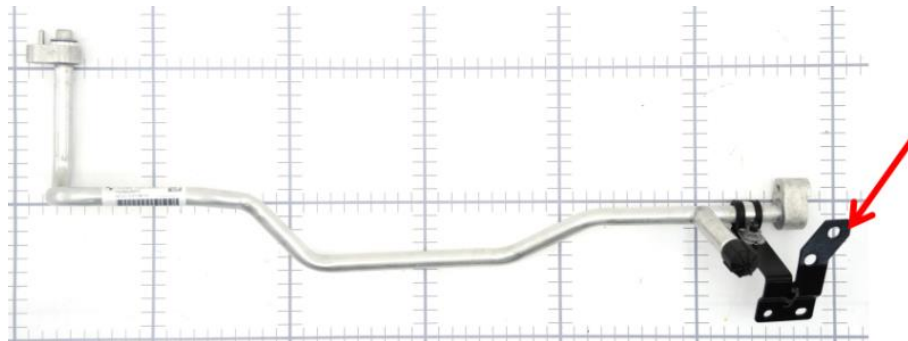
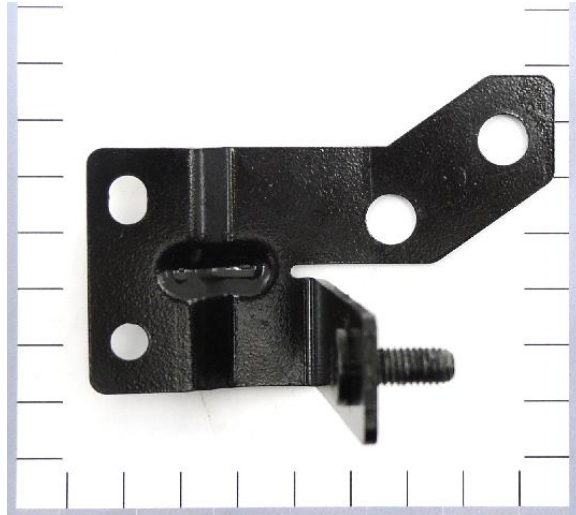
## Tube Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	9.00	1	0.25	21.64	HUN	\$0.05	99.99%	\$0.00
Tube Bending	15.80	1	0.25	26.59	HUN	\$0.12	99.63%	\$0.06

## Tube Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Tube	1	Aluminum 3003 - Seamless Tube	\$6.00	0.1030	0.1030	\$0.00	\$0.62

# Bracket Asm, Section 1 Asm



\...  
 \Line 2 Asm, Front Refrigerant Line Bundle Asm  
 \Section 1 Asm, Line 2 Asm  
 \Bracket Asm, Section 1 Asm

## Assembly Summary

Parts	3
Fasteners	1
Part Numbers	3
Steps	18
Fastenings	1
Right First Time	99.83 %
OEM Process Time (Min)	0.00
Supplier Process Time (Min)	0.41
Total Weight (kg)	0.06

Material Cost**	\$0.18
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.09
Q Burden	\$0.03
SG&A	\$0.03
Manufacturing Cost*	\$0.33

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Bracket Asm, Section 1 Asm



## Bracket Asm, Section 1 Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Bracket, Bracket Asm	1	1	0	7	0	99.97 %	0.00	0.00	0.00	0.16	0.0504
Assemble Bracket	1	2	1	10	1	99.86 %	0.00	0.00	0.08	0.16	0.0052

## Bracket Asm, Section 1 Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Bracket, Bracket Asm	\$0.00	\$0.14	\$0.00	\$0.00	\$0.00	\$0.03	\$0.00	\$0.02	\$0.19
Assemble Bracket	\$0.02	\$0.02	\$0.00	\$0.00	\$0.03	\$0.04	\$0.02	\$0.01	\$0.14

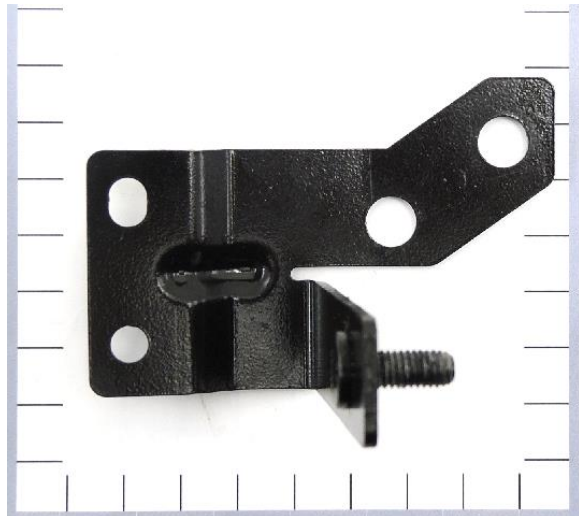
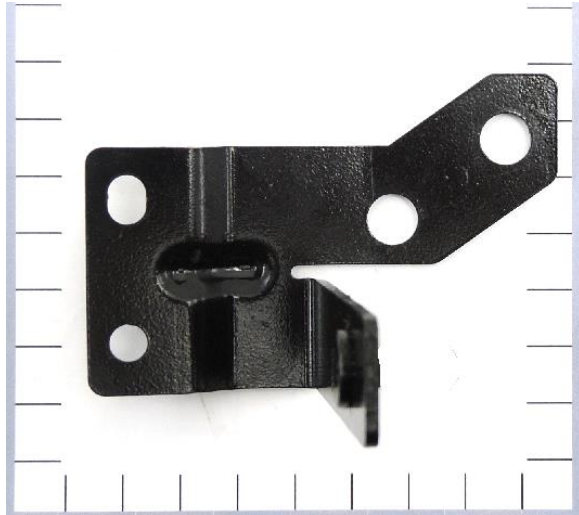
## Detailed Summary

<b>Parts</b>	<b>3</b>
<b>Fasteners</b>	<b>1</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>18</b>
<b>Fastenings</b>	<b>1</b>
<b>Right First Time</b>	<b>99.83%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.08</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.32</b>
<b>Total Weight (kg)</b>	<b>0.06</b>
<b>Purchased Part Cost</b>	<b>\$0.02</b>
<b>Material Cost</b>	<b>\$0.16</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.03</b>
<b>Supplier Fab. Cost</b>	<b>\$0.06</b>
<b>Q Burden</b>	<b>\$0.03</b>
<b>SG&amp;A</b>	<b>\$0.03</b>
<b>Manufacturing Cost*</b>	<b>\$0.33</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Bracket, Bracket Asm



\...  
\Bracket Asm, Section 1 Asm  
\Bracket, Bracket Asm  
\Bracket Process

## Process Summary

Right First Time	99.97 %
Process Time (Sec)	9.67
Total Weight (kg)	0.05

Material Cost**	\$0.14
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.03
Q Burden	\$0.00
SG&A	\$0.02
Manufacturing Cost*	\$0.19

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Bracket, Bracket Asm

## Bracket Process

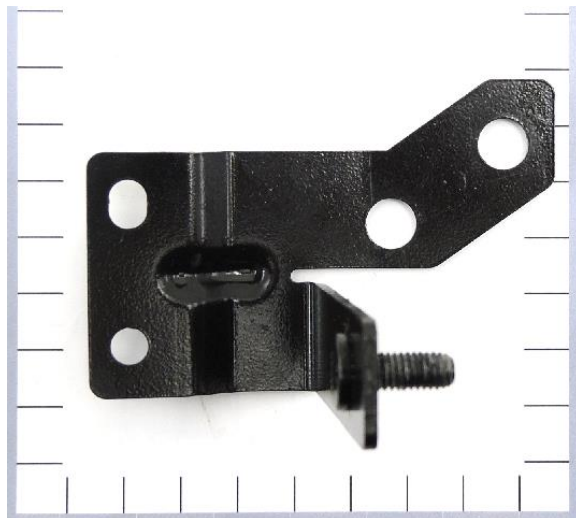
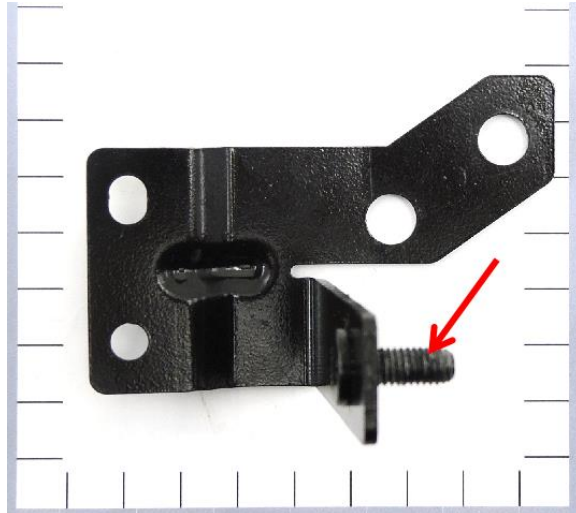
Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.95	HUN	\$0.02	99.99%	\$0.00
Deburr	4.00	1	0.25	4.86	HUN	\$0.01	99.99%	\$0.00
60 Ton Stamping Press	0.67	1	0.25	17.46	HUN	\$0.00	99.99%	\$0.00

## Bracket Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Mateiral, Bracket	1	Steel 1018 - Coil Stock	\$1.21	0.0504	0.1180	\$0.00	\$0.14



# Assemble Bracket



\...  
 \Section 1 Asm,Line 2 Asm  
 \Bracket Asm,Section 1 Asm  
 \Assemble Bracket

## Process Summary

<b>Right First Time</b>	<b>99.86 %</b>
<b>Process Time (Sec)</b>	<b>14.79</b>
<b>Total Weight (kg)</b>	<b>0.01</b>

<b>Material Cost**</b>	<b>\$0.04</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.06</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.01</b>
<b>Manufacturing Cost*</b>	<b>\$0.14</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Bracket



## Assemble Bracket

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Cure	7.71	1	0.25	9.58	HUN	\$0.02	99.97 %	\$0.01
Dip Painting Line	2.08	1	0.25	31.47	HUN	\$0.02	99.99 %	\$0.00
Supplier Automated Asm	5.00	1	0.25	18.11	HUN	\$0.03	99.91 %	\$0.01

## Assemble Bracket

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Paint	1	Paint - Basecoat		By Area	0.0000	-	\$0.00
M6x16-Flat Head Press-in Screw	1	Commodity Item		Purchased	0.0052	-	\$0.02

# Cap,Expansion Valve 2 Asm

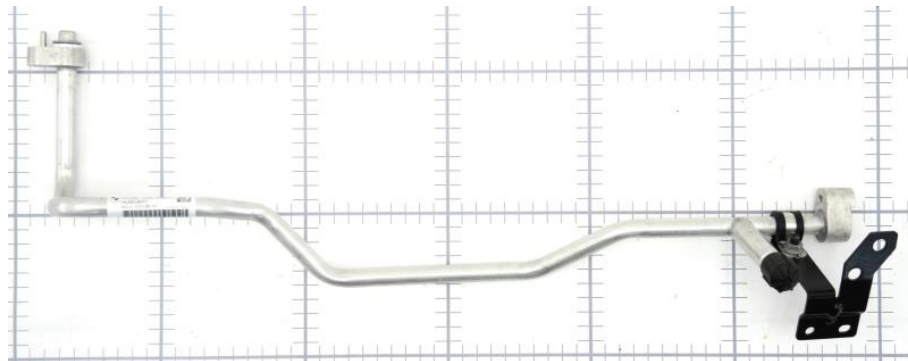


\...  
\Section 1 Asm,Line 2 Asm  
\Cap,Expansion Valve 2 Asm  
\Cap Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	1.34
Total Weight (kg)	0.00

Material Cost**	\$0.02
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.01
Q Burden	\$0.00
SG&A	\$0.00
Manufacturing Cost*	\$0.03



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Cap,Expansion Valve 2 Asm



## Cap Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
55Ton Injection Molding Press	10.72	8	0.25	14.89	HUN	\$0.01	99.99%	\$0.00

## Cap Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material,Cap	1	PA6	\$4.39	0.0044	0.0047	\$0.00	\$0.02

# Assemble Section 1

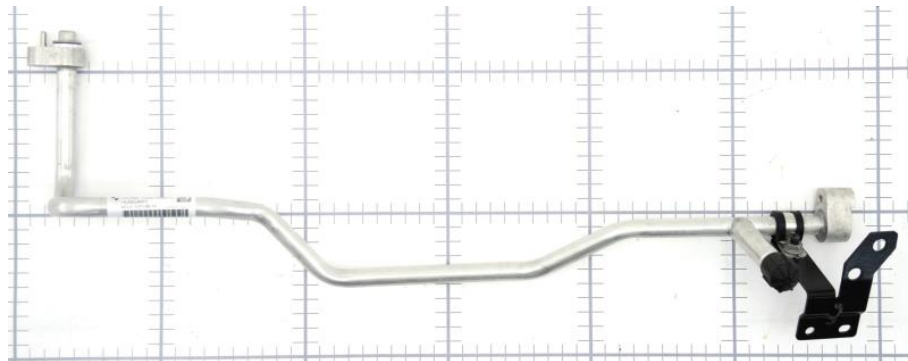


\...  
 \Line 2 Asm, Front Refrigerant Line Bundle Asm  
 \Section 1 Asm,Line 2 Asm  
 \Assemble Section 1

## Process Summary

<b>Right First Time</b>	<b>99.21 %</b>
<b>Process Time (Sec)</b>	<b>209.14</b>
<b>Total Weight (kg)</b>	<b>0.02</b>

<b>Material Cost**</b>	<b>\$0.93</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$1.45</b>
<b>Q Burden</b>	<b>\$0.12</b>
<b>SG&amp;A</b>	<b>\$0.20</b>
<b>Manufacturing Cost*</b>	<b>\$2.70</b>



\* Excluding tooling, ER&D, logistics, and profit margin  
 \*\* Includes material cost and purchased parts cost

# Assemble Section 1



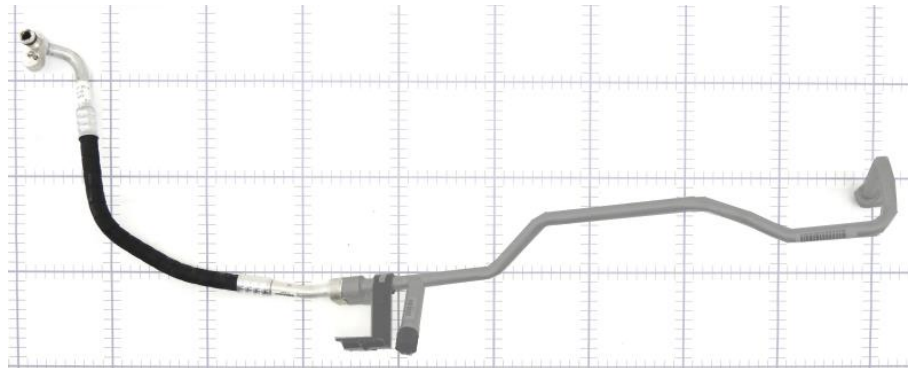
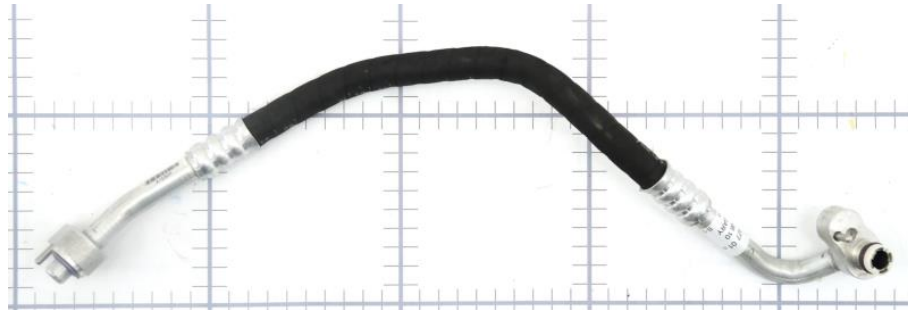
## Assemble Section 1

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	209.14	1	1.00	24.91	HUN	\$1.45	99.21%	\$0.12

## Assemble Section 1

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Expansion Valve,Expansion Valve 2 Asm	1	Commodity Item	Purchased	0.0134	-	\$0.75	\$0.00
Clip,Front Refrigerant LineAsm	1	Commodity Item	Purchased	0.0059	-	\$0.06	\$0.00
M5-6mm, Flange Nut	1	Commodity Item	Purchased	0.0033	-	\$0.02	\$0.00
QR Code Label,Section 1 Asm	1	Commodity Item	Purchased	0.0001	-	\$0.10	\$0.00

# Hose Section Asm, Line 2 Asm



\...

\Front Refrigerant Line Bundle Asm

\Line 2 Asm, Front Refrigerant Line Bundle Asm

\Hose Section Asm, Line 2 Asm

## Assembly Summary

<b>Parts</b>	<b>16</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>14</b>
<b>Steps</b>	<b>187</b>
<b>Fastenings</b>	<b>14</b>
<b>Right First Time</b>	<b>98.51 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>7.38</b>
<b>Total Weight (kg)</b>	<b>0.15</b>

<b>Material Cost**</b>	<b>\$1.12</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$3.25</b>
<b>Q Burden</b>	<b>\$0.23</b>
<b>SG&amp;A</b>	<b>\$0.52</b>
<b>Manufacturing Cost*</b>	<b>\$5.12</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Hose Section Asm,Line 2 Asm



## Hose Section Asm,Line 2 Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Connector 1 Asm,Hose Section Asm	1	6	5	86	5	99.36 %	0.00	0.00	2.09	1.36	0.0543
17mm-OD Wrapped Hose,Hose Section Asm	1	4	0	4	0	99.96 %	0.00	0.00	0.00	0.10	0.0370
Connector 2 Asm,Hose Section Asm	1	6	5	86	5	99.39 %	0.00	0.00	2.19	1.28	0.0589
Assemble Hose Section	1	0	4	8	4	99.79 %	0.00	0.00	0.37	0.00	0.0000

## Hose Section Asm,Line 2 Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Connector 1 Asm,Hose Section Asm	\$0.01	\$0.39	\$0.00	\$0.00	\$0.84	\$0.64	\$0.10	\$0.22	\$2.20
17mm-OD Wrapped Hose,Hose Section Asm	\$0.00	\$0.24	\$0.00	\$0.00	\$0.00	\$0.11	\$0.01	\$0.04	\$0.40
Connector 2 Asm,Hose Section Asm	\$0.04	\$0.44	\$0.00	\$0.00	\$0.88	\$0.64	\$0.09	\$0.24	\$2.33
Assemble Hose Section	\$0.00	\$0.00	\$0.00	\$0.00	\$0.14	\$0.00	\$0.03	\$0.02	\$0.19



## Detailed Summary

<b>Parts</b>	<b>16</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>14</b>
<b>Steps</b>	<b>187</b>
<b>Fastenings</b>	<b>14</b>
<b>Right First Time</b>	<b>98.51%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>4.65</b>
<b>Supplier Fab. Time (Min)</b>	<b>2.74</b>
<b>Total Weight (kg)</b>	<b>0.15</b>
<hr/>	
<b>Purchased Part Cost</b>	<b>\$0.05</b>
<b>Material Cost</b>	<b>\$1.07</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$1.86</b>
<b>Supplier Fab. Cost</b>	<b>\$1.40</b>
<b>Q Burden</b>	<b>\$0.23</b>
<b>SG&amp;A</b>	<b>\$0.52</b>
<b>Manufacturing Cost*</b>	<b>\$5.12</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connector 1 Asm, Hose Section Asm



\...  
 \Line 2 Asm, Front Refrigerant Line Bundle Asm  
 \Hose Section Asm, Line 2 Asm  
 \Connector 1 Asm, Hose Section Asm

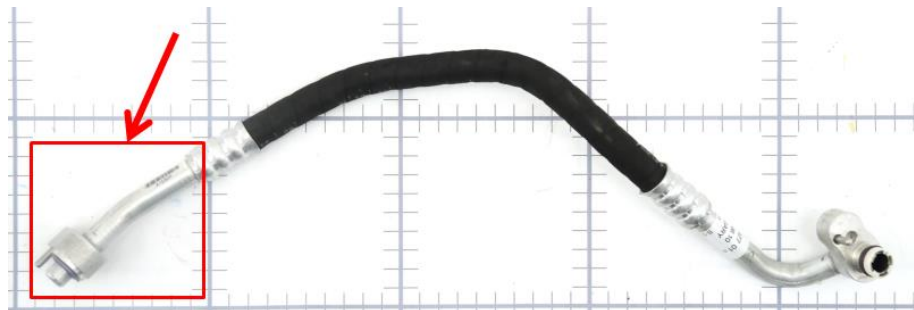
## Assembly Summary

<b>Parts</b>	<b>6</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>6</b>
<b>Steps</b>	<b>86</b>
<b>Fastenings</b>	<b>5</b>
<b>Right First Time</b>	<b>99.36 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>3.45</b>
<b>Total Weight (kg)</b>	<b>0.05</b>

<b>Material Cost**</b>	<b>\$0.40</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$1.48</b>
<b>Q Burden</b>	<b>\$0.10</b>
<b>SG&amp;A</b>	<b>\$0.22</b>
<b>Manufacturing Cost*</b>	<b>\$2.20</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Connector 1 Asm,Hose Section Asm



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## Connector 1 Asm,Hose Section Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Connecting Block,Hose Section Asm	1	1	0	30	0	99.90 %	0.00	0.00	0.00	0.86	0.0264
Sealing Ring,Hose Section Asm	1	2	0	10	0	99.96 %	0.00	0.00	0.00	0.19	0.0015
Connecting Tube, Hose Section Asm	1	1	0	8	0	99.90 %	0.00	0.00	0.00	0.14	0.0143
Assemble Connector 1	1	1	4	9	4	99.77 %	0.00	0.00	0.96	0.00	0.0007
Refrigerant Line Crimp Fitting,Line 2 Asm	1	1	0	21	0	99.93 %	0.00	0.00	0.27	0.17	0.0114
Assemble Refrigerant Line Crimp Fitting	1	0	1	4	1	99.92 %	0.00	0.00	0.86	0.00	0.0000

## Connector 1 Asm,Hose Section Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Connecting Block,Hose Section Asm	\$0.00	\$0.22	\$0.00	\$0.00	\$0.00	\$0.49	\$0.02	\$0.09	\$0.81
Sealing Ring,Hose Section Asm	\$0.00	\$0.03	\$0.00	\$0.00	\$0.00	\$0.06	\$0.01	\$0.01	\$0.11
Connecting Tube, Hose Section Asm	\$0.00	\$0.07	\$0.00	\$0.00	\$0.00	\$0.04	\$0.02	\$0.01	\$0.14
Assemble Connector 1	\$0.01	\$0.00	\$0.00	\$0.00	\$0.40	\$0.00	\$0.04	\$0.05	\$0.49
Refrigerant Line Crimp Fitting,Line 2 Asm	\$0.00	\$0.07	\$0.00	\$0.00	\$0.08	\$0.05	\$0.01	\$0.02	\$0.24
Assemble Refrigerant Line Crimp Fitting	\$0.00	\$0.00	\$0.00	\$0.00	\$0.36	\$0.00	\$0.01	\$0.04	\$0.41

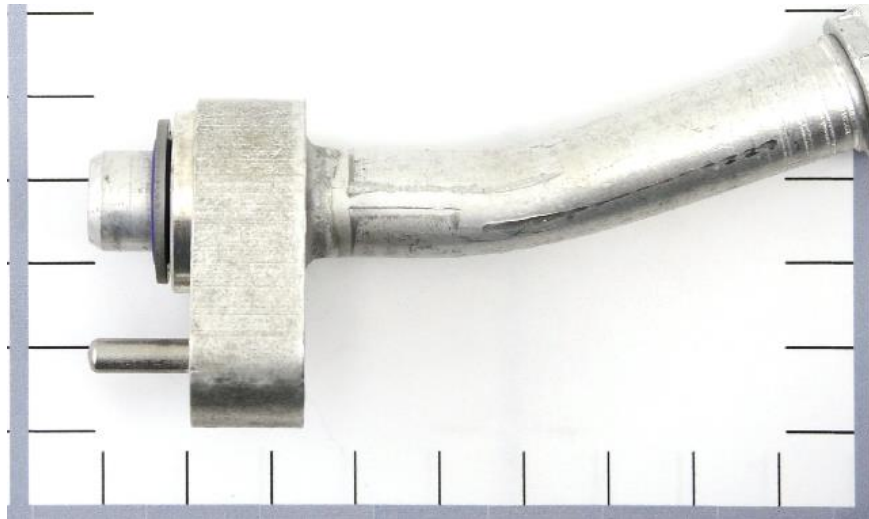
## Detailed Summary

<b>Parts</b>	<b>6</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>6</b>
<b>Steps</b>	<b>86</b>
<b>Fastenings</b>	<b>5</b>
<b>Right First Time</b>	<b>99.36%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>2.09</b>
<b>Supplier Fab. Time (Min)</b>	<b>1.36</b>
<b>Total Weight (kg)</b>	<b>0.05</b>
<b>Purchased Part Cost</b>	<b>\$0.01</b>
<b>Material Cost</b>	<b>\$0.39</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.84</b>
<b>Supplier Fab. Cost</b>	<b>\$0.64</b>
<b>Q Burden</b>	<b>\$0.10</b>
<b>SG&amp;A</b>	<b>\$0.22</b>
<b>Manufacturing Cost*</b>	<b>\$2.20</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connecting Block, Hose Section Asm



\...

- \Connector 1 Asm, Hose Section Asm
- \Connecting Block, Hose Section Asm
- \Connecting Block Process

## Process Summary

Right First Time	99.90 %
Process Time (Sec)	51.49
Total Weight (kg)	0.03

Material Cost**	\$0.22
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.49
Q Burden	\$0.02
SG&A	\$0.09
Manufacturing Cost*	\$0.81

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connecting Block, Hose Section Asm



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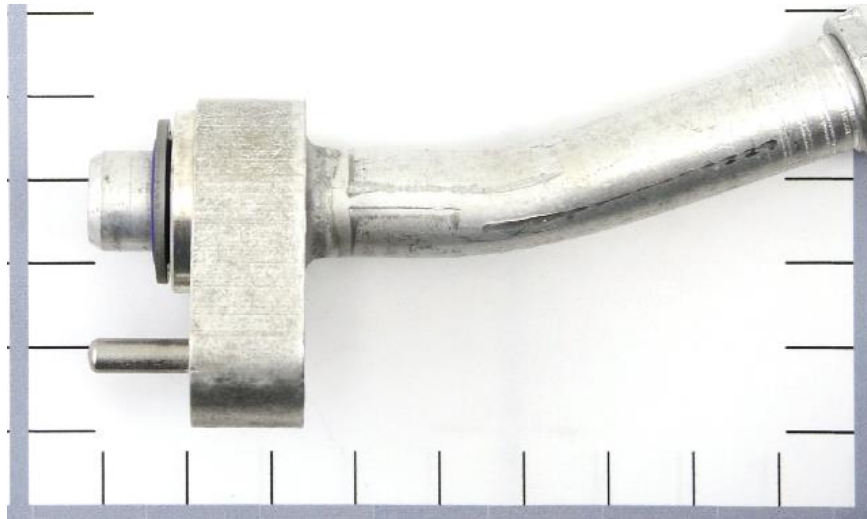
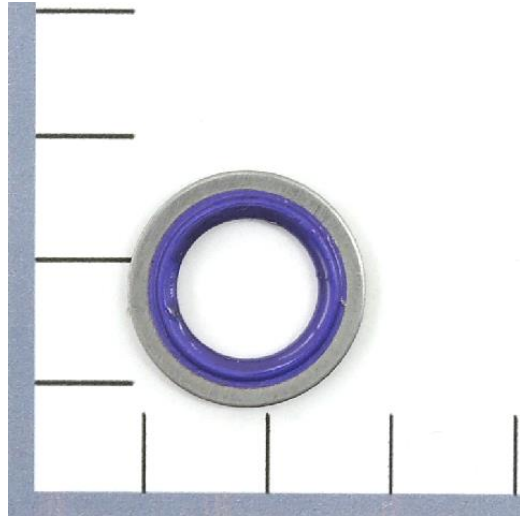
## Connecting Block Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.95	HUN	\$0.02	99.99 %	\$0.00
Deburr	4.00	1	0.25	22.62	HUN	\$0.03	99.99 %	\$0.00
CNC Machine	39.61	1	0.25	38.22	HUN	\$0.42	99.95 %	\$0.01
Cut Off	2.81	1	0.25	24.32	HUN	\$0.02	99.98 %	\$0.00
2200 Ton Extrusion Press	0.07	1	4.00	494.65	HUN	\$0.01	99.99 %	\$0.00

## Connecting Block Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Connecting Block	1	Aluminum 6061 - Bar Stock	\$3.06	0.0264	0.0704	\$0.00	\$0.22

# Sealing Ring,Hose Section Asm



\...  
\Connector 1 Asm,Hose Section Asm  
\Sealing Ring,Hose Section Asm  
\Sealing Ring Process

## Process Summary

<b>Right First Time</b>	<b>99.96 %</b>
<b>Process Time (Sec)</b>	<b>11.40</b>
<b>Total Weight (kg)</b>	<b>0.00</b>

<b>Material Cost**</b>	<b>\$0.03</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.06</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.01</b>
<b>Manufacturing Cost*</b>	<b>\$0.11</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Sealing Ring, Hose Section Asm

## Sealing Ring Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
55 Ton Injection Molding Press	46.40	8	0.25	23.26	HUN	\$0.04	99.99%	\$0.00
Wash	3.50	1	0.25	11.95	HUN	\$0.01	99.99%	\$0.00
Deburr	1.50	1	0.25	22.62	HUN	\$0.01	99.99%	\$0.00
25 Ton Stamping Press	0.60	1	0.25	14.05	HUN	\$0.00	99.99%	\$0.00

## Sealing Ring Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, O-Ring Seal	1	EPDM	\$4.04	0.0005	0.0005	\$0.00	\$0.01
Material, Outer Ring	1	Steel 1018 - Coil Stock	\$1.21	0.0010	0.0140	\$0.00	\$0.02



# Connecting Tube, Hose Section Asm

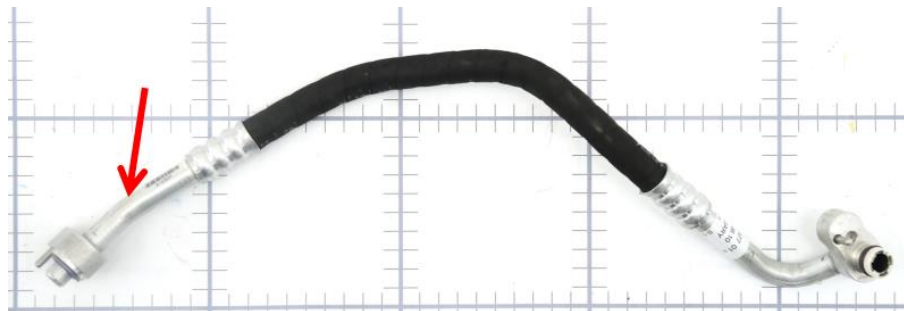


- \...
- \Connector 1 Asm,Hose Section Asm
- \Connecting Tube, Hose Section Asm
- \Connecting Tube Process

## Process Summary

Right First Time	99.90 %
Process Time (Sec)	8.40
Total Weight (kg)	0.01

Material Cost**	\$0.07
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.04
Q Burden	\$0.02
SG&A	\$0.01
Manufacturing Cost*	\$0.14



\* Excluding tooling, ER&D, logistics, and profit margin  
 \*\* Includes material cost and purchased parts cost

# Connecting Tube, Hose Section Asm



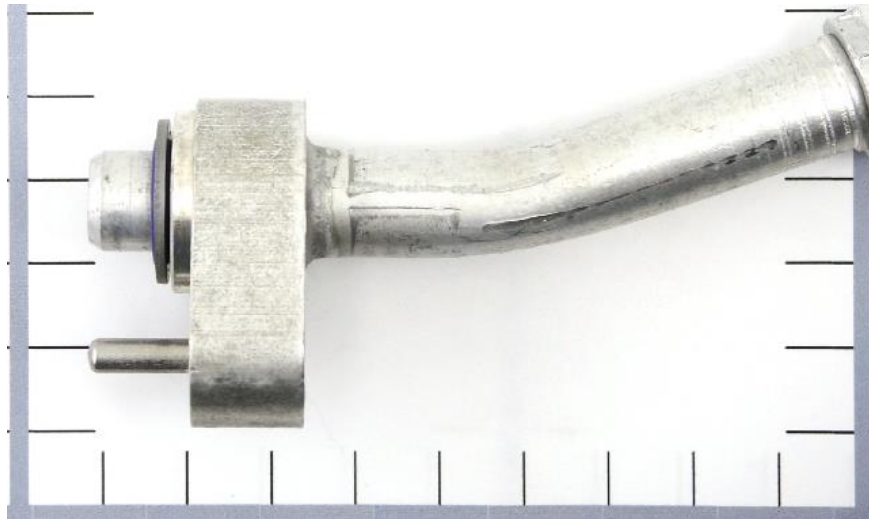
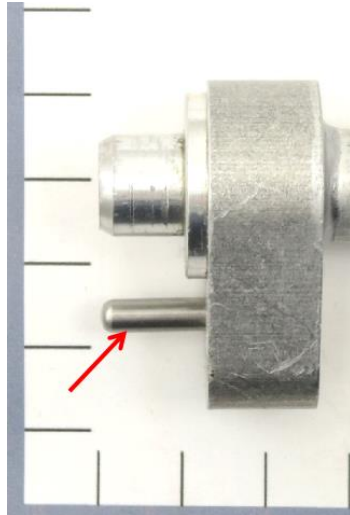
## Connecting Tube Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.95	HUN	\$0.02	99.99%	\$0.00
Tube Bending	3.40	1	0.25	26.59	HUN	\$0.03	99.91%	\$0.01

## Connecting Tube Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Connecting Tube	1	Aluminum 3003 - Clad Seamless Tube	\$5.00	0.0143	0.0143	\$0.00	\$0.07

# Assemble Connector 1



\...  
\Hose Section Asm,Line 2 Asm  
\Connector 1 Asm,Hose Section Asm  
\Assemble Connector 1

## Process Summary

Right First Time	99.77 %
Process Time (Sec)	57.90
Total Weight (kg)	0.00

Material Cost**	\$0.01
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.40
Q Burden	\$0.04
SG&A	\$0.05
Manufacturing Cost*	\$0.49

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Connector 1



## Assemble Connector 1

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	57.90	1	1.00	24.91	HUN	\$0.40	99.77%	\$0.04

## Assemble Connector 1

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Guide Pin, Connector 1 Asm	1	Commodity Item	Purchased	0.0007	-	\$0.01	\$0.00

# Refrigerant Line Crimp Fitting, Line 2 Asm



\...

\Connector 1 Asm, Hose Section Asm

\Refrigerant Line Crimp Fitting, Line 2 Asm

\Hose Crimp Fitting Process

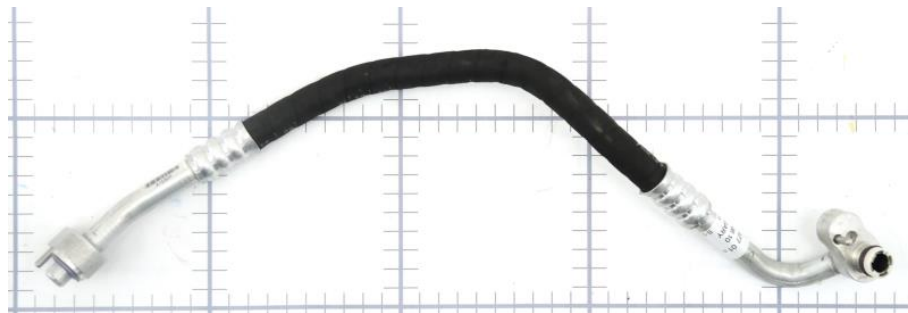
## Process Summary

Right First Time	99.93 %
Process Time (Sec)	26.32
Total Weight (kg)	0.01

Material Cost**	\$0.07
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.13
Q Burden	\$0.01
SG&A	\$0.02
Manufacturing Cost*	\$0.24

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Refrigerant Line Crimp Fitting, Line 2 Asm



## Hose Crimp Fitting Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Automated Asm	16.00	1	0.25	18.11	HUN	\$0.08	99.98 %	\$0.00
Wash	5.00	1	0.25	11.95	HUN	\$0.02	99.99 %	\$0.00
Debur	3.00	1	0.25	22.62	HUN	\$0.02	99.99 %	\$0.00
Circular Saw	2.32	1	0.25	24.32	HUN	\$0.02	99.97 %	\$0.01

## Hose Crimp Fitting Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Refeferant Hose Crimp Fitting	1	Aluminum 3003 - Seamless Tube	\$6.00	0.0114	0.0114	\$0.00	\$0.07

# Assemble Refrigerant Line Crimp Fitting

No Commodity Items  
Required for This  
Process



\...

\Hose Section Asm,Line 2 Asm

\Connector 1 Asm,Hose Section Asm

\Assemble Refrigerant Line Crimp Fitting

## Process Summary

Right First Time	99.92 %
Process Time (Sec)	51.34
Total Weight (kg)	0.00

Material Cost**	\$0.00
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.36
Q Burden	\$0.01
SG&A	\$0.04
Manufacturing Cost*	\$0.41

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Refrigerant Line Crimp Fitting



## Assemble Refrigerant Line Crimp Fitting

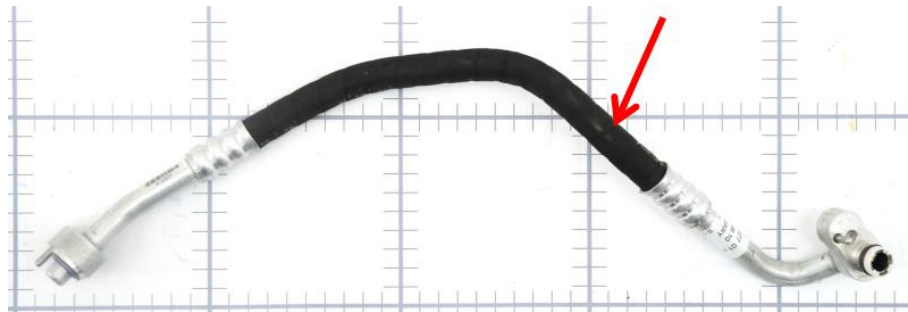
Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
<a href="#">Supplier Manual Asm</a>	51.34	1	1.00	24.91	HUN	\$0.36	99.92%	\$0.01

## Assemble Refrigerant Line Crimp Fitting

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# 17mm-OD Wrapped Hose, Hose Section Asm



\...

\Hose Section Asm,Line 2 Asm

\17mm-OD Wrapped Hose, Hose Section Asm

\17mm-OD Wrapped Hose Process

## Process Summary

Right First Time	99.96 %
Process Time (Sec)	5.90
Total Weight (kg)	0.04

Material Cost**	\$0.24
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.11
Q Burden	\$0.01
SG&A	\$0.04
Manufacturing Cost*	\$0.40

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# 17mm-OD Wrapped Hose, Hose Section Asm



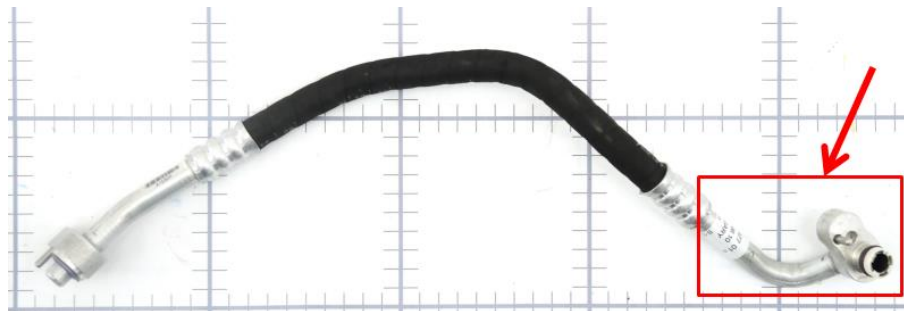
## 17mm-OD Wrapped Hose Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Extrusion:32mm 2 Layer & Reinf	5.90	1	0.50	67.99	HUN	\$0.11	99.96%	\$0.01

## 17mm-OD Wrapped Hose Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material,Inner Rubber Layer,17mm-OD Wrapped Hose	1	EPDM (Extrusion Grade)	\$4.43	0.0166	0.0166	\$0.00	\$0.07
Material,Reinforcement Layer,17mm-OD Wrapped Hose	1	PA Thread w/PVC Coating	By Area	0.0033	-	\$0.00	\$0.06
Material,Outer Rubber Layer,17mm-OD Wrapped Hose	1	EPDM (Extrusion Grade)	\$4.43	0.0150	0.0150	\$0.00	\$0.07
Material,Outer EPDM Covering,17mm-OD Wrapped Hose	1	EPDM Covering	By Area	0.0021	-	\$0.00	\$0.04

# Connector 2 Asm, Hose Section Asm



\...  
 \Line 2 Asm, Front Refrigerant Line Bundle Asm  
 \Hose Section Asm, Line 2 Asm  
 \Connector 2 Asm, Hose Section Asm  
**Assembly Summary**

<b>Parts</b>	<b>6</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>6</b>
<b>Steps</b>	<b>86</b>
<b>Fastenings</b>	<b>5</b>
<b>Right First Time</b>	<b>99.39 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>3.47</b>
<b>Total Weight (kg)</b>	<b>0.06</b>

<b>Material Cost**</b>	<b>\$0.48</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$1.52</b>
<b>Q Burden</b>	<b>\$0.09</b>
<b>SG&amp;A</b>	<b>\$0.24</b>
<b>Manufacturing Cost*</b>	<b>\$2.33</b>

\* Excluding tooling, ER&D, logistics, and profit margin  
 \*\* Includes material cost and purchased parts cost

# Connector 2 Asm,Hose Section Asm



## Connector 2 Asm,Hose Section Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Connecting Block,Connector 2 Asm	1	1	0	38	0	99.88 %	0.00	0.00	0.00	0.92	0.0320
12mm End Cap,Connector 2 Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.01	0.0003
Connecting Tube, Hose Section Asm	1	1	0	9	0	99.90 %	0.00	0.00	0.00	0.17	0.0143
Assemble Connector 2	1	2	4	9	4	99.78 %	0.00	0.00	1.07	0.00	0.0009
Refrigerant Line Crimp Fitting,Line 2 Asm	1	1	0	21	0	99.93 %	0.00	0.00	0.27	0.17	0.0114
Assemble Refrigerant Line Crimp Fitting	1	0	1	4	1	99.92 %	0.00	0.00	0.86	0.00	0.0000

## Connector 2 Asm,Hose Section Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Connecting Block,Connector 2 Asm	\$0.00	\$0.29	\$0.00	\$0.00	\$0.00	\$0.53	\$0.02	\$0.10	\$0.94
12mm End Cap,Connector 2 Asm	\$0.00	\$0.01	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.02
Connecting Tube, Hose Section Asm	\$0.00	\$0.07	\$0.00	\$0.00	\$0.00	\$0.06	\$0.02	\$0.02	\$0.16
Assemble Connector 2	\$0.04	\$0.00	\$0.00	\$0.00	\$0.45	\$0.00	\$0.03	\$0.05	\$0.57
Refrigerant Line Crimp Fitting,Line 2 Asm	\$0.00	\$0.07	\$0.00	\$0.00	\$0.08	\$0.05	\$0.01	\$0.02	\$0.24
Assemble Refrigerant Line Crimp Fitting	\$0.00	\$0.00	\$0.00	\$0.00	\$0.36	\$0.00	\$0.01	\$0.04	\$0.41

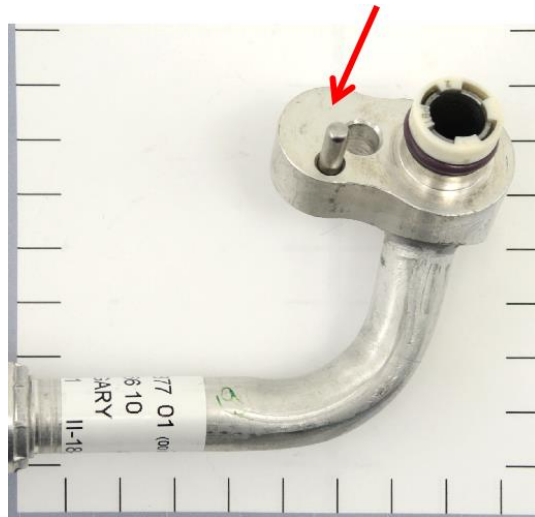
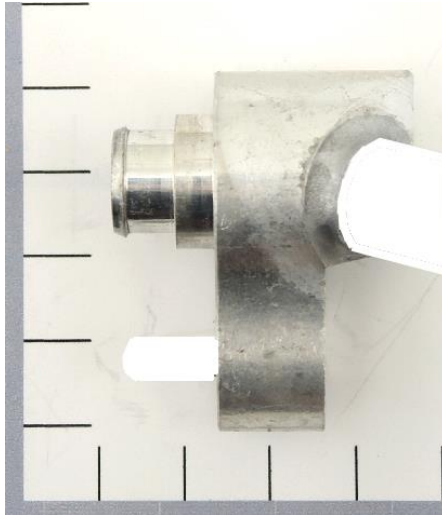
## Detailed Summary

<b>Parts</b>	<b>6</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>6</b>
<b>Steps</b>	<b>86</b>
<b>Fastenings</b>	<b>5</b>
<b>Right First Time</b>	<b>99.39%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>2.19</b>
<b>Supplier Fab. Time (Min)</b>	<b>1.28</b>
<b>Total Weight (kg)</b>	<b>0.06</b>
<b>Purchased Part Cost</b>	<b>\$0.04</b>
<b>Material Cost</b>	<b>\$0.44</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.88</b>
<b>Supplier Fab. Cost</b>	<b>\$0.64</b>
<b>Q Burden</b>	<b>\$0.09</b>
<b>SG&amp;A</b>	<b>\$0.24</b>
<b>Manufacturing Cost*</b>	<b>\$2.33</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connecting Block, Connector 2 Asm



\...  
\Connector 2 Asm,Hose Section Asm  
\Connecting Block,Connector 2 Asm  
\Connecting Block Process

## Process Summary

<b>Right First Time</b>	<b>99.88 %</b>
<b>Process Time (Sec)</b>	<b>55.05</b>
<b>Total Weight (kg)</b>	<b>0.03</b>

<b>Material Cost**</b>	<b>\$0.29</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.53</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.10</b>
<b>Manufacturing Cost*</b>	<b>\$0.94</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connecting Block, Connector 2 Asm



**MUNRO**  
& ASSOCIATES, INC.

## Connecting Block Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.95	HUN	\$0.02	99.99 %	\$0.00
Deburr	4.00	1	0.25	22.62	HUN	\$0.03	99.99 %	\$0.00
CNC Machine	43.14	1	0.25	38.22	HUN	\$0.46	99.93 %	\$0.01
Cut Off	2.82	1	0.25	24.32	HUN	\$0.02	99.98 %	\$0.00
2200 Ton Extrusion Press	0.09	1	4.00	494.65	HUN	\$0.01	99.99 %	\$0.00

## Connecting Block Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Connecting Block	1	Aluminum 6061 - Bar Stock	\$3.06	0.0320	0.0943	\$0.00	\$0.29

# 12mm End Cap, Connector 2 Asm



\...  
\Connector 2 Asm,Hose Section Asm  
\12mm End Cap,Connector 2 Asm  
\End Cap Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	0.88
Total Weight (kg)	0.00

Material Cost**	\$0.01
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.00
Q Burden	\$0.00
SG&A	\$0.00
Manufacturing Cost*	\$0.02



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# 12mm End Cap, Connector 2 Asm



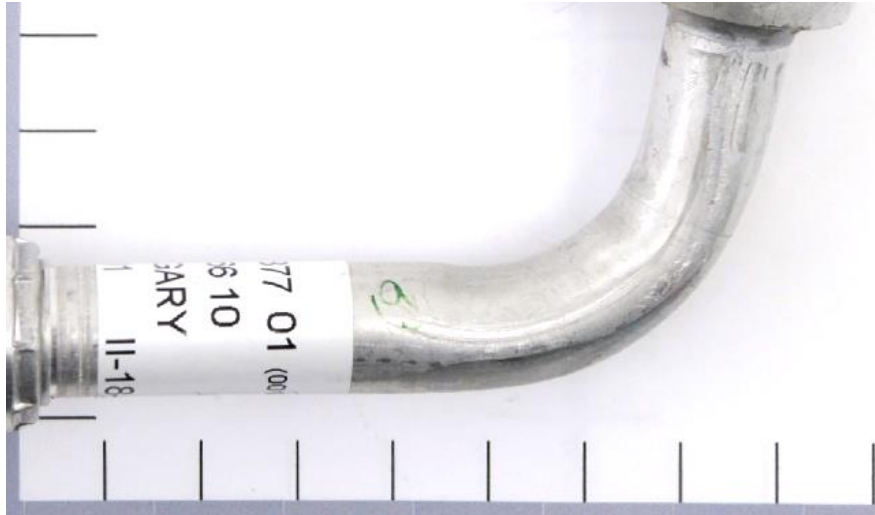
## End Cap Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
55Ton Injection Molding Press	7.04	8	0.25	14.89	HUN	\$0.00	99.99%	\$0.00

## End Cap Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material,End Cap	1	PBT	\$3.06	0.0003	0.0003	\$0.00	\$0.01

# Connecting Tube, Hose Section Asm

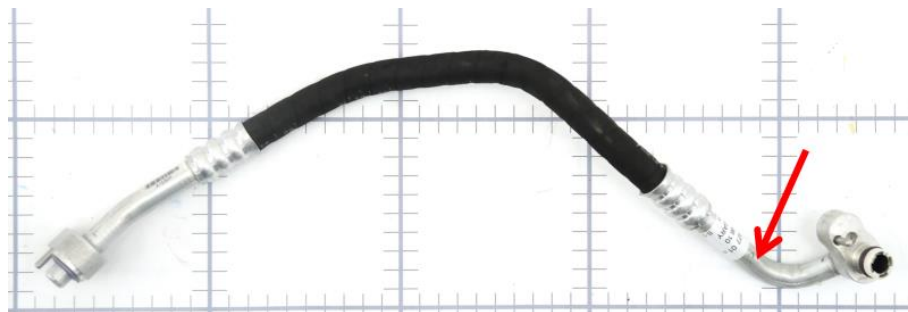


- \...
- \Connector 2 Asm,Hose Section Asm
- \Connecting Tube, Hose Section Asm
- \Connecting Tube Process

## Process Summary

<b>Right First Time</b>	<b>99.90 %</b>
<b>Process Time (Sec)</b>	<b>10.40</b>
<b>Total Weight (kg)</b>	<b>0.01</b>

<b>Material Cost**</b>	<b>\$0.07</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.06</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.02</b>
<b>Manufacturing Cost*</b>	<b>\$0.16</b>



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connecting Tube, Hose Section Asm



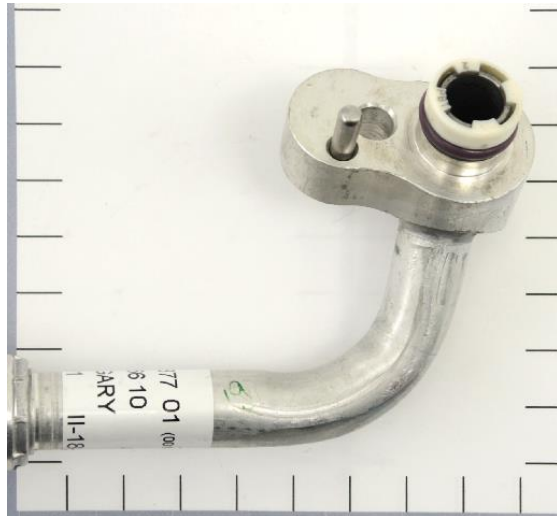
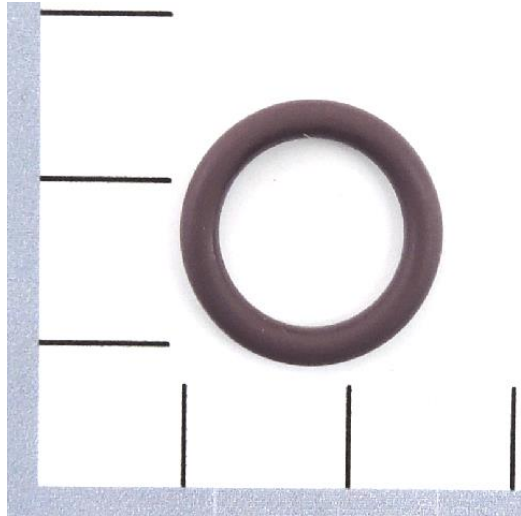
## Connecting Tube Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.95	HUN	\$0.02	99.99%	\$0.00
Tube Bending	5.40	1	0.25	26.59	HUN	\$0.04	99.91%	\$0.01

## Connecting Tube Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Connecting Tube	1	Aluminum 3003 - Clad Seamless Tube	\$5.00	0.0143	0.0143	\$0.00	\$0.07

# Assemble Connector 2



\...  
 \Hose Section Asm,Line 2 Asm  
 \Connector 2 Asm,Hose Section Asm  
 \Assemble Connector 2

## Process Summary

<b>Right First Time</b>	<b>99.78 %</b>
<b>Process Time (Sec)</b>	<b>64.34</b>
<b>Total Weight (kg)</b>	<b>0.00</b>

<b>Material Cost**</b>	<b>\$0.04</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.45</b>
<b>Q Burden</b>	<b>\$0.03</b>
<b>SG&amp;A</b>	<b>\$0.05</b>
<b>Manufacturing Cost*</b>	<b>\$0.57</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Connector 2



## Assemble Connector 2

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	64.34	1	1.00	24.91	HUN	\$0.45	99.78 %	\$0.03

## Assemble Connector 2

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
11mm O-Ring,Connector 2.Asm	1	Commodity Item	Purchased	0.0002	-	\$0.03	\$0.00
Guide Pin,Connector 2.Asm	1	Commodity Item	Purchased	0.0007	-	\$0.01	\$0.00

# Refrigerant Line Crimp Fitting, Line 2 Asm



\...

\Connector 2 Asm, Hose Section Asm

\Refrigerant Line Crimp Fitting, Line 2 Asm

\Hose Crimp Fitting Process

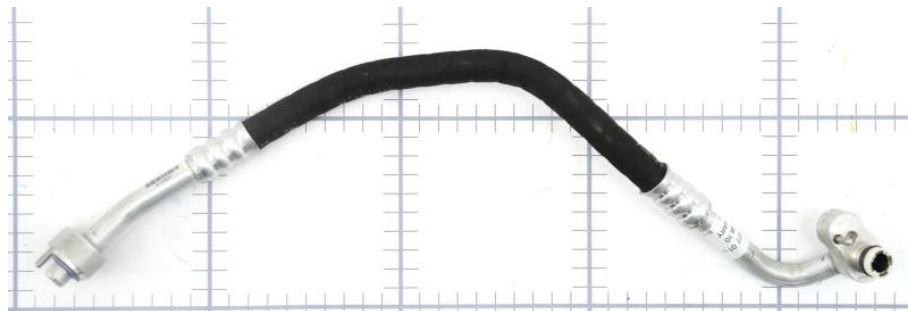
## Process Summary

Right First Time	99.93 %
Process Time (Sec)	26.32
Total Weight (kg)	0.01

Material Cost**	\$0.07
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.13
Q Burden	\$0.01
SG&A	\$0.02
Manufacturing Cost*	\$0.24

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Refrigerant Line Crimp Fitting, Line 2 Asm



## Hose Crimp Fitting Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Automated Asm	16.00	1	0.25	18.11	HUN	\$0.08	99.98 %	\$0.00
Wash	5.00	1	0.25	11.95	HUN	\$0.02	99.99 %	\$0.00
Debur	3.00	1	0.25	22.62	HUN	\$0.02	99.99 %	\$0.00
Circular Saw	2.32	1	0.25	24.32	HUN	\$0.02	99.97 %	\$0.01

## Hose Crimp Fitting Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Refeferant Hose Crimp Fitting	1	Aluminum 3003 - Seamless Tube	\$6.00	0.0114	0.0114	\$0.00	\$0.07

# Assemble Refrigerant Line Crimp Fitting

No Commodity Items  
Required for This  
Process



- \...
- \Hose Section Asm,Line 2 Asm
- \Connector 2 Asm,Hose Section Asm
- \Assemble Refrigerant Line Crimp Fitting

## Process Summary

Right First Time	99.92 %
Process Time (Sec)	51.34
Total Weight (kg)	0.00
Material Cost**	\$0.00
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.36
Q Burden	\$0.01
SG&A	\$0.04
Manufacturing Cost*	\$0.41

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Assemble Refrigerant Line Crimp Fitting

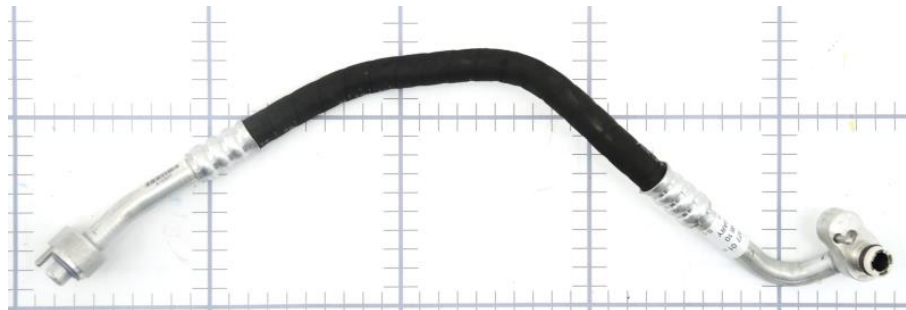
## Assemble Refrigerant Line Crimp Fitting

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
<a href="#">Supplier Manual Asm</a>	51.34	1	1.00	24.91	HUN	\$0.36	99.92%	\$0.01

## Assemble Refrigerant Line Crimp Fitting

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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No Commodity Items  
Required for This  
Process



\...

\Line 2 Asm, Front Refrigerant Line Bundle Asm  
\Hose Section Asm, Line 2 Asm  
\Assemble Hose Section

## Process Summary

Right First Time	99.79 %
Process Time (Sec)	22.00
Total Weight (kg)	0.00

Material Cost**	\$0.00
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.14
Q Burden	\$0.03
SG&A	\$0.02
Manufacturing Cost*	\$0.19

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Hose Section



## Assemble Hose Section

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Automated Asm	22.00	1	0.25	22.73	HUN	\$0.14	99.79%	\$0.03

## Assemble Hose Section

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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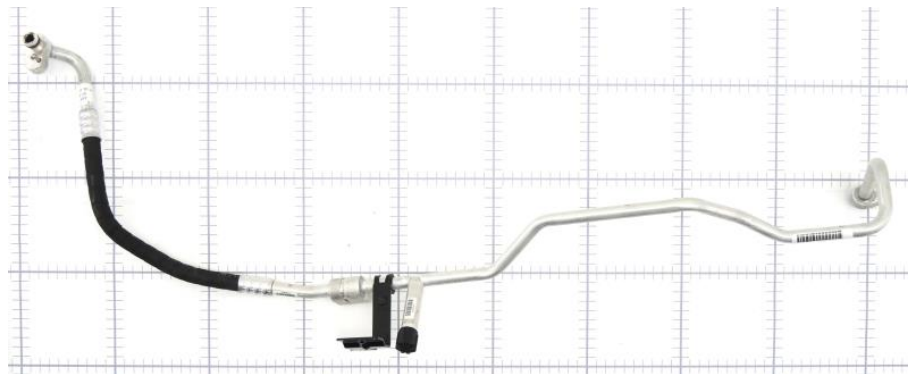


\...  
 \Front Refrigerant Line Bundle Asm  
 \Line 2 Asm, Front Refrigerant Line Bundle Asm  
 \Assemble Line 2

## Process Summary

<b>Right First Time</b>	<b>99.70 %</b>
<b>Process Time (Sec)</b>	<b>29.00</b>
<b>Total Weight (kg)</b>	<b>0.01</b>

<b>Material Cost**</b>	<b>\$0.13</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.20</b>
<b>Q Burden</b>	<b>\$0.05</b>
<b>SG&amp;A</b>	<b>\$0.03</b>
<b>Manufacturing Cost*</b>	<b>\$0.40</b>



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Line 2



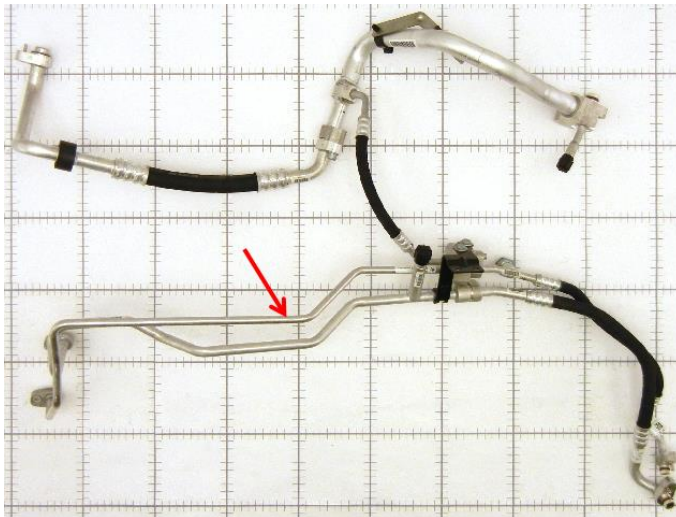
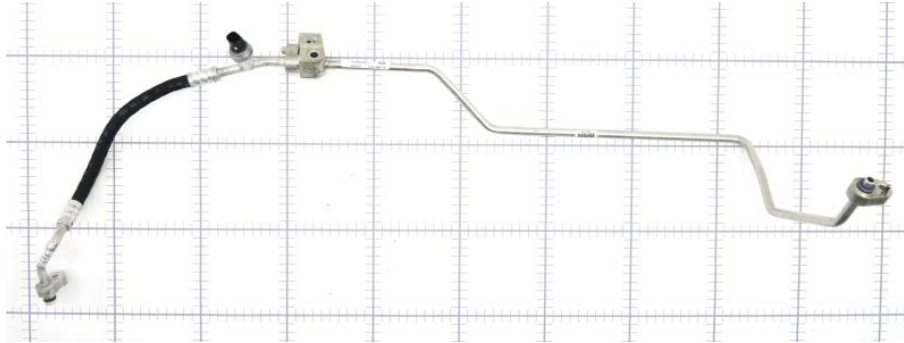
## Assemble Line 2

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	29.00	1	1.00	24.91	HUN	\$0.20	99.70%	\$0.05

## Assemble Line 2

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
M6x25mm-Torx Bolt	1	Commodity Item	Purchased	0.0085	-	\$0.03	\$0.00
Label,Refrigerant Line BundleLine 2 Asm	1	Commodity Item	Purchased	0.0001	-	\$0.10	\$0.00

# Line 3 Asm, Front Refrigerant Line Bundle Asm



\...

\Cooling Pack

\Front Refrigerant Line Bundle Asm

\Line 3 Asm, Front Refrigerant Line Bundle Asm

## Assembly Summary

<b>Parts</b>	<b>30</b>
<b>Fasteners</b>	<b>1</b>
<b>Part Numbers</b>	<b>24</b>
<b>Steps</b>	<b>377</b>
<b>Fastenings</b>	<b>30</b>
<b>Right First Time</b>	<b>96.79 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>14.66</b>
<b>Total Weight (kg)</b>	<b>0.34</b>

<b>Material Cost**</b>	<b>\$4.78</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$6.79</b>
<b>Q Burden</b>	<b>\$0.49</b>
<b>SG&amp;A</b>	<b>\$1.12</b>
<b>Manufacturing Cost*</b>	<b>\$13.18</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Line 3 Asm, Front Refrigerant Line Bundle Asm



## Line 3 Asm, Front Refrigerant Line Bundle Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Section 1 Asm,Line 3 Asm	1	8	8	140	8	99.01 %	0.00	0.00	1.74	2.85	0.1697
Hose Section Asm,Line3 Asm	1	21	20	228	20	98.03 %	0.00	0.00	6.12	3.48	0.1618
Assemble Line 3	1	1	2	7	2	99.73 %	0.00	0.00	0.47	0.00	0.0085

## Line 3 Asm, Front Refrigerant Line Bundle Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Section 1 Asm,Line 3 Asm	\$0.16	\$0.96	\$0.00	\$0.00	\$0.72	\$1.57	\$0.15	\$0.39	\$3.95
Hose Section Asm,Line3 Asm	\$2.78	\$0.85	\$0.00	\$0.00	\$2.48	\$1.83	\$0.30	\$0.70	\$8.94
Assemble Line 3	\$0.03	\$0.00	\$0.00	\$0.00	\$0.19	\$0.00	\$0.04	\$0.02	\$0.29

# Line 3 Asm, Front Refrigerant Line Bundle Asm

## Detailed Summary

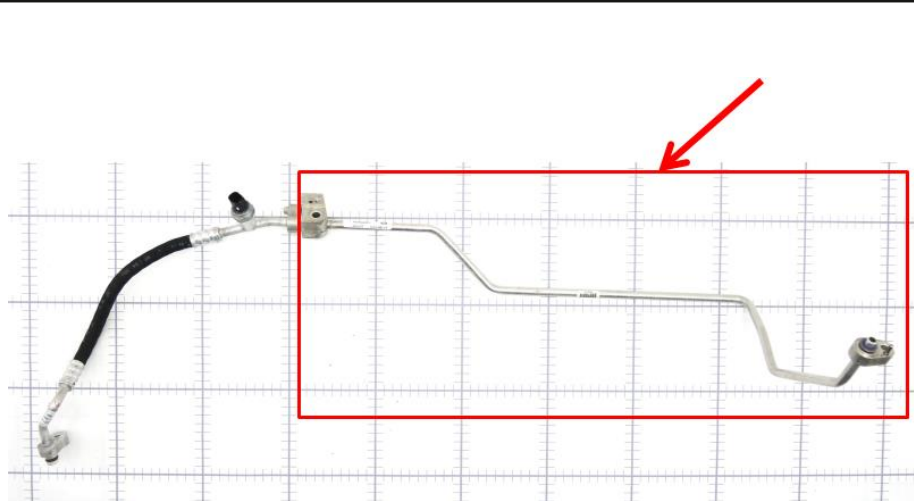
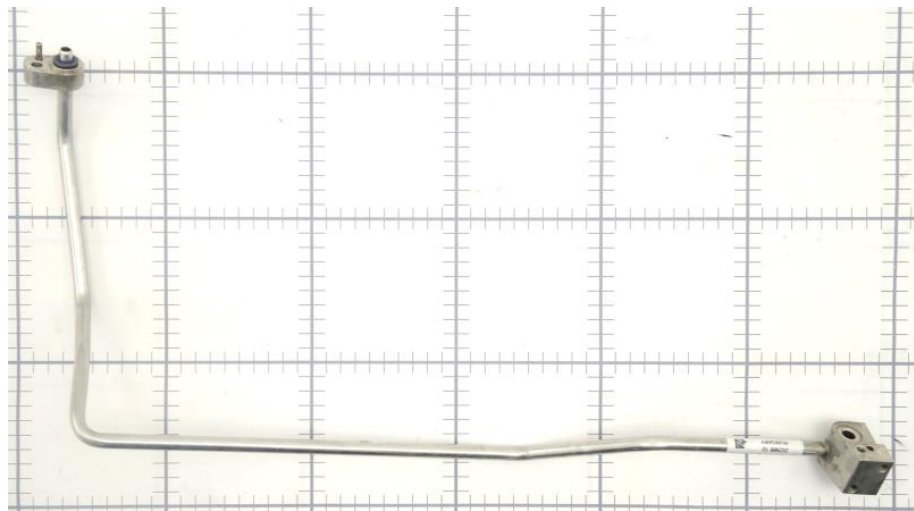
<b>Parts</b>	<b>30</b>
<b>Fasteners</b>	<b>1</b>
<b>Part Numbers</b>	<b>24</b>
<b>Steps</b>	<b>377</b>
<b>Fastenings</b>	<b>30</b>
<b>Right First Time</b>	<b>96.79%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>8.33</b>
<b>Supplier Fab. Time (Min)</b>	<b>6.33</b>
<b>Total Weight (kg)</b>	<b>0.34</b>
<b>Purchased Part Cost</b>	
	<b>\$2.97</b>
<b>Material Cost</b>	
	<b>\$1.81</b>
<b>OEM Asm. Cost</b>	
	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	
	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	
	<b>\$3.40</b>
<b>Supplier Fab. Cost</b>	
	<b>\$3.40</b>
<b>Q Burden</b>	
	<b>\$0.49</b>
<b>SG&amp;A</b>	
	<b>\$1.12</b>
<b>Manufacturing Cost*</b>	
	<b>\$13.18</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Section 1 Asm, Line 3 Asm



\...  
 \Front Refrigerant Line Bundle Asm  
 \Line 3 Asm, Front Refrigerant Line Bundle Asm  
 \Section 1 Asm, Line 3 Asm

## Assembly Summary

Parts	8
Fasteners	0
Part Numbers	8
Steps	140
Fastenings	8
Right First Time	99.01 %
OEM Process Time (Min)	0.00
Supplier Process Time (Min)	4.59
Total Weight (kg)	0.17

Material Cost**	\$1.12
OEM Process Cost	\$0.00
Supplier Process Cost	\$2.29
Q Burden	\$0.15
SG&A	\$0.39
Manufacturing Cost*	\$3.95

\* Excluding tooling, ER&D, logistics, and profit margin  
 \*\* Includes material cost and purchased parts cost

# Section 1 Asm,Line 3 Asm



## Section 1 Asm,Line 3 Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Connector Asm,Section 1 Asm	1	4	2	50	2	99.69 %	0.00	0.00	0.33	0.98	0.0271
Connector Block 2,Section 1 Asm	1	1	0	61	0	99.84 %	0.00	0.00	0.00	1.48	0.0781
Connecting Tube,Section 1 Asm	1	1	0	14	0	99.71 %	0.00	0.00	0.00	0.38	0.0643
Assemble Section 1	1	2	6	12	6	99.76 %	0.00	0.00	1.41	0.00	0.0002

## Section 1 Asm,Line 3 Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Connector Asm,Section 1 Asm	\$0.01	\$0.22	\$0.00	\$0.00	\$0.14	\$0.51	\$0.05	\$0.10	\$1.03
Connector Block 2,Section 1 Asm	\$0.00	\$0.35	\$0.00	\$0.00	\$0.00	\$0.89	\$0.02	\$0.15	\$1.42
Connecting Tube,Section 1 Asm	\$0.00	\$0.39	\$0.00	\$0.00	\$0.00	\$0.16	\$0.04	\$0.07	\$0.66
Assemble Section 1	\$0.15	\$0.00	\$0.00	\$0.00	\$0.59	\$0.00	\$0.04	\$0.07	\$0.85

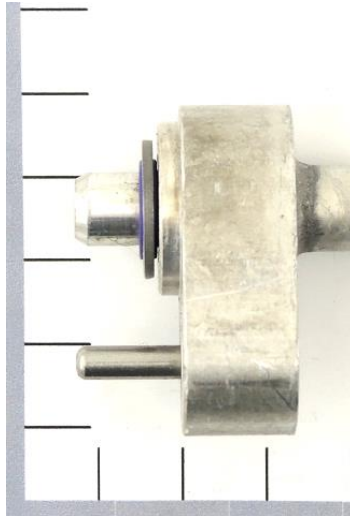
## Detailed Summary

<b>Parts</b>	<b>8</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>8</b>
<b>Steps</b>	<b>140</b>
<b>Fastenings</b>	<b>8</b>
<b>Right First Time</b>	<b>99.01%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>1.74</b>
<b>Supplier Fab. Time (Min)</b>	<b>2.85</b>
<b>Total Weight (kg)</b>	<b>0.17</b>
<b>Purchased Part Cost</b>	<b>\$0.16</b>
<b>Material Cost</b>	<b>\$0.96</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.72</b>
<b>Supplier Fab. Cost</b>	<b>\$1.57</b>
<b>Q Burden</b>	<b>\$0.15</b>
<b>SG&amp;A</b>	<b>\$0.39</b>
<b>Manufacturing Cost*</b>	<b>\$3.95</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connector Asm, Section 1 Asm



\...  
 \Line 3 Asm, Front Refrigerant Line Bundle Asm  
 \Section 1 Asm, Line 3 Asm  
 \Connector Asm, Section 1 Asm

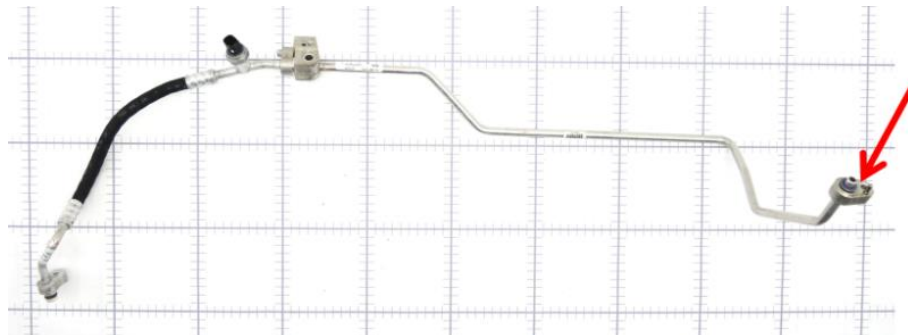
## Assembly Summary

<b>Parts</b>	<b>4</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>4</b>
<b>Steps</b>	<b>50</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.69 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>1.32</b>
<b>Total Weight (kg)</b>	<b>0.03</b>

<b>Material Cost**</b>	<b>\$0.23</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.65</b>
<b>Q Burden</b>	<b>\$0.05</b>
<b>SG&amp;A</b>	<b>\$0.10</b>
<b>Manufacturing Cost*</b>	<b>\$1.03</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Connector Asm,Section 1 Asm



## Connector Asm,Section 1 Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Connecting Block,Connector Asm	1	1	0	34	0	99.88 %	0.00	0.00	0.00	0.80	0.0254
8.5mm Sealing Ring,Connector Asm	1	2	0	8	0	99.96 %	0.00	0.00	0.00	0.18	0.0010
Assemble Connector 1	1	1	2	6	2	99.85 %	0.00	0.00	0.33	0.00	0.0007

## Connector Asm,Section 1 Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Connecting Block,Connector Asm	\$0.00	\$0.20	\$0.00	\$0.00	\$0.00	\$0.46	\$0.02	\$0.08	\$0.75
8.5mm Sealing Ring,Connector Asm	\$0.00	\$0.02	\$0.00	\$0.00	\$0.00	\$0.06	\$0.01	\$0.01	\$0.09
Assemble Connector 1	\$0.01	\$0.00	\$0.00	\$0.00	\$0.14	\$0.00	\$0.02	\$0.02	\$0.19

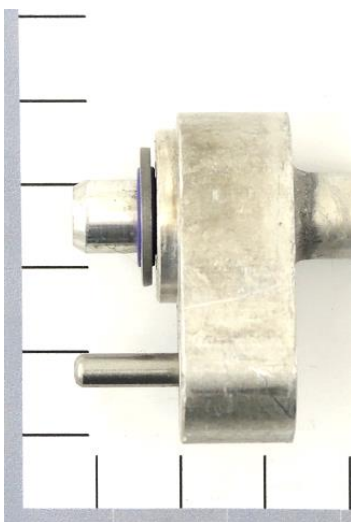
## Detailed Summary

<b>Parts</b>	<b>4</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>4</b>
<b>Steps</b>	<b>50</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.69%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.33</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.98</b>
<b>Total Weight (kg)</b>	<b>0.03</b>
<hr/>	
<b>Purchased Part Cost</b>	<b>\$0.01</b>
<b>Material Cost</b>	<b>\$0.22</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.14</b>
<b>Supplier Fab. Cost</b>	<b>\$0.51</b>
<b>Q Burden</b>	<b>\$0.05</b>
<b>SG&amp;A</b>	<b>\$0.10</b>
<b>Manufacturing Cost*</b>	<b>\$1.03</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connecting Block, Connector Asm



\...

- \Connector Asm, Section 1 Asm
- \Connecting Block, Connector Asm
- \Connecting Block Process

## Process Summary

<b>Right First Time</b>	<b>99.88 %</b>
<b>Process Time (Sec)</b>	<b>48.15</b>
<b>Total Weight (kg)</b>	<b>0.03</b>

<b>Material Cost**</b>	<b>\$0.20</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.46</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.08</b>
<b>Manufacturing Cost*</b>	<b>\$0.75</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connecting Block, Connector Asm



**MUNRO**  
& ASSOCIATES, INC.

## Connecting Block Process

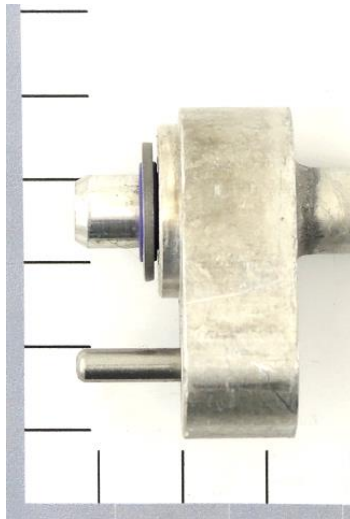
Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.95	HUN	\$0.02	99.99 %	\$0.00
Deburr	4.00	1	0.25	22.62	HUN	\$0.03	99.99 %	\$0.00
CNC Machine	36.29	1	0.25	38.22	HUN	\$0.39	99.94 %	\$0.01
Cut Off	2.79	1	0.25	24.32	HUN	\$0.02	99.98 %	\$0.00
2200 Ton Extrusion Press	0.07	1	4.00	494.65	HUN	\$0.01	99.99 %	\$0.00

## Connecting Block Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Connecting Block	1	Aluminum 6061 - Billet Stock	\$2.80	0.0254	0.0704	\$0.00	\$0.20



# 8.5mm Sealing Ring, Connector Asm



\...

\Connector Asm, Section 1 Asm

\8.5mm Sealing Ring, Connector Asm

\8.5mm Sealing Ring Process

## Process Summary

<b>Right First Time</b>	<b>99.96 %</b>
<b>Process Time (Sec)</b>	<b>10.90</b>
<b>Total Weight (kg)</b>	<b>0.00</b>

<b>Material Cost**</b>	<b>\$0.02</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.06</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.01</b>
<b>Manufacturing Cost*</b>	<b>\$0.09</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# 8.5mm Sealing Ring, Connector Asm



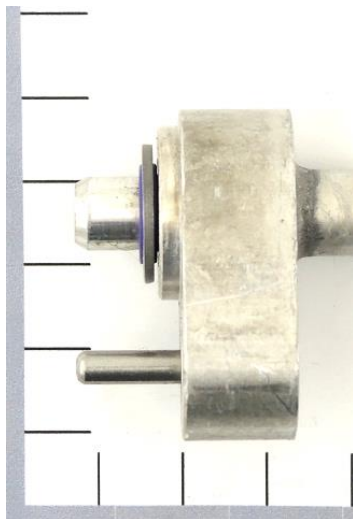
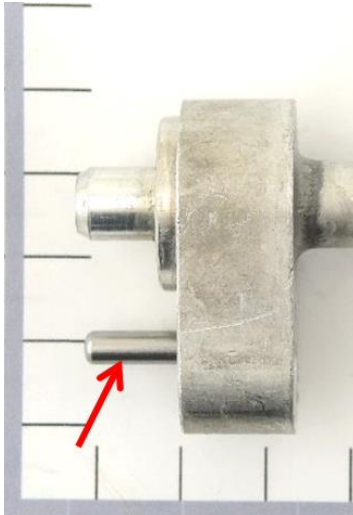
## 8.5mm Sealing Ring Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
55 Ton Injection Molding Press	42.40	8	0.25	23.26	HUN	\$0.03	99.99%	\$0.00
Wash	3.50	1	0.25	11.95	HUN	\$0.01	99.99%	\$0.00
Deburr	1.50	1	0.25	22.62	HUN	\$0.01	99.99%	\$0.00
25 Ton Stamping Press	0.60	1	0.25	14.05	HUN	\$0.00	99.99%	\$0.00

## 8.5mm Sealing Ring Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, O-Ring Seal	1	EPDM	\$4.04	0.0003	0.0003	\$0.00	\$0.01
Material, Outer Ring	1	Steel 1018 - Coil Stock	\$1.21	0.0007	0.0008	\$0.00	\$0.01

# Assemble Connector 1



\...

\Section 1 Asm,Line 3 Asm

\Connector Asm,Section 1 Asm

\Assemble Connector 1

## Process Summary

Right First Time	99.85 %
Process Time (Sec)	20.00
Total Weight (kg)	0.00

Material Cost**	\$0.01
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.14
Q Burden	\$0.02
SG&A	\$0.02
Manufacturing Cost*	\$0.19

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Connector 1

## Assemble Connector 1

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	20.00	1	1.00	24.91	HUN	\$0.14	99.85%	\$0.02

## Assemble Connector 1

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Guide Pin, Connector Asm	1	Commodity Item	Purchased	0.0007	-	\$0.01	\$0.00

# Connector Block 2, Section 1 Asm



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\Section 1 Asm, Line 3 Asm

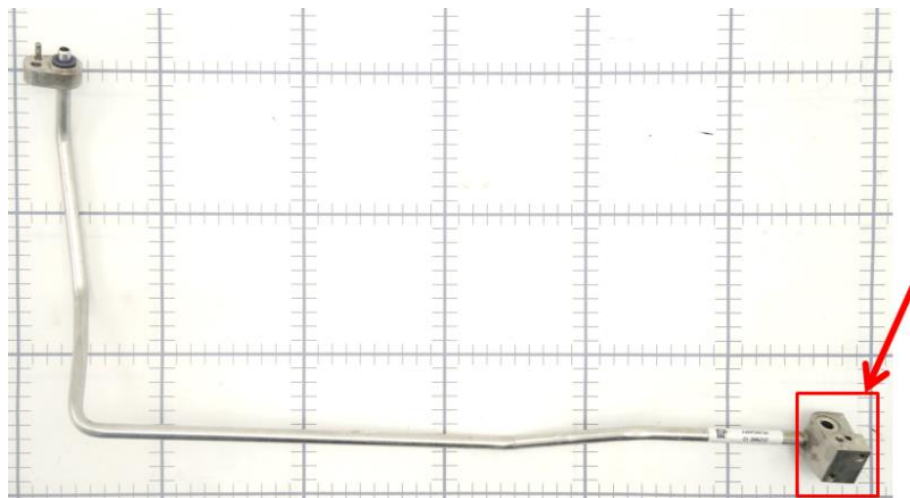
\Connector Block 2, Section 1 Asm

\Connecting Block 2 Process

## Process Summary

Right First Time	99.84 %
Process Time (Sec)	88.97
Total Weight (kg)	0.08

Material Cost**	\$0.35
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.89
Q Burden	\$0.02
SG&A	\$0.15
Manufacturing Cost*	\$1.42



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connector Block 2, Section 1 Asm



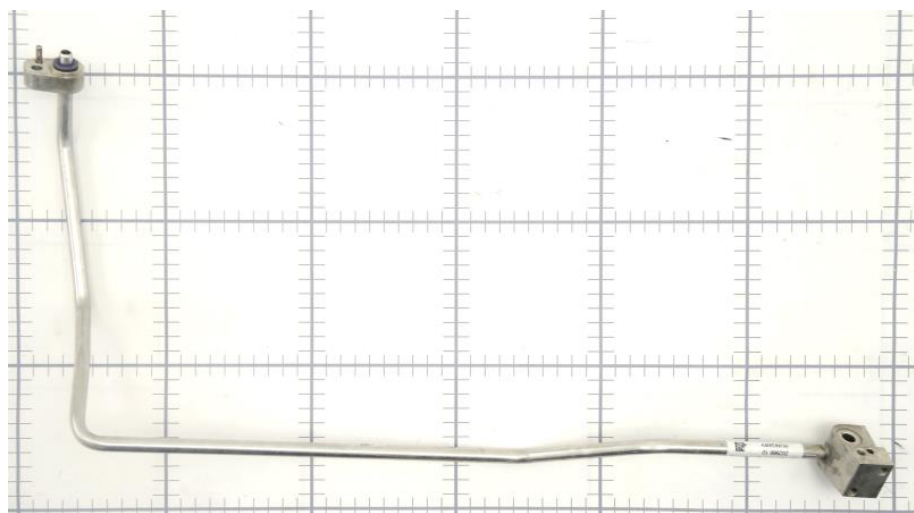
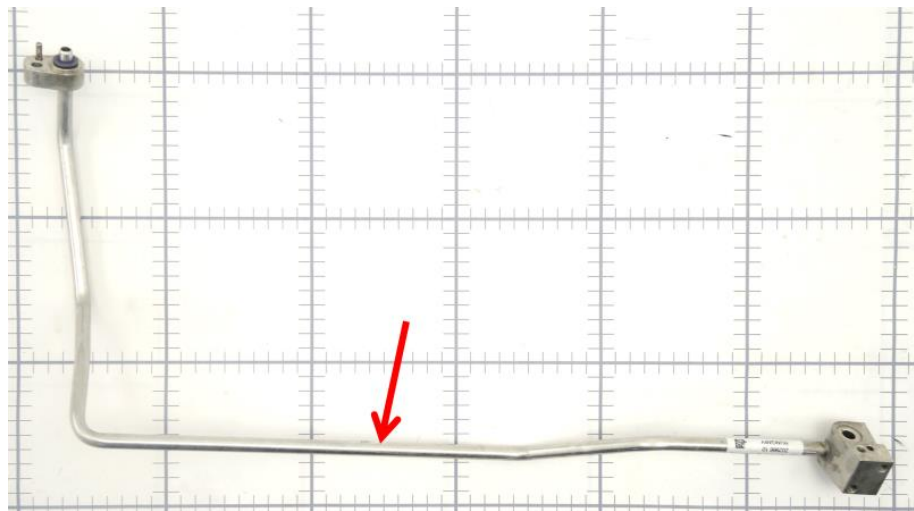
## Connecting Block 2 Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.95	HUN	\$0.02	99.99 %	\$0.00
Deburr	4.00	1	0.25	22.62	HUN	\$0.03	99.99 %	\$0.00
CNC Machine	76.98	1	0.25	38.22	HUN	\$0.82	99.90 %	\$0.02
Cut Off	2.87	1	0.25	24.32	HUN	\$0.02	99.98 %	\$0.00
2200 Ton Extrusion Press	0.12	1	4.00	494.65	HUN	\$0.02	99.99 %	\$0.00

## Connecting Block 2 Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Connecting Block 2	1	Aluminum 6061 - Billet Stock	\$2.80	0.0781	0.1256	\$0.00	\$0.35

# Connecting Tube, Section 1 Asm



\...

- \Section 1 Asm, Line 3 Asm
- \Connecting Tube, Section 1 Asm
- \Connecting Tube Process

## Process Summary

Right First Time	99.71 %
Process Time (Sec)	23.00
Total Weight (kg)	0.06

Material Cost**	\$0.39
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.16
Q Burden	\$0.04
SG&A	\$0.07
Manufacturing Cost*	\$0.66

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connecting Tube, Section 1 Asm



## Connecting Tube Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	9.00	1	0.25	21.64	HUN	\$0.05	99.99%	\$0.00
Tube Bending	14.00	1	0.25	26.69	HUN	\$0.10	99.72%	\$0.04

## Connecting Tube Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Connecting Tube	1	Aluminum 3003 - Seamless Tube	\$6.00	0.0643	0.0643	\$0.00	\$0.39



# Assemble Section 1



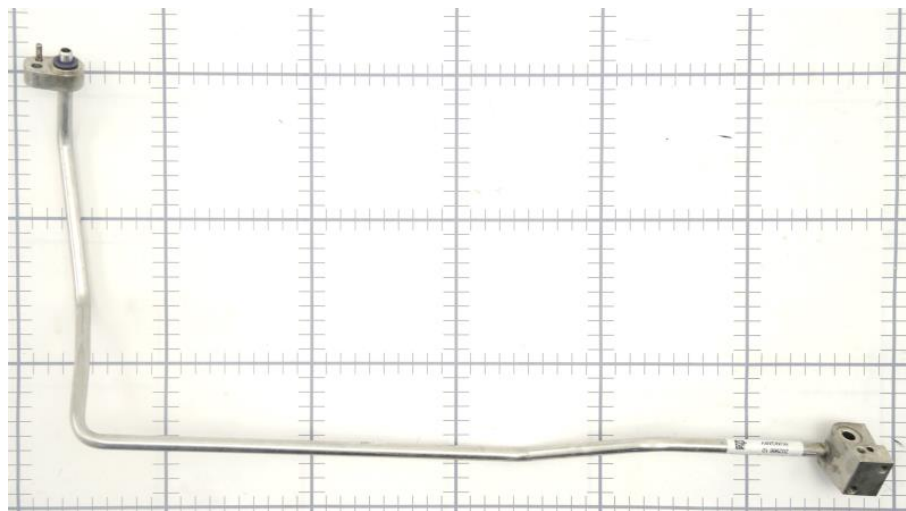
\...

\Line 3 Asm, Front Refrigerant Line Bundle Asm  
 \Section 1 Asm, Line 3 Asm  
 \Assemble Section 1

## Process Summary

<b>Right First Time</b>	<b>99.76 %</b>
<b>Process Time (Sec)</b>	<b>84.55</b>
<b>Total Weight (kg)</b>	<b>0.00</b>

<b>Material Cost**</b>	<b>\$0.15</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.59</b>
<b>Q Burden</b>	<b>\$0.04</b>
<b>SG&amp;A</b>	<b>\$0.07</b>
<b>Manufacturing Cost*</b>	<b>\$0.85</b>



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Section 1



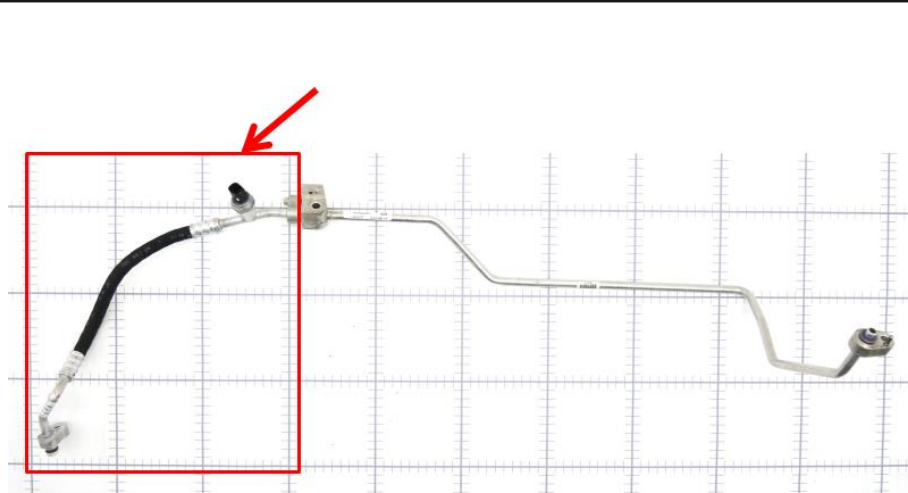
## Assemble Section 1

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	84.55	1	1.00	24.91	HUN	\$0.59	99.76%	\$0.04

## Assemble Section 1

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
QR Label,Front Refrigerant Line Bundle Asm	1	Commodity Item	Purchased	0.0001	-	\$0.10	\$0.00
Bar Code Label,Front Refrigerant Line Bundle Asm	1	Commodity Item	Purchased	0.0001	-	\$0.05	\$0.00

# Hose Section Asm, Line 3 Asm



\...  
 \Front Refrigerant Line Bundle Asm  
 \Line 3 Asm, Front Refrigerant Line Bundle Asm  
 \Hose Section Asm, Line 3 Asm

## Assembly Summary

<b>Parts</b>	<b>21</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>19</b>
<b>Steps</b>	<b>228</b>
<b>Fastenings</b>	<b>20</b>
<b>Right First Time</b>	<b>98.03 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>9.60</b>
<b>Total Weight (kg)</b>	<b>0.16</b>

<b>Material Cost**</b>	<b>\$3.63</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$4.31</b>
<b>Q Burden</b>	<b>\$0.30</b>
<b>SG&amp;A</b>	<b>\$0.70</b>
<b>Manufacturing Cost*</b>	<b>\$8.94</b>

\* Excluding tooling, ER&D, logistics, and profit margin  
 \*\* Includes material cost and purchased parts cost

# Hose Section Asm, Line 3 Asm



## Hose Section Asm, Line 3 Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Connector 1 Asm, Hose Section Asm	1	9	8	127	8	99.01 %	0.00	0.00	3.53	2.11	0.0874
14mm Hose, Hose Section Asm	1	4	0	4	0	99.96 %	0.00	0.00	0.00	0.09	0.0223
Connector 2 Asm, Hose Section Asm	1	6	6	82	6	99.34 %	0.00	0.00	1.98	1.29	0.0518
Assemble Hose Section	1	2	6	12	6	99.71 %	0.00	0.00	0.51	0.00	0.0002

## Hose Section Asm, Line 3 Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Connector 1 Asm, Hose Section Asm	\$2.54	\$0.38	\$0.00	\$0.00	\$1.43	\$1.07	\$0.15	\$0.42	\$6.00
14mm Hose, Hose Section Asm	\$0.00	\$0.17	\$0.00	\$0.00	\$0.00	\$0.10	\$0.01	\$0.03	\$0.31
Connector 2 Asm, Hose Section Asm	\$0.04	\$0.30	\$0.00	\$0.00	\$0.79	\$0.66	\$0.10	\$0.21	\$2.10
Assemble Hose Section	\$0.20	\$0.00	\$0.00	\$0.00	\$0.25	\$0.00	\$0.04	\$0.04	\$0.53

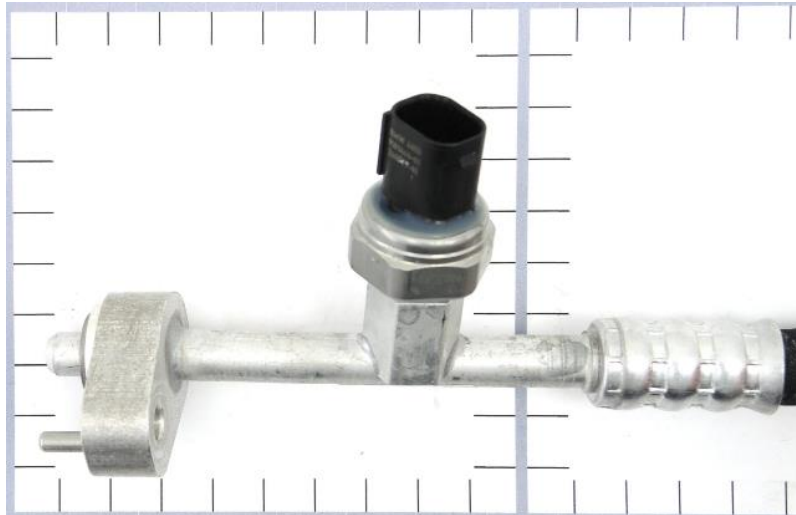
## Detailed Summary

<b>Parts</b>	<b>21</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>19</b>
<b>Steps</b>	<b>228</b>
<b>Fastenings</b>	<b>20</b>
<b>Right First Time</b>	<b>98.03%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>6.12</b>
<b>Supplier Fab. Time (Min)</b>	<b>3.48</b>
<b>Total Weight (kg)</b>	<b>0.16</b>
<b>Purchased Part Cost</b>	
	<b>\$2.78</b>
<b>Material Cost</b>	
	<b>\$0.85</b>
<b>OEM Asm. Cost</b>	
	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	
	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	
	<b>\$2.48</b>
<b>Supplier Fab. Cost</b>	
	<b>\$1.83</b>
<b>Q Burden</b>	
	<b>\$0.30</b>
<b>SG&amp;A</b>	
	<b>\$0.70</b>
<b>Manufacturing Cost*</b>	
	<b>\$8.94</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connector 1 Asm, Hose Section Asm



\...  
 \Line 3 Asm, Front Refrigerant Line Bundle Asm  
 \Hose Section Asm, Line 3 Asm  
 \Connector 1 Asm, Hose Section Asm

## Assembly Summary

Parts	9
Fasteners	0
Part Numbers	9
Steps	127
Fastenings	8
Right First Time	99.01 %
OEM Process Time (Min)	0.00
Supplier Process Time (Min)	5.64
Total Weight (kg)	0.09

Material Cost**	\$2.92
OEM Process Cost	\$0.00
Supplier Process Cost	\$2.50
Q Burden	\$0.15
SG&A	\$0.42
Manufacturing Cost*	\$6.00

\* Excluding tooling, ER&D, logistics, and profit margin  
 \*\* Includes material cost and purchased parts cost

# Connector 1 Asm,Hose Section Asm



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## Connector 1 Asm,Hose Section Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Connector Block Asm,Section 1 Asm	1	4	2	52	2	99.68 %	0.00	0.00	0.32	0.99	0.0271
Connecting Tube, Hose Section Asm	1	1	0	9	0	99.90 %	0.00	0.00	0.00	0.16	0.0072
Temperature Sensor Mount,Section 1 Asm	1	1	0	26	0	99.92 %	0.00	0.00	0.00	0.79	0.0085
Assemble Connector 1	1	2	5	11	5	99.66 %	0.00	0.00	2.25	0.00	0.0332
Hose Crimp Fitting, Hose Asm	1	1	0	21	0	99.93 %	0.00	0.00	0.27	0.17	0.0114
Assemble Hose Crimp	1	0	1	4	1	99.92 %	0.00	0.00	0.70	0.00	0.0000

## Connector 1 Asm,Hose Section Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Connector Block Asm,Section 1 Asm	\$0.01	\$0.22	\$0.00	\$0.00	\$0.13	\$0.52	\$0.05	\$0.10	\$1.03
Connecting Tube, Hose Section Asm	\$0.00	\$0.04	\$0.00	\$0.00	\$0.00	\$0.05	\$0.02	\$0.01	\$0.12
Temperature Sensor Mount,Section 1 Asm	\$0.00	\$0.05	\$0.00	\$0.00	\$0.00	\$0.44	\$0.01	\$0.06	\$0.56
Assemble Connector 1	\$2.53	\$0.00	\$0.00	\$0.00	\$0.93	\$0.00	\$0.05	\$0.19	\$3.70
Hose Crimp Fitting, Hose Asm	\$0.00	\$0.07	\$0.00	\$0.00	\$0.08	\$0.06	\$0.01	\$0.03	\$0.25
Assemble Hose Crimp	\$0.00	\$0.00	\$0.00	\$0.00	\$0.29	\$0.00	\$0.01	\$0.03	\$0.34

## Detailed Summary

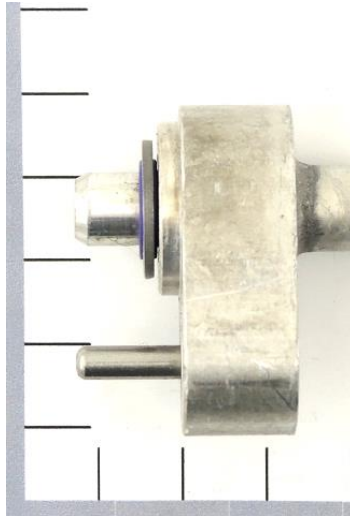
<b>Parts</b>	<b>9</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>9</b>
<b>Steps</b>	<b>127</b>
<b>Fastenings</b>	<b>8</b>
<b>Right First Time</b>	<b>99.01%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>3.53</b>
<b>Supplier Fab. Time (Min)</b>	<b>2.11</b>
<b>Total Weight (kg)</b>	<b>0.09</b>
<b>Purchased Part Cost</b>	<b>\$2.54</b>
<b>Material Cost</b>	<b>\$0.38</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$1.43</b>
<b>Supplier Fab. Cost</b>	<b>\$1.07</b>
<b>Q Burden</b>	<b>\$0.15</b>
<b>SG&amp;A</b>	<b>\$0.42</b>
<b>Manufacturing Cost*</b>	<b>\$6.00</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Connector Block Asm, Section 1 Asm



\...  
 \Hose Section Asm, Line 3 Asm  
 \Connector 1 Asm, Hose Section Asm  
 \Connector Block Asm, Section 1 Asm

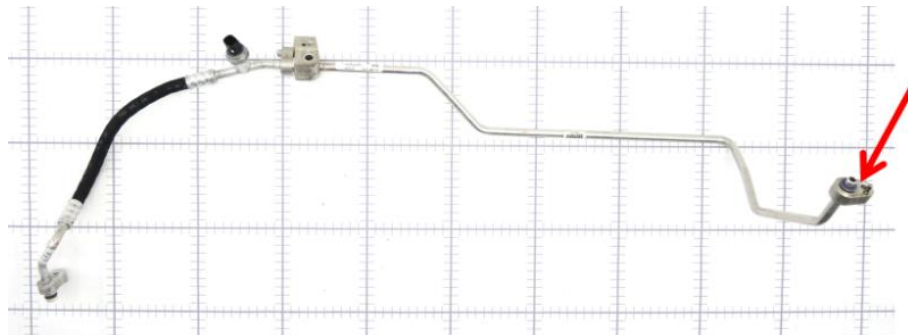
## Assembly Summary

<b>Parts</b>	<b>4</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>4</b>
<b>Steps</b>	<b>52</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.68 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>1.31</b>
<b>Total Weight (kg)</b>	<b>0.03</b>

<b>Material Cost**</b>	<b>\$0.23</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.65</b>
<b>Q Burden</b>	<b>\$0.05</b>
<b>SG&amp;A</b>	<b>\$0.10</b>
<b>Manufacturing Cost*</b>	<b>\$1.03</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Connector Block Asm, Section 1 Asm



## Connector Block Asm, Section 1 Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Connecting Block, Connector Asm	1	1	0	34	0	99.88 %	0.00	0.00	0.00	0.80	0.0254
8.5mm Sealing Ring, Connector Asm	1	2	0	10	0	99.96 %	0.00	0.00	0.00	0.19	0.0010
Assemble Connecting Block	1	1	2	6	2	99.85 %	0.00	0.00	0.32	0.00	0.0007

## Connector Block Asm, Section 1 Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Connecting Block, Connector Asm	\$0.00	\$0.20	\$0.00	\$0.00	\$0.00	\$0.46	\$0.02	\$0.08	\$0.75
8.5mm Sealing Ring, Connector Asm	\$0.00	\$0.02	\$0.00	\$0.00	\$0.00	\$0.06	\$0.01	\$0.01	\$0.10
Assemble Connecting Block	\$0.01	\$0.00	\$0.00	\$0.00	\$0.13	\$0.00	\$0.02	\$0.02	\$0.18

## Detailed Summary

<b>Parts</b>	<b>4</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>4</b>
<b>Steps</b>	<b>52</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.68%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.32</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.99</b>
<b>Total Weight (kg)</b>	<b>0.03</b>
<b>Purchased Part Cost</b>	<b>\$0.01</b>
<b>Material Cost</b>	<b>\$0.22</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.13</b>
<b>Supplier Fab. Cost</b>	<b>\$0.52</b>
<b>Q Burden</b>	<b>\$0.05</b>
<b>SG&amp;A</b>	<b>\$0.10</b>
<b>Manufacturing Cost*</b>	<b>\$1.03</b>

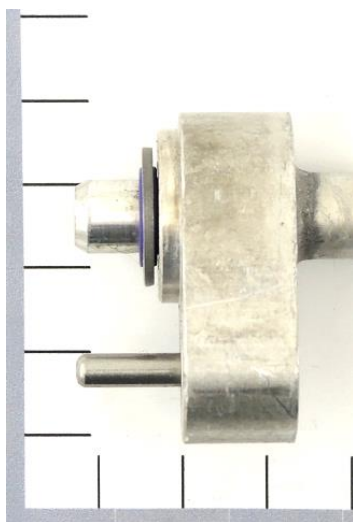
\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connecting Block, Connector Asm



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\...

\Connector Block Asm, Section 1 Asm

\Connecting Block, Connector Asm

\Connecting Block Process

## Process Summary

<b>Right First Time</b>	<b>99.88 %</b>
<b>Process Time (Sec)</b>	<b>48.15</b>
<b>Total Weight (kg)</b>	<b>0.03</b>

<b>Material Cost**</b>	<b>\$0.20</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.46</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.08</b>
<b>Manufacturing Cost*</b>	<b>\$0.75</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connecting Block, Connector Asm



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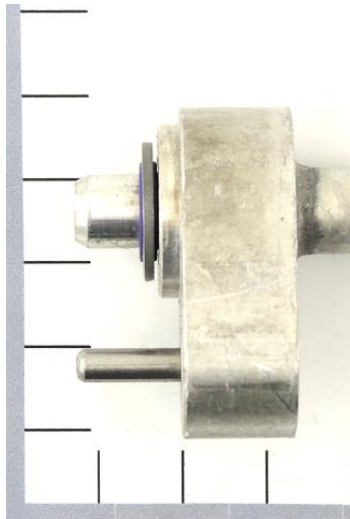
## Connecting Block Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.95	HUN	\$0.02	99.99 %	\$0.00
Deburr	4.00	1	0.25	22.62	HUN	\$0.03	99.99 %	\$0.00
CNC Machine	36.29	1	0.25	38.22	HUN	\$0.39	99.94 %	\$0.01
Cut Off	2.79	1	0.25	24.32	HUN	\$0.02	99.98 %	\$0.00
2200 Ton Extrusion Press	0.07	1	4.00	494.65	HUN	\$0.01	99.99 %	\$0.00

## Connecting Block Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Connecting Block	1	Aluminum 6061 - Billet Stock	\$2.80	0.0254	0.0704	\$0.00	\$0.20

# 8.5mm Sealing Ring, Connector Asm



\...

- \Connector Block Asm, Section 1 Asm
- \8.5mm Sealing Ring, Connector Asm
- \8.5mm Sealing Ring Process

## Process Summary

<b>Right First Time</b>	<b>99.96 %</b>
<b>Process Time (Sec)</b>	<b>11.40</b>
<b>Total Weight (kg)</b>	<b>0.00</b>

<b>Material Cost**</b>	<b>\$0.02</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.06</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.01</b>
<b>Manufacturing Cost*</b>	<b>\$0.10</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# 8.5mm Sealing Ring, Connector Asm



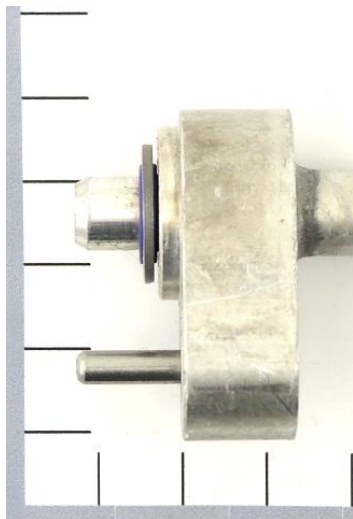
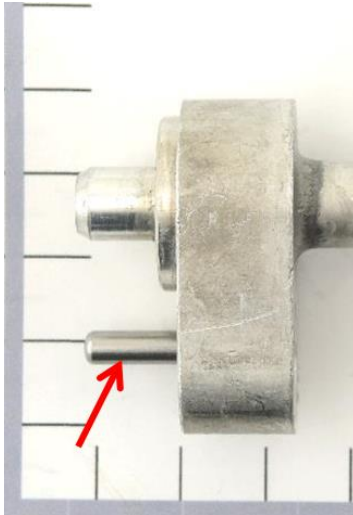
## 8.5mm Sealing Ring Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
55 Ton Injection Molding Press	46.40	8	0.25	23.26	HUN	\$0.04	99.99%	\$0.00
Wash	3.50	1	0.25	11.95	HUN	\$0.01	99.99%	\$0.00
Deburr	1.50	1	0.25	22.62	HUN	\$0.01	99.99%	\$0.00
25 Ton Stamping Press	0.60	1	0.25	14.05	HUN	\$0.00	99.99%	\$0.00

## 8.5mm Sealing Ring Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, O-Ring Seal	1	EPDM	\$4.04	0.0003	0.0003	\$0.00	\$0.01
Material, Outer Ring	1	Steel 1018 - Coil Stock	\$1.21	0.0007	0.0008	\$0.00	\$0.01

# Assemble Connecting Block



\...

- \Connector 1 Asm,Hose Section Asm
- \Connector Block Asm,Section 1 Asm
- \Assemble Connecting Block

## Process Summary

Right First Time	99.85 %
Process Time (Sec)	19.00
Total Weight (kg)	0.00

Material Cost**	\$0.01
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.13
Q Burden	\$0.02
SG&A	\$0.02
Manufacturing Cost*	\$0.18

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Assemble Connecting Block



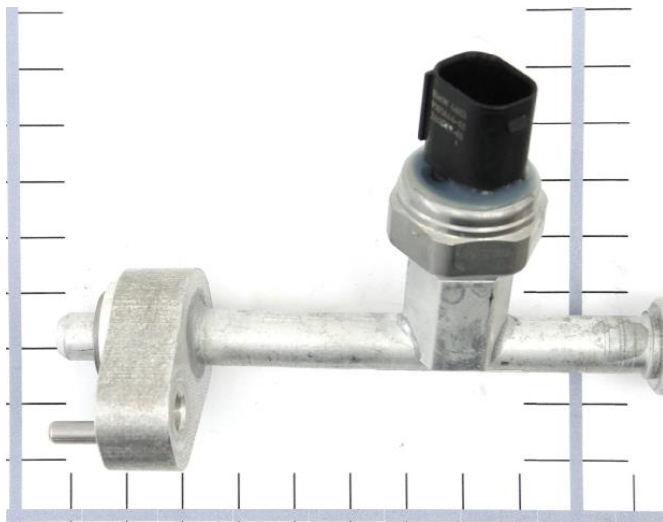
## Assemble Connecting Block

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	19.00	1	1.00	24.91	HUN	\$0.13	99.85%	\$0.02

## Assemble Connecting Block

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Guide Pin, Connector Asm	1	Commodity Item	Purchased	0.0007	-	\$0.01	\$0.00

# Connecting Tube, Hose Section Asm



- \...
- \Connector 1 Asm,Hose Section Asm
- \Connecting Tube, Hose Section Asm
- \Connecting Tube Process

## Process Summary

<b>Right First Time</b>	<b>99.90 %</b>
<b>Process Time (Sec)</b>	<b>9.40</b>
<b>Total Weight (kg)</b>	<b>0.01</b>

<b>Material Cost**</b>	<b>\$0.04</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.05</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.01</b>
<b>Manufacturing Cost*</b>	<b>\$0.12</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connecting Tube, Hose Section Asm



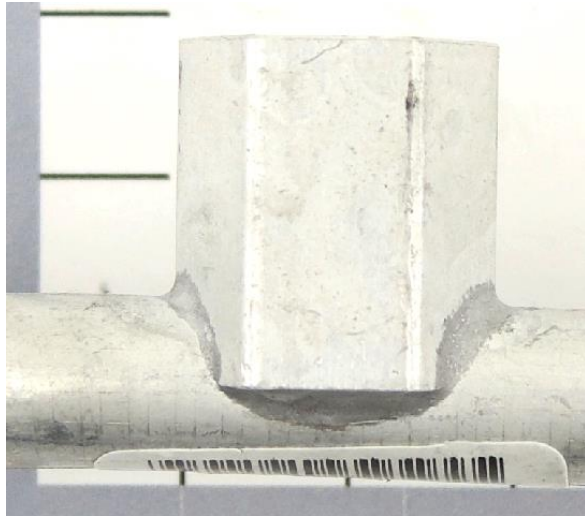
## Connecting Tube Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.95	HUN	\$0.02	99.99%	\$0.00
Tube Bending	4.40	1	0.25	26.59	HUN	\$0.03	99.91%	\$0.01

## Connecting Tube Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Connecting Tube	1	Aluminum 3003 - Clad Seamless Tube	\$5.00	0.0072	0.0072	\$0.00	\$0.04

# Temperature Sensor Mount, Section 1 Asm



\...

- \Connector 1 Asm, Hose Section Asm
- \Temperature Sensor Mount, Section 1 Asm
- \Temperature Sensor Mount Process

## Process Summary

Right First Time	99.92 %
Process Time (Sec)	47.15
Total Weight (kg)	0.01

Material Cost**	\$0.05
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.44
Q Burden	\$0.01
SG&A	\$0.06
Manufacturing Cost*	\$0.56



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Temperature Sensor Mount, Section 1 Asm

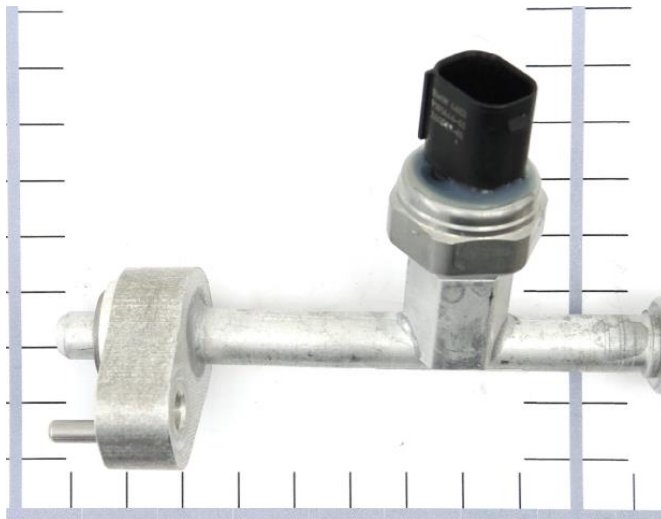
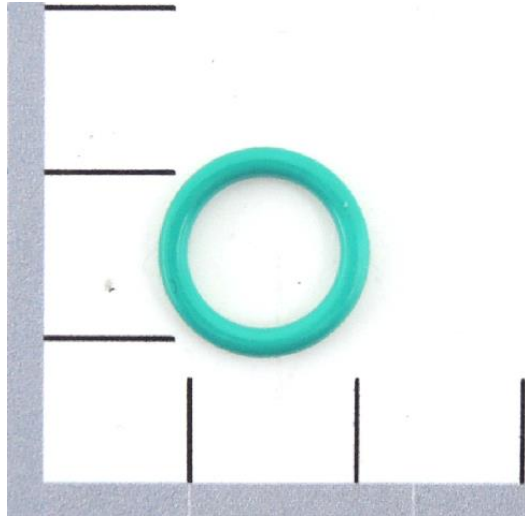
## Temperature Sensor Mount Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.95	HUN	\$0.02	99.99 %	\$0.00
Deburr	4.00	1	0.25	22.62	HUN	\$0.03	99.99 %	\$0.00
CNC Machine	35.78	1	0.25	38.22	HUN	\$0.38	99.97 %	\$0.00
Cut Off	2.35	1	0.25	24.32	HUN	\$0.02	99.98 %	\$0.00
2200 Ton Extrusion Press	0.02	1	4.00	494.65	HUN	\$0.00	99.99 %	\$0.00

## Temperature Sensor Mount Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Temperature Sensor Mount	1	Aluminum 6061 - Bar Stock	\$3.06	0.0085	0.0163	\$0.00	\$0.05

# Assemble Connector 1



\...

\Hose Section Asm,Line 3 Asm  
\Connector 1 Asm,Hose Section Asm  
\Assemble Connector 1

## Process Summary

Right First Time	99.66 %
Process Time (Sec)	134.81
Total Weight (kg)	0.03
Material Cost**	\$2.53
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.93
Q Burden	\$0.05
SG&A	\$0.19
Manufacturing Cost*	\$3.70

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Connector 1



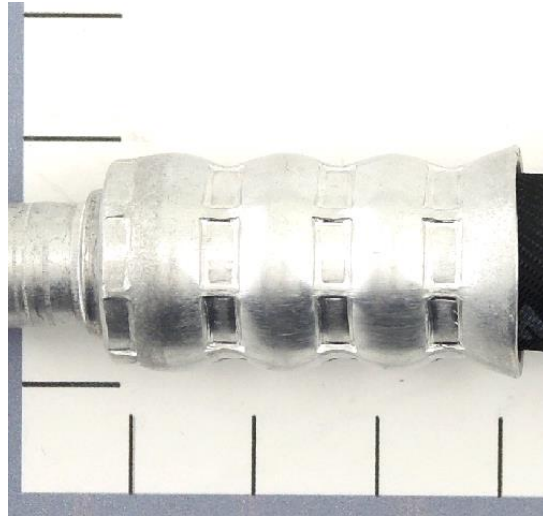
## Assemble Connector 1

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	134.81	1	1.00	24.91	HUN	\$0.93	99.66%	\$0.05

## Assemble Connector 1

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
9mm O-Ring, Temperature Sensor	1	Commodity Item	Purchased	0.0001	-	\$0.03	\$0.00
Pressure Sensor,Section 1 Asm	1	Commodity Item	Purchased	0.0331	-	\$2.50	\$0.00

# Hose Crimp Fitting, Hose Asm



\...  
\Connector 1 Asm,Hose Section Asm  
\Hose Crimp Fitting, Hose Asm  
\Hose Crimp Fitting Process

## Process Summary

Right First Time	99.93 %
Process Time (Sec)	26.32
Total Weight (kg)	0.01

Material Cost**	\$0.07
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.15
Q Burden	\$0.01
SG&A	\$0.03
Manufacturing Cost*	\$0.25



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Hose Crimp Fitting, Hose Asm



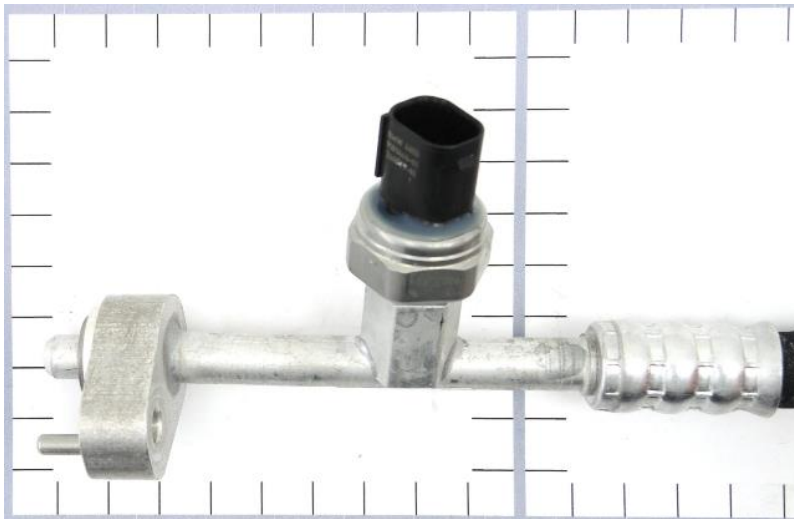
## Hose Crimp Fitting Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Automated Asm	16.00	1	0.25	18.11	HUN	\$0.08	99.98 %	\$0.00
Wash	5.00	1	0.25	21.64	HUN	\$0.03	99.99 %	\$0.00
Debur	3.00	1	0.25	22.62	HUN	\$0.02	99.99 %	\$0.00
Circular Saw	2.32	1	0.25	24.32	HUN	\$0.02	99.97 %	\$0.01

## Hose Crimp Fitting Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Refeferant Hose Crimp Fitting	1	Aluminum 3003 - Seamless Tube	\$6.00	0.0114	0.0114	\$0.00	\$0.07

## No Commodity Items Required for This Process



\...

\Hose Section Asm,Line 3 Asm

\Connector 1 Asm,Hose Section Asm

\Assemble Hose Crimp

### Process Summary

<b>Right First Time</b>	<b>99.92 %</b>
<b>Process Time (Sec)</b>	<b>41.90</b>
<b>Total Weight (kg)</b>	<b>0.00</b>
<b>Material Cost**</b>	<b>\$0.00</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.29</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.03</b>
<b>Manufacturing Cost*</b>	<b>\$0.34</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Hose Crimp



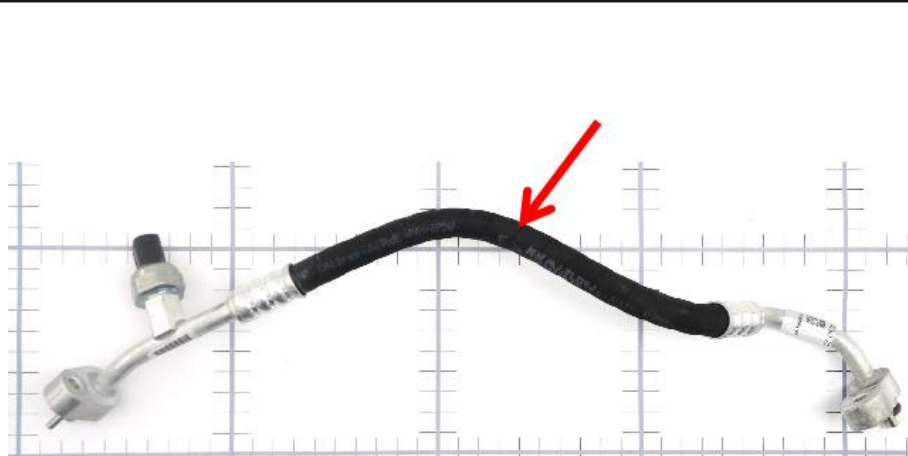
## Assemble Hose Crimp

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	41.90	1	1.00	24.91	HUN	\$0.29	99.92%	\$0.01

## Assemble Hose Crimp

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# 14mm Hose, Hose Section Asm



\...

\Hose Section Asm,Line 3 Asm  
\14mm Hose, Hose Section Asm  
\14mm Hose Process

## Process Summary

Right First Time	99.96 %
Process Time (Sec)	5.38
Total Weight (kg)	0.02

Material Cost**	\$0.17
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.10
Q Burden	\$0.01
SG&A	\$0.03
Manufacturing Cost*	\$0.31

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# 14mm Hose, Hose Section Asm

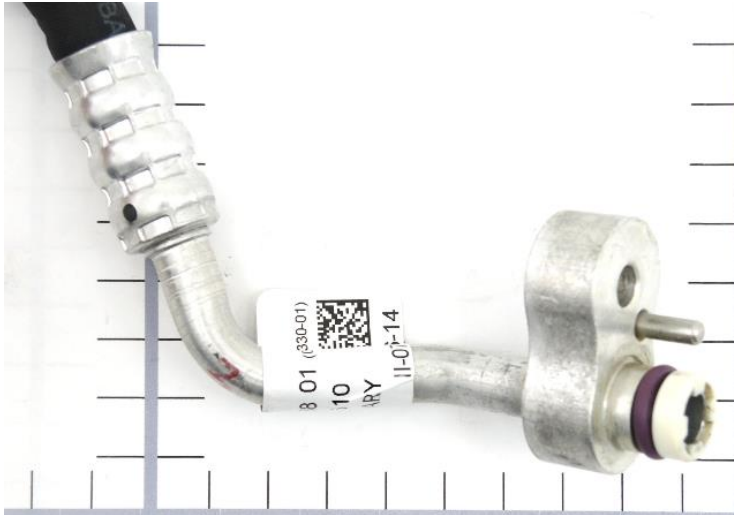
## 14mm Hose Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Extrusion:32mm 2 Layer&Reinf	5.38	1	0.50	67.99	HUN	\$0.10	99.96%	\$0.01

## 14mm Hose Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material,Inner Rubber Layer,14mm Hose	1	EPDM (Extrusion Grade)	\$4.43	0.0103	0.0103	\$0.00	\$0.05
Material,Reinforcement Layer,14mm-OD Wrapped Hose	1	PA Thread w/PVC Coating	By Area	0.0019	-	\$0.00	\$0.05
Material,Outer Rubber Layer,14mm-OD Wrapped Hose	1	EPDM (Extrusion Grade)	\$4.43	0.0089	0.0089	\$0.00	\$0.04
Material,Outer EPDM Covering,14mm Wrapped Hose	1	EPDM Covering	By Area	0.0012	-	\$0.00	\$0.03

# Connector 2 Asm, Hose Section Asm



\...  
 \Line 3 Asm, Front Refrigerant Line Bundle Asm  
 \Hose Section Asm, Line 3 Asm  
 \Connector 2 Asm, Hose Section Asm  
**Assembly Summary**

<b>Parts</b>	<b>6</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>6</b>
<b>Steps</b>	<b>82</b>
<b>Fastenings</b>	<b>6</b>
<b>Right First Time</b>	<b>99.34 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>3.27</b>
<b>Total Weight (kg)</b>	<b>0.05</b>

<b>Material Cost**</b>	<b>\$0.34</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$1.45</b>
<b>Q Burden</b>	<b>\$0.10</b>
<b>SG&amp;A</b>	<b>\$0.21</b>
<b>Manufacturing Cost*</b>	<b>\$2.10</b>

\* Excluding tooling, ER&D, logistics, and profit margin  
 \*\* Includes material cost and purchased parts cost

# Connector 2 Asm,Hose Section Asm



**MUNRO**  
& ASSOCIATES, INC.

## Connector 2 Asm,Hose Section Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Connecting Block,Connector 2 Asm	1	1	0	31	0	99.91 %	0.00	0.00	0.00	0.93	0.0320
12mm End Cap,Connector 2 Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.01	0.0003
Connecting Tube, Connector 2 Asm	1	1	0	10	0	99.86 %	0.00	0.00	0.00	0.17	0.0072
Assemble Connector 2	1	2	5	11	5	99.74 %	0.00	0.00	1.01	0.00	0.0009
Hose Crimp Fitting, Hose Asm	1	1	0	21	0	99.93 %	0.00	0.00	0.27	0.17	0.0114
Assemble Hose Crimp	1	0	1	4	1	99.92 %	0.00	0.00	0.70	0.00	0.0000

## Connector 2 Asm,Hose Section Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Connecting Block,Connector 2 Asm	\$0.00	\$0.18	\$0.00	\$0.00	\$0.00	\$0.53	\$0.01	\$0.09	\$0.81
12mm End Cap,Connector 2 Asm	\$0.00	\$0.01	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.02
Connecting Tube, Connector 2 Asm	\$0.00	\$0.04	\$0.00	\$0.00	\$0.00	\$0.06	\$0.02	\$0.01	\$0.13
Assemble Connector 2	\$0.04	\$0.00	\$0.00	\$0.00	\$0.42	\$0.00	\$0.04	\$0.05	\$0.55
Hose Crimp Fitting, Hose Asm	\$0.00	\$0.07	\$0.00	\$0.00	\$0.08	\$0.06	\$0.01	\$0.03	\$0.25
Assemble Hose Crimp	\$0.00	\$0.00	\$0.00	\$0.00	\$0.29	\$0.00	\$0.01	\$0.03	\$0.34

## Detailed Summary

<b>Parts</b>	<b>6</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>6</b>
<b>Steps</b>	<b>82</b>
<b>Fastenings</b>	<b>6</b>
<b>Right First Time</b>	<b>99.34%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>1.98</b>
<b>Supplier Fab. Time (Min)</b>	<b>1.29</b>
<b>Total Weight (kg)</b>	<b>0.05</b>
<b>Purchased Part Cost</b>	<b>\$0.04</b>
<b>Material Cost</b>	<b>\$0.30</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.79</b>
<b>Supplier Fab. Cost</b>	<b>\$0.66</b>
<b>Q Burden</b>	<b>\$0.10</b>
<b>SG&amp;A</b>	<b>\$0.21</b>
<b>Manufacturing Cost*</b>	<b>\$2.10</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Connecting Block, Connector 2 Asm



\...  
 \Connector 2 Asm,Hose Section Asm  
 \Connecting Block,Connector 2 Asm  
 \Connecting Block Process

## Process Summary

<b>Right First Time</b>	<b>99.91 %</b>
<b>Process Time (Sec)</b>	<b>55.57</b>
<b>Total Weight (kg)</b>	<b>0.03</b>

<b>Material Cost**</b>	<b>\$0.18</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.53</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.09</b>
<b>Manufacturing Cost*</b>	<b>\$0.81</b>



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connecting Block, Connector 2 Asm



## Connecting Block Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.95	HUN	\$0.02	99.99 %	\$0.00
Deburr	4.00	1	0.25	22.62	HUN	\$0.03	99.99 %	\$0.00
CNC Machine	44.08	1	0.25	38.22	HUN	\$0.47	99.96 %	\$0.01
Cut Off	2.43	1	0.25	24.32	HUN	\$0.02	99.98 %	\$0.00
2200 Ton Extrusion Press	0.06	1	4.00	494.65	HUN	\$0.01	99.99 %	\$0.00

## Connecting Block Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Connecting Block	1	Aluminum 6061 - Billet Stock	\$2.80	0.0320	0.0643	\$0.00	\$0.18

# 12mm End Cap, Connector 2 Asm



\...  
\Connector 2 Asm,Hose Section Asm  
\12mm End Cap,Connector 2 Asm  
\End Cap Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	0.88
Total Weight (kg)	0.00

Material Cost**	\$0.01
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.00
Q Burden	\$0.00
SG&A	\$0.00
Manufacturing Cost*	\$0.02



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# 12mm End Cap, Connector 2 Asm



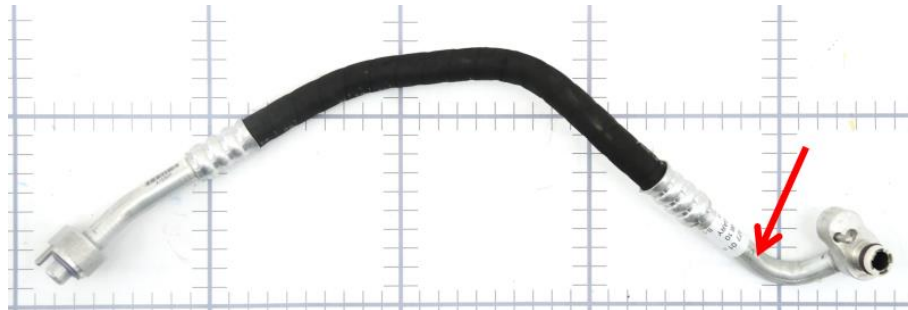
## End Cap Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
55Ton Injection Molding Press	7.04	8	0.25	14.89	HUN	\$0.00	99.99%	\$0.00

## End Cap Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, 12mm End Cap	1	PBT	\$3.06	0.0003	0.0003	\$0.00	\$0.01

# Connecting Tube, Connector 2 Asm



- \...
- \Connector 2 Asm,Hose Section Asm
- \Connecting Tube, Connector 2 Asm
- \Connecting Tube Process

## Process Summary

<b>Right First Time</b>	<b>99.86 %</b>
<b>Process Time (Sec)</b>	<b>10.40</b>
<b>Total Weight (kg)</b>	<b>0.01</b>

<b>Material Cost**</b>	<b>\$0.04</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.06</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.01</b>
<b>Manufacturing Cost*</b>	<b>\$0.13</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connecting Tube, Connector 2 Asm



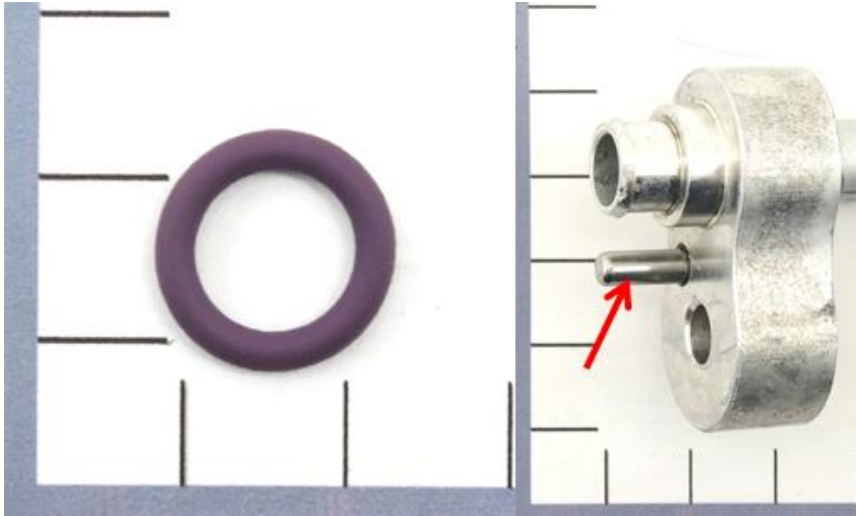
## Connecting Tube Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.95	HUN	\$0.02	99.99%	\$0.00
Tube Bending	5.40	1	0.25	26.59	HUN	\$0.04	99.87%	\$0.02

## Connecting Tube Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Connecting Tube	1	Aluminum 3003 - Clad Seamless Tube	\$5.00	0.0072	0.0072	\$0.00	\$0.04

# Assemble Connector 2



- \...
- \Hose Section Asm,Line 3 Asm
- \Connector 2 Asm,Hose Section Asm
- \Assemble Connector 2

## Process Summary

<b>Right First Time</b>	<b>99.74 %</b>
<b>Process Time (Sec)</b>	<b>60.90</b>
<b>Total Weight (kg)</b>	<b>0.00</b>
<b>Material Cost**</b>	<b>\$0.04</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.42</b>
<b>Q Burden</b>	<b>\$0.04</b>
<b>SG&amp;A</b>	<b>\$0.05</b>
<b>Manufacturing Cost*</b>	<b>\$0.55</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Connector 2



## Assemble Connector 2

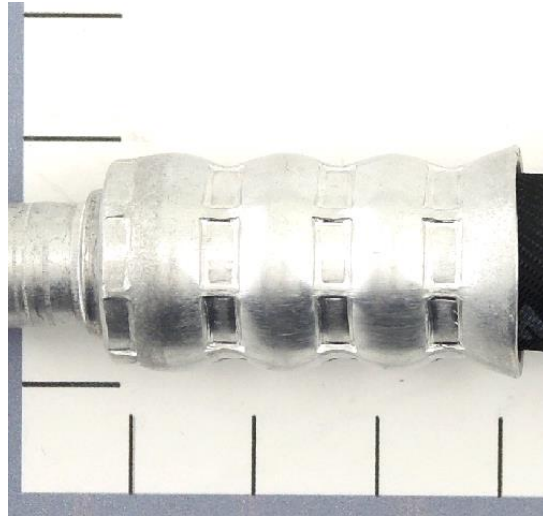
Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	60.90	1	1.00	24.91	HUN	\$0.42	99.74 %	\$0.04

## Assemble Connector 2

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
10mm O-Ring, Connector 1 Asm	1	Commodity Item	Purchased	0.0002	-	\$0.03	\$0.00
Guide Pin, Connector 2 Asm	1	Commodity Item	Purchased	0.0007	-	\$0.01	\$0.00



# Hose Crimp Fitting, Hose Asm



\...

- \Connector 2 Asm,Hose Section Asm
- \Hose Crimp Fitting, Hose Asm
- \Hose Crimp Fitting Process

## Process Summary

Right First Time	99.93 %
Process Time (Sec)	26.32
Total Weight (kg)	0.01

Material Cost**	\$0.07
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.15
Q Burden	\$0.01
SG&A	\$0.03
Manufacturing Cost*	\$0.25



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Hose Crimp Fitting, Hose Asm



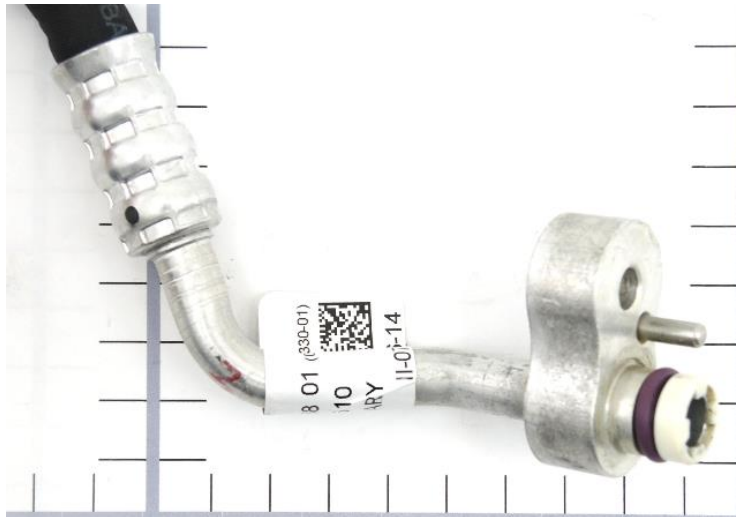
## Hose Crimp Fitting Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Automated Asm	16.00	1	0.25	18.11	HUN	\$0.08	99.98 %	\$0.00
Wash	5.00	1	0.25	21.64	HUN	\$0.03	99.99 %	\$0.00
Debur	3.00	1	0.25	22.62	HUN	\$0.02	99.99 %	\$0.00
Circular Saw	2.32	1	0.25	24.32	HUN	\$0.02	99.97 %	\$0.01

## Hose Crimp Fitting Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Refeferant Hose Crimp Fitting	1	Aluminum 3003 - Seamless Tube	\$6.00	0.0114	0.0114	\$0.00	\$0.07

## No Commodity Items Required for This Process



\...

\Hose Section Asm,Line 3 Asm

\Connector 2 Asm,Hose Section Asm

\Assemble Hose Crimp

### Process Summary

<b>Right First Time</b>	<b>99.92 %</b>
<b>Process Time (Sec)</b>	<b>41.90</b>
<b>Total Weight (kg)</b>	<b>0.00</b>
<b>Material Cost**</b>	<b>\$0.00</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.29</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.03</b>
<b>Manufacturing Cost*</b>	<b>\$0.34</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Hose Crimp

## Assemble Hose Crimp

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
<a href="#">Supplier Manual Asm</a>	41.90	1	1.00	24.91	HUN	\$0.29	99.92%	\$0.01

## Assemble Hose Crimp

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Assemble Hose Section

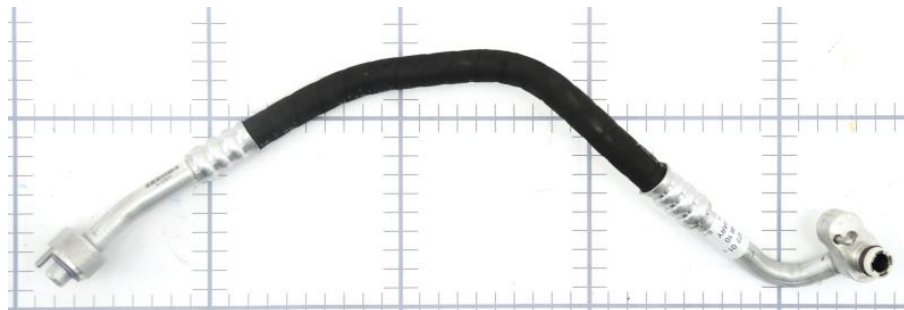


\...  
 \Line 3 Asm, Front Refrigerant Line Bundle Asm  
 \Hose Section Asm, Line 3 Asm  
 \Assemble Hose Section

## Process Summary

<b>Right First Time</b>	<b>99.71 %</b>
<b>Process Time (Sec)</b>	<b>36.50</b>
<b>Total Weight (kg)</b>	<b>0.00</b>

<b>Material Cost**</b>	<b>\$0.20</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.25</b>
<b>Q Burden</b>	<b>\$0.04</b>
<b>SG&amp;A</b>	<b>\$0.04</b>
<b>Manufacturing Cost*</b>	<b>\$0.53</b>



\* Excluding tooling, ER&D, logistics, and profit margin  
 \*\* Includes material cost and purchased parts cost

# Assemble Hose Section



## Assemble Hose Section

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	36.50	1	1.00	24.91	HUN	\$0.25	99.71 %	\$0.04

## Assemble Hose Section

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
QR Label,Front Refrigerant Line Bundle Asm	1	Commodity Item	Purchased	0.0001	-	\$0.10	\$0.00
QR Label,Front Refrigerant Line Bundle Asm	1	Commodity Item	Purchased	0.0001	-	\$0.10	\$0.00



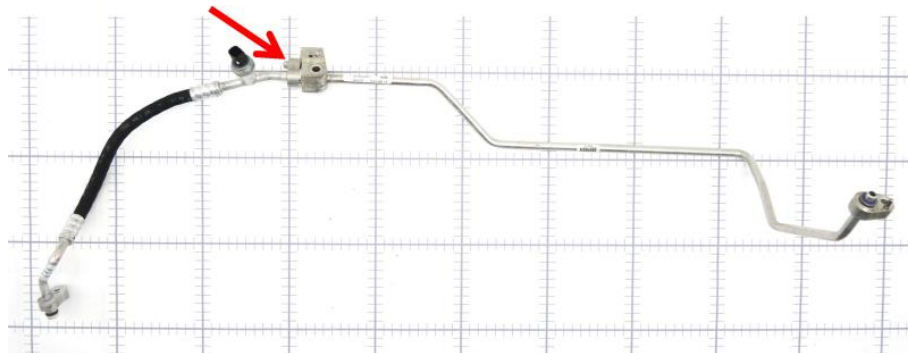
\...

- \Front Refrigerant Line Bundle Asm
- \Line 3 Asm, Front Refrigerant Line Bundle Asm
- \Assemble Line 3

## Process Summary

<b>Right First Time</b>	<b>99.73 %</b>
<b>Process Time (Sec)</b>	<b>28.00</b>
<b>Total Weight (kg)</b>	<b>0.01</b>

<b>Material Cost**</b>	<b>\$0.03</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.19</b>
<b>Q Burden</b>	<b>\$0.04</b>
<b>SG&amp;A</b>	<b>\$0.02</b>
<b>Manufacturing Cost*</b>	<b>\$0.29</b>



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Line 3



## Assemble Line 3

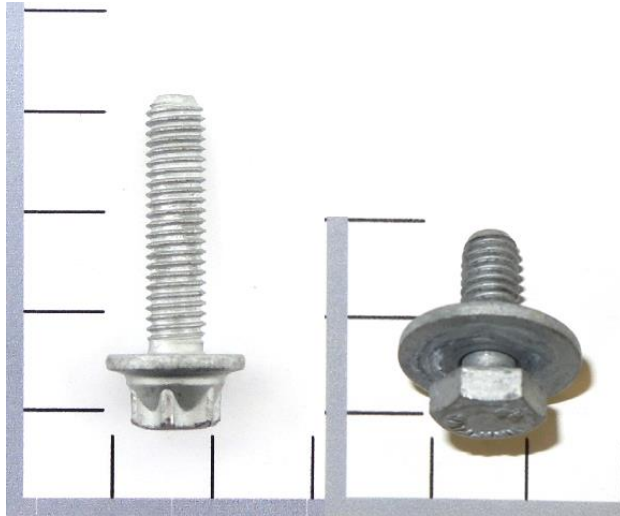
Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	28.00	1	1.00	24.91	HUN	\$0.19	99.73%	\$0.04

## Assemble Line 3

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
M6x25mm-Torx Bolt	1	Commodity Item	Purchased	0.0085	-	\$0.03	\$0.00



# Assemble Front Refrigerant Line Bundle

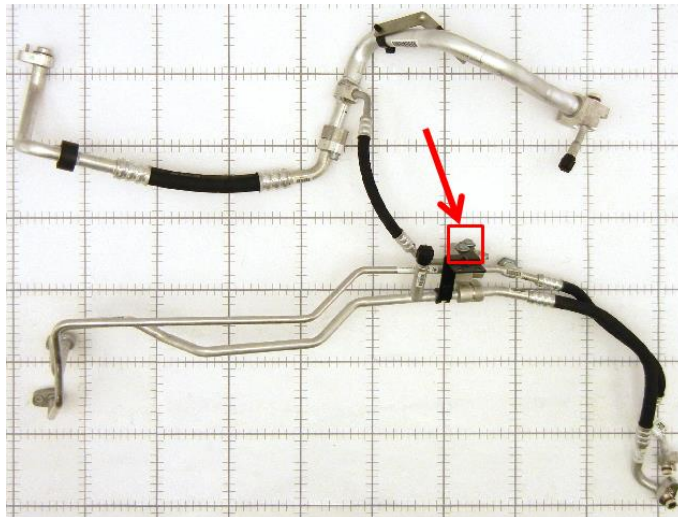


\...  
\Cooling Pack  
\Front Refrigerant Line Bundle Asm  
\Assemble Front Refrigerant Line Bundle

## Process Summary

Right First Time	99.29 %
Process Time (Sec)	64.00
Total Weight (kg)	0.02

Material Cost**	\$0.09
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.44
Q Burden	\$0.11
SG&A	\$0.06
Manufacturing Cost*	\$0.69



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Front Refrigerant Line Bundle



## Assemble Front Refrigerant Line Bundle

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	64.00	1	1.00	24.91	HUN	\$0.44	99.29%	\$0.11

## Assemble Front Refrigerant Line Bundle

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
M6x25mm-Torx Bolt	1	Commodity Item	Purchased	0.0085	-	\$0.03	\$0.00
M6x14mm-Hex SEMS Bolt	2	Commodity Item	Purchased	0.0080	-	\$0.03	\$0.00

## No Commodity Items Required for This Process



\...  
\Zone 6 Cooling Pack & HVAC  
\Cooling Pack  
\Front Refrigerant Line Bundle Installation

### Process Summary

<b>Right First Time</b>	<b>99.78 %</b>
<b>Process Time (Sec)</b>	<b>18.00</b>
<b>Total Weight (kg)</b>	<b>0.00</b>

<b>Material Cost**</b>	<b>\$0.00</b>
<b>OEM Process Cost</b>	<b>\$0.46</b>
<b>Supplier Process Cost</b>	<b>\$0.00</b>
<b>Q Burden</b>	<b>\$0.03</b>
<b>SG&amp;A</b>	<b>\$0.05</b>
<b>Manufacturing Cost*</b>	<b>\$0.54</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Front Refrigerant Line Bundle Installation

## Front Refrigerant Line Bundle Installation

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
OEM Manual Asm	18.00	1	1.00	91.41	GER	\$0.46	99.78 %	\$0.03

## Front Refrigerant Line Bundle Installation

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Refrigerant Return Line Asm



\...  
 \Zone 6 Cooling Pack & HVAC  
 \Cooling Pack  
 \Refrigerant Return Line Asm

## Assembly Summary

<b>Parts</b>	<b>23</b>
<b>Fasteners</b>	<b>2</b>
<b>Part Numbers</b>	<b>22</b>
<b>Steps</b>	<b>247</b>
<b>Fastenings</b>	<b>22</b>
<b>Right First Time</b>	<b>97.73 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>10.22</b>
<b>Total Weight (kg)</b>	<b>0.30</b>

<b>Material Cost**</b>	<b>\$2.09</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$4.43</b>
<b>Q Burden</b>	<b>\$0.34</b>
<b>SG&amp;A</b>	<b>\$0.76</b>
<b>Manufacturing Cost*</b>	<b>\$7.62</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Refrigerant Return Line Asm



**MUNRO**  
& ASSOCIATES, INC.

## Refrigerant Return Line Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Section 1 Asm,RefrigerantReturn Line Asm	1	9	10	124	10	99.03 %	0.00	0.00	2.73	1.95	0.1012
Section 2 Asm,RefriderantReturn Line Asm	1	3	3	76	3	99.51 %	0.00	0.00	2.50	1.31	0.0676
Isolator,Refrigerant Return Line Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.01	0.0068
17mm-OD Wrapped Hose,Refrigerant Return Line Asm	1	4	0	4	0	99.96 %	0.00	0.00	0.00	0.21	0.1071
Bracket Asm,Refrigerant Return Line Asm	1	3	1	19	1	99.83 %	0.00	0.00	0.10	0.24	0.0110
Assemble Refrigerant Return Line	1	3	8	18	8	99.40 %	0.00	0.00	1.19	0.00	0.0093

## Refrigerant Return Line Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Section 1 Asm,Refrigerant Return Line Asm	\$0.06	\$0.69	\$0.00	\$0.00	\$1.13	\$0.77	\$0.15	\$0.31	\$3.10
Section 2 Asm,RefriderantReturn Line Asm	\$0.00	\$0.41	\$0.00	\$0.00	\$1.01	\$0.66	\$0.07	\$0.25	\$2.40
Isolator,Refrigerant Return Line Asm	\$0.00	\$0.03	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.04
17mm-OD Wrapped Hose,Refrigerant Return Line Asm	\$0.00	\$0.61	\$0.00	\$0.00	\$0.00	\$0.24	\$0.01	\$0.10	\$0.95
Bracket Asm,Refrigerant Return Line Asm	\$0.02	\$0.09	\$0.00	\$0.00	\$0.03	\$0.11	\$0.03	\$0.03	\$0.30
Assemble Refrigerant Return Line	\$0.18	\$0.00	\$0.00	\$0.00	\$0.49	\$0.00	\$0.09	\$0.06	\$0.83

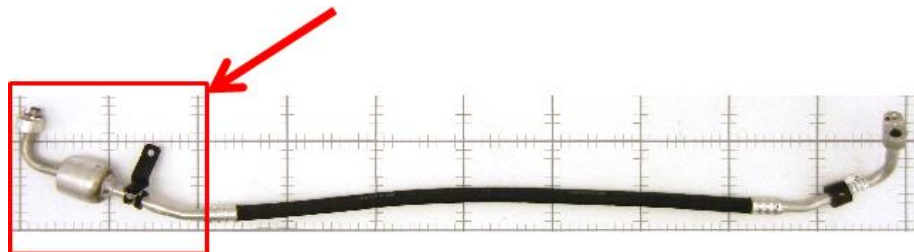
## Detailed Summary

<b>Parts</b>	<b>23</b>
<b>Fasteners</b>	<b>2</b>
<b>Part Numbers</b>	<b>22</b>
<b>Steps</b>	<b>247</b>
<b>Fastenings</b>	<b>22</b>
<b>Right First Time</b>	<b>97.73%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>6.52</b>
<b>Supplier Fab. Time (Min)</b>	<b>3.70</b>
<b>Total Weight (kg)</b>	<b>0.30</b>
<b>Purchased Part Cost</b>	<b>\$0.26</b>
<b>Material Cost</b>	<b>\$1.83</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$2.66</b>
<b>Supplier Fab. Cost</b>	<b>\$1.77</b>
<b>Q Burden</b>	<b>\$0.34</b>
<b>SG&amp;A</b>	<b>\$0.76</b>
<b>Manufacturing Cost*</b>	<b>\$7.62</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Section 1 Asm, Refrigerant Return Line Asm



\...  
 \Cooling Pack  
 \Refrigerant Return Line Asm  
 \Section 1 Asm, Refrigerant Return Line Asm  
**Assembly Summary**

<b>Parts</b>	<b>9</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>9</b>
<b>Steps</b>	<b>124</b>
<b>Fastenings</b>	<b>10</b>
<b>Right First Time</b>	<b>99.03 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>4.67</b>
<b>Total Weight (kg)</b>	<b>0.10</b>

<b>Material Cost**</b>	<b>\$0.75</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$1.89</b>
<b>Q Burden</b>	<b>\$0.15</b>
<b>SG&amp;A</b>	<b>\$0.31</b>
<b>Manufacturing Cost*</b>	<b>\$3.10</b>

\* Excluding tooling, ER&D, logistics, and profit margin  
 \*\* Includes material cost and purchased parts cost



# Section 1 Asm,Refrigerant Return Line Asm



## Section 1 Asm,Refrigerant Return Line Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Connector 1 Asm,Section 1 Asm	1	5	4	63	4	99.51 %	0.00	0.00	1.09	1.19	0.0410
Silencer,Section 1 Asm	1	1	0	10	0	99.96 %	0.00	0.00	0.00	0.41	0.0306
Connecting Tube, Section 1 Asm	1	1	0	10	0	99.86 %	0.00	0.00	0.00	0.18	0.0181
Assemble Section 1	1	1	5	12	5	99.86 %	0.00	0.00	0.27	0.00	0.0001
Refrigerant Return Line Crimp Fitting	1	1	0	21	0	99.93 %	0.00	0.00	0.27	0.17	0.0114
Assemble Refrigerant Return Line Crimp Fitting	1	0	1	4	1	99.92 %	0.00	0.00	1.10	0.00	0.0000

## Section 1 Asm,Refrigerant Return Line Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Connector 1 Asm,Section 1 Asm	\$0.01	\$0.29	\$0.00	\$0.00	\$0.45	\$0.59	\$0.07	\$0.16	\$1.57
Silencer,Section 1 Asm	\$0.00	\$0.22	\$0.00	\$0.00	\$0.00	\$0.07	\$0.01	\$0.03	\$0.33
Connecting Tube, Section 1 Asm	\$0.00	\$0.11	\$0.00	\$0.00	\$0.00	\$0.06	\$0.02	\$0.02	\$0.21
Assemble Section 1	\$0.05	\$0.00	\$0.00	\$0.00	\$0.14	\$0.00	\$0.02	\$0.02	\$0.23
Refrigerant Return Line Crimp Fitting	\$0.00	\$0.07	\$0.00	\$0.00	\$0.08	\$0.05	\$0.01	\$0.02	\$0.24
Assemble Refrigerant Return Line Crimp Fitting	\$0.00	\$0.00	\$0.00	\$0.00	\$0.46	\$0.00	\$0.01	\$0.05	\$0.52

# Section 1 Asm, Refrigerant Return Line Asm

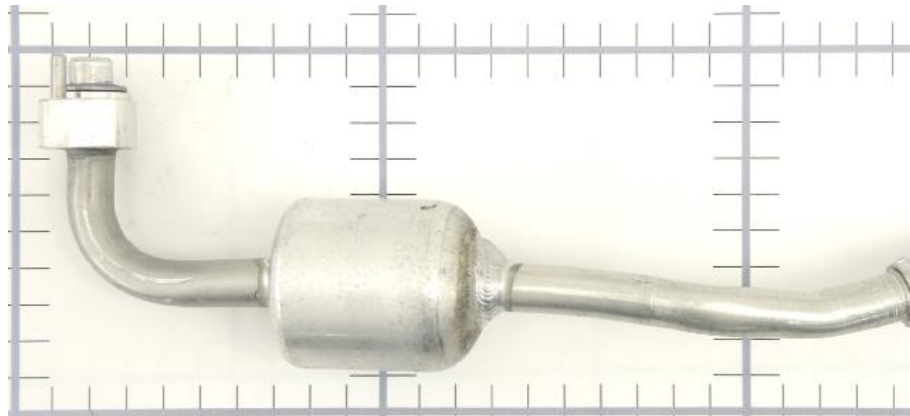
## Detailed Summary

<b>Parts</b>	<b>9</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>9</b>
<b>Steps</b>	<b>124</b>
<b>Fastenings</b>	<b>10</b>
<b>Right First Time</b>	<b>99.03%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>2.73</b>
<b>Supplier Fab. Time (Min)</b>	<b>1.95</b>
<b>Total Weight (kg)</b>	<b>0.10</b>
<b>Purchased Part Cost</b>	
	<b>\$0.06</b>
<b>Material Cost</b>	
	<b>\$0.69</b>
<b>OEM Asm. Cost</b>	
	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	
	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	
	<b>\$1.13</b>
<b>Supplier Fab. Cost</b>	
	<b>\$0.77</b>
<b>Q Burden</b>	
	<b>\$0.15</b>
<b>SG&amp;A</b>	
	<b>\$0.31</b>
<b>Manufacturing Cost*</b>	
	<b>\$3.10</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connector 1 Asm, Section 1 Asm



\...  
 \Refrigerant Return Line Asm  
 \Section 1 Asm, Refrigerant Return Line Asm  
 \Connector 1 Asm, Section 1 Asm

## Assembly Summary

<b>Parts</b>	<b>5</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>5</b>
<b>Steps</b>	<b>63</b>
<b>Fastenings</b>	<b>4</b>
<b>Right First Time</b>	<b>99.51 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>2.27</b>
<b>Total Weight (kg)</b>	<b>0.04</b>

<b>Material Cost**</b>	<b>\$0.30</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$1.04</b>
<b>Q Burden</b>	<b>\$0.07</b>
<b>SG&amp;A</b>	<b>\$0.16</b>
<b>Manufacturing Cost*</b>	<b>\$1.57</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connector 1 Asm, Section 1 Asm



## Connector 1 Asm, Section 1 Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Connecting Block, Connector 1 Asm	1	1	0	34	0	99.89 %	0.00	0.00	0.00	0.83	0.0264
11.5mm Sealing Ring, Connector 1 Asm	1	2	0	8	0	99.96 %	0.00	0.00	0.00	0.18	0.0015
Connecting Tube, Connector 1 Asm	1	1	0	9	0	99.90 %	0.00	0.00	0.00	0.18	0.0124
Assemble Connector 1	1	1	4	9	4	99.77 %	0.00	0.00	1.09	0.00	0.0007

## Connector 1 Asm, Section 1 Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Connecting Block, Connector 1 Asm	\$0.00	\$0.20	\$0.00	\$0.00	\$0.00	\$0.47	\$0.02	\$0.08	\$0.77
11.5mm Sealing Ring, Connector 1 Asm	\$0.00	\$0.03	\$0.00	\$0.00	\$0.00	\$0.06	\$0.01	\$0.01	\$0.10
Connecting Tube, Connector 1 Asm	\$0.00	\$0.06	\$0.00	\$0.00	\$0.00	\$0.06	\$0.02	\$0.01	\$0.15
Assemble Connector 1	\$0.01	\$0.00	\$0.00	\$0.00	\$0.45	\$0.00	\$0.04	\$0.05	\$0.55

## Detailed Summary

<b>Parts</b>	<b>5</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>5</b>
<b>Steps</b>	<b>63</b>
<b>Fastenings</b>	<b>4</b>
<b>Right First Time</b>	<b>99.51%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>1.09</b>
<b>Supplier Fab. Time (Min)</b>	<b>1.19</b>
<b>Total Weight (kg)</b>	<b>0.04</b>
<b>Purchased Part Cost</b>	<b>\$0.01</b>
<b>Material Cost</b>	<b>\$0.29</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.45</b>
<b>Supplier Fab. Cost</b>	<b>\$0.59</b>
<b>Q Burden</b>	<b>\$0.07</b>
<b>SG&amp;A</b>	<b>\$0.16</b>
<b>Manufacturing Cost*</b>	<b>\$1.57</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connecting Block, Connector 1 Asm



\...

- \Connector 1 Asm, Section 1 Asm
- \Connecting Block, Connector 1 Asm
- \Connecting Block Process

## Process Summary

Right First Time	99.89 %
Process Time (Sec)	49.90
Total Weight (kg)	0.03

Material Cost**	\$0.20
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.47
Q Burden	\$0.02
SG&A	\$0.08
Manufacturing Cost*	\$0.77

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connecting Block, Connector 1 Asm

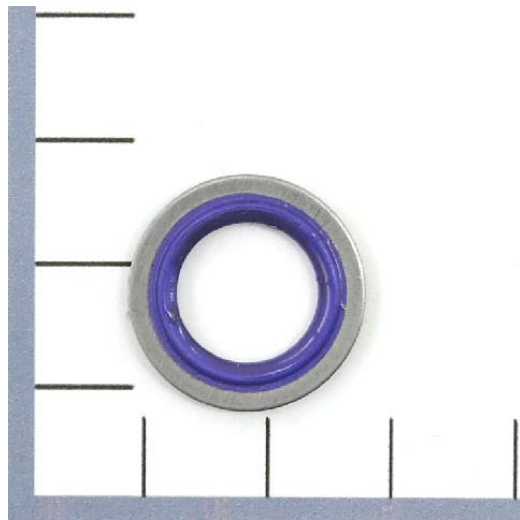
## Connecting Block Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.95	HUN	\$0.02	99.99 %	\$0.00
Deburr	4.00	1	0.25	22.62	HUN	\$0.03	99.99 %	\$0.00
CNC Machine	38.05	1	0.25	38.22	HUN	\$0.40	99.94 %	\$0.01
Cut Off	2.79	1	0.25	24.32	HUN	\$0.02	99.98 %	\$0.00
2200 Ton Extrusion Press	0.07	1	4.00	494.65	HUN	\$0.01	99.99 %	\$0.00

## Connecting Block Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Connecting Block	1	Aluminum 6061 - Billet Stock	\$2.80	0.0264	0.0713	\$0.00	\$0.20

# 11.5mm Sealing Ring, Connector 1 Asm



\...  
\Connector 1 Asm, Section 1 Asm  
\11.5mm Sealing Ring, Connector 1 Asm  
\Sealing Ring Process

## Process Summary

Right First Time	99.96 %
Process Time (Sec)	10.90
Total Weight (kg)	0.00

Material Cost**	\$0.03
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.06
Q Burden	\$0.01
SG&A	\$0.01
Manufacturing Cost*	\$0.10

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# 11.5mm Sealing Ring, Connector 1 Asm



**MUNRO**  
& ASSOCIATES, INC.

## Sealing Ring Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
55 Ton Injection Molding Press	42.40	8	0.25	23.26	HUN	\$0.03	99.99%	\$0.00
Wash	3.50	1	0.25	11.95	HUN	\$0.01	99.99%	\$0.00
Deburr	1.50	1	0.25	22.62	HUN	\$0.01	99.99%	\$0.00
25 Ton Stamping Press	0.60	1	0.25	14.05	HUN	\$0.00	99.99%	\$0.00

## Sealing Ring Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, O-Ring Seal	1	EPDM	\$4.04	0.0005	0.0005	\$0.00	\$0.01
Material, Outer Ring	1	Steel 1018 - Coil Stock	\$1.21	0.0010	0.0140	\$0.00	\$0.02

# Connecting Tube, Connector 1 Asm



\...

- \Connector 1 Asm, Section 1 Asm
- \Connecting Tube, Connector 1 Asm
- \Connecting Tube Process

## Process Summary

Right First Time	99.90 %
Process Time (Sec)	10.52
Total Weight (kg)	0.01

Material Cost**	\$0.06
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.06
Q Burden	\$0.02
SG&A	\$0.01
Manufacturing Cost*	\$0.15

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connecting Tube, Connector 1 Asm



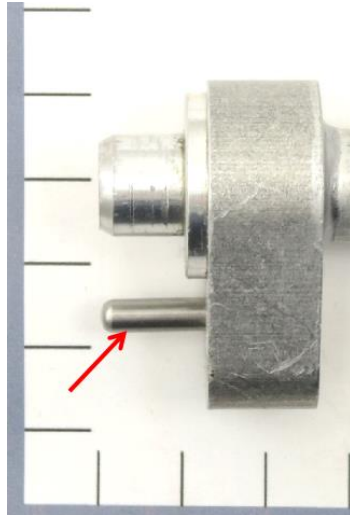
## Connecting Tube Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.95	HUN	\$0.02	99.99%	\$0.00
Tube Bending	5.52	1	0.25	26.59	HUN	\$0.04	99.91%	\$0.01

## Connecting Tube Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Connecting Tube	1	Aluminum 3003 - Clad Seamless Tube	\$5.00	0.0124	0.0124	\$0.00	\$0.06

# Assemble Connector 1



\...  
\Section 1 Asm,Refrigerant Return Line Asm  
\Connector 1 Asm,Section 1 Asm  
\Assemble Connector 1

## Process Summary

<b>Right First Time</b>	<b>99.77 %</b>
<b>Process Time (Sec)</b>	<b>65.15</b>
<b>Total Weight (kg)</b>	<b>0.00</b>

<b>Material Cost**</b>	<b>\$0.01</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.45</b>
<b>Q Burden</b>	<b>\$0.04</b>
<b>SG&amp;A</b>	<b>\$0.05</b>
<b>Manufacturing Cost*</b>	<b>\$0.55</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Connector 1



## Assemble Connector 1

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	65.15	1	1.00	24.91	HUN	\$0.45	99.77%	\$0.04

## Assemble Connector 1

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Guide Pin, Connector 1 Asm	1	Commodity Item	Purchased	0.0007	-	\$0.01	\$0.00

# Silencer, Section 1 Asm



\...  
\Section 1 Asm, Refrigerant Return Line Asm  
\Silencer, Section 1 Asm  
\Silencer Process

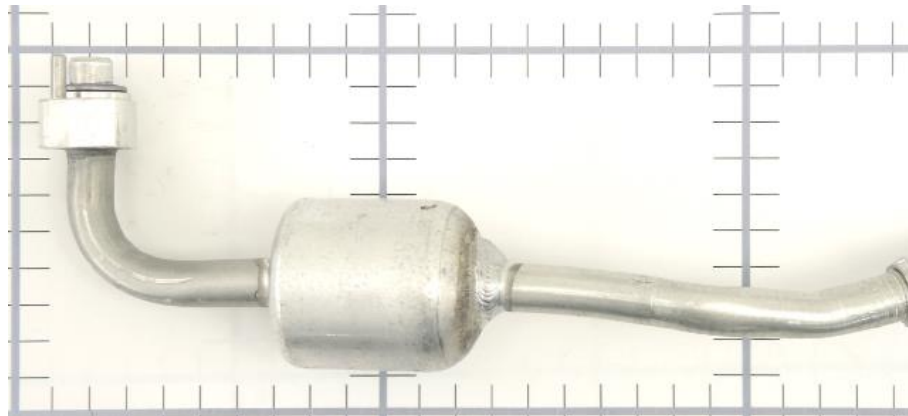
## Process Summary

Right First Time	99.96 %
Process Time (Sec)	24.60
Total Weight (kg)	0.03

Material Cost**	\$0.22
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.07
Q Burden	\$0.01
SG&A	\$0.03
Manufacturing Cost*	\$0.33

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Silencer, Section 1 Asm

## Silencer Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	9.00	1	0.25	11.95	HUN	\$0.03	99.99%	\$0.00
Deburr	9.00	1	0.25	4.86	HUN	\$0.01	99.99%	\$0.00
Tube End Form	6.00	1	0.25	14.05	HUN	\$0.02	99.99%	\$0.00
Deep Draw, 25 Ton Stamping Press	0.60	1	0.25	14.05	HUN	\$0.00	99.99%	\$0.00

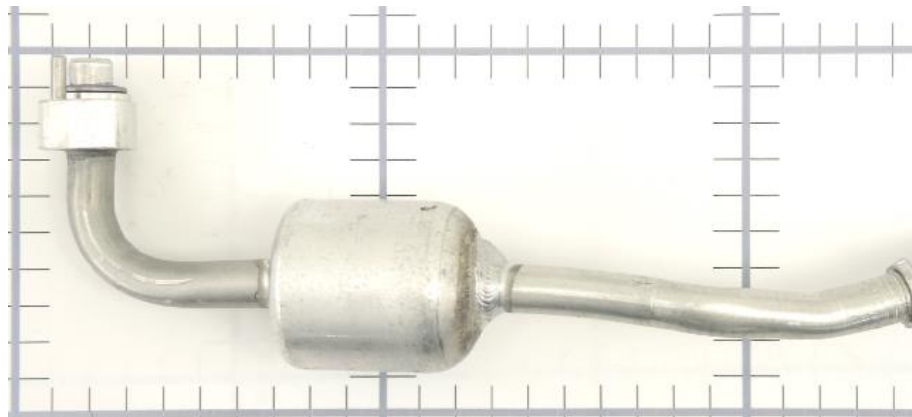
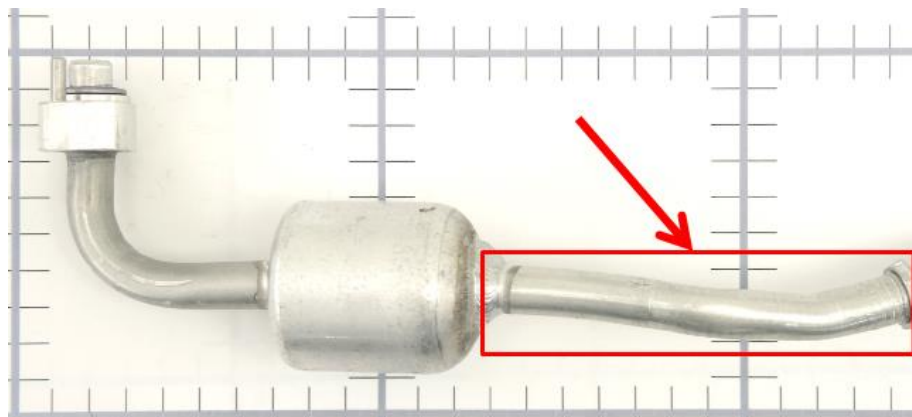
## Silencer Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Silencer	1	Aluminum 3003-H14 - Coil Stock	\$4.54	0.0306	0.0470	\$0.00	\$0.22

# Connecting Tube, Section 1 Asm



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\...  
\Section 1 Asm,Refrigerant Return Line Asm  
\Connecting Tube, Section 1 Asm  
\Connecting Tube Process

## Process Summary

Right First Time	99.86 %
Process Time (Sec)	10.52
Total Weight (kg)	0.02

Material Cost**	\$0.11
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.06
Q Burden	\$0.02
SG&A	\$0.02
Manufacturing Cost*	\$0.21

\* Excluding tooling, ER&D, logistics, and profit margin  
\*\* Includes material cost and purchased parts cost



# Connecting Tube, Section 1 Asm



## Connecting Tube Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.95	HUN	\$0.02	99.99%	\$0.00
Tube Bending	5.52	1	0.25	26.59	HUN	\$0.04	99.87%	\$0.02

## Connecting Tube Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Connecting Tube	1	Aluminum 3003 - Seamless Tube	\$6.00	0.0181	0.0181	\$0.00	\$0.11

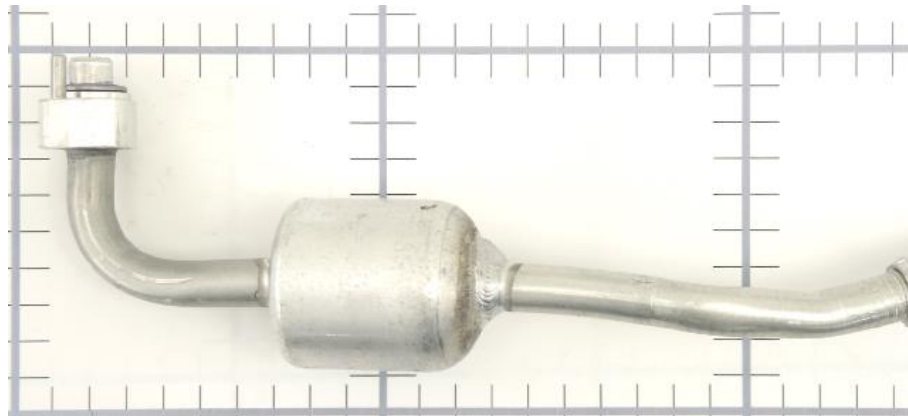


\...  
 \Refrigerant Return Line Asm  
 \Section 1 Asm,Refrigerant Return Line Asm  
 \Assemble Section 1

## Process Summary

<b>Right First Time</b>	<b>99.86 %</b>
<b>Process Time (Sec)</b>	<b>16.46</b>
<b>Total Weight (kg)</b>	<b>0.00</b>

<b>Material Cost**</b>	<b>\$0.05</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.14</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.02</b>
<b>Manufacturing Cost*</b>	<b>\$0.23</b>



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Section 1

## Assemble Section 1

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	4.65	1	1.00	24.91	HUN	\$0.03	99.97 %	\$0.00
Supplier Robotic MIG Welding	11.81	1	0.25	31.91	HUN	\$0.10	99.89 %	\$0.02

## Assemble Section 1

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Bar Code Label,Refrigerant Return Line Asm	1	Commodity Item	Purchased	0.0001	-	\$0.05	\$0.00

# Refrigerant Return Line Crimp Fitting



\...

- \Section 1 Asm, Refrigerant Return Line Asm
- \Refrigerant Return Line Crimp Fitting
- \Hose Crimp Fitting Process

## Process Summary

Right First Time	99.93 %
Process Time (Sec)	26.32
Total Weight (kg)	0.01

Material Cost**	\$0.07
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.13
Q Burden	\$0.01
SG&A	\$0.02
Manufacturing Cost*	\$0.24



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Refrigerant Return Line Crimp Fitting



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## Hose Crimp Fitting Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Automated Asm	16.00	1	0.25	18.11	HUN	\$0.08	99.98 %	\$0.00
Wash	5.00	1	0.25	11.95	HUN	\$0.02	99.99 %	\$0.00
Debur	3.00	1	0.25	22.62	HUN	\$0.02	99.99 %	\$0.00
Circular Saw	2.32	1	0.25	24.32	HUN	\$0.02	99.97 %	\$0.01

## Hose Crimp Fitting Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Refeferant Hose Crimp Fitting	1	Aluminum 3003 - Seamless Tube	\$6.00	0.0114	0.0114	\$0.00	\$0.07

# Assemble Refrigerant Return Line Crimp Fitting

No Commodity Items  
Required for This  
Process



\...  
\Refrigerant Return Line Asm  
\Section 1 Asm,Refrigerant Return Line Asm  
\Assemble Refrigerant Return Line Crimp Fitting

## Process Summary

Right First Time	99.92 %
Process Time (Sec)	66.10
Total Weight (kg)	0.00
Material Cost**	\$0.00
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.46
Q Burden	\$0.01
SG&A	\$0.05
Manufacturing Cost*	\$0.52

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Refrigerant Return Line Crimp Fitting

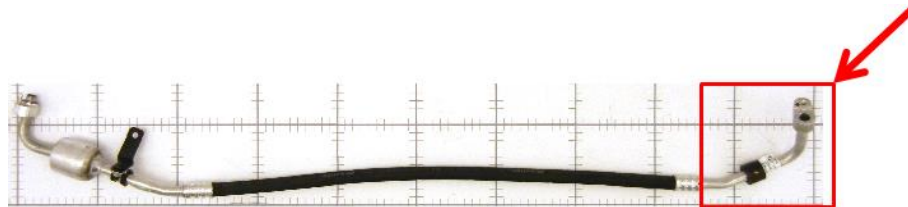
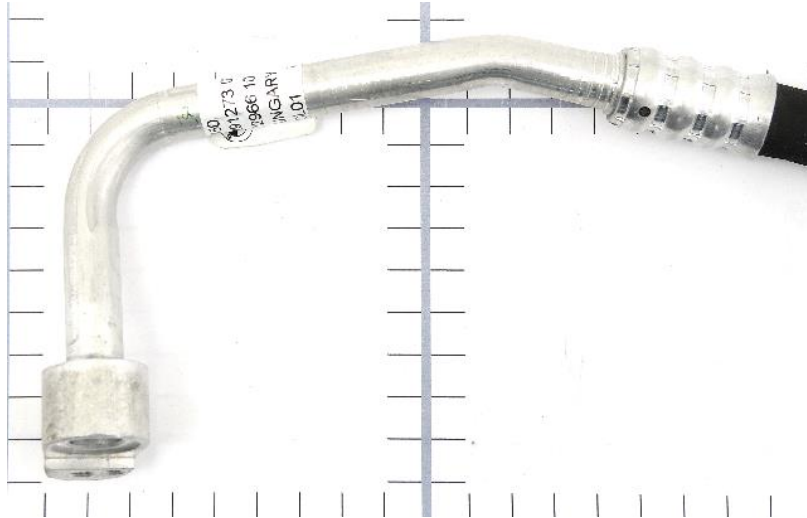
## Assemble Refrigerant Return Line Crimp Fitting

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
<a href="#">Supplier Manual Asm</a>	66.10	1	1.00	24.91	HUN	\$0.46	99.92%	\$0.01

## Assemble Refrigerant Return Line Crimp Fitting

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Section 2 Asm, Refrigerant Return Line Asm



- \...
  - \Cooling Pack
  - \Refrigerant Return Line Asm
  - \Section 2 Asm, Refrigerant Return Line Asm
- ## Assembly Summary

<b>Parts</b>	<b>3</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>76</b>
<b>Fastenings</b>	<b>3</b>
<b>Right First Time</b>	<b>99.51 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>3.81</b>
<b>Total Weight (kg)</b>	<b>0.07</b>

<b>Material Cost**</b>	<b>\$0.41</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$1.67</b>
<b>Q Burden</b>	<b>\$0.07</b>
<b>SG&amp;A</b>	<b>\$0.25</b>
<b>Manufacturing Cost*</b>	<b>\$2.40</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Section 2 Asm,Refriderant Return Line Asm



## Section 2 Asm,Refriderant Return Line Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Connector 2,Section 2 Asm	1	1	0	34	0	99.90 %	0.00	0.00	0.00	0.95	0.0253
Connecting Tube, Section 2 Asm	1	1	0	9	0	99.88 %	0.00	0.00	0.00	0.18	0.0309
Assemble Connector 2	1	0	2	5	2	99.89 %	0.00	0.00	1.14	0.00	0.0000
Refrigerant Return Line Crimp Fitting	1	1	0	21	0	99.93 %	0.00	0.00	0.27	0.17	0.0114
Assemble Refrigerant Return Line Crimp Fitting	1	0	1	4	1	99.92 %	0.00	0.00	1.10	0.00	0.0000

## Section 2 Asm,Refriderant Return Line Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Connector 2,Section 2 Asm	\$0.00	\$0.15	\$0.00	\$0.00	\$0.00	\$0.55	\$0.02	\$0.08	\$0.80
Connecting Tube, Section 2 Asm	\$0.00	\$0.19	\$0.00	\$0.00	\$0.00	\$0.06	\$0.02	\$0.03	\$0.30
Assemble Connector 2	\$0.00	\$0.00	\$0.00	\$0.00	\$0.47	\$0.00	\$0.02	\$0.06	\$0.54
Refrigerant Return Line Crimp Fitting	\$0.00	\$0.07	\$0.00	\$0.00	\$0.08	\$0.05	\$0.01	\$0.02	\$0.24
Assemble Refrigerant Return Line Crimp Fitting	\$0.00	\$0.00	\$0.00	\$0.00	\$0.46	\$0.00	\$0.01	\$0.05	\$0.52

## Detailed Summary

<b>Parts</b>	<b>3</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>76</b>
<b>Fastenings</b>	<b>3</b>
<b>Right First Time</b>	<b>99.51%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>2.50</b>
<b>Supplier Fab. Time (Min)</b>	<b>1.31</b>
<b>Total Weight (kg)</b>	<b>0.07</b>
<b>Purchased Part Cost</b>	<b>\$0.00</b>
<b>Material Cost</b>	<b>\$0.41</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$1.01</b>
<b>Supplier Fab. Cost</b>	<b>\$0.66</b>
<b>Q Burden</b>	<b>\$0.07</b>
<b>SG&amp;A</b>	<b>\$0.25</b>
<b>Manufacturing Cost*</b>	<b>\$2.40</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connector 2, Section 2 Asm

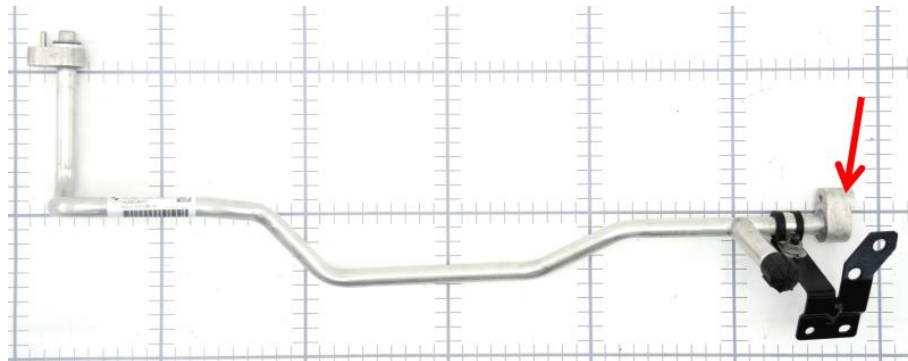


\...  
\Section 2 Asm,Refriderant Return Line Asm  
\Connector 2,Section 2 Asm  
\Connector 2 Process

## Process Summary

Right First Time	99.90 %
Process Time (Sec)	57.02
Total Weight (kg)	0.03

Material Cost**	\$0.15
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.55
Q Burden	\$0.02
SG&A	\$0.08
Manufacturing Cost*	\$0.80



\* Excluding tooling, ER&D, logistics, and profit margin  
\*\* Includes material cost and purchased parts cost

# Connector 2, Section 2 Asm



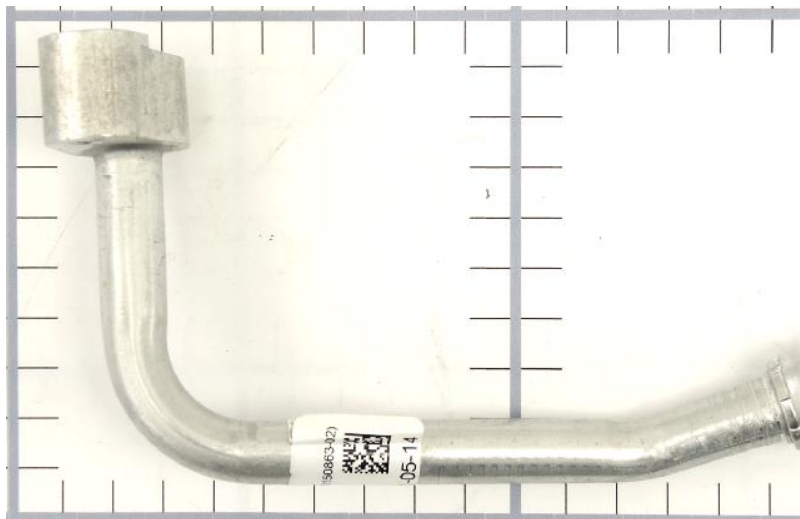
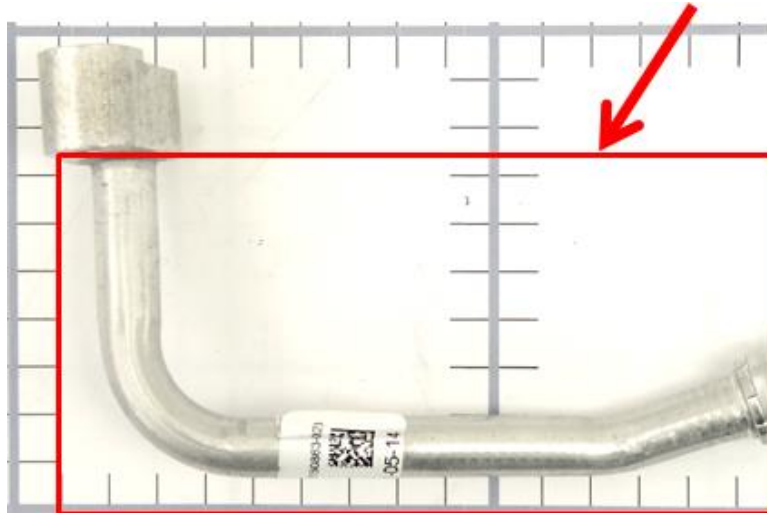
## Connector 2 Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.95	HUN	\$0.02	99.99 %	\$0.00
Deburr	4.00	1	0.25	22.62	HUN	\$0.03	99.99 %	\$0.00
CNC Machine	45.22	1	0.25	38.22	HUN	\$0.48	99.95 %	\$0.01
Cut Off	2.75	1	0.25	24.32	HUN	\$0.02	99.98 %	\$0.00
2200 Ton Extrusion Press	0.05	1	4.00	494.65	HUN	\$0.01	99.99 %	\$0.00

## Connector 2 Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Connector 2	1	Aluminum 6061 - Billet Stock	\$2.80	0.0253	0.0542	\$0.00	\$0.15

# Connecting Tube, Section 2 Asm



\...  
\Section 2 Asm,Refriderant Return Line Asm  
\Connecting Tube, Section 2 Asm  
\Connecting Tube Process

## Process Summary

Right First Time	99.88 %
Process Time (Sec)	11.00
Total Weight (kg)	0.03

Material Cost**	\$0.19
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.06
Q Burden	\$0.02
SG&A	\$0.03
Manufacturing Cost*	\$0.30

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connecting Tube, Section 2 Asm



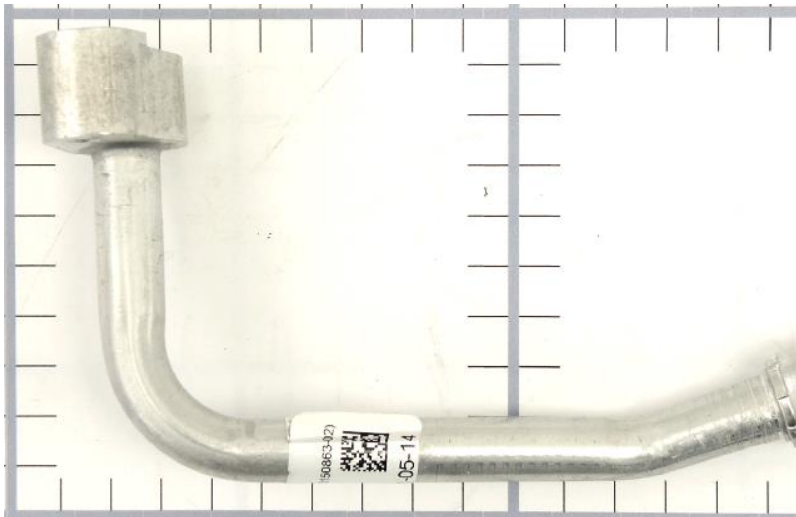
## Connecting Tube Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.95	HUN	\$0.02	99.99%	\$0.00
Tube Bending	6.00	1	0.25	26.59	HUN	\$0.04	99.89%	\$0.02

## Connecting Tube Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Connecting Tube	1	Aluminum 3003 -Seamless Tube	\$6.00	0.0309	0.0309	\$0.00	\$0.19

## No Commodity Items Required for This Process



\...  
\Refrigerant Return Line Asm  
\Section 2 Asm,Refriderant Return Line Asm  
\Assemble Connector 2

### Process Summary

Right First Time	99.89 %
Process Time (Sec)	68.10
Total Weight (kg)	0.00
Material Cost**	\$0.00
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.47
Q Burden	\$0.02
SG&A	\$0.06
Manufacturing Cost*	\$0.54

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Connector 2



## Assemble Connector 2

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	68.10	1	1.00	24.91	HUN	\$0.47	99.89%	\$0.02

## Assemble Connector 2

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Refrigerant Return Line Crimp Fitting



\...  
\Section 2 Asm,Refriderant Return Line Asm  
\Refrigerant Return Line Crimp Fitting  
\Hose Crimp Fitting Process

## Process Summary

Right First Time	99.93 %
Process Time (Sec)	26.32
Total Weight (kg)	0.01

Material Cost**	\$0.07
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.13
Q Burden	\$0.01
SG&A	\$0.02
Manufacturing Cost*	\$0.24

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Refrigerant Return Line Crimp Fitting



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& ASSOCIATES, INC.

## Hose Crimp Fitting Process

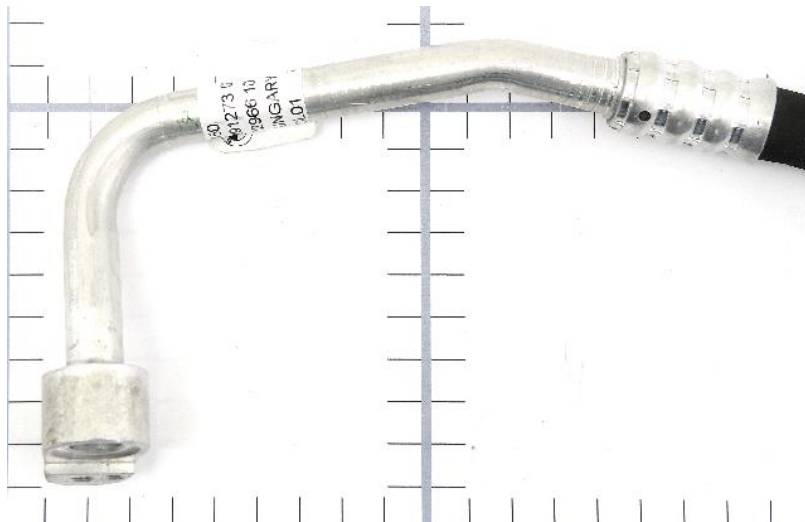
Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Automated Asm	16.00	1	0.25	18.11	HUN	\$0.08	99.98 %	\$0.00
Wash	5.00	1	0.25	11.95	HUN	\$0.02	99.99 %	\$0.00
Debur	3.00	1	0.25	22.62	HUN	\$0.02	99.99 %	\$0.00
Circular Saw	2.32	1	0.25	24.32	HUN	\$0.02	99.97 %	\$0.01

## Hose Crimp Fitting Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Refeferant Hose Crimp Fitting	1	Aluminum 3003 - Seamless Tube	\$6.00	0.0114	0.0114	\$0.00	\$0.07

# Assemble Refrigerant Return Line Crimp Fitting

No Commodity Items  
Required for This  
Process



- \...
- \Refrigerant Return Line Asm
- \Section 2 Asm,Refriderant Return Line Asm
- \Assemble Refrigerant Return Line Crimp Fitting

## Process Summary

Right First Time	99.92 %
Process Time (Sec)	66.10
Total Weight (kg)	0.00
Material Cost**	\$0.00
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.46
Q Burden	\$0.01
SG&A	\$0.05
Manufacturing Cost*	\$0.52

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Refrigerant Return Line Crimp Fitting



## Assemble Refrigerant Return Line Crimp Fitting

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
<a href="#">Supplier Manual Asm</a>	66.10	1	1.00	24.91	HUN	\$0.46	99.92%	\$0.01

## Assemble Refrigerant Return Line Crimp Fitting

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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\...

- \Refrigerant Return Line Asm
- \Isolator, Refrigerant Return Line Asm
- \Isolator Process

## Process Summary

<b>Right First Time</b>	<b>99.99 %</b>
<b>Process Time (Sec)</b>	<b>0.31</b>
<b>Total Weight (kg)</b>	<b>0.01</b>

<b>Material Cost**</b>	<b>\$0.03</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.00</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.00</b>
<b>Manufacturing Cost*</b>	<b>\$0.04</b>



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Isolator, Refrigerant Return Line Asm



## Isolator Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Extrude: 45mm, 1 Layer	0.31	1	0.50	31.32	HUN	\$0.00	99.99%	\$0.00

## Isolator Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Isolator	1	EPDM (Extrusion Grade)	\$4.43	0.0068	0.0070	\$0.00	\$0.03

# 17mm-OD Wrapped Hose, Refrigerant Return Line Asm



\...  
\Refrigerant Return Line Asm  
\17mm-OD Wrapped Hose, Refrigerant Return Line  
Asm \17mm-OD Wrapped Hose Process

## Process Summary

Right First Time	99.96 %
Process Time (Sec)	12.48
Total Weight (kg)	0.11

Material Cost**	\$0.61
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.24
Q Burden	\$0.01
SG&A	\$0.10
Manufacturing Cost*	\$0.95

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# 17mm-OD Wrapped Hose, Refrigerant Return Line Asm

## 17mm-OD Wrapped Hose Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Extrusion:32mm 2 Layer & Reinf	12.48	1	0.50	67.99	HUN	\$0.24	99.96%	\$0.01

## 17mm-OD Wrapped Hose Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material,Inner Rubber Layer,17mm-OD Wrapped Hose	1	EPDM (Extrusion Grade)	\$4.43	0.0472	0.0472	\$0.00	\$0.21
Material,Reinforcement Layer,17mm-OD Wrapped Hose	1	PA Thread w/PVC Coating	By Area	0.0095	-	\$0.00	\$0.13
Material,Outer Rubber Layer,17mm-OD Wrapped Hose	1	EPDM (Extrusion Grade)	\$4.43	0.0426	0.0426	\$0.00	\$0.19
Material,Outer EPDM Covering,17mm-OD Wrapped Hose	1	EPDM Covering	By Area	0.0078	-	\$0.00	\$0.08



# Bracket Asm, Refrigerant Return Line Asm



\...  
 \Cooling Pack  
 \Refrigerant Return Line Asm  
 \Bracket Asm, Refrigerant Return Line Asm  
**Assembly Summary**

<b>Parts</b>	<b>3</b>
<b>Fasteners</b>	<b>1</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>19</b>
<b>Fastenings</b>	<b>1</b>
<b>Right First Time</b>	<b>99.83 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>0.34</b>
<b>Total Weight (kg)</b>	<b>0.01</b>

<b>Material Cost**</b>	<b>\$0.11</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.14</b>
<b>Q Burden</b>	<b>\$0.03</b>
<b>SG&amp;A</b>	<b>\$0.03</b>
<b>Manufacturing Cost*</b>	<b>\$0.30</b>

\* Excluding tooling, ER&D, logistics, and profit margin  
 \*\* Includes material cost and purchased parts cost

# Bracket Asm,Refrigerant Return Line Asm



## Bracket Asm,Refrigerant Return Line Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Bracket,Bracket Asm	1	1	0	7	0	99.97 %	0.00	0.00	0.00	0.16	0.0058
Assemble Bracket	1	2	1	11	1	99.86 %	0.00	0.00	0.10	0.08	0.0052

## Bracket Asm,Refrigerant Return Line Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Bracket,Bracket Asm	\$0.00	\$0.05	\$0.00	\$0.00	\$0.00	\$0.02	\$0.00	\$0.01	\$0.09
Assemble Bracket	\$0.02	\$0.04	\$0.00	\$0.00	\$0.03	\$0.08	\$0.02	\$0.02	\$0.21

## Detailed Summary

<b>Parts</b>	<b>3</b>
<b>Fasteners</b>	<b>1</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>19</b>
<b>Fastenings</b>	<b>1</b>
<b>Right First Time</b>	<b>99.83%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.10</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.24</b>
<b>Total Weight (kg)</b>	<b>0.01</b>
<hr/>	
<b>Purchased Part Cost</b>	<b>\$0.02</b>
<b>Material Cost</b>	<b>\$0.09</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.03</b>
<b>Supplier Fab. Cost</b>	<b>\$0.11</b>
<b>Q Burden</b>	<b>\$0.03</b>
<b>SG&amp;A</b>	<b>\$0.03</b>
<b>Manufacturing Cost*</b>	<b>\$0.30</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



\...  
 \Bracket Asm, Refrigerant Return Line Asm  
 \Bracket, Bracket Asm  
 \Bracket Process

## Process Summary

<b>Right First Time</b>	<b>99.97 %</b>
<b>Process Time (Sec)</b>	<b>9.60</b>
<b>Total Weight (kg)</b>	<b>0.01</b>

<b>Material Cost**</b>	<b>\$0.05</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.02</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.01</b>
<b>Manufacturing Cost*</b>	<b>\$0.09</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Bracket, Bracket Asm

## Bracket Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.95	HUN	\$0.02	99.99%	\$0.00
Deburr	4.00	1	0.25	4.86	HUN	\$0.01	99.99%	\$0.00
25 Ton Stamping Press	0.60	1	0.25	14.05	HUN	\$0.00	99.99%	\$0.00

## Bracket Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Mateiral, Bracket	1	Aluminum 6061 - Coil Stock	\$2.80	0.0058	0.0162	\$0.00	\$0.05

# Assemble Bracket



\...  
 \Refrigerant Return Line Asm  
 \Bracket Asm,Refrigerant Return Line Asm  
 \Assemble Bracket

## Process Summary

Right First Time	99.86 %
Process Time (Sec)	10.64
Total Weight (kg)	0.01

Material Cost**	\$0.06
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.11
Q Burden	\$0.02
SG&A	\$0.02
Manufacturing Cost*	\$0.21

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Bracket

## Assemble Bracket

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Cure	2.61	1	0.25	9.58	HUN	\$0.01	99.97 %	\$0.01
Dip Painting Line	2.03	1	0.25	131.87	HUN	\$0.07	99.99 %	\$0.00
Supplier Automated Asm	6.00	1	0.25	18.11	HUN	\$0.03	99.91 %	\$0.01

## Assemble Bracket

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Paint	1	Paint - Basecoat		By Area	0.0000	-	\$0.00
M6x16-Flat Head Press-in Screw	1	Commodity Item		Purchased	0.0052	-	\$0.02

# Assemble Refrigerant Return Line



- \...
- \Cooling Pack
- \Refrigerant Return Line Asm
- \Assemble Refrigerant Return Line

## Process Summary

<b>Right First Time</b>	<b>99.40 %</b>
<b>Process Time (Sec)</b>	<b>71.38</b>
<b>Total Weight (kg)</b>	<b>0.01</b>
<b>Material Cost**</b>	<b>\$0.18</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.49</b>
<b>Q Burden</b>	<b>\$0.09</b>
<b>SG&amp;A</b>	<b>\$0.06</b>
<b>Manufacturing Cost*</b>	<b>\$0.83</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Assemble Refrigerant Return Line



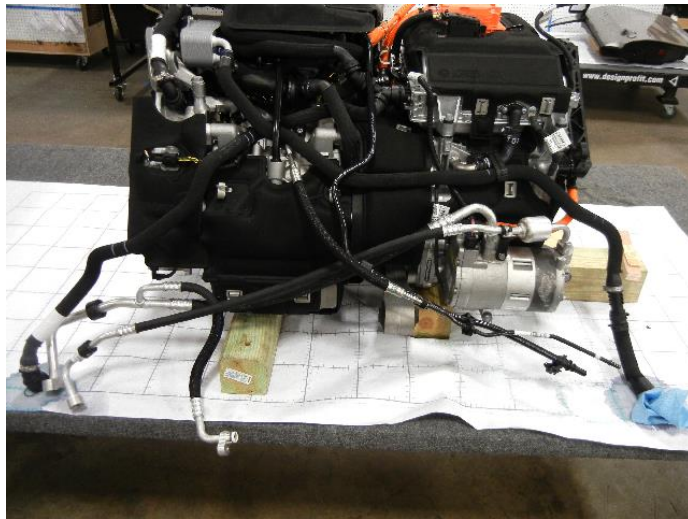
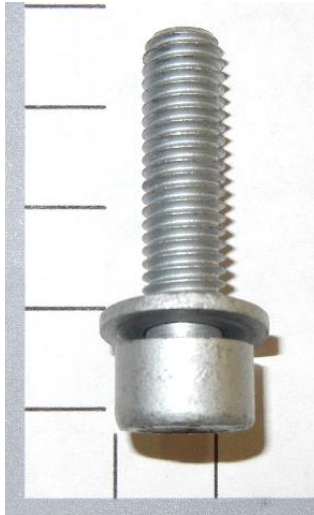
## Assemble Refrigerant Return Line

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	71.38	1	1.00	24.91	HUN	\$0.49	99.40%	\$0.09

## Assemble Refrigerant Return Line

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Clip,Refrigerant Return Line Asm	1	Commodity Item	Purchased	0.0059	-	\$0.06	\$0.00
M5-6mm, Flange Nut	1	Commodity Item	Purchased	0.0033	-	\$0.02	\$0.00
QR Label,Refrigerant Return Line Asm	1	Commodity Item	Purchased	0.0001	-	\$0.10	\$0.00

# Refrigerant Return Line Asm Installation



\...  
\Zone 6 Cooling Pack & HVAC  
\Cooling Pack  
\Refrigerant Return Line Asm Installation

## Process Summary

Right First Time	99.13 %
Process Time (Sec)	67.00
Total Weight (kg)	5.98

Material Cost**	\$165.59
OEM Process Cost	\$1.70
Supplier Process Cost	\$0.00
Q Burden	\$0.13
SG&A	\$5.17
Manufacturing Cost*	\$172.59

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Refrigerant Return Line Asm Installation

## Refrigerant Return Line Asm Installation

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
OEM Manual Asm	67.00	1	1.00	91.41	GER	\$1.70	99.13%	\$0.13

## Refrigerant Return Line Asm Installation

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
M8x28-Socket Head SEMS Screw	1	Commodity Item	Purchased	0.0175	-	\$0.05	\$0.00
AC Compressor Asm	1	Commodity Item	Purchased	5.9040	-	\$165.00	\$0.00
M6x93-Hex SEMS Bolt	3	Commodity Item	Purchased	0.0197	-	\$0.18	\$0.00

# Refrigerant Sending Line Asm



\...  
 \Zone 6 Cooling Pack & HVAC  
 \Cooling Pack  
 \Refrigerant Sending Line Asm

## Assembly Summary

<b>Parts</b>	<b>28</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>25</b>
<b>Steps</b>	<b>334</b>
<b>Fastenings</b>	<b>30</b>
<b>Right First Time</b>	<b>96.82 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>16.35</b>
<b>Total Weight (kg)</b>	<b>0.49</b>

<b>Material Cost**</b>	<b>\$3.26</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$7.25</b>
<b>Q Burden</b>	<b>\$0.49</b>
<b>SG&amp;A</b>	<b>\$1.24</b>
<b>Manufacturing Cost*</b>	<b>\$12.24</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Refrigerant Sending Line Asm



## Refrigerant Sending Line Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Main Line Asm,Refrigerant Sending Line Asm	1	14	15	191	15	98.24 %	0.00	0.00	6.27	3.06	0.3682
Branch Line Asm,Refrigerant Sending Line Asm	1	13	12	134	12	98.69 %	0.00	0.00	4.08	1.74	0.1186
Assemble Refrigerant Sending Line	1	1	3	7	3	99.86 %	0.00	0.00	1.20	0.00	0.0001

## Refrigerant Sending Line Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Main Line Asm,Refrigerant Sending Line Asm	\$0.01	\$2.27	\$0.00	\$0.00	\$2.54	\$1.71	\$0.27	\$0.78	\$7.58
Branch Line Asm,Refrigerant Sending Line Asm	\$0.18	\$0.70	\$0.00	\$0.00	\$1.64	\$0.87	\$0.20	\$0.39	\$3.98
Assemble Refrigerant Sending Line	\$0.10	\$0.00	\$0.00	\$0.00	\$0.50	\$0.00	\$0.02	\$0.06	\$0.68

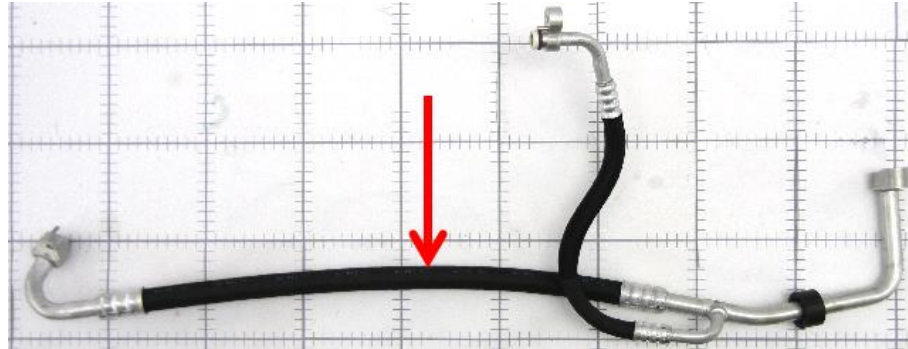
## Detailed Summary

<b>Parts</b>	<b>28</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>25</b>
<b>Steps</b>	<b>334</b>
<b>Fastenings</b>	<b>30</b>
<b>Right First Time</b>	<b>96.82%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>11.56</b>
<b>Supplier Fab. Time (Min)</b>	<b>4.79</b>
<b>Total Weight (kg)</b>	<b>0.49</b>
<b>Purchased Part Cost</b>	<b>\$0.29</b>
<b>Material Cost</b>	<b>\$2.97</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$4.68</b>
<b>Supplier Fab. Cost</b>	<b>\$2.58</b>
<b>Q Burden</b>	<b>\$0.49</b>
<b>SG&amp;A</b>	<b>\$1.24</b>
<b>Manufacturing Cost*</b>	<b>\$12.24</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Main Line Asm, Refrigerant Sending Line Asm



\...

\Cooling Pack

\Refrigerant Sending Line Asm

\Main Line Asm, Refrigerant Sending Line Asm

## Assembly Summary

<b>Parts</b>	<b>14</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>13</b>
<b>Steps</b>	<b>191</b>
<b>Fastenings</b>	<b>15</b>
<b>Right First Time</b>	<b>98.24 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>9.33</b>
<b>Total Weight (kg)</b>	<b>0.37</b>

<b>Material Cost**</b>	<b>\$2.28</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$4.25</b>
<b>Q Burden</b>	<b>\$0.27</b>
<b>SG&amp;A</b>	<b>\$0.78</b>
<b>Manufacturing Cost*</b>	<b>\$7.58</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Main Line Asm, Refrigerant Sending Line Asm



## Main Line Asm, Refrigerant Sending Line Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Connector 1 Asm, Main Line Asm	1	6	5	95	5	99.30 %	0.00	0.00	2.80	1.51	0.0936
Connector 2 Asm, Main Line Asm	1	3	3	73	3	99.49 %	0.00	0.00	2.52	1.33	0.1370
Isolator, Main Line Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.01	0.0131
23mm-OD Main Hose, Main Line Asm	1	4	0	4	0	99.96 %	0.00	0.00	0.00	0.21	0.1245
Assemble Main Line	1	0	7	14	7	99.49 %	0.00	0.00	0.95	0.00	0.0000

## Main Line Asm, Refrigerant Sending Line Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Connector 1 Asm, Main Line Asm	\$0.01	\$0.70	\$0.00	\$0.00	\$1.13	\$0.78	\$0.10	\$0.31	\$3.04
Connector 2 Asm, Main Line Asm	\$0.00	\$0.79	\$0.00	\$0.00	\$1.02	\$0.69	\$0.08	\$0.30	\$2.88
Isolator, Main Line Asm	\$0.00	\$0.06	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.01	\$0.07
23mm-OD Main Hose, Main Line Asm	\$0.00	\$0.72	\$0.00	\$0.00	\$0.00	\$0.23	\$0.01	\$0.11	\$1.07
Assemble Main Line	\$0.00	\$0.00	\$0.00	\$0.00	\$0.39	\$0.00	\$0.08	\$0.05	\$0.52



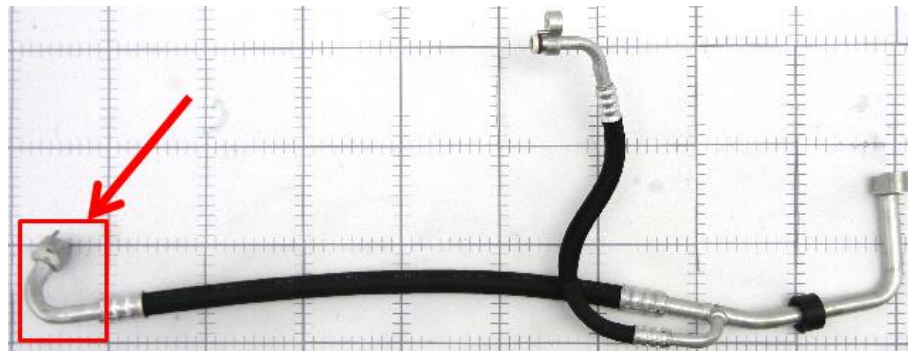
## Detailed Summary

<b>Parts</b>	<b>14</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>13</b>
<b>Steps</b>	<b>191</b>
<b>Fastenings</b>	<b>15</b>
<b>Right First Time</b>	<b>98.24%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>6.27</b>
<b>Supplier Fab. Time (Min)</b>	<b>3.06</b>
<b>Total Weight (kg)</b>	<b>0.37</b>
<b>Purchased Part Cost</b>	
	<b>\$0.01</b>
<b>Material Cost</b>	
	<b>\$2.27</b>
<b>OEM Asm. Cost</b>	
	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	
	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	
	<b>\$2.54</b>
<b>Supplier Fab. Cost</b>	
	<b>\$1.71</b>
<b>Q Burden</b>	
	<b>\$0.27</b>
<b>SG&amp;A</b>	
	<b>\$0.78</b>
<b>Manufacturing Cost*</b>	
	<b>\$7.58</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connector 1 Asm, Main Line Asm



- \...
- \Refrigerant Sending Line Asm
- \Main Line Asm, Refrigerant Sending Line Asm
- \Connector 1 Asm, Main Line Asm

## Assembly Summary

<b>Parts</b>	<b>6</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>6</b>
<b>Steps</b>	<b>95</b>
<b>Fastenings</b>	<b>5</b>
<b>Right First Time</b>	<b>99.30 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>4.31</b>
<b>Total Weight (kg)</b>	<b>0.09</b>

<b>Material Cost**</b>	<b>\$0.71</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$1.91</b>
<b>Q Burden</b>	<b>\$0.10</b>
<b>SG&amp;A</b>	<b>\$0.31</b>
<b>Manufacturing Cost*</b>	<b>\$3.04</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connector 1 Asm,Main Line Asm



**MUNRO**  
& ASSOCIATES, INC.

## Connector 1 Asm,Main Line Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Connecting Block,Connector 1 Asm	1	1	0	40	0	99.85 %	0.00	0.00	0.00	1.00	0.0375
17mm Sealing Ring,Connector 1 Asm	1	2	0	8	0	99.96 %	0.00	0.00	0.00	0.16	0.0016
Connecting Tube,Connector 1 Asm	1	1	0	9	0	99.88 %	0.00	0.00	0.00	0.18	0.0308
Assemble Connector 1	1	1	4	9	4	99.77 %	0.00	0.00	1.44	0.00	0.0007
Hose Crimp Fitting, Section 2 Asm	1	1	0	21	0	99.93 %	0.00	0.00	0.27	0.17	0.0230
Assemble Hose Crimp Fitting	1	0	1	4	1	99.92 %	0.00	0.00	1.10	0.00	0.0000

## Connector 1 Asm,Main Line Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Connecting Block,Connector 1 Asm	\$0.00	\$0.38	\$0.00	\$0.00	\$0.00	\$0.59	\$0.02	\$0.12	\$1.11
17mm Sealing Ring,Connector 1 Asm	\$0.00	\$0.03	\$0.00	\$0.00	\$0.00	\$0.05	\$0.01	\$0.01	\$0.09
Connecting Tube,Connector 1 Asm	\$0.00	\$0.15	\$0.00	\$0.00	\$0.00	\$0.07	\$0.02	\$0.03	\$0.27
Assemble Connector 1	\$0.01	\$0.00	\$0.00	\$0.00	\$0.60	\$0.00	\$0.04	\$0.07	\$0.71
Hose Crimp Fitting, Section 2 Asm	\$0.00	\$0.14	\$0.00	\$0.00	\$0.08	\$0.06	\$0.01	\$0.03	\$0.33
Assemble Hose Crimp Fitting	\$0.00	\$0.00	\$0.00	\$0.00	\$0.46	\$0.00	\$0.01	\$0.05	\$0.52

## Detailed Summary

<b>Parts</b>	<b>6</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>6</b>
<b>Steps</b>	<b>95</b>
<b>Fastenings</b>	<b>5</b>
<b>Right First Time</b>	<b>99.3%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>2.80</b>
<b>Supplier Fab. Time (Min)</b>	<b>1.51</b>
<b>Total Weight (kg)</b>	<b>0.09</b>
<b>Purchased Part Cost</b>	<b>\$0.01</b>
<b>Material Cost</b>	<b>\$0.70</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$1.13</b>
<b>Supplier Fab. Cost</b>	<b>\$0.78</b>
<b>Q Burden</b>	<b>\$0.10</b>
<b>SG&amp;A</b>	<b>\$0.31</b>
<b>Manufacturing Cost*</b>	<b>\$3.04</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connecting Block, Connector 1 Asm



\...

\Connector 1 Asm, Main Line Asm  
\Connecting Block, Connector 1 Asm  
\Connecting Block Process

## Process Summary

Right First Time	99.85 %
Process Time (Sec)	59.76
Total Weight (kg)	0.04
Material Cost**	\$0.38
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.59
Q Burden	\$0.02
SG&A	\$0.12
Manufacturing Cost*	\$1.11

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connecting Block, Connector 1 Asm



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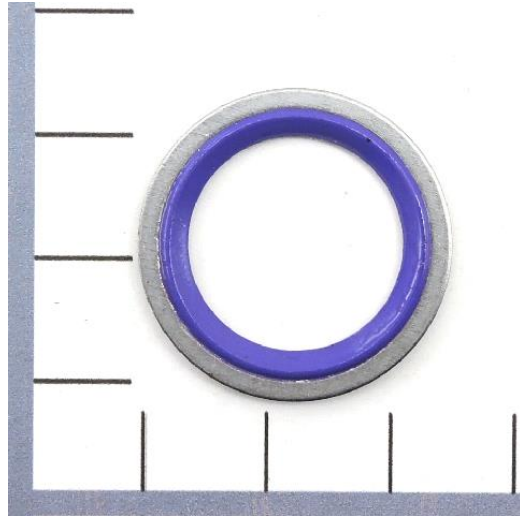
## Connecting Block Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.95	HUN	\$0.02	99.99 %	\$0.00
Deburr	4.00	1	0.25	22.62	HUN	\$0.03	99.99 %	\$0.00
CNC Machine	48.04	1	0.25	38.22	HUN	\$0.51	99.91 %	\$0.01
Cut Off	2.59	1	0.25	24.32	HUN	\$0.02	99.98 %	\$0.00
2200 Ton Extrusion Press	0.13	1	4.00	494.65	HUN	\$0.02	99.99 %	\$0.00

## Connecting Block Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Connecting Block	1	Aluminum 6061 - Billet Stock	\$2.80	0.0375	0.1353	\$0.00	\$0.38

# 17mm Sealing Ring, Connector 1 Asm



\...  
\Connector 1 Asm, Main Line Asm  
\17mm Sealing Ring, Connector 1 Asm  
\Sealing Ring Process

## Process Summary

<b>Right First Time</b>	<b>99.96 %</b>
<b>Process Time (Sec)</b>	<b>9.57</b>
<b>Total Weight (kg)</b>	<b>0.00</b>
<b>Material Cost**</b>	<b>\$0.03</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.05</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.01</b>
<b>Manufacturing Cost*</b>	<b>\$0.09</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# 17mm Sealing Ring, Connector 1 Asm



## Sealing Ring Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
55 Ton Injection Molding Press	31.76	8	0.25	23.26	HUN	\$0.03	99.99%	\$0.00
Wash	3.50	1	0.25	11.95	HUN	\$0.01	99.99%	\$0.00
Deburr	1.50	1	0.25	22.62	HUN	\$0.01	99.99%	\$0.00
25 Ton Stamping Press	0.60	1	0.25	14.05	HUN	\$0.00	99.99%	\$0.00

## Sealing Ring Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, O-Ring Seal	1	EPDM	\$4.04	0.0006	0.0006	\$0.00	\$0.01
Material, Outer Ring	1	Steel 1018 - Coil Stock	\$1.21	0.0010	0.0140	\$0.00	\$0.02



# Connecting Tube, Connector 1 Asm



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\...

- \Connector 1 Asm, Main Line Asm
- \Connecting Tube, Connector 1 Asm
- \Connecting Tube Process

## Process Summary

<b>Right First Time</b>	<b>99.88 %</b>
<b>Process Time (Sec)</b>	<b>11.00</b>
<b>Total Weight (kg)</b>	<b>0.03</b>

<b>Material Cost**</b>	<b>\$0.15</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.07</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.03</b>
<b>Manufacturing Cost*</b>	<b>\$0.27</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connecting Tube, Connector 1 Asm



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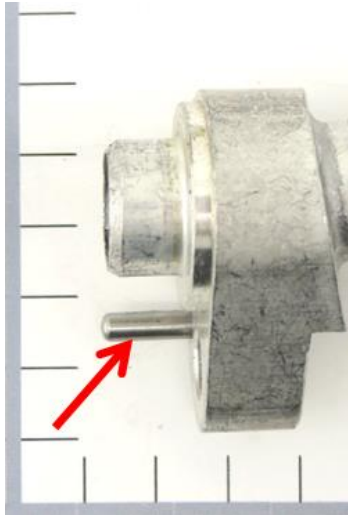
## Connecting Tube Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	21.64	HUN	\$0.03	99.99%	\$0.00
Tube Bending	6.00	1	0.25	26.69	HUN	\$0.04	99.89%	\$0.02

## Connecting Tube Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Connecting Tube	1	Aluminum 3003 - Clad Seamless Tube	\$5.00	0.0308	0.0308	\$0.00	\$0.15

# Assemble Connector 1



\...

\Main Line Asm,Refrigerant Sending Line Asm  
 \Connector 1 Asm,Main Line Asm  
 \Assemble Connector 1

## Process Summary

<b>Right First Time</b>	<b>99.77 %</b>
<b>Process Time (Sec)</b>	<b>86.10</b>
<b>Total Weight (kg)</b>	<b>0.00</b>

<b>Material Cost**</b>	<b>\$0.01</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.60</b>
<b>Q Burden</b>	<b>\$0.04</b>
<b>SG&amp;A</b>	<b>\$0.07</b>
<b>Manufacturing Cost*</b>	<b>\$0.71</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Connector 1



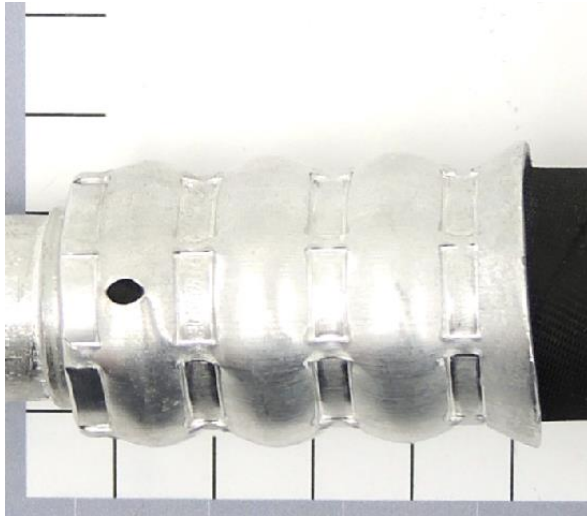
## Assemble Connector 1

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	86.10	1	1.00	24.91	HUN	\$0.60	99.77%	\$0.04

## Assemble Connector 1

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Guide Pin, Connector 1 Asm	1	Commodity Item	Purchased	0.0007	-	\$0.01	\$0.00

# Hose Crimp Fitting, Section 2 Asm



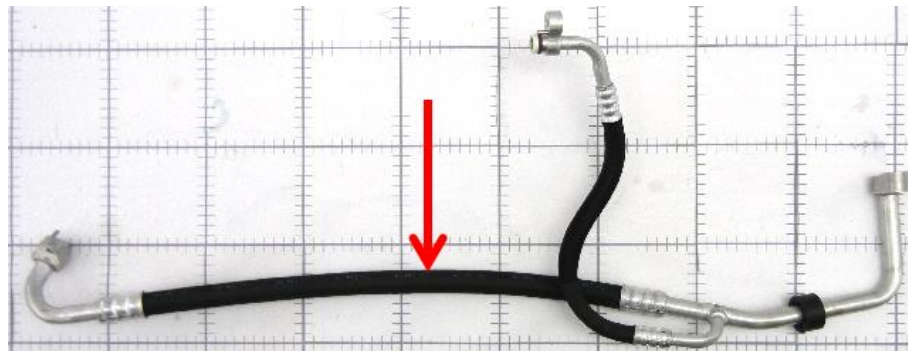
\...

- \Connector 1 Asm, Main Line Asm
- \Hose Crimp Fitting, Section 2 Asm
- \Hose Crimp Fitting Process

## Process Summary

Right First Time	99.93 %
Process Time (Sec)	26.32
Total Weight (kg)	0.02

Material Cost**	\$0.14
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.15
Q Burden	\$0.01
SG&A	\$0.03
Manufacturing Cost*	\$0.33



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Hose Crimp Fitting, Section 2 Asm

## Hose Crimp Fitting Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Automated Asm	16.00	1	0.25	18.11	HUN	\$0.08	99.98 %	\$0.00
Wash	5.00	1	0.25	21.64	HUN	\$0.03	99.99 %	\$0.00
Debur	3.00	1	0.25	22.62	HUN	\$0.02	99.99 %	\$0.00
Circular Saw	2.32	1	0.25	24.32	HUN	\$0.02	99.97 %	\$0.01

## Hose Crimp Fitting Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Hose Crimp Fitting	1	Aluminum 3003 - Seamless Tube	\$6.00	0.0230	0.0230	\$0.00	\$0.14

## No Commodity Items Required for This Process



\...

- \Main Line Asm, Refrigerant Sending Line Asm
- \Connector 1 Asm, Main Line Asm
- \Assemble Hose Crimp Fitting

### Process Summary

Right First Time	99.92 %
Process Time (Sec)	66.10
Total Weight (kg)	0.00
Material Cost**	\$0.00
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.46
Q Burden	\$0.01
SG&A	\$0.05
Manufacturing Cost*	\$0.52

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Hose Crimp Fitting



## Assemble Hose Crimp Fitting

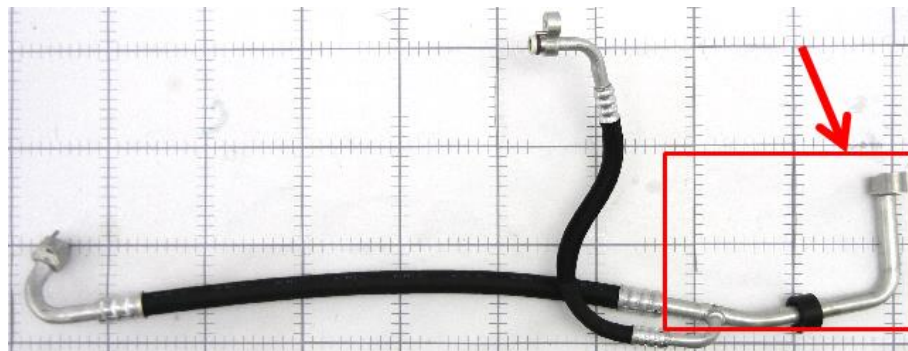
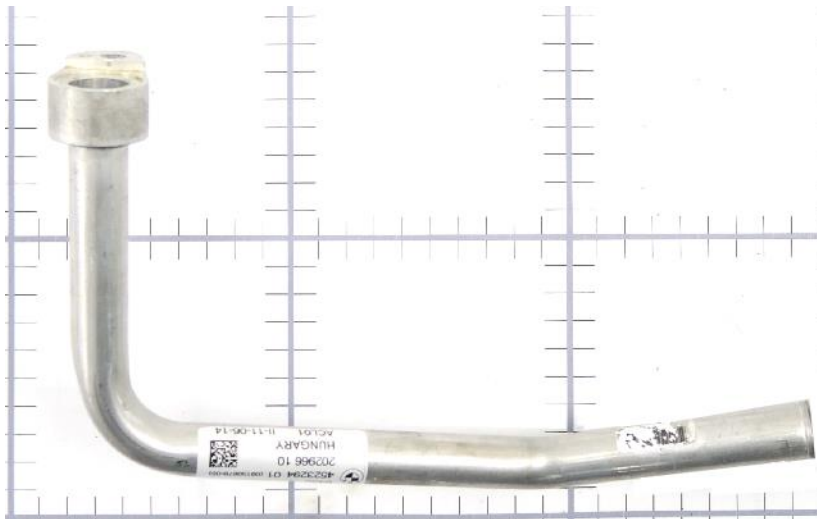
Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
<a href="#">Supplier Manual Asm</a>	66.10	1	1.00	24.91	HUN	\$0.46	99.92%	\$0.01

## Assemble Hose Crimp Fitting

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Connector 2 Asm, Main Line Asm



- \...
- \Refrigerant Sending Line Asm
- \Main Line Asm, Refrigerant Sending Line Asm
- \Connector 2 Asm, Main Line Asm

## Assembly Summary

<b>Parts</b>	<b>3</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>73</b>
<b>Fastenings</b>	<b>3</b>
<b>Right First Time</b>	<b>99.49 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>3.85</b>
<b>Total Weight (kg)</b>	<b>0.14</b>

<b>Material Cost**</b>	<b>\$0.79</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$1.71</b>
<b>Q Burden</b>	<b>\$0.08</b>
<b>SG&amp;A</b>	<b>\$0.30</b>
<b>Manufacturing Cost*</b>	<b>\$2.88</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connector 2 Asm, Main Line Asm



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## Connector 2 Asm, Main Line Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Connector 2, Connector 2 Asm	1	1	0	30	0	99.89 %	0.00	0.00	0.00	0.97	0.0346
Connecting Tube, Connector 2 Asm	1	1	0	10	0	99.86 %	0.00	0.00	0.00	0.20	0.0794
Assemble Connector 2	1	0	2	5	2	99.89 %	0.00	0.00	1.15	0.00	0.0000
Hose Crimp Fitting, Section 2 Asm	1	1	0	21	0	99.93 %	0.00	0.00	0.27	0.17	0.0230
Assemble Hose Crimp Fitting	1	0	1	4	1	99.92 %	0.00	0.00	1.10	0.00	0.0000

## Connector 2 Asm, Main Line Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Connector 2, Connector 2 Asm	\$0.00	\$0.25	\$0.00	\$0.00	\$0.00	\$0.56	\$0.02	\$0.10	\$0.93
Connecting Tube, Connector 2 Asm	\$0.00	\$0.40	\$0.00	\$0.00	\$0.00	\$0.07	\$0.02	\$0.06	\$0.54
Assemble Connector 2	\$0.00	\$0.00	\$0.00	\$0.00	\$0.48	\$0.00	\$0.02	\$0.06	\$0.55
Hose Crimp Fitting, Section 2 Asm	\$0.00	\$0.14	\$0.00	\$0.00	\$0.08	\$0.06	\$0.01	\$0.03	\$0.33
Assemble Hose Crimp Fitting	\$0.00	\$0.00	\$0.00	\$0.00	\$0.46	\$0.00	\$0.01	\$0.05	\$0.52

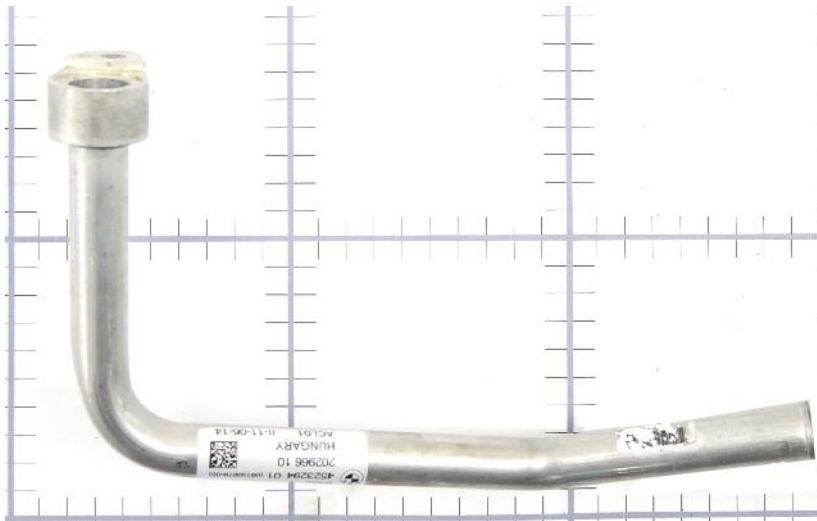
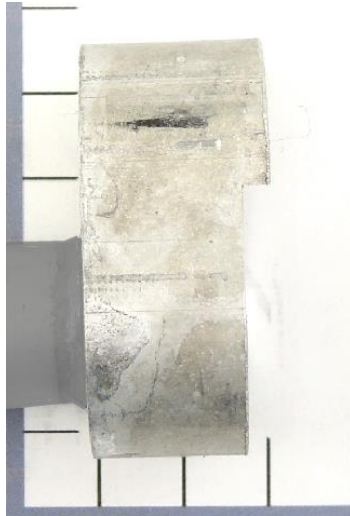
## Detailed Summary

<b>Parts</b>	<b>3</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>73</b>
<b>Fastenings</b>	<b>3</b>
<b>Right First Time</b>	<b>99.49%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>2.52</b>
<b>Supplier Fab. Time (Min)</b>	<b>1.33</b>
<b>Total Weight (kg)</b>	<b>0.14</b>
<b>Purchased Part Cost</b>	<b>\$0.00</b>
<b>Material Cost</b>	<b>\$0.79</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$1.02</b>
<b>Supplier Fab. Cost</b>	<b>\$0.69</b>
<b>Q Burden</b>	<b>\$0.08</b>
<b>SG&amp;A</b>	<b>\$0.30</b>
<b>Manufacturing Cost*</b>	<b>\$2.88</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connector 2, Connector 2 Asm



\...  
\Connector 2 Asm, Main Line Asm  
\Connector 2, Connector 2 Asm  
\Connector 2 Process

## Process Summary

Right First Time	99.89 %
Process Time (Sec)	58.04
Total Weight (kg)	0.03
Material Cost**	\$0.25
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.56
Q Burden	\$0.02
SG&A	\$0.10
Manufacturing Cost*	\$0.93

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connector 2, Connector 2 Asm



## Connector 2 Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.95	HUN	\$0.02	99.99 %	\$0.00
Deburr	4.00	1	0.25	22.62	HUN	\$0.03	99.99 %	\$0.00
CNC Machine	46.37	1	0.25	38.22	HUN	\$0.49	99.95 %	\$0.01
Cut Off	2.59	1	0.25	24.32	HUN	\$0.02	99.98 %	\$0.00
2200 Ton Extrusion Press	0.08	1	4.00	494.65	HUN	\$0.01	99.99 %	\$0.00

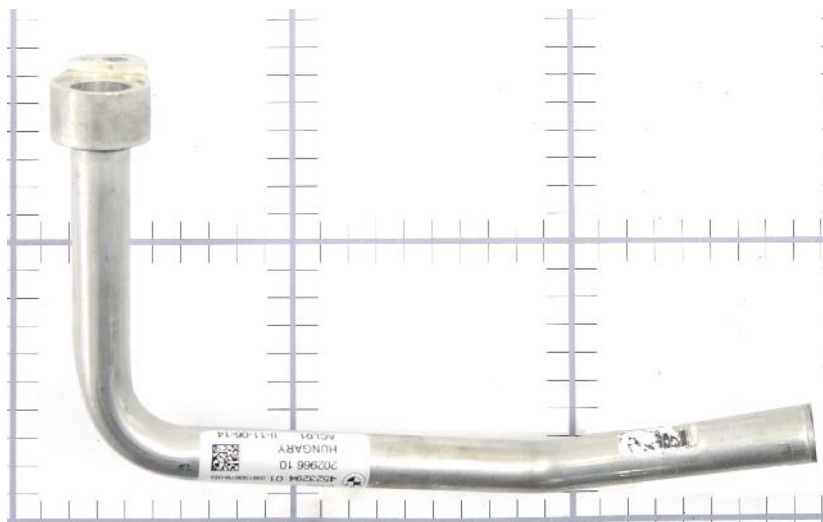
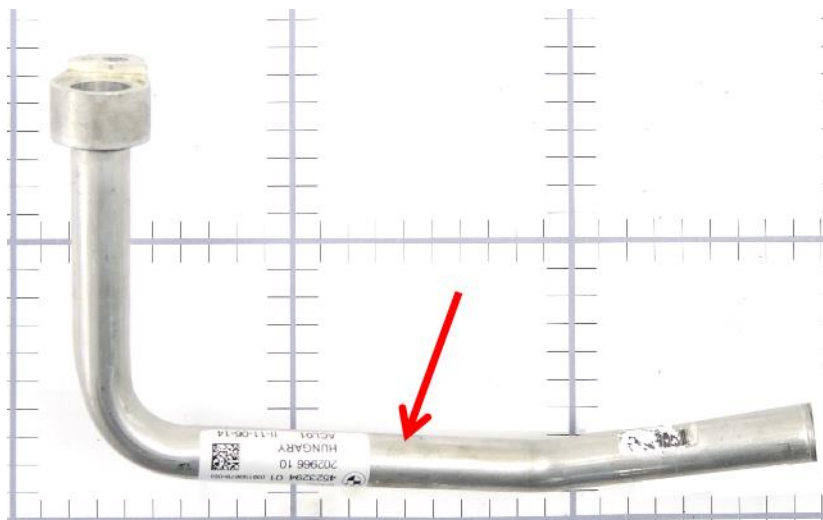
## Connector 2 Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Connector 2	1	Aluminum 6061 - Bar Stock	\$3.06	0.0346	0.0820	\$0.00	\$0.25

# Connecting Tube, Connector 2 Asm



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- \...
- \Connector 2 Asm, Main Line Asm
- \Connecting Tube, Connector 2 Asm
- \Connecting Tube Process

## Process Summary

<b>Right First Time</b>	<b>99.86 %</b>
<b>Process Time (Sec)</b>	<b>11.72</b>
<b>Total Weight (kg)</b>	<b>0.08</b>

<b>Material Cost**</b>	<b>\$0.40</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.07</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.06</b>
<b>Manufacturing Cost*</b>	<b>\$0.54</b>

\* Excluding tooling, ER&D, logistics, and profit margin  
 \*\* Includes material cost and purchased parts cost

# Connecting Tube, Connector 2 Asm



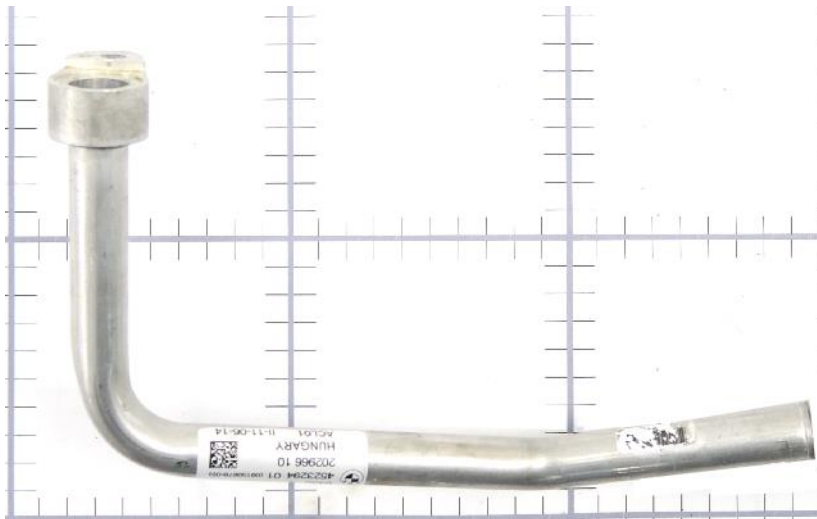
## Connecting Tube Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.95	HUN	\$0.02	99.99%	\$0.00
Tube Bending	6.72	1	0.25	26.59	HUN	\$0.05	99.87%	\$0.02

## Connecting Tube Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Connecting Tube	1	Aluminum 3003 - Clad Seamless Tube	\$5.00	0.0794	0.0794	\$0.00	\$0.40

## No Commodity Items Required for This Process



\...

- \Main Line Asm,Refrigerant Sending Line Asm
- \Connector 2 Asm,Main Line Asm
- \Assemble Connector 2

### Process Summary

<b>Right First Time</b>	<b>99.89 %</b>
<b>Process Time (Sec)</b>	<b>69.10</b>
<b>Total Weight (kg)</b>	<b>0.00</b>
<b>Material Cost**</b>	<b>\$0.00</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.48</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.06</b>
<b>Manufacturing Cost*</b>	<b>\$0.55</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Assemble Connector 2



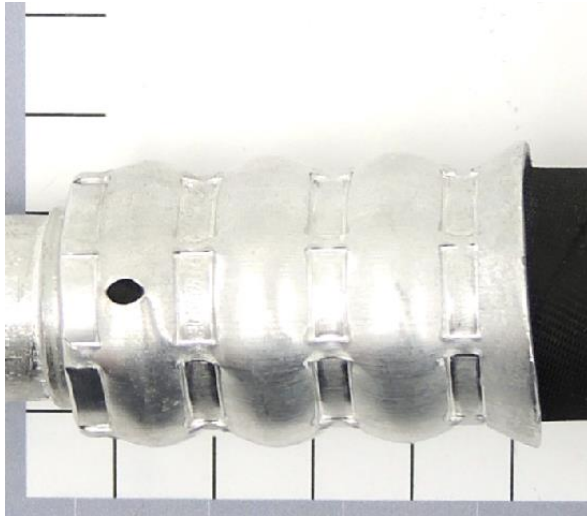
## Assemble Connector 2

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	69.10	1	1.00	24.91	HUN	\$0.48	99.89%	\$0.02

## Assemble Connector 2

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Hose Crimp Fitting, Section 2 Asm



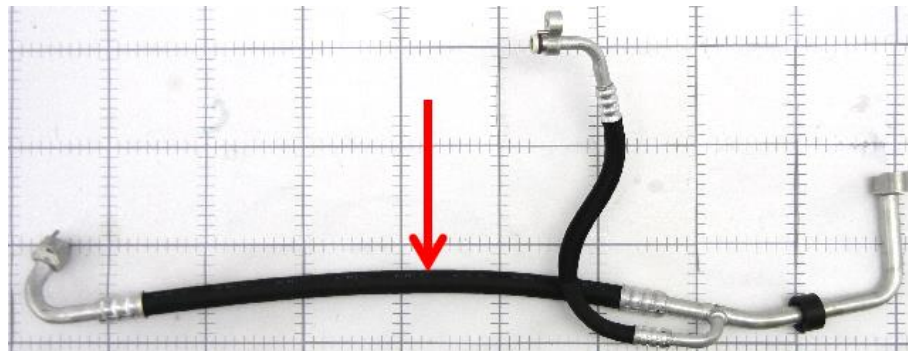
\...

- \Connector 2 Asm, Main Line Asm
- \Hose Crimp Fitting, Section 2 Asm
- \Hose Crimp Fitting Process

## Process Summary

Right First Time	99.93 %
Process Time (Sec)	26.32
Total Weight (kg)	0.02

Material Cost**	\$0.14
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.15
Q Burden	\$0.01
SG&A	\$0.03
Manufacturing Cost*	\$0.33



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

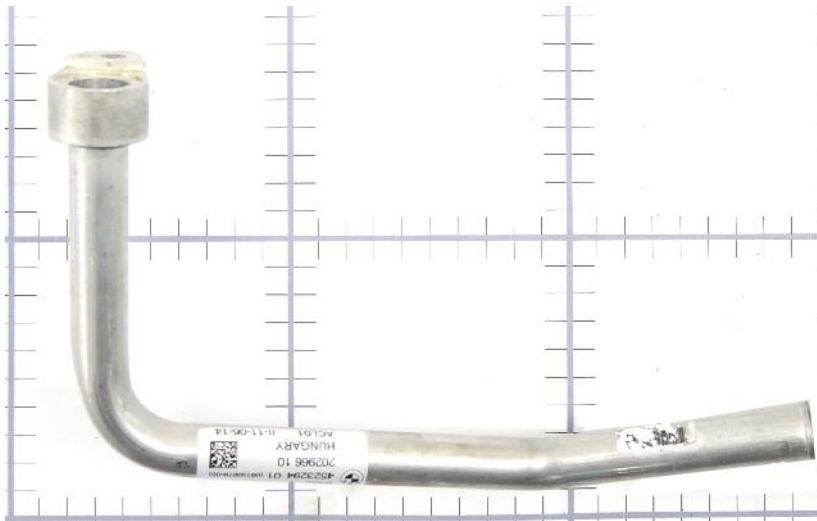
# Hose Crimp Fitting, Section 2 Asm



Hose Crimp Fitting Process									
Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden	
Supplier Automated Asm	16.00	1	0.25	18.11	HUN	\$0.08	99.98 %	\$0.00	
Wash	5.00	1	0.25	21.64	HUN	\$0.03	99.99 %	\$0.00	
Debur	3.00	1	0.25	22.62	HUN	\$0.02	99.99 %	\$0.00	
Circular Saw	2.32	1	0.25	24.32	HUN	\$0.02	99.97 %	\$0.01	

Hose Crimp Fitting Process								
Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost	
Material, Hose Crimp Fitting	1	Aluminum 3003 - Seamless Tube	\$6.00	0.0230	0.0230	\$0.00	\$0.14	

## No Commodity Items Required for This Process



\...

- \Main Line Asm, Refrigerant Sending Line Asm
- \Connector 2 Asm, Main Line Asm
- \Assemble Hose Crimp Fitting

### Process Summary

Right First Time	99.92 %
Process Time (Sec)	66.10
Total Weight (kg)	0.00
Material Cost**	\$0.00
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.46
Q Burden	\$0.01
SG&A	\$0.05
Manufacturing Cost*	\$0.52

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Hose Crimp Fitting



## Assemble Hose Crimp Fitting

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
<a href="#">Supplier Manual Asm</a>	66.10	1	1.00	24.91	HUN	\$0.46	99.92%	\$0.01

## Assemble Hose Crimp Fitting

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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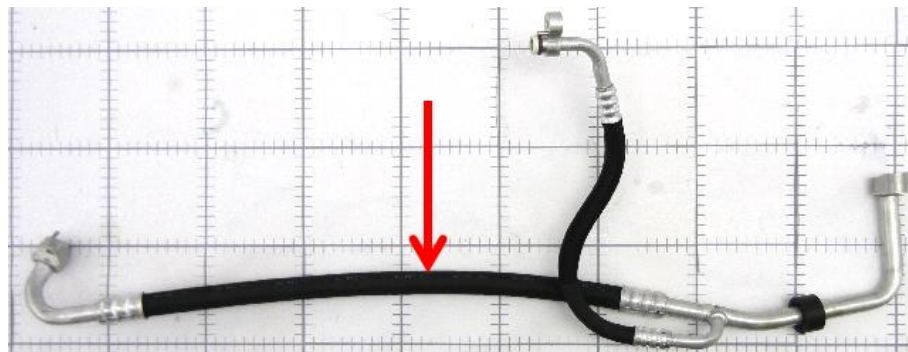


\...  
 \Main Line Asm, Refrigerant Sending Line Asm  
 \Isolator, Main Line Asm  
 \Isolator Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	0.31
Total Weight (kg)	0.01

Material Cost**	\$0.06
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.00
Q Burden	\$0.00
SG&A	\$0.01
Manufacturing Cost*	\$0.07



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Isolator, Main Line Asm

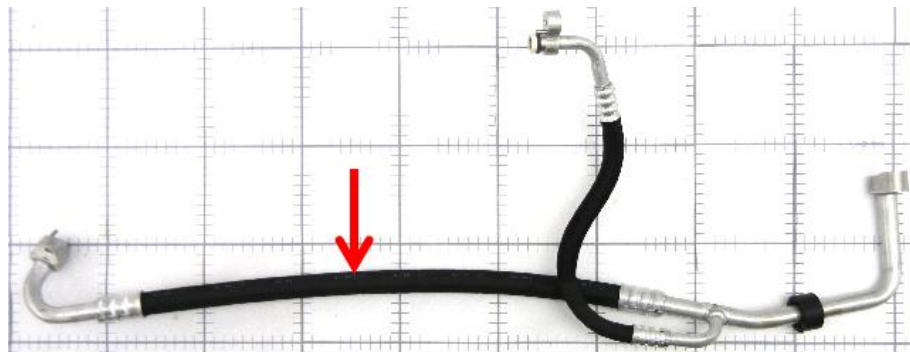
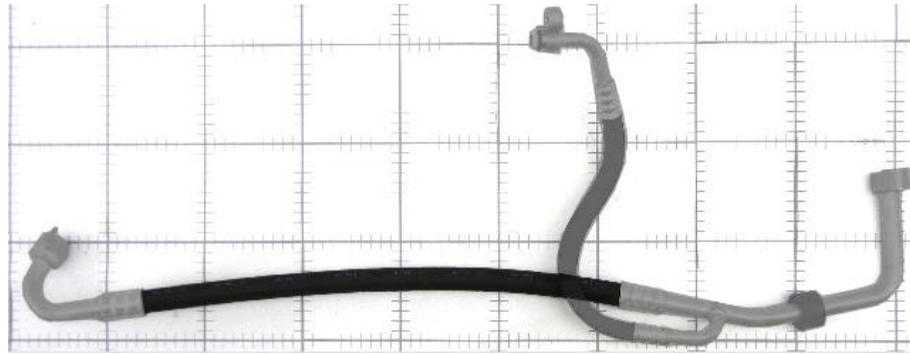
## Isolator Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Extrude: 45mm, 1 Layer	0.31	1	0.50	31.32	HUN	\$0.00	99.99%	\$0.00

## Isolator Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Isolator	1	EPDM (Extrusion Grade)	\$4.43	0.0131	0.0131	\$0.00	\$0.06

# 23mm-OD Main Hose, Main Line Asm



\...

\Main Line Asm, Refrigerant Sending Line Asm

\23mm-OD Main Hose, Main Line Asm

\23mm-OD Main Hose Process

## Process Summary

Right First Time	99.96 %
Process Time (Sec)	12.39
Total Weight (kg)	0.12

Material Cost**	\$0.72
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.23
Q Burden	\$0.01
SG&A	\$0.11
Manufacturing Cost*	\$1.07

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# 23mm-OD Main Hose, Main Line Asm



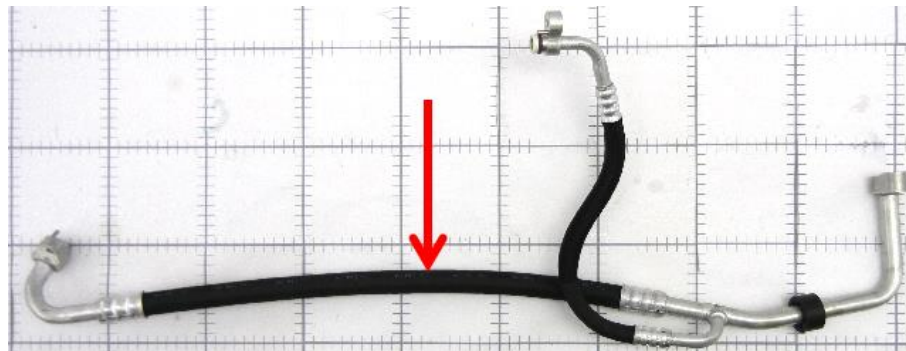
## 23mm-OD Main Hose Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Extrusion:32mm 2 Layer & Reinf	12.39	1	0.50	67.99	HUN	\$0.23	99.96%	\$0.01

## 23mm-OD Main Hose Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material,Inner Rubber Layer,23mm-OD Main Hose	1	EPDM (Extrusion Grade)	\$4.43	0.0549	0.0549	\$0.00	\$0.24
Material,Reinforcement Layer,23mm-OD Main Hose	1	PA Thread w/PVC Coating	By Area	0.0101	-	\$0.00	\$0.18
Material,Outer Rubber Layer,23mm-OD Main Hose	1	EPDM (Extrusion Grade)	\$4.43	0.0438	0.0438	\$0.00	\$0.19
Material,Outer EPDM Covering,23mm-OD Main Hose	1	EPDM Covering	By Area	0.0157	-	\$0.00	\$0.11

No Commodity Items  
Required for This  
Process



\...

\Refrigerant Sending Line Asm

\Main Line Asm, Refrigerant Sending Line Asm

\Assemble Main Line

## Process Summary

Right First Time	99.49 %
Process Time (Sec)	57.00
Total Weight (kg)	0.00

Material Cost**	\$0.00
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.39
Q Burden	\$0.08
SG&A	\$0.05
Manufacturing Cost*	\$0.52

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Main Line



## Assemble Main Line

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	57.00	1	1.00	24.91	HUN	\$0.39	99.49%	\$0.08

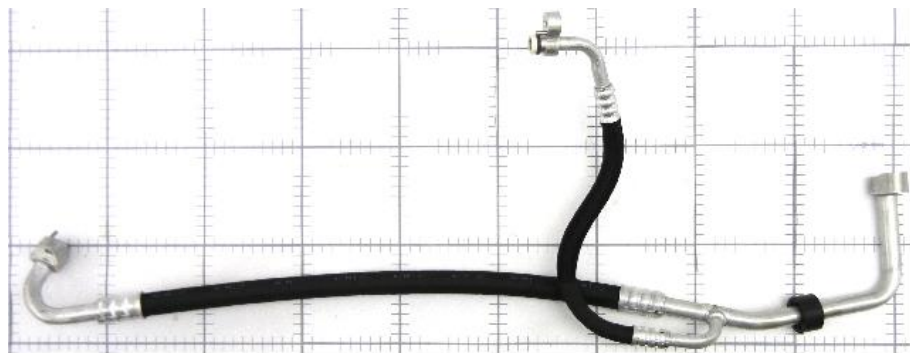
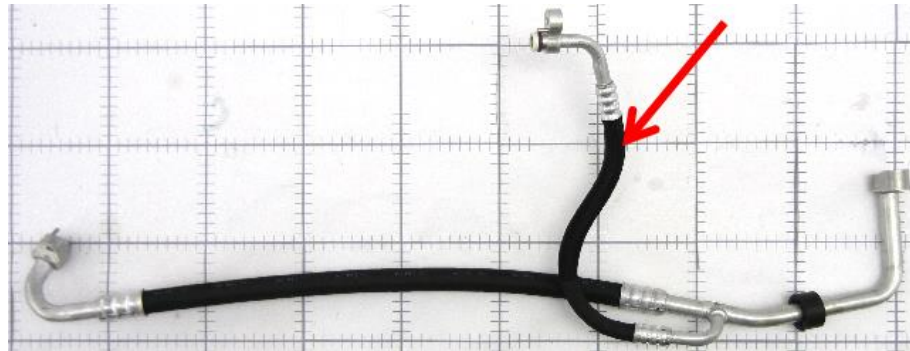
## Assemble Main Line

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Branch Line Asm, Refrigerant Sending Line Asm



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- \...
  - \Cooling Pack
  - \Refrigerant Sending Line Asm
  - \Branch Line Asm, Refrigerant Sending Line Asm
- ## Assembly Summary

<b>Parts</b>	<b>13</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>12</b>
<b>Steps</b>	<b>134</b>
<b>Fastenings</b>	<b>12</b>
<b>Right First Time</b>	<b>98.69 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>5.82</b>
<b>Total Weight (kg)</b>	<b>0.12</b>

<b>Material Cost**</b>	<b>\$0.88</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$2.51</b>
<b>Q Burden</b>	<b>\$0.20</b>
<b>SG&amp;A</b>	<b>\$0.39</b>
<b>Manufacturing Cost*</b>	<b>\$3.98</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Branch Line Asm, Refrigerant Sending Line Asm



## Branch Line Asm, Refrigerant Sending Line Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Connector Asm, Branch Line Asm	1	6	6	82	6	99.32 %	0.00	0.00	2.34	1.30	0.0515
17mm-OD Branch Hose, Branch Line Asm	1	4	0	4	0	99.96 %	0.00	0.00	0.00	0.10	0.0405
Connecting Tube Asm, Branch Line Asm	1	2	1	35	1	99.76 %	0.00	0.00	1.12	0.34	0.0216
Assemble Branch Line	1	1	5	10	5	99.65 %	0.00	0.00	0.62	0.00	0.0050

## Branch Line Asm, Refrigerant Sending Line Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Connector Asm, Branch Line Asm	\$0.05	\$0.31	\$0.00	\$0.00	\$0.94	\$0.66	\$0.10	\$0.23	\$2.29
17mm-OD Branch Hose, Branch Line Asm	\$0.00	\$0.27	\$0.00	\$0.00	\$0.00	\$0.11	\$0.01	\$0.05	\$0.43
Connecting Tube Asm, Branch Line Asm	\$0.00	\$0.12	\$0.00	\$0.00	\$0.44	\$0.10	\$0.04	\$0.08	\$0.78
Assemble Branch Line	\$0.13	\$0.00	\$0.00	\$0.00	\$0.26	\$0.00	\$0.05	\$0.03	\$0.47

## Detailed Summary

<b>Parts</b>	<b>13</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>12</b>
<b>Steps</b>	<b>134</b>
<b>Fastenings</b>	<b>12</b>
<b>Right First Time</b>	<b>98.69%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>4.08</b>
<b>Supplier Fab. Time (Min)</b>	<b>1.74</b>
<b>Total Weight (kg)</b>	<b>0.12</b>
<b>Purchased Part Cost</b>	<b>\$0.18</b>
<b>Material Cost</b>	<b>\$0.70</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$1.64</b>
<b>Supplier Fab. Cost</b>	<b>\$0.87</b>
<b>Q Burden</b>	<b>\$0.20</b>
<b>SG&amp;A</b>	<b>\$0.39</b>
<b>Manufacturing Cost*</b>	<b>\$3.98</b>

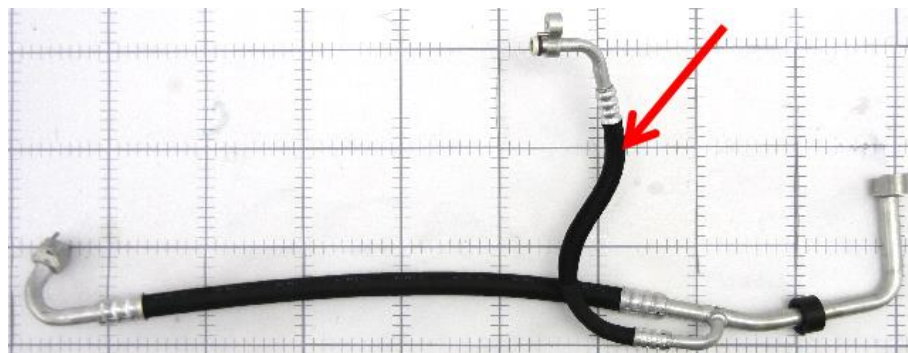
\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connector Asm, Branch Line Asm



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\...

\Refrigerant Sending Line Asm

\Branch Line Asm, Refrigerant Sending Line Asm

\Connector Asm, Branch Line Asm

## Assembly Summary

<b>Parts</b>	<b>6</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>6</b>
<b>Steps</b>	<b>82</b>
<b>Fastenings</b>	<b>6</b>
<b>Right First Time</b>	<b>99.32 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>3.64</b>
<b>Total Weight (kg)</b>	<b>0.05</b>

<b>Material Cost**</b>	<b>\$0.36</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$1.60</b>
<b>Q Burden</b>	<b>\$0.10</b>
<b>SG&amp;A</b>	<b>\$0.23</b>
<b>Manufacturing Cost*</b>	<b>\$2.29</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connector Asm, Branch Line Asm



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## Connector Asm, Branch Line Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Connecting Tube, Connector Asm	1	1	0	8	0	99.92 %	0.00	0.00	0.00	0.15	0.0102
Connecting Block, Connector Asm	1	1	0	33	0	99.88 %	0.00	0.00	0.00	0.96	0.0286
End Cap, Connector Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.01	0.0003
Assemble Connector	1	2	5	11	5	99.68 %	0.00	0.00	1.22	0.00	0.0010
Refrigerant Line Crimp Fitting, Branch Line Asm	1	1	0	21	0	99.93 %	0.00	0.00	0.27	0.17	0.0114
Assemble Hose Crimp Fitting	1	0	1	4	1	99.92 %	0.00	0.00	0.86	0.00	0.0000

## Connector Asm, Branch Line Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Connecting Tube, Connector Asm	\$0.00	\$0.05	\$0.00	\$0.00	\$0.00	\$0.05	\$0.01	\$0.01	\$0.12
Connecting Block, Connector Asm	\$0.00	\$0.18	\$0.00	\$0.00	\$0.00	\$0.56	\$0.02	\$0.09	\$0.84
End Cap, Connector Asm	\$0.00	\$0.01	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.02
Assemble Connector	\$0.05	\$0.00	\$0.00	\$0.00	\$0.51	\$0.00	\$0.05	\$0.06	\$0.67
Refrigerant Line Crimp Fitting, Branch Line Asm	\$0.00	\$0.07	\$0.00	\$0.00	\$0.08	\$0.05	\$0.01	\$0.02	\$0.24
Assemble Hose Crimp Fitting	\$0.00	\$0.00	\$0.00	\$0.00	\$0.36	\$0.00	\$0.01	\$0.04	\$0.41



## Detailed Summary

<b>Parts</b>	<b>6</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>6</b>
<b>Steps</b>	<b>82</b>
<b>Fastenings</b>	<b>6</b>
<b>Right First Time</b>	<b>99.32%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>2.34</b>
<b>Supplier Fab. Time (Min)</b>	<b>1.30</b>
<b>Total Weight (kg)</b>	<b>0.05</b>
<b>Purchased Part Cost</b>	
	<b>\$0.05</b>
<b>Material Cost</b>	
	<b>\$0.31</b>
<b>OEM Asm. Cost</b>	
	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	
	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	
	<b>\$0.94</b>
<b>Supplier Fab. Cost</b>	
	<b>\$0.66</b>
<b>Q Burden</b>	
	<b>\$0.10</b>
<b>SG&amp;A</b>	
	<b>\$0.23</b>
<b>Manufacturing Cost*</b>	
	<b>\$2.29</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



\...

- \Connector Asm, Branch Line Asm
- \Connecting Tube, Connector Asm
- \Connecting Tube Process

## Process Summary

<b>Right First Time</b>	<b>99.92 %</b>
<b>Process Time (Sec)</b>	<b>9.00</b>
<b>Total Weight (kg)</b>	<b>0.01</b>
<b>Material Cost**</b>	<b>\$0.05</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.05</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.01</b>
<b>Manufacturing Cost*</b>	<b>\$0.12</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connecting Tube, Connector Asm



## Connecting Tube Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.95	HUN	\$0.02	99.99%	\$0.00
Tube Bending	4.00	1	0.25	26.59	HUN	\$0.03	99.93%	\$0.01

## Connecting Tube Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Connecting Tube	1	Aluminum 3003 - Clad Seamless Tube	\$5.00	0.0102	0.0102	\$0.00	\$0.05

# Connecting Block, Connector Asm



\...

- \Connector Asm, Branch Line Asm
- \Connecting Block, Connector Asm
- \Connecting Block Process

## Process Summary

Right First Time	99.88 %
Process Time (Sec)	57.81
Total Weight (kg)	0.03
Material Cost**	\$0.18
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.56
Q Burden	\$0.02
SG&A	\$0.09
Manufacturing Cost*	\$0.84

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connecting Block, Connector Asm



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## Connecting Block Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.95	HUN	\$0.02	99.99 %	\$0.00
Deburr	4.00	1	0.25	22.62	HUN	\$0.03	99.99 %	\$0.00
CNC Machine	45.92	1	0.25	38.22	HUN	\$0.49	99.94 %	\$0.01
Cut Off	2.83	1	0.25	24.32	HUN	\$0.02	99.98 %	\$0.00
2200 Ton Extrusion Press	0.06	1	4.00	494.65	HUN	\$0.01	99.99 %	\$0.00

## Connecting Block Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Connecting Block	1	Aluminum 6061 - Billet Stock	\$2.80	0.0286	0.0643	\$0.00	\$0.18

# End Cap, Connector Asm



\...  
\Connector Asm, Branch Line Asm  
\End Cap, Connector Asm  
\End Cap Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	0.83
Total Weight (kg)	0.00

Material Cost**	\$0.01
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.00
Q Burden	\$0.00
SG&A	\$0.00
Manufacturing Cost*	\$0.02

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# End Cap, Connector Asm



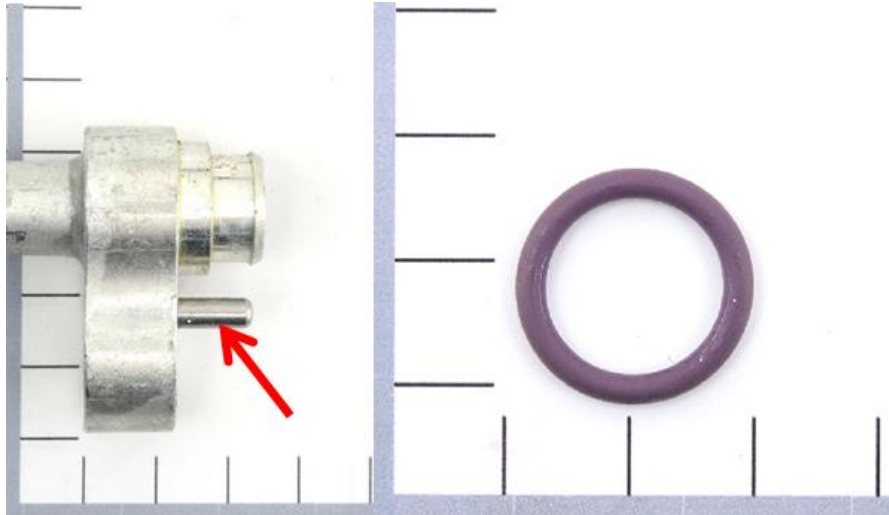
## End Cap Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
55Ton Injection Molding Press	6.64	8	0.25	14.89	HUN	\$0.00	99.99%	\$0.00

## End Cap Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material,End Cap	1	PBT	\$3.06	0.0003	0.0003	\$0.00	\$0.01

# Assemble Connector



\...

- \Branch Line Asm, Refrigerant Sending Line Asm
- \Connector Asm, Branch Line Asm
- \Assemble Connector

## Process Summary

<b>Right First Time</b>	<b>99.68 %</b>
<b>Process Time (Sec)</b>	<b>73.34</b>
<b>Total Weight (kg)</b>	<b>0.00</b>

<b>Material Cost**</b>	<b>\$0.05</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.51</b>
<b>Q Burden</b>	<b>\$0.05</b>
<b>SG&amp;A</b>	<b>\$0.06</b>
<b>Manufacturing Cost*</b>	<b>\$0.67</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Assemble Connector



## Assemble Connector

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	73.34	1	1.00	24.91	HUN	\$0.51	99.68 %	\$0.05

## Assemble Connector

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Guide Pin, Connector Asm	1	Commodity Item	Purchased	0.0007	-	\$0.01	\$0.00
14mm O-Ring, Connector Asm	1	Commodity Item	Purchased	0.0003	-	\$0.04	\$0.00

# Refrigerant Line Crimp Fitting, Branch Line Asm



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\Connector Asm, Branch Line Asm

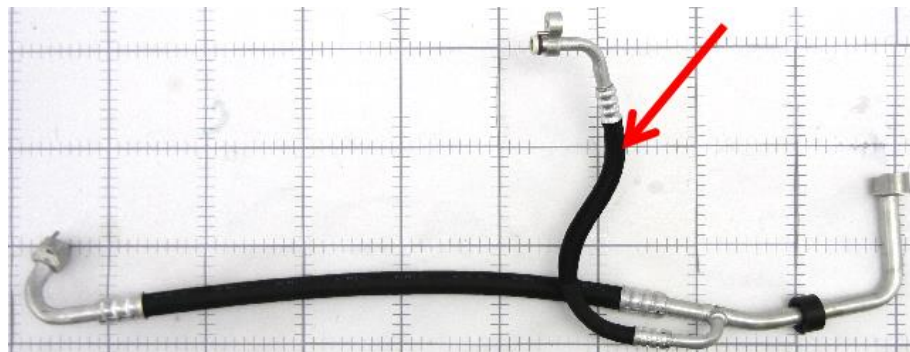
\Refrigerant Line Crimp Fitting, Branch Line Asm

\Hose Crimp Fitting Process

## Process Summary

Right First Time	99.93 %
Process Time (Sec)	26.32
Total Weight (kg)	0.01

Material Cost**	\$0.07
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.13
Q Burden	\$0.01
SG&A	\$0.02
Manufacturing Cost*	\$0.24



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Refrigerant Line Crimp Fitting, Branch Line Asm



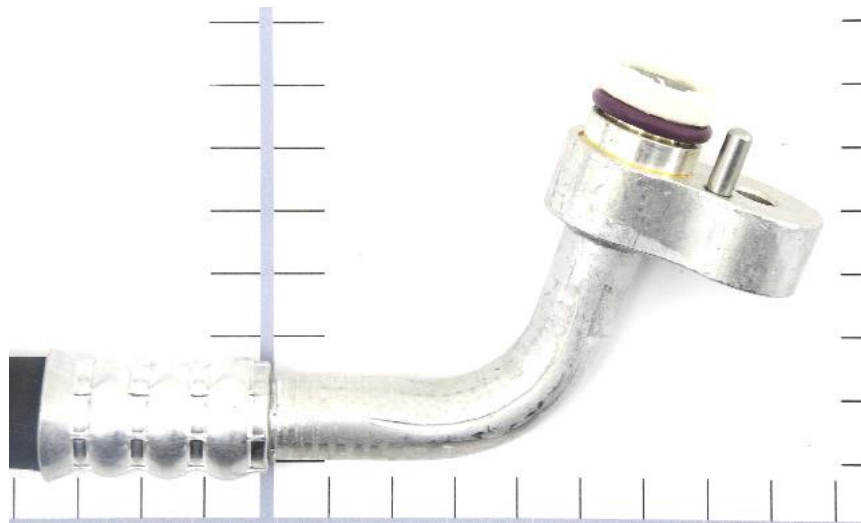
## Hose Crimp Fitting Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Automated Asm	16.00	1	0.25	18.11	HUN	\$0.08	99.98 %	\$0.00
Wash	5.00	1	0.25	11.95	HUN	\$0.02	99.99 %	\$0.00
Deburr	3.00	1	0.25	22.62	HUN	\$0.02	99.99 %	\$0.00
Circular Saw	2.32	1	0.25	24.32	HUN	\$0.02	99.97 %	\$0.01

## Hose Crimp Fitting Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Refeferant Hose Crimp Fitting	1	Aluminum 3003 - Seamless Tube	\$6.00	0.0114	0.0114	\$0.00	\$0.07

No Commodity Items  
Required for This  
Process



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\Branch Line Asm,Refrigerant Sending Line Asm  
\Connector Asm,Branch Line Asm  
\Assemble Hose Crimp Fitting

## Process Summary

Right First Time	99.92 %
Process Time (Sec)	51.34
Total Weight (kg)	0.00
Material Cost**	\$0.00
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.36
Q Burden	\$0.01
SG&A	\$0.04
Manufacturing Cost*	\$0.41

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Hose Crimp Fitting



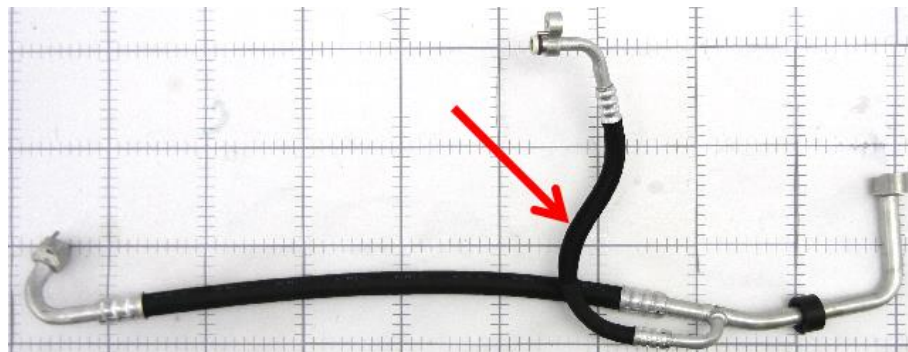
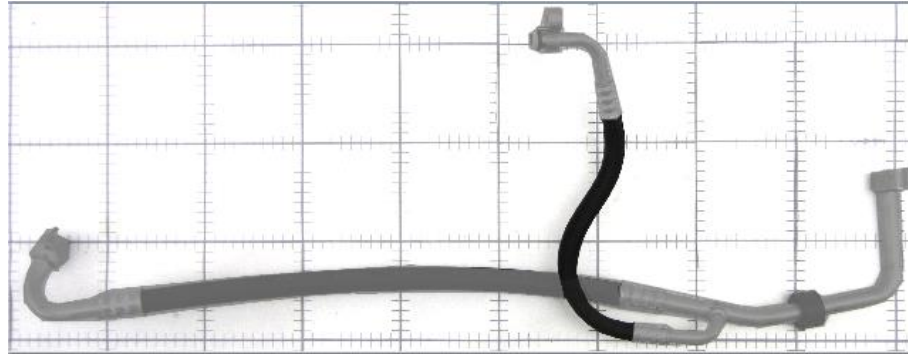
## Assemble Hose Crimp Fitting

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
<a href="#">Supplier Manual Asm</a>	51.34	1	1.00	24.91	HUN	\$0.36	99.92%	\$0.01

## Assemble Hose Crimp Fitting

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# 17mm-OD Branch Hose, Branch Line Asm



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- \Branch Line Asm,Refrigerant Sending Line Asm
- \17mm-OD Branch Hose, Branch Line Asm
- \17mm-OD Branch Hose Process

## Process Summary

Right First Time	99.96 %
Process Time (Sec)	5.86
Total Weight (kg)	0.04

Material Cost**	\$0.27
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.11
Q Burden	\$0.01
SG&A	\$0.05
Manufacturing Cost*	\$0.43

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# 17mm-OD Branch Hose, Branch Line Asm

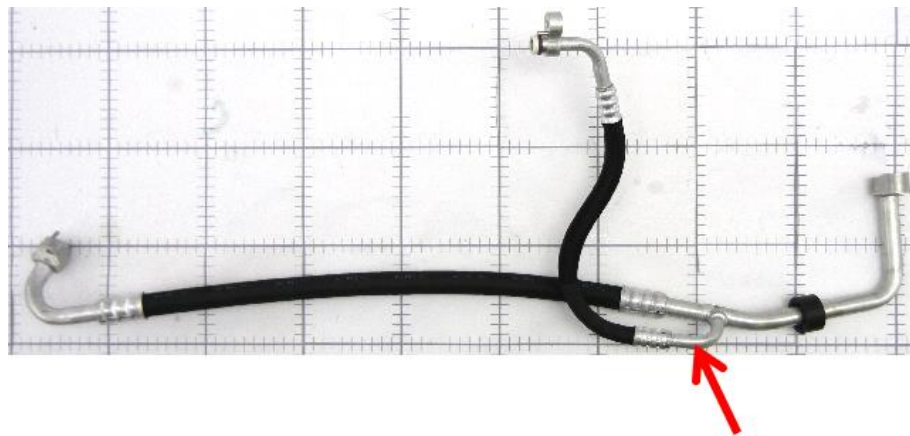
## 17mm-OD Branch Hose Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Extrusion:32mm 2 Layer&Reinf	5.86	1	0.50	67.99	HUN	\$0.11	99.96%	\$0.01

## 17mm-OD Branch Hose Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material,Inner Rubber Layer,17mm-OD Branch Hose	1	EPDM (Extrusion Grade)	\$4.43	0.0182	0.0182	\$0.00	\$0.08
Material,Reinforcement Layer,7mm-OD Branch Hose	1	PA Thread w/PVC Coating	By Area	0.0036	-	\$0.00	\$0.08
Material,Outer Rubber Layer,17mm-OD Branch Hose	1	EPDM (Extrusion Grade)	\$4.43	0.0164	0.0164	\$0.00	\$0.07
Material,Outer EPDM Covering,17mm-OD Branch Hose	1	EPDM Covering	By Area	0.0023	-	\$0.00	\$0.04

# Connecting Tube Asm, Branch Line Asm



- \...
- \Refrigerant Sending Line Asm
- \Branch Line Asm, Refrigerant Sending Line Asm
- \Connecting Tube Asm, Branch Line Asm

## Assembly Summary

<b>Parts</b>	<b>2</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>2</b>
<b>Steps</b>	<b>35</b>
<b>Fastenings</b>	<b>1</b>
<b>Right First Time</b>	<b>99.76 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>1.46</b>
<b>Total Weight (kg)</b>	<b>0.02</b>

<b>Material Cost**</b>	<b>\$0.12</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.54</b>
<b>Q Burden</b>	<b>\$0.04</b>
<b>SG&amp;A</b>	<b>\$0.08</b>
<b>Manufacturing Cost*</b>	<b>\$0.78</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Connecting Tube Asm, Branch Line Asm



## Connecting Tube Asm, Branch Line Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Connecting Tube, Connecting Tube Asm	1	1	0	8	0	99.92 %	0.00	0.00	0.00	0.17	0.0102
Refrigerant Line Crimp Fitting, Connecting Tube As	1	1	0	21	0	99.93 %	0.00	0.00	0.27	0.17	0.0114
Assemble Hose Crimp Fitting	1	0	1	4	1	99.92 %	0.00	0.00	0.86	0.00	0.0000

## Connecting Tube Asm, Branch Line Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Connecting Tube, Connecting Tube Asm	\$0.00	\$0.05	\$0.00	\$0.00	\$0.00	\$0.05	\$0.01	\$0.01	\$0.13
Refrigerant Line Crimp Fitting, Connecting Tube As	\$0.00	\$0.07	\$0.00	\$0.00	\$0.08	\$0.05	\$0.01	\$0.02	\$0.24
Assemble Hose Crimp Fitting	\$0.00	\$0.00	\$0.00	\$0.00	\$0.36	\$0.00	\$0.01	\$0.04	\$0.41

# Connecting Tube Asm, Branch Line Asm

## Detailed Summary

<b>Parts</b>	<b>2</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>2</b>
<b>Steps</b>	<b>35</b>
<b>Fastenings</b>	<b>1</b>
<b>Right First Time</b>	<b>99.76%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>1.12</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.34</b>
<b>Total Weight (kg)</b>	<b>0.02</b>
<b>Purchased Part Cost</b>	<b>\$0.00</b>
<b>Material Cost</b>	<b>\$0.12</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.44</b>
<b>Supplier Fab. Cost</b>	<b>\$0.10</b>
<b>Q Burden</b>	<b>\$0.04</b>
<b>SG&amp;A</b>	<b>\$0.08</b>
<b>Manufacturing Cost*</b>	<b>\$0.78</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connecting Tube, Connecting Tube Asm



\...  
\Connecting Tube Asm, Branch Line Asm  
\Connecting Tube, Connecting Tube Asm  
\Connecting Tube Process

## Process Summary

Right First Time	99.92 %
Process Time (Sec)	10.00
Total Weight (kg)	0.01

Material Cost**	\$0.05
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.05
Q Burden	\$0.01
SG&A	\$0.01
Manufacturing Cost*	\$0.13

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Connecting Tube, Connecting Tube Asm

## Connecting Tube Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.95	HUN	\$0.02	99.99%	\$0.00
Tube Bending	5.00	1	0.25	26.59	HUN	\$0.04	99.93%	\$0.01

## Connecting Tube Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material,Connecting Tube	1	Aluminum 3003 - Clad Seamless Tube	\$5.00	0.0102	0.0102	\$0.00	\$0.05

# Refrigerant Line Crimp Fitting, Connecting Tube As



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\Connecting Tube Asm, Branch Line Asm

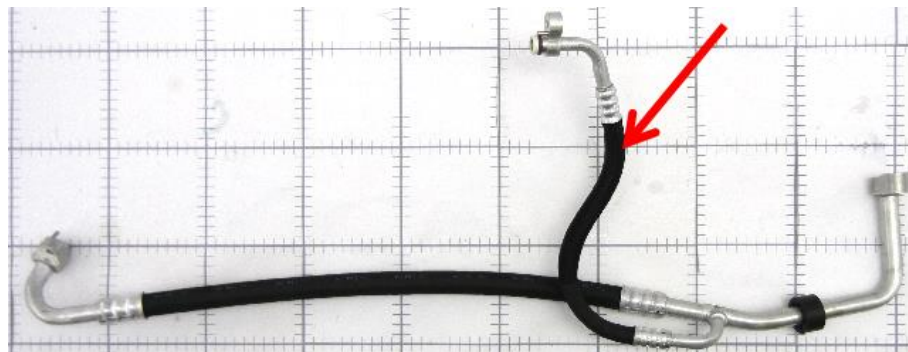
\Refrigerant Line Crimp Fitting, Connecting Tube As

\Hose Crimp Fitting Process

## Process Summary

Right First Time	99.93 %
Process Time (Sec)	26.32
Total Weight (kg)	0.01

Material Cost**	\$0.07
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.13
Q Burden	\$0.01
SG&A	\$0.02
Manufacturing Cost*	\$0.24



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

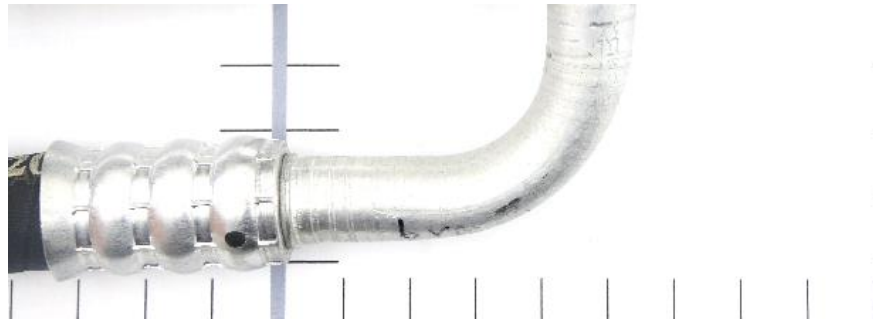
# Refrigerant Line Crimp Fitting, Connecting Tube As



Hose Crimp Fitting Process									
Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden	
Supplier Automated Asm	16.00	1	0.25	18.11	HUN	\$0.08	99.98 %	\$0.00	
Wash	5.00	1	0.25	11.95	HUN	\$0.02	99.99 %	\$0.00	
Deburr	3.00	1	0.25	22.62	HUN	\$0.02	99.99 %	\$0.00	
Circular Saw	2.32	1	0.25	24.32	HUN	\$0.02	99.97 %	\$0.01	

Hose Crimp Fitting Process								
Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost	
Material, Refeferant Hose Crimp Fitting	1	Aluminum 3003 - Seamless Tube	\$6.00	0.0114	0.0114	\$0.00	\$0.07	

No Commodity Items  
Required for This  
Process



\...

- \Branch Line Asm, Refrigerant Sending Line Asm
- \Connecting Tube Asm, Branch Line Asm
- \Assemble Hose Crimp Fitting

## Process Summary

Right First Time	99.92 %
Process Time (Sec)	51.34
Total Weight (kg)	0.00

Material Cost**	\$0.00
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.36
Q Burden	\$0.01
SG&A	\$0.04
Manufacturing Cost*	\$0.41

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Hose Crimp Fitting



## Assemble Hose Crimp Fitting

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
<a href="#">Supplier Manual Asm</a>	51.34	1	1.00	24.91	HUN	\$0.36	99.92%	\$0.01

## Assemble Hose Crimp Fitting

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Assemble Branch Line

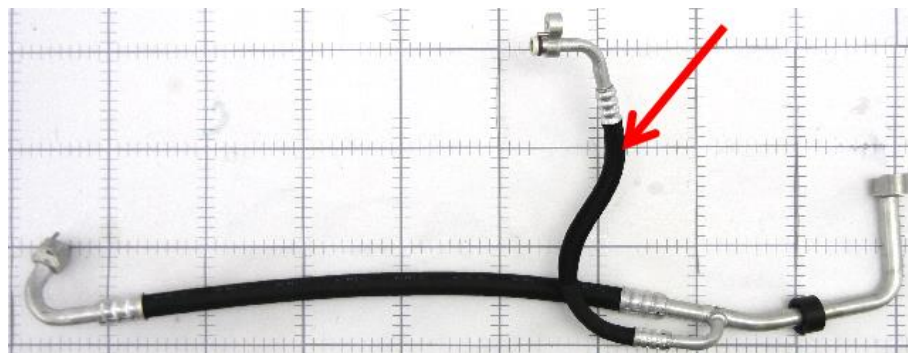


- \...
- \Refrigerant Sending Line Asm
- \Branch Line Asm,Refrigerant Sending Line Asm
- \Assemble Branch Line

## Process Summary

Right First Time	99.65 %
Process Time (Sec)	37.00
Total Weight (kg)	0.01

Material Cost**	\$0.13
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.26
Q Burden	\$0.05
SG&A	\$0.03
Manufacturing Cost*	\$0.47



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Branch Line



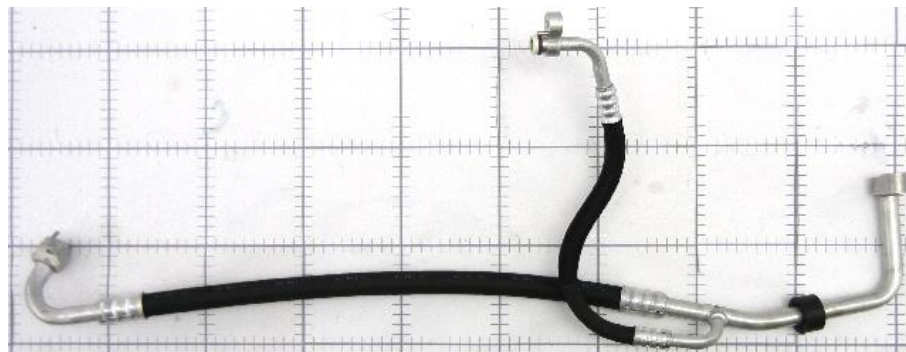
## Assemble Branch Line

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	37.00	1	1.00	24.91	HUN	\$0.26	99.65%	\$0.05

## Assemble Branch Line

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Braided Tube Sleeve,Branch Line Asm	1	Commodity Item	Purchased	0.0050	-	\$0.13	\$0.00

# Assemble Refrigerant Sending Line



- \...
- \Cooling Pack
- \Refrigerant Sending Line Asm
- \Assemble Refrigerant Sending Line

## Process Summary

<b>Right First Time</b>	<b>99.86 %</b>
<b>Process Time (Sec)</b>	<b>71.93</b>
<b>Total Weight (kg)</b>	<b>0.00</b>

<b>Material Cost**</b>	<b>\$0.10</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.50</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.06</b>
<b>Manufacturing Cost*</b>	<b>\$0.68</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Refrigerant Sending Line

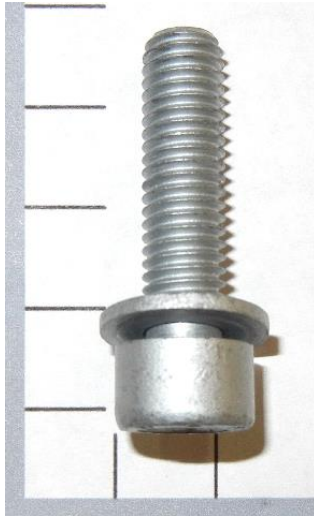


## Assemble Refrigerant Sending Line

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	71.93	1	1.00	24.91	HUN	\$0.50	99.86%	\$0.02

## Assemble Refrigerant Sending Line

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
QR Label, Refrigerant Sending Line Asm	1	Commodity Item	Purchased	0.0001	-	\$0.10	\$0.00

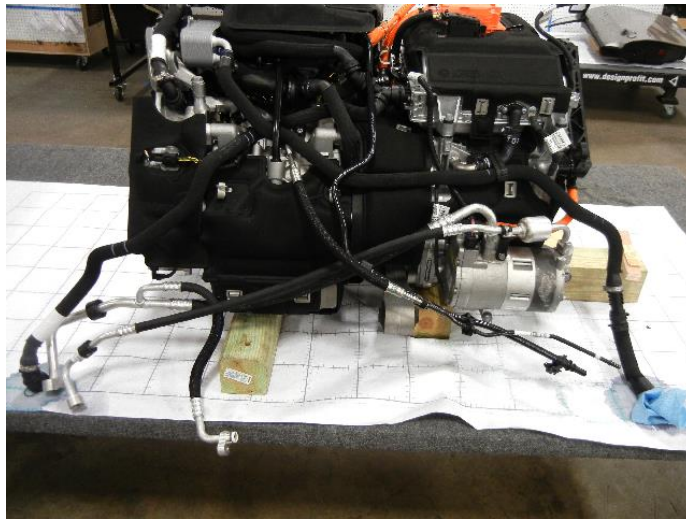


\...  
 \Zone 6 Cooling Pack & HVAC  
 \Cooling Pack  
 \Refrigerant Sending Line Installation

## Process Summary

<b>Right First Time</b>	<b>99.77 %</b>
<b>Process Time (Sec)</b>	<b>22.00</b>
<b>Total Weight (kg)</b>	<b>0.02</b>

<b>Material Cost**</b>	<b>\$0.05</b>
<b>OEM Process Cost</b>	<b>\$0.56</b>
<b>Supplier Process Cost</b>	<b>\$0.00</b>
<b>Q Burden</b>	<b>\$0.04</b>
<b>SG&amp;A</b>	<b>\$0.07</b>
<b>Manufacturing Cost*</b>	<b>\$0.71</b>



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Refrigerant Sending Line Installation



## Refrigerant Sending Line Installation

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
OEM Manual Asm	22.00	1	1.00	91.41	GER	\$0.56	99.77 %	\$0.04

## Refrigerant Sending Line Installation

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
M8x28-Socket Head SEMS Screw	1	Commodity Item	Purchased	0.0175	-	\$0.05	\$0.00



The HVAC System consists of the HVAC unit, all the HVAC Ducting, the Cabin Heater Coolant Reservoir, the heat exchanger, and the Plenum.

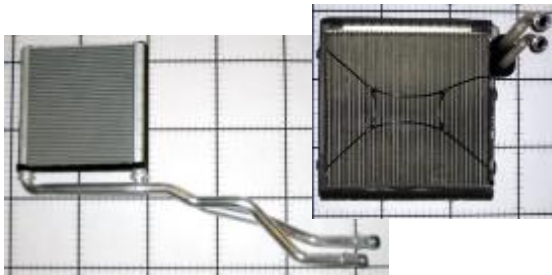
The HVAC Unit consists of a series of air flaps that control airflow through or around the evaporator and heater core in various amounts to provide the desired passenger compartment temperature. A two-piece microfilter is used, accessible via a side access door for replacement. The HVAC Ducts are all blow molded plastic ducts. The cabin heater coolant reservoir is a dual plastic housing that is vibration welded together.

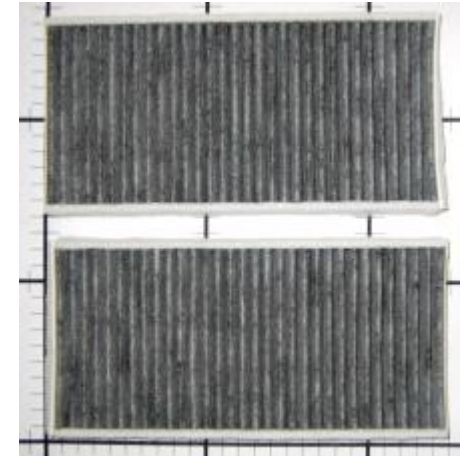


All major components were costed in detail, while prices were applied to commodity items (i.e. seals, rivets, snap rings).

*Estimates are based on actual parts.*

*Photos: Background on 100mm grid paper.*





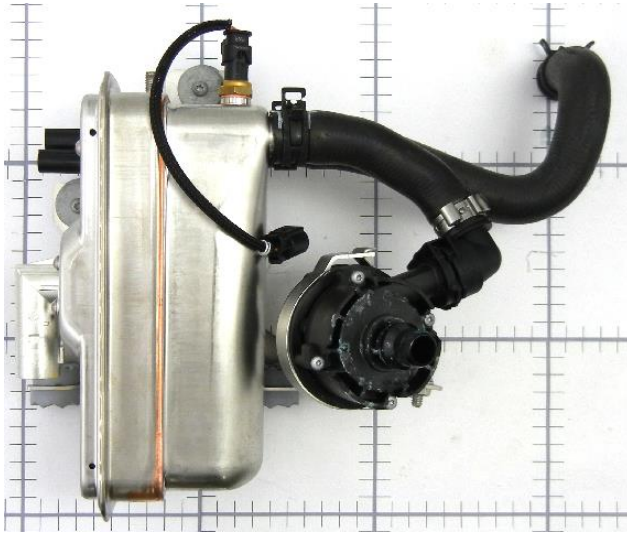
## Description:

- Two piece micro filter accessible through a side door for replacement

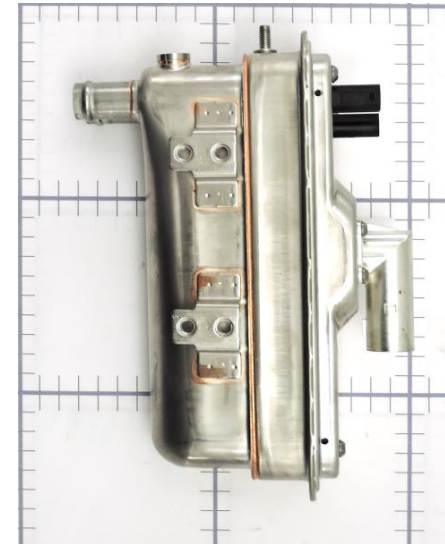
## Advantages:

- Easy access from the right passenger side foot well for filter replacement with no need to remove other interior components.
- Door does interfere slightly with unit housing reducing the opening clearance.





## Electric High Voltage Cabin Heat Exchanger



### Description:

- The heat exchanger is used to provide heat to the passenger cabin.
- The coolant is heated from the battery or preconditioned and heated from the charging module current while plugged in.

### Advantages:

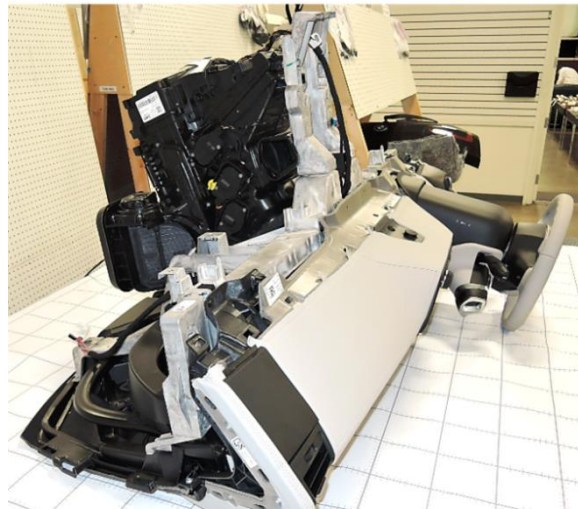
- Both the battery pack and the cabin heater can be user programmed to be at the optimal temperature during the time the vehicle is charging.
- Using the phone app for the i3 the user can set a time of departure and the preconditioning cycle will be set to run via the vehicle software.

## Summary

<b>Parts</b>	<b>505</b>
<b>Fasteners</b>	<b>113</b>
<b>Part Numbers</b>	<b>208</b>
<b>Steps</b>	<b>2,446</b>
<b>Fastenings</b>	<b>431</b>
<b>Right First Time</b>	<b>67.32%</b>
<b>OEM Process Time (Hrs)</b>	<b>0.08</b>
<b>Supplier Process Time (Hrs)</b>	<b>1.52</b>
<b>Total Weight (kg)</b>	<b>14.20</b>
<b>Material Cost**</b>	<b>\$341.27</b>
<b>OEM Process Cost</b>	<b>\$7.69</b>
<b>Supplier Process Cost</b>	<b>\$67.73</b>
<b>Q Burden</b>	<b>\$5.93</b>
<b>SG&amp;A</b>	<b>\$38.86</b>
<b>Manufacturing Cost*</b>	<b>\$461.49</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



\...  
 \Zone 6 Cooling Pack & HVAC  
 \HVAC  
 \HVAC Unit Asm

## Assembly Summary

<b>Parts</b>	<b>319</b>
<b>Fasteners</b>	<b>47</b>
<b>Part Numbers</b>	<b>94</b>
<b>Steps</b>	<b>1,643</b>
<b>Fastenings</b>	<b>199</b>
<b>Right First Time</b>	<b>79.15 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>53.76</b>
<b>Total Weight (kg)</b>	<b>7.56</b>

<b>Material Cost**</b>	<b>\$218.19</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$25.49</b>
<b>Q Burden</b>	<b>\$3.51</b>
<b>SG&amp;A</b>	<b>\$26.70</b>
<b>Manufacturing Cost*</b>	<b>\$273.89</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# HVAC Unit Asm



## HVAC Unit Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Housing RH, HVAC Unit Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.34	0.8400
Inner Baffle RH, HVAC Unit Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.15	0.0600
Assemble RH Housing and Baffle	1	0	1	3	1	99.94 %	0.00	0.00	0.25	0.00	0.0000
Airflap Footwell RH, HVAC Unit Asm	1	2	0	2	0	99.98 %	0.00	0.00	0.00	0.15	0.0500
Assemble Airflap Footwell RH	1	0	1	2	1	99.96 %	0.00	0.00	0.17	0.00	0.0000
Airflap RH Cntr Vnt, HVAC Unit Asm	1	2	0	2	0	99.98 %	0.00	0.00	0.00	0.15	0.0450
Assemble Airflap RH Cntr Vnt	1	0	1	2	1	99.98 %	0.00	0.00	0.10	0.00	0.0000
Upper RH Blend Flap, HVAC Unit Asm	1	2	0	2	0	99.98 %	0.00	0.00	0.00	0.12	0.0250
Assemble Upper RH Blend Flap	1	0	1	2	1	99.98 %	0.00	0.00	0.10	0.00	0.0000
Blend Flap RH, HVAC Unit Asm	1	2	0	2	0	99.98 %	0.00	0.00	0.00	0.12	0.0200
Assemble Bend Flap RH	1	0	1	2	1	99.98 %	0.00	0.00	0.10	0.00	0.0000
Center Baffle, HVAC Unit Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.13	0.1650

## HVAC Unit Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Housing RH, HVAC Unit Asm	\$0.00	\$2.28	\$0.00	\$0.00	\$0.00	\$0.25	\$0.00	\$0.33	\$2.86
Inner Baffle RH, HVAC Unit Asm	\$0.00	\$0.17	\$0.00	\$0.00	\$0.00	\$0.04	\$0.00	\$0.03	\$0.24
Assemble RH Housing and Baffle	\$0.00	\$0.00	\$0.00	\$0.00	\$0.10	\$0.00	\$0.01	\$0.01	\$0.12
Airflap Footwell RH, HVAC Unit Asm	\$0.00	\$0.17	\$0.00	\$0.00	\$0.00	\$0.06	\$0.00	\$0.03	\$0.27
Assemble Airflap Footwell RH	\$0.00	\$0.00	\$0.00	\$0.00	\$0.07	\$0.00	\$0.01	\$0.01	\$0.08
Airflap RH Cntr Vnt, HVAC Unit Asm	\$0.00	\$0.14	\$0.00	\$0.00	\$0.00	\$0.06	\$0.00	\$0.03	\$0.23
Assemble Airflap RH Cntr Vnt	\$0.00	\$0.00	\$0.00	\$0.00	\$0.04	\$0.00	\$0.00	\$0.01	\$0.05
Upper RH Blend Flap, HVAC Unit Asm	\$0.00	\$0.08	\$0.00	\$0.00	\$0.00	\$0.05	\$0.00	\$0.02	\$0.15
Assemble Upper RH Blend Flap	\$0.00	\$0.00	\$0.00	\$0.00	\$0.04	\$0.00	\$0.00	\$0.01	\$0.05
Blend Flap RH, HVAC Unit Asm	\$0.00	\$0.06	\$0.00	\$0.00	\$0.00	\$0.05	\$0.00	\$0.01	\$0.13
Assemble Bend Flap RH	\$0.00	\$0.00	\$0.00	\$0.00	\$0.04	\$0.00	\$0.00	\$0.01	\$0.05
Center Baffle, HVAC Unit Asm	\$0.00	\$0.45	\$0.00	\$0.00	\$0.00	\$0.10	\$0.00	\$0.07	\$0.62

# HVAC Unit Asm



**MUNRO**  
& ASSOCIATES, INC.

## HVAC Unit Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Assemble Center Baffle	1	0	7	9	7	99.84 %	0.00	0.00	0.48	0.00	0.0000
Inner Baffle LH, HVAC Unit Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.15	0.0600
Assemble Inner Baffle LH	1	0	1	2	1	99.96 %	0.00	0.00	0.17	0.00	0.0000
Airflap Footwell LH, HVAC Unit Asm	1	2	0	2	0	99.98 %	0.00	0.00	0.00	0.15	0.0500
Assemble Airflap Footwell LH	1	0	1	2	1	99.96 %	0.00	0.00	0.17	0.00	0.0000
Airflap LH Cntr Vnt, HVAC Unit Asm	1	2	0	2	0	99.98 %	0.00	0.00	0.00	0.15	0.0450
Assemble Airflap LH Cntr Vnt	1	0	1	2	1	99.96 %	0.00	0.00	0.15	0.00	0.0000
Upper LH Blend Flap, HVAC Unit Asm	1	2	0	2	0	99.98 %	0.00	0.00	0.00	0.12	0.0250
Assemble Upper LH Blend Flap	1	0	1	2	1	99.96 %	0.00	0.00	0.15	0.00	0.0000
Blend Flap LH, HVAC Unit Asm	1	2	0	2	0	99.98 %	0.00	0.00	0.00	0.12	0.0200
Assemble Blend Flap LH	1	0	1	2	1	99.96 %	0.00	0.00	0.15	0.00	0.0000
Housing LH, HVAC Unit Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.36	0.7450

## HVAC Unit Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Assemble Center Baffle	\$0.00	\$0.00	\$0.00	\$0.00	\$0.20	\$0.00	\$0.02	\$0.03	\$0.25
Inner Baffle LH, HVAC Unit Asm	\$0.00	\$0.17	\$0.00	\$0.00	\$0.00	\$0.04	\$0.00	\$0.03	\$0.24
Assemble Inner Baffle LH	\$0.00	\$0.00	\$0.00	\$0.00	\$0.07	\$0.00	\$0.01	\$0.01	\$0.08
Airflap Footwell LH, HVAC Unit Asm	\$0.00	\$0.16	\$0.00	\$0.00	\$0.00	\$0.07	\$0.00	\$0.03	\$0.26
Assemble Airflap Footwell LH	\$0.00	\$0.00	\$0.00	\$0.00	\$0.07	\$0.00	\$0.01	\$0.01	\$0.08
Airflap LH Cntr Vnt, HVAC Unit Asm	\$0.00	\$0.14	\$0.00	\$0.00	\$0.00	\$0.06	\$0.00	\$0.03	\$0.23
Assemble Airflap LH Cntr Vnt	\$0.00	\$0.00	\$0.00	\$0.00	\$0.06	\$0.00	\$0.01	\$0.01	\$0.08
Upper LH Blend Flap, HVAC Unit Asm	\$0.00	\$0.08	\$0.00	\$0.00	\$0.00	\$0.05	\$0.00	\$0.02	\$0.15
Assemble Upper LH Blend Flap	\$0.00	\$0.00	\$0.00	\$0.00	\$0.06	\$0.00	\$0.01	\$0.01	\$0.08
Blend Flap LH, HVAC Unit Asm	\$0.00	\$0.06	\$0.00	\$0.00	\$0.00	\$0.05	\$0.00	\$0.01	\$0.13
Assemble Blend Flap LH	\$0.00	\$0.00	\$0.00	\$0.00	\$0.06	\$0.00	\$0.01	\$0.01	\$0.08
Housing LH, HVAC Unit Asm	\$0.00	\$2.02	\$0.00	\$0.00	\$0.00	\$0.33	\$0.00	\$0.30	\$2.65

# HVAC Unit Asm



**MUNRO**  
& ASSOCIATES, INC.

## HVAC Unit Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Assemble Housing LH	1	13	17	34	17	97.30 %	0.00	0.00	2.77	0.00	0.0354
Blend Damper Link, HVAC Unit Asm	2	1	0	1	0	99.99 %	0.00	0.00	0.00	0.04	0.0060
Assemble Blend Damper Link	1	0	4	6	4	99.92 %	0.00	0.00	0.30	0.00	0.0000
Damper Gear, HVAC Unit Asm	2	1	0	1	0	99.99 %	0.00	0.00	0.00	0.03	0.0029
Assemble Damper Gear and Motor	1	9	14	27	14	98.43 %	0.00	0.00	2.07	0.00	0.1884
Fresh Air Inlet Asm, HVAC Unit Asm	1	15	13	49	13	98.71 %	0.00	0.00	2.22	0.77	0.5212
Assemble Fresh Air Inlet	1	6	7	15	7	98.75 %	0.00	0.00	1.28	0.00	0.0084
Microfilter Service Door, HVAC Unit Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.06	0.0200
Assemble Microfilter Service Door	1	0	2	4	2	99.96 %	0.00	0.00	0.22	0.00	0.0000
Blower Asm, HVAC Unit Asm	1	8	9	30	9	99.60 %	0.00	0.00	1.98	0.29	1.2097
Assemble Blower	1	6	5	14	5	98.91 %	0.00	0.00	1.27	0.00	0.1470
Evaporator Asm, HVAC Unit Asm	1	125	22	710	22	94.64 %	0.00	0.00	5.64	7.22	0.7068

## HVAC Unit Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Assemble Housing LH	\$0.30	\$0.00	\$0.00	\$0.00	\$1.13	\$0.00	\$0.41	\$0.16	\$2.00
Blend Damper Link, HVAC Unit Asm	\$0.00	\$0.02	\$0.00	\$0.00	\$0.00	\$0.01	\$0.00	\$0.00	\$0.03
Assemble Blend Damper Link	\$0.00	\$0.00	\$0.00	\$0.00	\$0.12	\$0.00	\$0.01	\$0.02	\$0.15
Damper Gear, HVAC Unit Asm	\$0.00	\$0.01	\$0.00	\$0.00	\$0.00	\$0.01	\$0.00	\$0.00	\$0.02
Assemble Damper Gear and Motor	\$0.12	\$70.56	\$0.00	\$0.00	\$0.85	\$0.00	\$0.24	\$9.29	\$81.05
Fresh Air Inlet Asm, HVAC Unit Asm	\$0.08	\$24.90	\$0.00	\$0.00	\$0.91	\$0.38	\$0.19	\$3.41	\$29.87
Assemble Fresh Air Inlet	\$0.12	\$0.00	\$0.00	\$0.00	\$0.53	\$0.00	\$0.19	\$0.07	\$0.91
Microfilter Service Door, HVAC Unit Asm	\$0.00	\$0.06	\$0.00	\$0.00	\$0.00	\$0.02	\$0.00	\$0.01	\$0.09
Assemble Microfilter Service Door	\$0.00	\$0.00	\$0.00	\$0.00	\$0.09	\$0.00	\$0.01	\$0.01	\$0.11
Blower Asm, HVAC Unit Asm	\$12.67	\$0.56	\$0.00	\$0.00	\$0.81	\$0.09	\$0.06	\$0.57	\$14.77
Assemble Blower	\$0.10	\$14.69	\$0.00	\$0.00	\$0.52	\$0.00	\$0.16	\$1.98	\$17.45
Evaporator Asm, HVAC Unit Asm	\$1.37	\$12.72	\$0.00	\$0.00	\$5.08	\$2.07	\$0.83	\$2.62	\$24.69

# HVAC Unit Asm



**MUNRO**  
& ASSOCIATES, INC.

## HVAC Unit Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Side Cover, HVAC Unit Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.20	0.1050
Bottom Cover, HVAC Unit Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.21	0.2550
Assemble Evaporator	1	11	20	38	20	97.96 %	0.00	0.00	2.67	0.00	0.2806
Heat Exchanger Asm, HVAC Unit Asm	1	79	7	483	7	96.51 %	0.00	0.00	3.70	6.05	0.7958
Assemble Heat Exchanger	1	0	1	2	1	99.96 %	0.00	0.00	0.17	0.00	0.0000
Heat Exchanger Retainer, HVAC Unit Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.04	0.0050
Assemble Heat Exchanger Retainer	1	1	1	4	1	99.78 %	0.00	0.00	0.33	0.00	0.0014
Heat Exchanger Cover, HVAC Unit Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.13	0.0350
Assemble Heat Exchanger Cover	1	1	5	8	5	99.74 %	0.00	0.00	0.43	0.00	0.0014
Seal, HVAC Unit Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.30	0.3850
Assemble Seal	1	0	4	6	4	99.66 %	0.00	0.00	0.45	0.00	0.0000
Back Plate, HVAC Unit Asm	1	1	0	11	0	99.96 %	0.00	0.00	0.00	0.22	0.0184

## HVAC Unit Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Side Cover, HVAC Unit Asm	\$0.00	\$0.29	\$0.00	\$0.00	\$0.00	\$0.07	\$0.00	\$0.05	\$0.41
Bottom Cover, HVAC Unit Asm	\$0.00	\$0.69	\$0.00	\$0.00	\$0.00	\$0.15	\$0.00	\$0.11	\$0.95
Assemble Evaporator	\$8.18	\$0.00	\$0.00	\$0.00	\$1.09	\$0.00	\$0.31	\$0.39	\$9.97
Heat Exchanger Asm, HVAC Unit Asm	\$1.10	\$4.16	\$0.00	\$0.00	\$3.49	\$1.76	\$0.53	\$1.26	\$12.30
Assemble Heat Exchanger	\$0.00	\$0.00	\$0.00	\$0.00	\$0.07	\$0.00	\$0.01	\$0.01	\$0.08
Heat Exchanger Retainer, HVAC Unit Asm	\$0.00	\$0.01	\$0.00	\$0.00	\$0.00	\$0.01	\$0.00	\$0.00	\$0.02
Assemble Heat Exchanger Retainer	\$0.02	\$0.00	\$0.00	\$0.00	\$0.14	\$0.00	\$0.03	\$0.02	\$0.21
Heat Exchanger Cover, HVAC Unit Asm	\$0.00	\$0.10	\$0.00	\$0.00	\$0.00	\$0.04	\$0.00	\$0.02	\$0.16
Assemble Heat Exchanger Cover	\$0.02	\$0.00	\$0.00	\$0.00	\$0.18	\$0.00	\$0.04	\$0.02	\$0.26
Seal, HVAC Unit Asm	\$0.00	\$1.67	\$0.00	\$0.00	\$0.00	\$0.30	\$0.00	\$0.26	\$2.23
Assemble Seal	\$0.00	\$0.00	\$0.00	\$0.00	\$0.18	\$0.00	\$0.05	\$0.02	\$0.26
Back Plate, HVAC Unit Asm	\$0.00	\$0.10	\$0.00	\$0.00	\$0.00	\$0.06	\$0.01	\$0.02	\$0.19

# HVAC Unit Asm



**MUNRO**  
& ASSOCIATES, INC.

## HVAC Unit Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Assemble Back Plate	1	4	5	11	5	99.48 %	0.00	0.00	0.83	0.00	0.3358
Side Divert Duct, HVAC Unit Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.14	0.1250
Assemble Side Divert Duct	1	1	39	78	39	98.81 %	0.00	0.00	4.93	0.00	0.1500
Fresh Air Seal, HVAC Unit Asm	1	1	0	4	0	99.95 %	0.00	0.00	0.00	1.49	0.0500
Assemble Fresh Air Seal	1	0	1	2	1	99.96 %	0.00	0.00	0.13	0.00	0.0000
Assemble Plugs, Foam Seal, & Labels	1	6	6	15	6	99.82 %	0.00	0.00	0.93	0.00	0.0107

## HVAC Unit Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Assemble Back Plate	\$25.28	\$21.21	\$0.00	\$0.00	\$0.34	\$0.00	\$0.08	\$3.56	\$50.47
Side Divert Duct, HVAC Unit Asm	\$0.00	\$0.35	\$0.00	\$0.00	\$0.00	\$0.07	\$0.00	\$0.05	\$0.47
Assemble Side Divert Duct	\$0.00	\$10.13	\$0.00	\$0.00	\$2.02	\$0.00	\$0.18	\$1.58	\$13.91
Fresh Air Seal, HVAC Unit Asm	\$0.00	\$0.21	\$0.00	\$0.00	\$0.00	\$0.42	\$0.01	\$0.08	\$0.72
Assemble Fresh Air Seal	\$0.00	\$0.00	\$0.00	\$0.00	\$0.05	\$0.00	\$0.01	\$0.01	\$0.07
Assemble Plugs, Foam Seal, & Labels	\$0.38	\$0.00	\$0.00	\$0.00	\$0.38	\$0.00	\$0.03	\$0.06	\$0.85



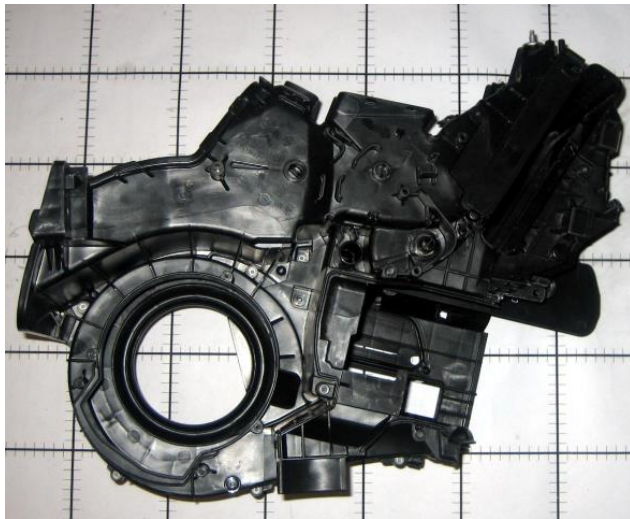
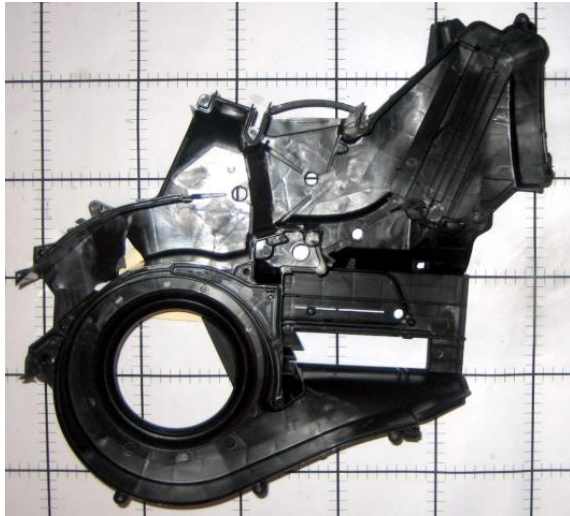
## Detailed Summary

<b>Parts</b>	<b>319</b>
<b>Fasteners</b>	<b>47</b>
<b>Part Numbers</b>	<b>94</b>
<b>Steps</b>	<b>1,643</b>
<b>Fastenings</b>	<b>199</b>
<b>Right First Time</b>	<b>79.15%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>34.30</b>
<b>Supplier Fab. Time (Min)</b>	<b>19.47</b>
<b>Total Weight (kg)</b>	<b>7.56</b>
<b>Purchased Part Cost</b>	<b>\$49.74</b>
<b>Material Cost</b>	<b>\$168.45</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$18.80</b>
<b>Supplier Fab. Cost</b>	<b>\$6.69</b>
<b>Q Burden</b>	<b>\$3.51</b>
<b>SG&amp;A</b>	<b>\$26.70</b>
<b>Manufacturing Cost*</b>	<b>\$273.89</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Housing RH, HVAC Unit Asm



\...

\HVAC Unit Asm

\Housing RH, HVAC Unit Asm

\Housing RH Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	20.65
Total Weight (kg)	0.84

Material Cost**	\$2.28
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.25
Q Burden	\$0.00
SG&A	\$0.33
Manufacturing Cost*	\$2.86

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Housing RH, HVAC Unit Asm



## Housing RH Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
500 Ton Injection Molding Press	20.65	1	0.25	43.20	CZE	\$0.25	99.99%	\$0.00

## Housing RH Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Housing RH	1	PPTD20	\$2.54	0.8400	0.8990	\$0.00	\$2.28

# Inner Baffle RH, HVAC Unit Asm



\...

\HVAC Unit Asm

\Inner Baffle RH, HVAC Unit Asm

\Inner Baffle RH Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	9.18
Total Weight (kg)	0.06

Material Cost**	\$0.17
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.04
Q Burden	\$0.00
SG&A	\$0.03
Manufacturing Cost*	\$0.24

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Inner Baffle RH, HVAC Unit Asm



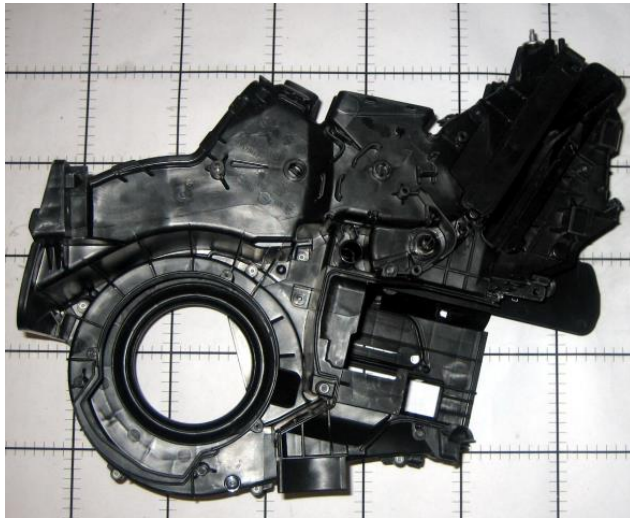
## Inner Baffle RH Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
55Ton Injection Molding Press	18.36	2	0.25	14.88	CZE	\$0.04	99.99%	\$0.00

## Inner Baffle RH Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Inner Baffle RH	1	PPTD20	\$2.54	0.0600	0.0650	\$0.00	\$0.17

## No Commodity Items Required for This Process



\...  
\HVAC  
\HVAC Unit Asm  
\Assemble RH Housing and Baffle

### Process Summary

<b>Right First Time</b>	<b>99.94 %</b>
<b>Process Time (Sec)</b>	<b>15.00</b>
<b>Total Weight (kg)</b>	<b>0.00</b>
<b>Material Cost**</b>	<b>\$0.00</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.10</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.01</b>
<b>Manufacturing Cost*</b>	<b>\$0.12</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble RH Housing and Baffle



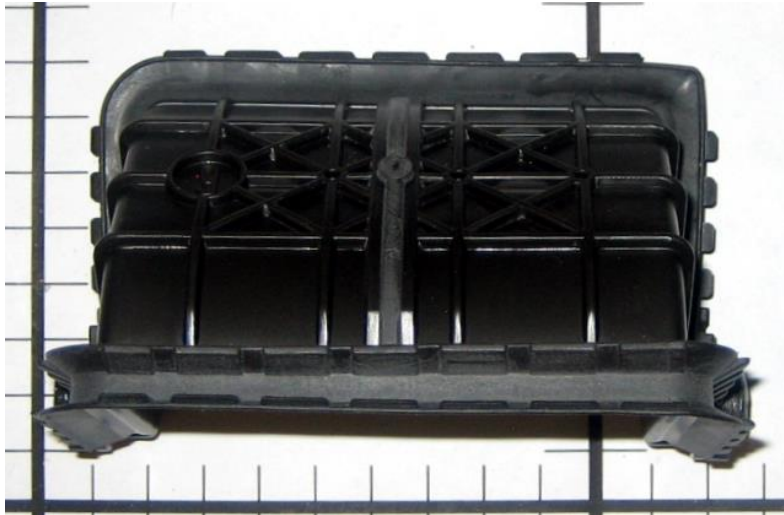
## Assemble RH Housing and Baffle

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	15.00	1	1.00	24.59	CZE	\$0.10	99.94%	\$0.01

## Assemble RH Housing and Baffle

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Airflap Footwell RH, HVAC Unit Asm



\...

\HVAC Unit Asm

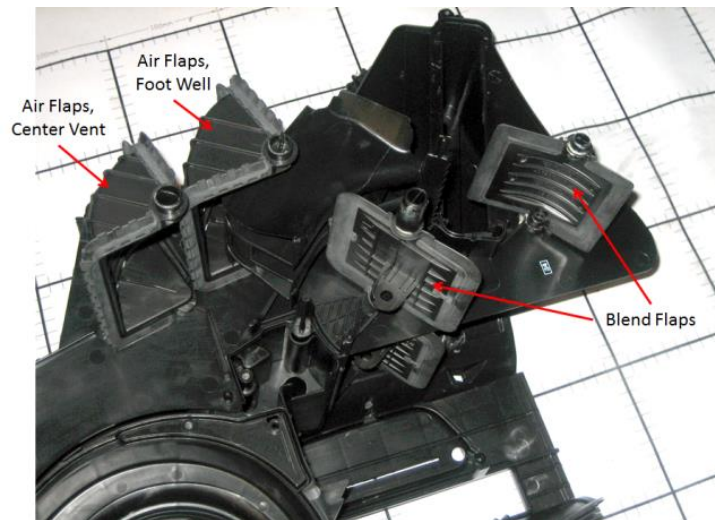
\Airflap Footwell RH, HVAC Unit Asm

\Airflap Footwell RH Process

## Process Summary

Right First Time	99.98 %
Process Time (Sec)	8.82
Total Weight (kg)	0.05

Material Cost**	\$0.17
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.06
Q Burden	\$0.00
SG&A	\$0.03
Manufacturing Cost*	\$0.27



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Airflap Footwell RH, HVAC Unit Asm



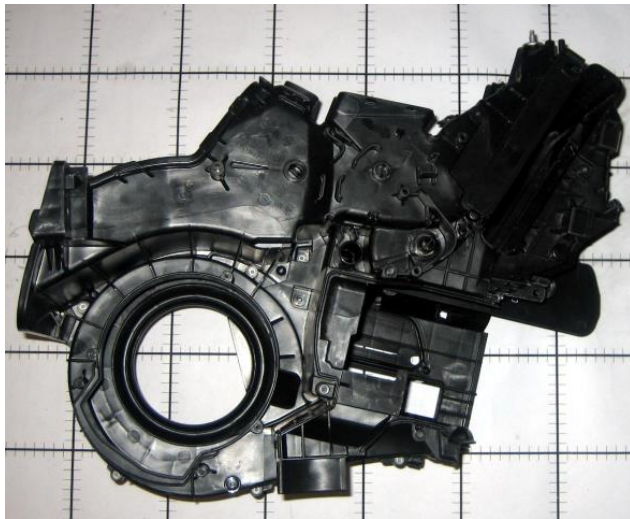
## Airflap Footwell RH Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
150 Ton Injection Molding Press, 2 Shot	35.28	4	0.25	26.25	CZE	\$0.06	99.98 %	\$0.00

## Airflap Footwell RH Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material 1, Airflap Footwell RH	1	PPTD40	\$2.14	0.0460	0.0490	\$0.00	\$0.11
Material 2, Airflap Footwell RH	1	SEBS	\$11.55	0.0040	0.0050	\$0.00	\$0.06

## No Commodity Items Required for This Process



\...  
\HVAC  
\HVAC Unit Asm  
\Assemble Airflap Footwell RH

### Process Summary

<b>Right First Time</b>	<b>99.96 %</b>
<b>Process Time (Sec)</b>	<b>10.00</b>
<b>Total Weight (kg)</b>	<b>0.00</b>
<b>Material Cost**</b>	<b>\$0.00</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.07</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.01</b>
<b>Manufacturing Cost*</b>	<b>\$0.08</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Airflap Footwell RH



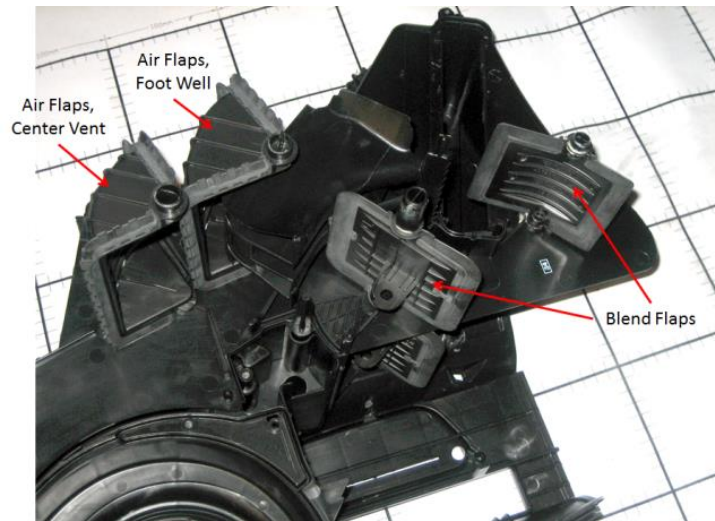
## Assemble Airflap Footwell RH

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	10.00	1	1.00	24.59	CZE	\$0.07	99.96%	\$0.01

## Assemble Airflap Footwell RH

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Airflap RH Cntr Vnt, HVAC Unit Asm



- \...
- \HVAC Unit Asm
- \Airflap RH Cntr Vnt, HVAC Unit Asm
- \Airflap RH Cntr Vnt Process

## Process Summary

<b>Right First Time</b>	<b>99.98 %</b>
<b>Process Time (Sec)</b>	<b>8.78</b>
<b>Total Weight (kg)</b>	<b>0.05</b>

<b>Material Cost**</b>	<b>\$0.14</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.06</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.03</b>
<b>Manufacturing Cost*</b>	<b>\$0.23</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Airflap RH Cntr Vnt, HVAC Unit Asm



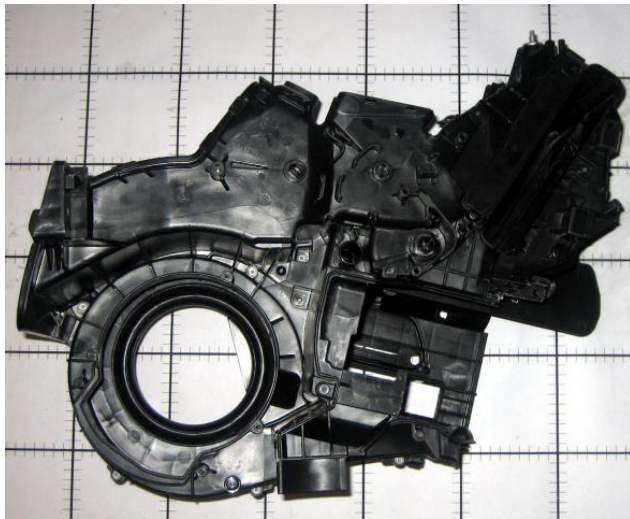
## Airflap RH Cntr Vnt Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
150 Ton Injection Molding Press, 2 Shot	35.12	4	0.25	26.25	CZE	\$0.06	99.98 %	\$0.00

## Airflap RH Cntr Vnt Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material 1, Airflap RH Cntr Vnt	1	PPTD40	\$2.14	0.0410	0.0440	\$0.00	\$0.09
Material 2, Airflap RH Cntr Vnt	1	SEBS	\$11.55	0.0040	0.0040	\$0.00	\$0.05

## No Commodity Items Required for This Process



\...

\HVAC

\HVAC Unit Asm

\Assemble Airflap RH Cntr Vnt

### Process Summary

Right First Time	99.98 %
Process Time (Sec)	6.00
Total Weight (kg)	0.00
Material Cost**	\$0.00
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.04
Q Burden	\$0.00
SG&A	\$0.01
Manufacturing Cost*	\$0.05

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Airflap RH Cntr Vnt



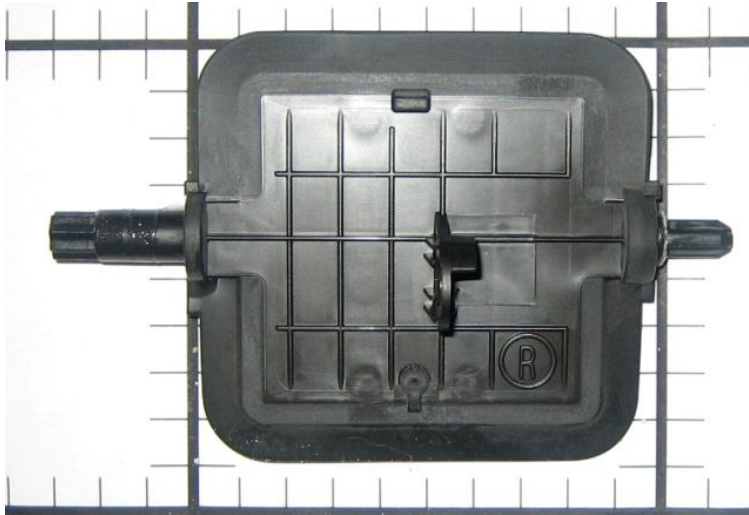
## Assemble Airflap RH Cntr Vnt

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	6.00	1	1.00	24.59	CZE	\$0.04	99.98 %	\$0.00

## Assemble Airflap RH Cntr Vnt

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Upper RH Blend Flap, HVAC Unit Asm

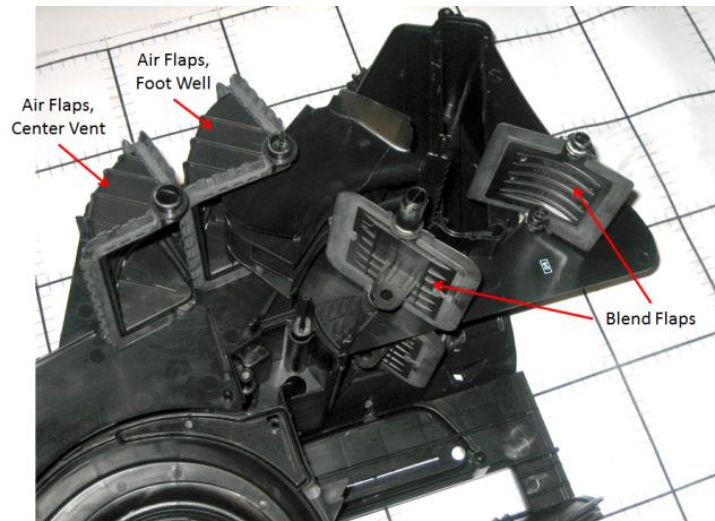


- \...
- \HVAC Unit Asm
- \Upper RH Blend Flap, HVAC Unit Asm
- \Upper RH Blend Flap Process

## Process Summary

<b>Right First Time</b>	<b>99.98 %</b>
<b>Process Time (Sec)</b>	<b>7.19</b>
<b>Total Weight (kg)</b>	<b>0.03</b>

<b>Material Cost**</b>	<b>\$0.08</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.05</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.02</b>
<b>Manufacturing Cost*</b>	<b>\$0.15</b>



\* Excluding tooling, ER&D, logistics, and profit margin  
 \*\* Includes material cost and purchased parts cost



# Upper RH Blend Flap, HVAC Unit Asm



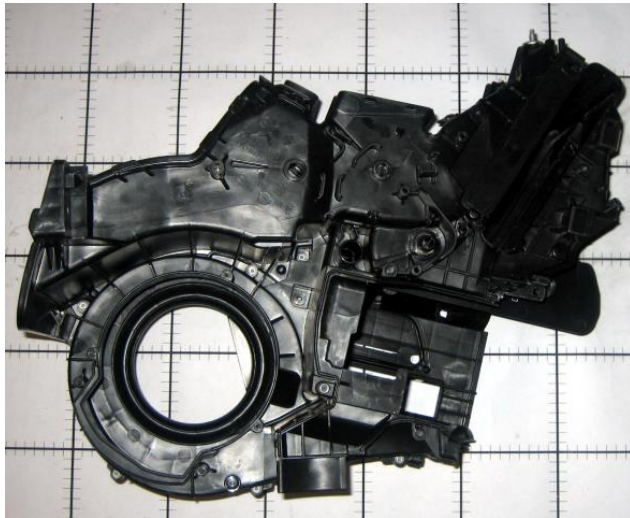
## Upper RH Blend Flap Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
150 Ton Injection Molding Press, 2 Shot	28.76	4	0.25	26.25	CZE	\$0.05	99.98 %	\$0.00

## Upper RH Blend Flap Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material 1, Upper RH Blend Flap	1	PPTD40	\$2.14	0.0230	0.0240	\$0.00	\$0.05
Material 2, UpperRH Blend Flap	1	SEBS	\$11.55	0.0020	0.0020	\$0.00	\$0.03

## No Commodity Items Required for This Process



\...

\HVAC

\HVAC Unit Asm

\Assemble Upper RH Blend Flap

### Process Summary

<b>Right First Time</b>	<b>99.98 %</b>
<b>Process Time (Sec)</b>	<b>6.00</b>
<b>Total Weight (kg)</b>	<b>0.00</b>

<b>Material Cost**</b>	<b>\$0.00</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.04</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.01</b>
<b>Manufacturing Cost*</b>	<b>\$0.05</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Upper RH Blend Flap



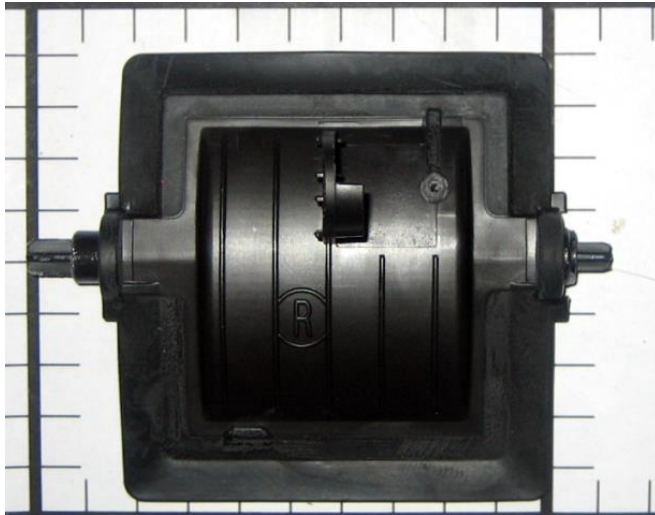
## Assemble Upper RH Blend Flap

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	6.00	1	1.00	24.59	CZE	\$0.04	99.98 %	\$0.00

## Assemble Upper RH Blend Flap

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Blend Flap RH, HVAC Unit Asm



\...

\HVAC Unit Asm

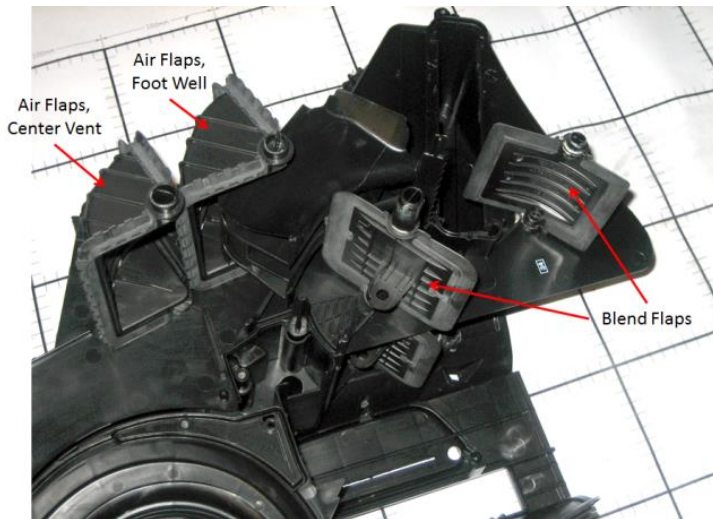
\Blend Flap RH, HVAC Unit Asm

\Blend Flap RH Process

## Process Summary

Right First Time	99.98 %
Process Time (Sec)	7.18
Total Weight (kg)	0.02

Material Cost**	\$0.06
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.05
Q Burden	\$0.00
SG&A	\$0.01
Manufacturing Cost*	\$0.13



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Blend Flap RH, HVAC Unit Asm



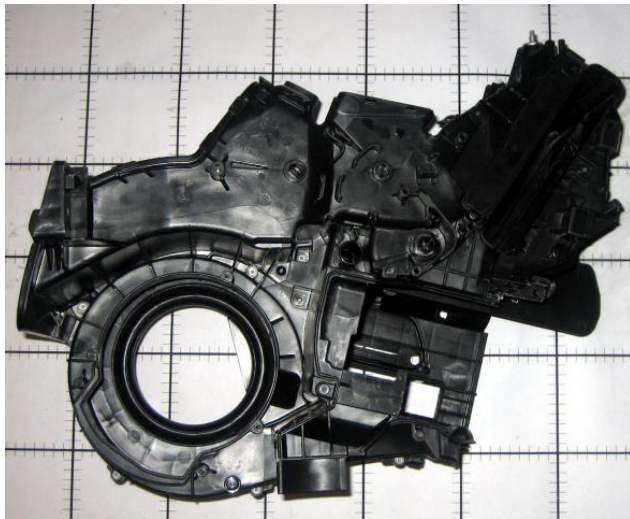
## Blend Flap RH Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
110 Ton Injection Molding Press, 2 Shot	28.72	4	0.25	25.24	CZE	\$0.05	99.98 %	\$0.00

## Blend Flap RH Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material 1, Blend Flap RH	1	PPTD40	\$2.14	0.0180	0.0190	\$0.00	\$0.04
Material 2, Blend Flap RH	1	SEBS	\$11.55	0.0020	0.0020	\$0.00	\$0.02

## No Commodity Items Required for This Process



\...  
\HVAC  
\HVAC Unit Asm  
\Assemble Bend Flap RH

### Process Summary

<b>Right First Time</b>	<b>99.98 %</b>
<b>Process Time (Sec)</b>	<b>6.00</b>
<b>Total Weight (kg)</b>	<b>0.00</b>
<b>Material Cost**</b>	<b>\$0.00</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.04</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.01</b>
<b>Manufacturing Cost*</b>	<b>\$0.05</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Bend Flap RH



## Assemble Bend Flap RH

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	6.00	1	1.00	24.59	CZE	\$0.04	99.98 %	\$0.00

## Assemble Bend Flap RH

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Center Baffle, HVAC Unit Asm



**MUNRO**  
& ASSOCIATES, INC.



\...

\HVAC Unit Asm

\Center Baffle, HVAC Unit Asm

\Center Baffle Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	8.02
Total Weight (kg)	0.17

Material Cost**	\$0.45
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.10
Q Burden	\$0.00
SG&A	\$0.07
Manufacturing Cost*	\$0.62

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Center Baffle, HVAC Unit Asm



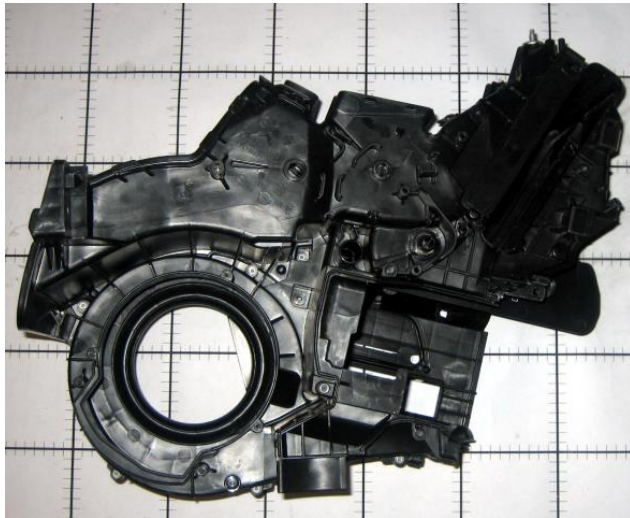
## Center Baffle Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
500 Ton Injection Molding Press	16.04	2	0.25	43.20	CZE	\$0.10	99.99%	\$0.00

## Center Baffle Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Center Baffle	1	PPTD20	\$2.54	0.1650	0.1770	\$0.00	\$0.45

## No Commodity Items Required for This Process



\...  
\HVAC  
\HVAC Unit Asm  
\Assemble Center Baffle

### Process Summary

<b>Right First Time</b>	<b>99.84 %</b>
<b>Process Time (Sec)</b>	<b>29.00</b>
<b>Total Weight (kg)</b>	<b>0.00</b>
<b>Material Cost**</b>	<b>\$0.00</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.20</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.03</b>
<b>Manufacturing Cost*</b>	<b>\$0.25</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Center Baffle



## Assemble Center Baffle

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	29.00	1	1.00	24.59	CZE	\$0.20	99.84 %	\$0.02

## Assemble Center Baffle

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Inner Baffle LH, HVAC Unit Asm



\...

\HVAC Unit Asm

\Inner Baffle LH, HVAC Unit Asm

\Inner Baffle LH Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	9.18
Total Weight (kg)	0.06

Material Cost**	\$0.17
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.04
Q Burden	\$0.00
SG&A	\$0.03
Manufacturing Cost*	\$0.24

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Inner Baffle LH, HVAC Unit Asm



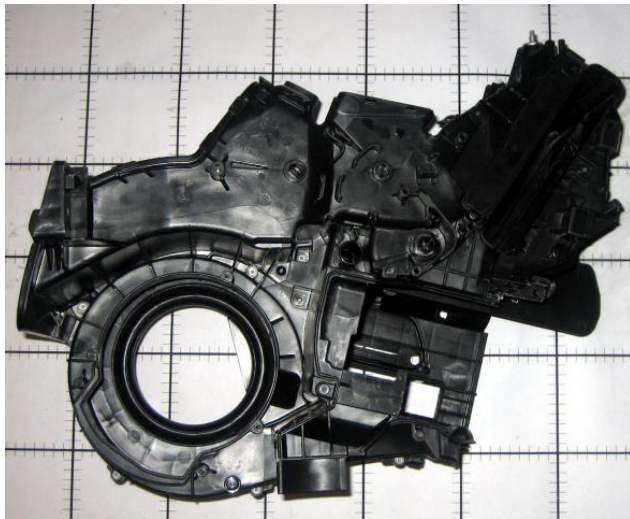
## Inner Baffle LH Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
55Ton Injection Molding Press	18.36	2	0.25	14.88	CZE	\$0.04	99.99%	\$0.00

## Inner Baffle LH Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Inner Baffle LH	1	PPTD20	\$2.54	0.0600	0.0650	\$0.00	\$0.17

## No Commodity Items Required for This Process



\...  
\HVAC  
\HVAC Unit Asm  
\Assemble Inner Baffle LH

### Process Summary

<b>Right First Time</b>	<b>99.96 %</b>
<b>Process Time (Sec)</b>	<b>10.00</b>
<b>Total Weight (kg)</b>	<b>0.00</b>
<b>Material Cost**</b>	<b>\$0.00</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.07</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.01</b>
<b>Manufacturing Cost*</b>	<b>\$0.08</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Inner Baffle LH



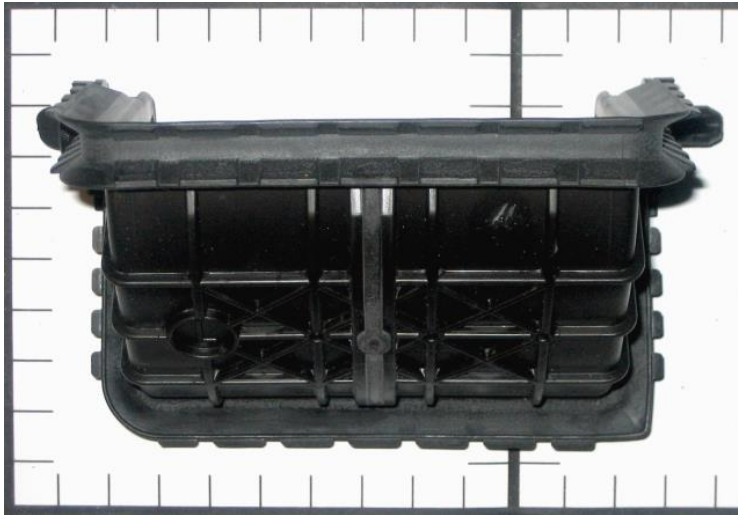
## Assemble Inner Baffle LH

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	10.00	1	1.00	24.59	CZE	\$0.07	99.96%	\$0.01

## Assemble Inner Baffle LH

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Airflap Footwell LH, HVAC Unit Asm

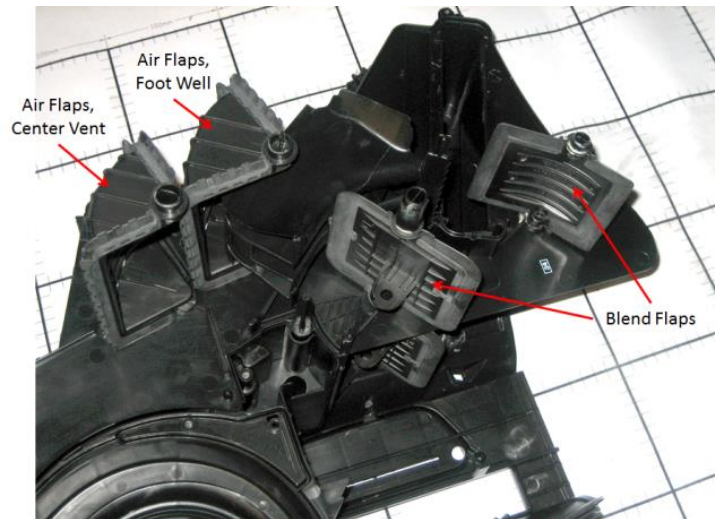


\...  
 \HVAC Unit Asm  
   \Airflap Footwell LH, HVAC Unit Asm  
     \Airflap Footwell LH Process

## Process Summary

<b>Right First Time</b>	<b>99.98 %</b>
<b>Process Time (Sec)</b>	<b>8.80</b>
<b>Total Weight (kg)</b>	<b>0.05</b>

<b>Material Cost**</b>	<b>\$0.16</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.07</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.03</b>
<b>Manufacturing Cost*</b>	<b>\$0.26</b>



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Airflap Footwell LH, HVAC Unit Asm



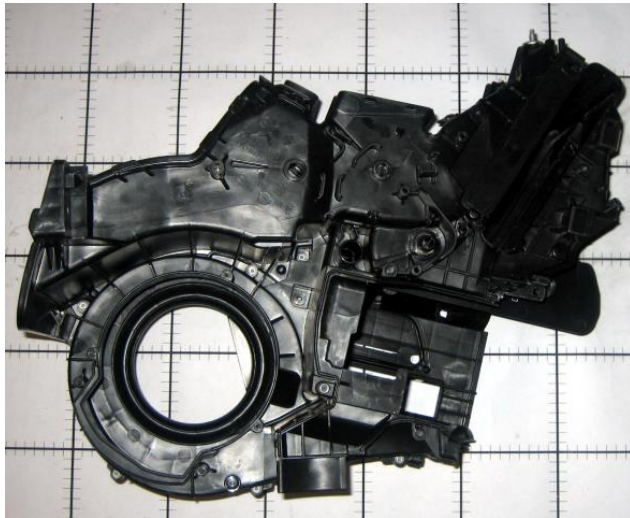
## Airflap Footwell LH Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
200 Ton Injection Molding Press, 2 Shot	35.20	4	0.25	28.99	CZE	\$0.07	99.98 %	\$0.00

## Airflap Footwell LH Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material 1, Airflap Footwell LH	1	PPTD40	\$2.14	0.0460	0.0500	\$0.00	\$0.11
Material 2, Airflap Footwell LH	1	SEBS	\$11.55	0.0040	0.0040	\$0.00	\$0.05

## No Commodity Items Required for This Process



\...  
\HVAC  
\HVAC Unit Asm  
\Assemble Airflap Footwell LH

### Process Summary

<b>Right First Time</b>	<b>99.96 %</b>
<b>Process Time (Sec)</b>	<b>10.00</b>
<b>Total Weight (kg)</b>	<b>0.00</b>

<b>Material Cost**</b>	<b>\$0.00</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.07</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.01</b>
<b>Manufacturing Cost*</b>	<b>\$0.08</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Airflap Footwell LH



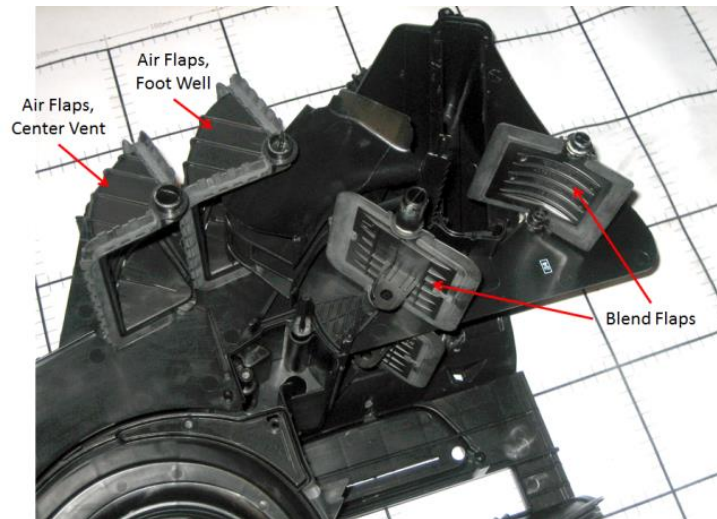
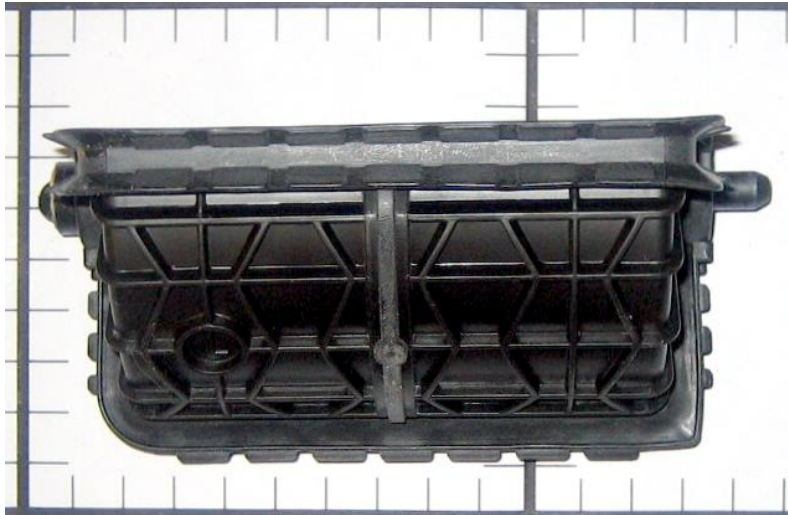
## Assemble Airflap Footwell LH

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	10.00	1	1.00	24.59	CZE	\$0.07	99.96%	\$0.01

## Assemble Airflap Footwell LH

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Airflap LH Cntr Vnt, HVAC Unit Asm



\...

\HVAC Unit Asm

\Airflap LH Cntr Vnt, HVAC Unit Asm

\Airflap LH Cntr Vnt Process

## Process Summary

Right First Time	99.98 %
Process Time (Sec)	8.78
Total Weight (kg)	0.05

Material Cost**	\$0.14
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.06
Q Burden	\$0.00
SG&A	\$0.03
Manufacturing Cost*	\$0.23

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Airflap LH Cntr Vnt, HVAC Unit Asm



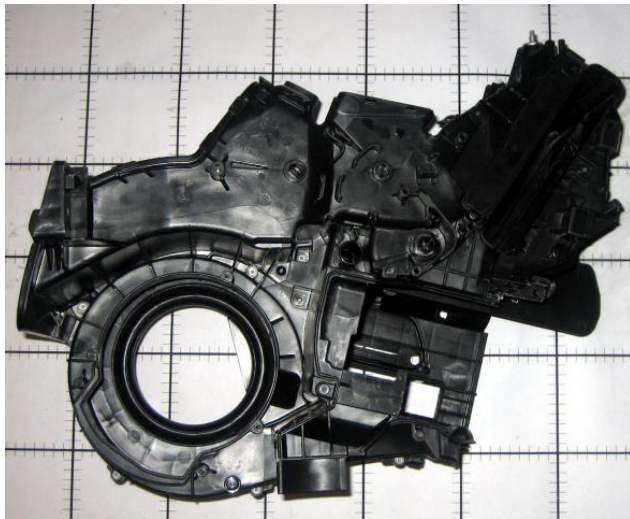
## Airflap LH Cntr Vnt Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
150 Ton Injection Molding Press, 2 Shot	35.12	4	0.25	26.25	CZE	\$0.06	99.98 %	\$0.00

## Airflap LH Cntr Vnt Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material 1, Airflap LH Cntr Vnt	1	PPTD40	\$2.14	0.0410	0.0440	\$0.00	\$0.09
Material 2, Airflap LH Cntr Vnt	1	SEBS	\$11.55	0.0040	0.0040	\$0.00	\$0.05

## No Commodity Items Required for This Process



\...  
\HVAC  
\HVAC Unit Asm  
\Assemble Airflap LH Cntr Vnt

### Process Summary

<b>Right First Time</b>	<b>99.96 %</b>
<b>Process Time (Sec)</b>	<b>9.00</b>
<b>Total Weight (kg)</b>	<b>0.00</b>
<b>Material Cost**</b>	<b>\$0.00</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.06</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.01</b>
<b>Manufacturing Cost*</b>	<b>\$0.08</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Airflap LH Cntr Vnt



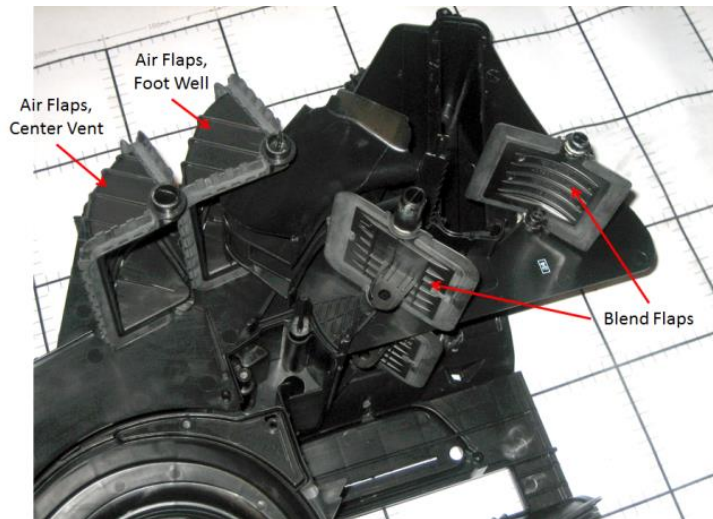
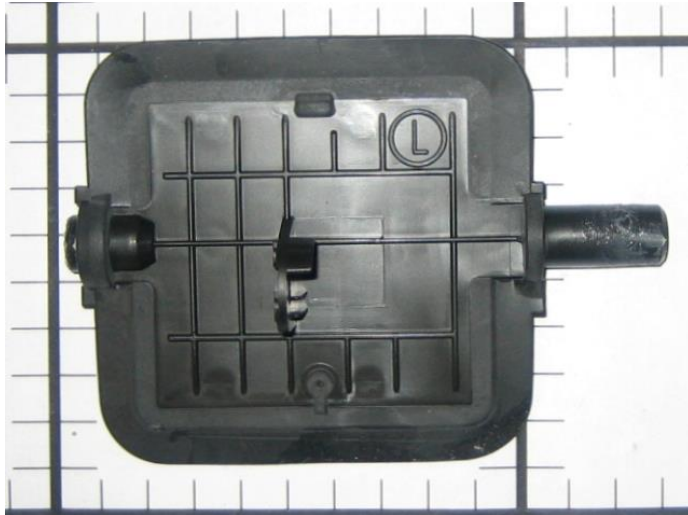
## Assemble Airflap LH Cntr Vnt

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	9.00	1	1.00	24.59	CZE	\$0.06	99.96%	\$0.01

## Assemble Airflap LH Cntr Vnt

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Upper LH Blend Flap, HVAC Unit Asm



\...  
 \HVAC Unit Asm  
 \Upper LH Blend Flap, HVAC Unit Asm  
 \Upper LH Blend Flap Process

## Process Summary

<b>Right First Time</b>	<b>99.98 %</b>
<b>Process Time (Sec)</b>	<b>7.19</b>
<b>Total Weight (kg)</b>	<b>0.03</b>

<b>Material Cost**</b>	<b>\$0.08</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.05</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.02</b>
<b>Manufacturing Cost*</b>	<b>\$0.15</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Upper LH Blend Flap, HVAC Unit Asm



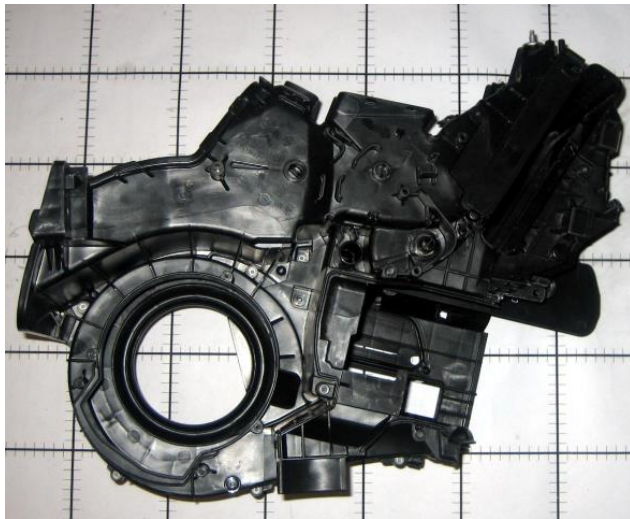
## Upper LH Blend Flap Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
150 Ton Injection Molding Press, 2 Shot	28.76	4	0.25	26.25	CZE	\$0.05	99.98 %	\$0.00

## Upper LH Blend Flap Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material 1, Upper LH Blend Flap	1	PPTD40	\$2.14	0.0230	0.0240	\$0.00	\$0.05
Material 2, Upper LH Blend Flap	1	SEBS	\$11.55	0.0020	0.0020	\$0.00	\$0.03

## No Commodity Items Required for This Process



\...  
\HVAC  
\HVAC Unit Asm  
\Assemble Upper LH Blend Flap

### Process Summary

<b>Right First Time</b>	<b>99.96 %</b>
<b>Process Time (Sec)</b>	<b>9.00</b>
<b>Total Weight (kg)</b>	<b>0.00</b>
<b>Material Cost**</b>	<b>\$0.00</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.06</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.01</b>
<b>Manufacturing Cost*</b>	<b>\$0.08</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Upper LH Blend Flap



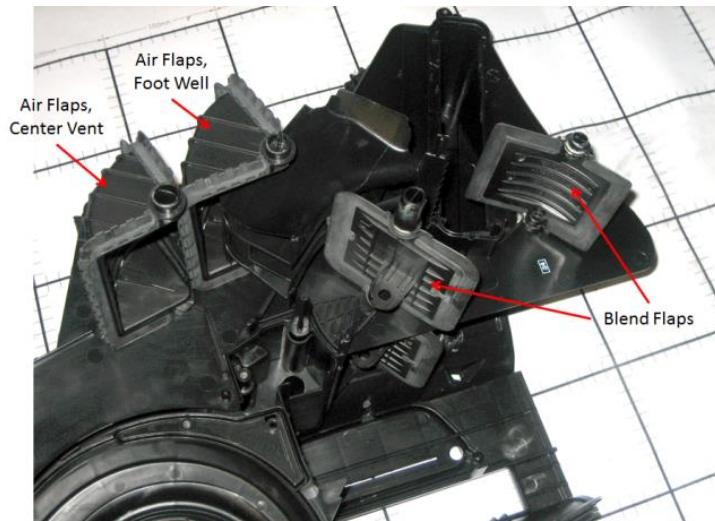
## Assemble Upper LH Blend Flap

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	9.00	1	1.00	24.59	CZE	\$0.06	99.96%	\$0.01

## Assemble Upper LH Blend Flap

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Blend Flap LH, HVAC Unit Asm



\...

\HVAC Unit Asm

\Blend Flap LH, HVAC Unit Asm

\Blend Flap LH Process

## Process Summary

Right First Time	99.98 %
Process Time (Sec)	7.18
Total Weight (kg)	0.02

Material Cost**	\$0.06
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.05
Q Burden	\$0.00
SG&A	\$0.01
Manufacturing Cost*	\$0.13

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Blend Flap LH, HVAC Unit Asm



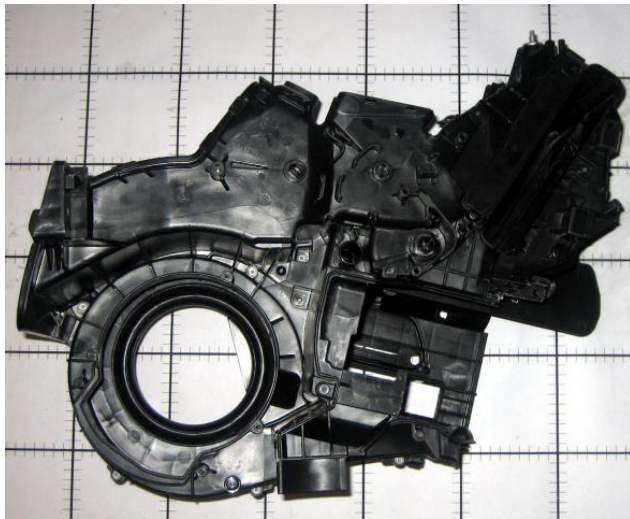
## Blend Flap LH Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
110 Ton Injection Molding Press, 2 Shot	28.72	4	0.25	25.24	CZE	\$0.05	99.98 %	\$0.00

## Blend Flap LH Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material 1, Blend Flap LH	1	PPTD40	\$2.14	0.0180	0.0190	\$0.00	\$0.04
Material 2, Blend Flap LH	1	SEBS	\$11.55	0.0020	0.0020	\$0.00	\$0.02

## No Commodity Items Required for This Process



\...  
\HVAC  
\HVAC Unit Asm  
\Assemble Blend Flap LH

### Process Summary

<b>Right First Time</b>	<b>99.96 %</b>
<b>Process Time (Sec)</b>	<b>9.00</b>
<b>Total Weight (kg)</b>	<b>0.00</b>
<b>Material Cost**</b>	<b>\$0.00</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.06</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.01</b>
<b>Manufacturing Cost*</b>	<b>\$0.08</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Blend Flap LH



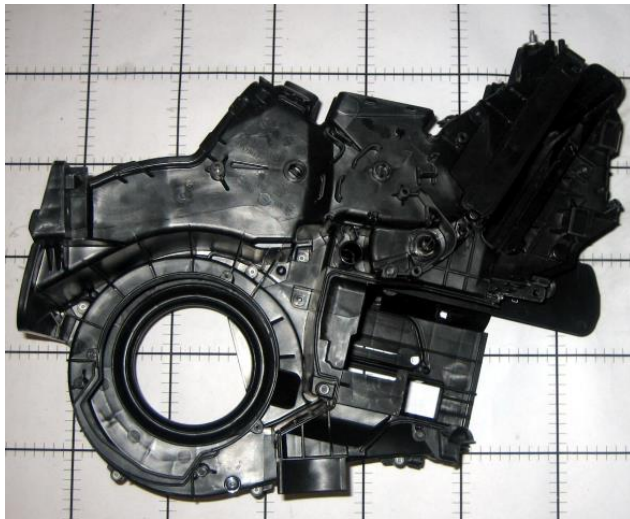
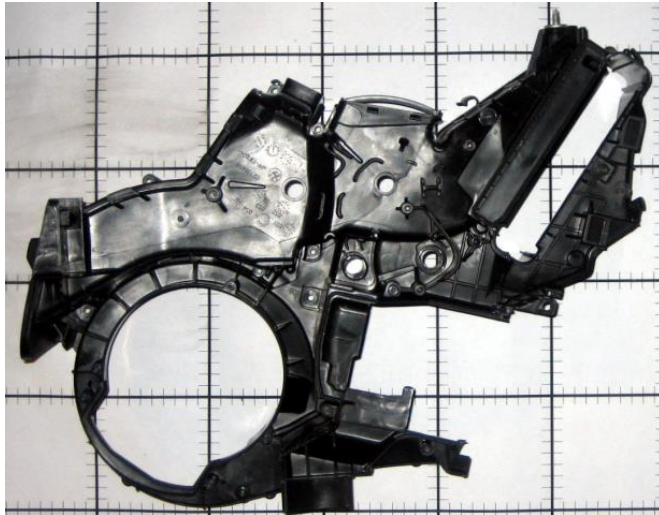
## Assemble Blend Flap LH

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	9.00	1	1.00	24.59	CZE	\$0.06	99.96%	\$0.01

## Assemble Blend Flap LH

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Housing LH, HVAC Unit Asm



\...

\HVAC Unit Asm

\Housing LH, HVAC Unit Asm

\Housing LH Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	21.68
Total Weight (kg)	0.75

Material Cost**	\$2.02
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.33
Q Burden	\$0.00
SG&A	\$0.30
Manufacturing Cost*	\$2.65

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Housing LH, HVAC Unit Asm



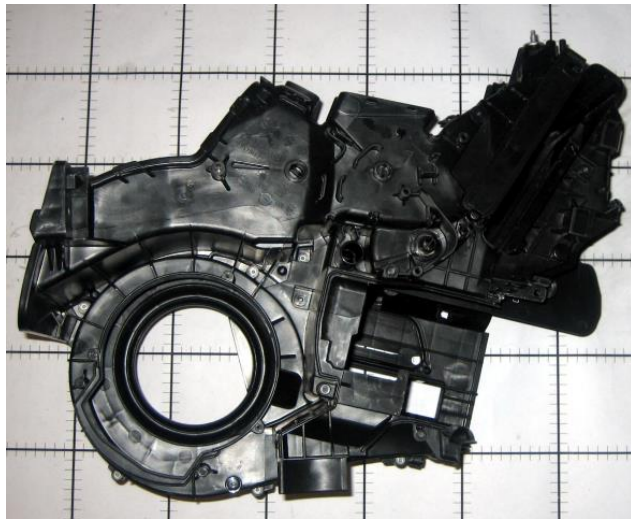
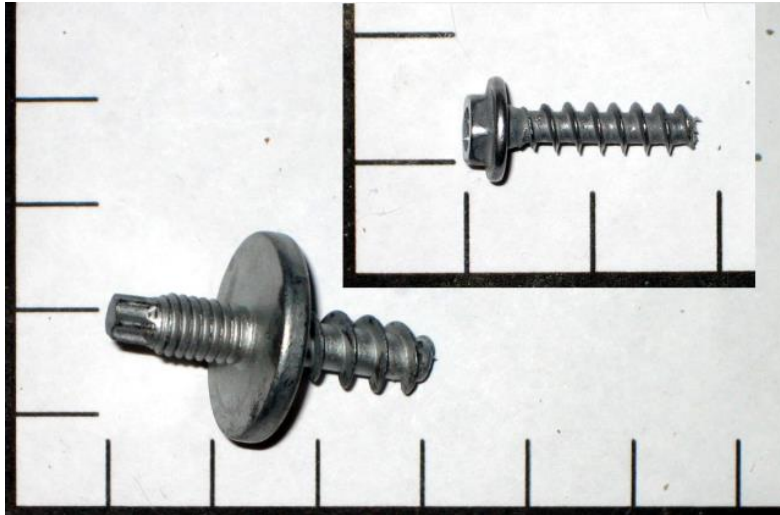
## Housing LH Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
610 Ton Injection Molding Press	21.68	1	0.25	54.05	CZE	\$0.33	99.99%	\$0.00

## Housing LH Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Housing LH	1	PPTD20	\$2.54	0.7450	0.7950	\$0.00	\$2.02

# Assemble Housing LH



\...  
\HVAC  
\HVAC Unit Asm  
\Assemble Housing LH

## Process Summary

Right First Time	97.30 %
Process Time (Sec)	166.00
Total Weight (kg)	0.04

Material Cost**	\$0.30
OEM Process Cost	\$0.00
Supplier Process Cost	\$1.13
Q Burden	\$0.41
SG&A	\$0.16
Manufacturing Cost*	\$2.00

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Housing LH



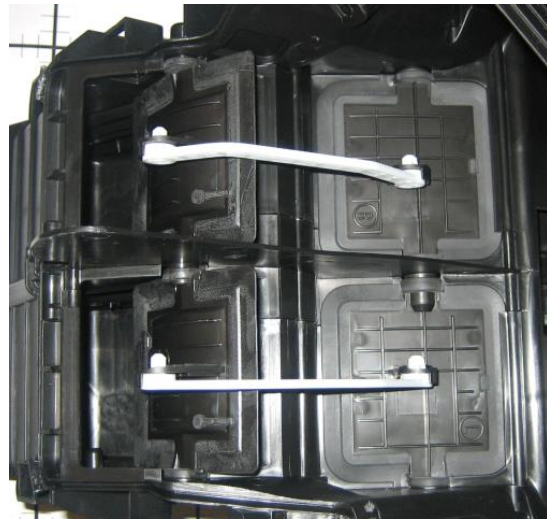
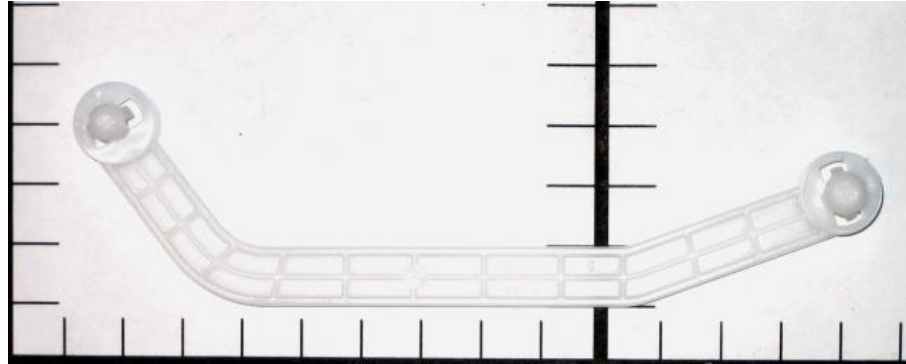
## Assemble Housing LH

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	166.00	1	1.00	24.59	CZE	\$1.13	97.30%	\$0.41

## Assemble Housing LH

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
M4x15-Torx Screw	11	Commodity Item	Purchased	0.0014	-	\$0.02	\$0.00
M6x13 Torx Stud Insert, HVAC	2	Commodity Item	Purchased	0.0100	-	\$0.04	\$0.00

# Blend Damper Link, HVAC Unit Asm



\...

\HVAC Unit Asm

\Blend Damper Link, HVAC Unit Asm

\Blend Damper Link Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	2.29
Total Weight (kg)	0.01

Material Cost**	\$0.02
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.01
Q Burden	\$0.00
SG&A	\$0.00
Manufacturing Cost*	\$0.03

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Blend Damper Link, HVAC Unit Asm



## Blend Damper Link Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
55Ton Injection Molding Press	9.16	4	0.25	14.88	CZE	\$0.01	99.99%	\$0.00

## Blend Damper Link Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Blend Damper Link	1	POM	\$3.18	0.0060	0.0065	\$0.00	\$0.02

## No Commodity Items Required for This Process



\...  
\HVAC  
\HVAC Unit Asm  
\Assemble Blend Damper Link

### Process Summary

<b>Right First Time</b>	<b>99.92 %</b>
<b>Process Time (Sec)</b>	<b>18.00</b>
<b>Total Weight (kg)</b>	<b>0.00</b>
<b>Material Cost**</b>	<b>\$0.00</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.12</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.02</b>
<b>Manufacturing Cost*</b>	<b>\$0.15</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Blend Damper Link



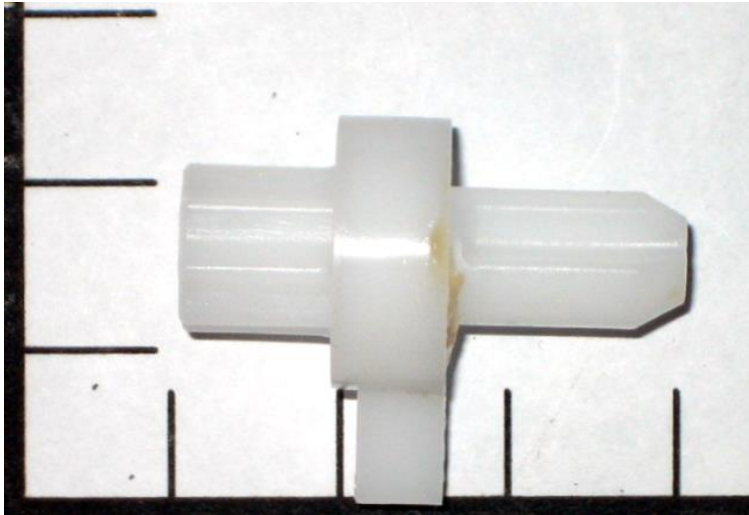
## Assemble Blend Damper Link

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
<a href="#">Supplier Manual Asm</a>	18.00	1	1.00	24.59	CZE	\$0.12	99.92%	\$0.01

## Assemble Blend Damper Link

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Damper Gear, HVAC Unit Asm



\...

\HVAC Unit Asm

\Damper Gear, HVAC Unit Asm

\Damper Gear Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	1.62
Total Weight (kg)	0.00

Material Cost**	\$0.01
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.01
Q Burden	\$0.00
SG&A	\$0.00
Manufacturing Cost*	\$0.02



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Damper Gear, HVAC Unit Asm



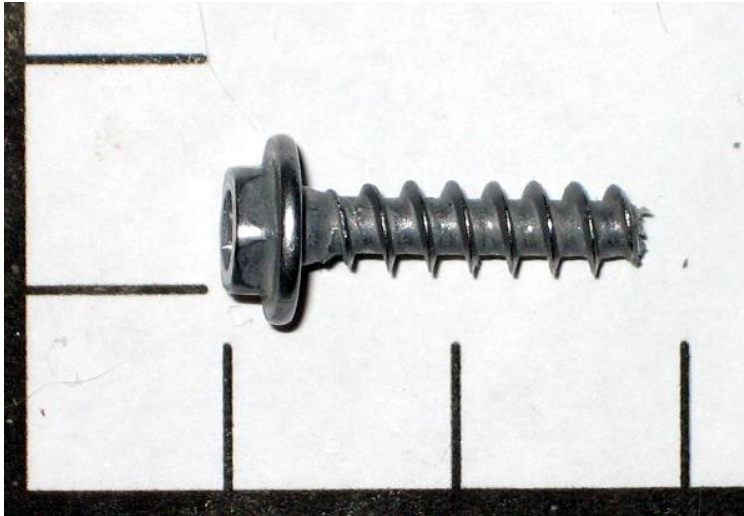
## Damper Gear Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
55Ton Injection Molding Press	12.96	8	0.25	14.88	CZE	\$0.01	99.99%	\$0.00

## Damper Gear Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Damper Gear	1	POM	\$3.18	0.0029	0.0030	\$0.00	\$0.01

# Assemble Damper Gear and Motor



\...  
\HVAC  
\HVAC Unit Asm  
\Assemble Damper Gear and Motor

## Process Summary

Right First Time	98.43 %
Process Time (Sec)	124.07
Total Weight (kg)	0.19

Material Cost**	\$70.68
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.85
Q Burden	\$0.24
SG&A	\$9.29
Manufacturing Cost*	\$81.05



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Damper Gear and Motor



## Assemble Damper Gear and Motor

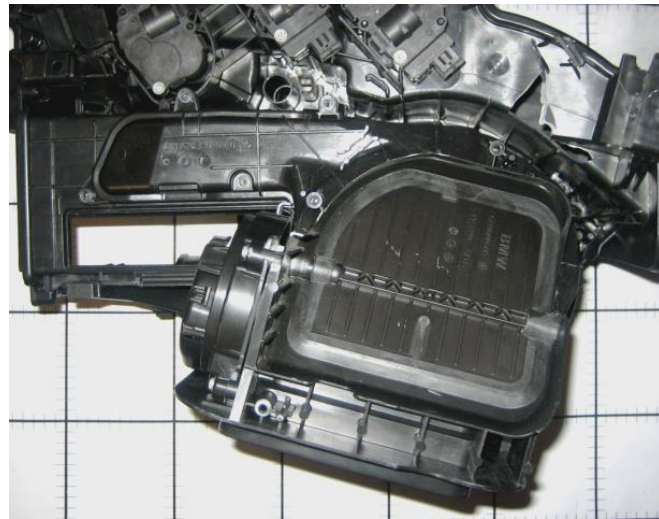
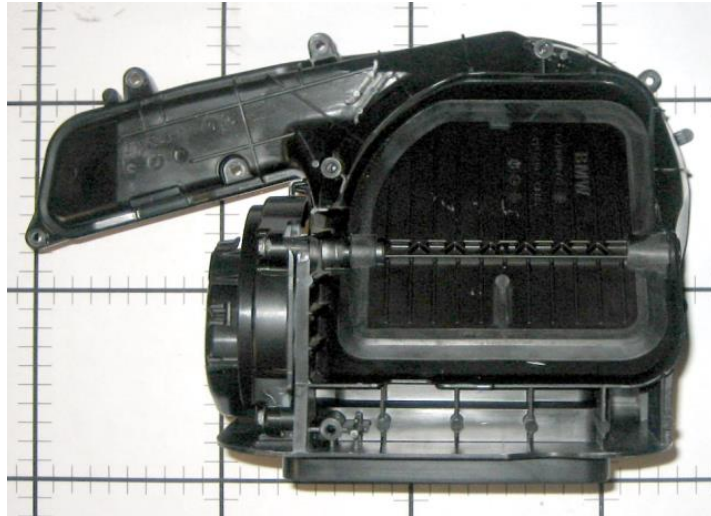
Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
<a href="#">Supplier Manual Asm</a>	124.07	1	1.00	24.59	CZE	\$0.85	98.43%	\$0.24

## Assemble Damper Gear and Motor

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Damper Motor	3	See Appendix	-	0.0600	-	\$0.00	\$23.52
M4x15-Torx Screw	6	Commodity Item	Purchased	0.0014	-	\$0.02	\$0.00

[Click Here for TechInsights Electronics Report on Damper Motor](#)

# Fresh Air Inlet Asm, HVAC Unit Asm



\...  
 \HVAC  
 \HVAC Unit Asm  
 \Fresh Air Inlet Asm, HVAC Unit Asm  
**Assembly Summary**

<b>Parts</b>	<b>15</b>
<b>Fasteners</b>	<b>4</b>
<b>Part Numbers</b>	<b>11</b>
<b>Steps</b>	<b>49</b>
<b>Fastenings</b>	<b>13</b>
<b>Right First Time</b>	<b>98.71 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>2.99</b>
<b>Total Weight (kg)</b>	<b>0.52</b>

<b>Material Cost**</b>	<b>\$24.98</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$1.29</b>
<b>Q Burden</b>	<b>\$0.19</b>
<b>SG&amp;A</b>	<b>\$3.41</b>
<b>Manufacturing Cost*</b>	<b>\$29.87</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Fresh Air Inlet Asm, HVAC Unit Asm



## Fresh Air Inlet Asm, HVAC Unit Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Fresh Air Inlet, Fresh Air Inlet Asm	1	2	0	2	0	99.98 %	0.00	0.00	0.00	0.29	0.2950
Recirculation Flap, Fresh Air Inlet Asm	1	2	0	2	0	99.98 %	0.00	0.00	0.00	0.13	0.0400
Assemble Fresh Air Inlet and Recirculation Flap	1	0	1	3	1	99.94 %	0.00	0.00	0.27	0.00	0.0000
Fresh Air Flap, Fresh Air Inlet Asm	1	2	0	2	0	99.98 %	0.00	0.00	0.00	0.13	0.0450
Assemble Fresh Air Flap	1	0	3	6	3	99.92 %	0.00	0.00	0.30	0.00	0.0000
Damper Gear, Fresh Air Inlet Asm	2	1	0	1	0	99.99 %	0.00	0.00	0.00	0.04	0.0032
Assemble Damper Gear	1	0	2	4	2	99.92 %	0.00	0.00	0.27	0.00	0.0000
Damper Cam, Fresh Air Inlet Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.06	0.0260
Assemble Damper Cam	1	0	1	2	1	99.98 %	0.00	0.00	0.13	0.00	0.0000
Motor-Cover Asm, Fresh Air Inlet Asm	1	3	2	8	2	99.71 %	0.00	0.00	0.43	0.09	0.1046
Assemble Motor-Cover Asm	1	3	4	10	4	99.34 %	0.00	0.00	0.82	0.00	0.0042

## Fresh Air Inlet Asm, HVAC Unit Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Fresh Air Inlet, Fresh Air Inlet Asm	\$0.00	\$0.87	\$0.00	\$0.00	\$0.00	\$0.17	\$0.00	\$0.14	\$1.18
Recirculation Flap, Fresh Air Inlet Asm	\$0.00	\$0.13	\$0.00	\$0.00	\$0.00	\$0.06	\$0.00	\$0.03	\$0.22
Assemble Fresh Air Inlet and Recirculation Flap	\$0.00	\$0.00	\$0.00	\$0.00	\$0.11	\$0.00	\$0.01	\$0.01	\$0.13
Fresh Air Flap, Fresh Air Inlet Asm	\$0.00	\$0.15	\$0.00	\$0.00	\$0.00	\$0.08	\$0.00	\$0.03	\$0.26
Assemble Fresh Air Flap	\$0.00	\$0.00	\$0.00	\$0.00	\$0.12	\$0.00	\$0.01	\$0.02	\$0.15
Damper Gear, Fresh Air Inlet Asm	\$0.00	\$0.01	\$0.00	\$0.00	\$0.00	\$0.01	\$0.00	\$0.00	\$0.03
Assemble Damper Gear	\$0.00	\$0.00	\$0.00	\$0.00	\$0.11	\$0.00	\$0.01	\$0.01	\$0.14
Damper Cam, Fresh Air Inlet Asm	\$0.00	\$0.09	\$0.00	\$0.00	\$0.00	\$0.02	\$0.00	\$0.01	\$0.12
Assemble Damper Cam	\$0.00	\$0.00	\$0.00	\$0.00	\$0.05	\$0.00	\$0.00	\$0.01	\$0.07
Motor-Cover Asm, Fresh Air Inlet Asm	\$0.02	\$23.64	\$0.00	\$0.00	\$0.18	\$0.03	\$0.04	\$3.10	\$27.01
Assemble Motor-Cover Asm	\$0.06	\$0.00	\$0.00	\$0.00	\$0.33	\$0.00	\$0.10	\$0.05	\$0.54

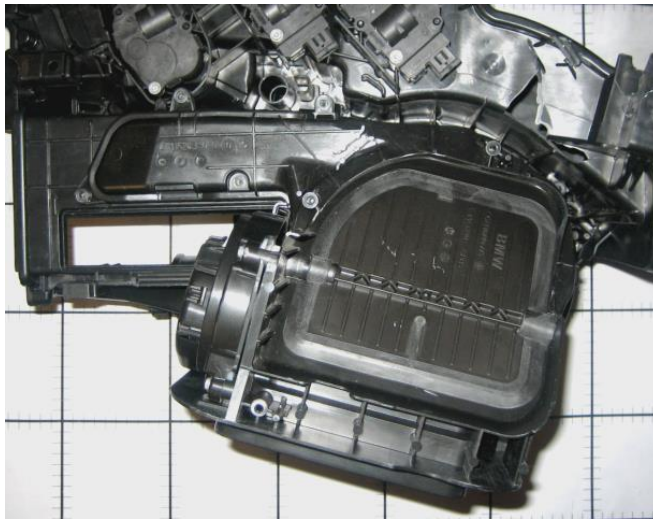
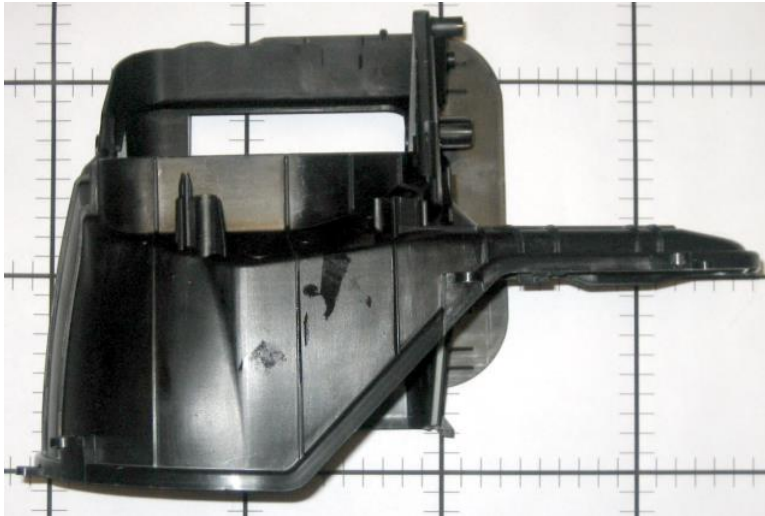
## Detailed Summary

<b>Parts</b>	<b>15</b>
<b>Fasteners</b>	<b>4</b>
<b>Part Numbers</b>	<b>11</b>
<b>Steps</b>	<b>49</b>
<b>Fastenings</b>	<b>13</b>
<b>Right First Time</b>	<b>98.71%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>2.22</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.77</b>
<b>Total Weight (kg)</b>	<b>0.52</b>
<b>Purchased Part Cost</b>	
	<b>\$0.08</b>
<b>Material Cost</b>	
	<b>\$24.90</b>
<b>OEM Asm. Cost</b>	
	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	
	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	
	<b>\$0.91</b>
<b>Supplier Fab. Cost</b>	
	<b>\$0.38</b>
<b>Q Burden</b>	
	<b>\$0.19</b>
<b>SG&amp;A</b>	
	<b>\$3.41</b>
<b>Manufacturing Cost*</b>	
	<b>\$29.87</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Fresh Air Inlet, Fresh Air Inlet Asm



- \...
- \Fresh Air Inlet Asm, HVAC Unit Asm
- \Fresh Air Inlet, Fresh Air Inlet Asm
- \Fresh Air Inlet Process

## Process Summary

Right First Time	99.98 %
Process Time (Sec)	17.13
Total Weight (kg)	0.30

Material Cost**	\$0.87
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.17
Q Burden	\$0.00
SG&A	\$0.14
Manufacturing Cost*	\$1.18

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Fresh Air Inlet, Fresh Air Inlet Asm



## Fresh Air Inlet Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
300 Ton Injection Molding Press, 2 Shot	34.26	2	0.25	36.50	CZE	\$0.17	99.98 %	\$0.00

## Fresh Air Inlet Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material 1, Fresh Air Inlet	1	PPTD20	\$2.54	0.2880	0.3090	\$0.00	\$0.78
Material 2, Fresh Air Inlet	1	SEBS	\$11.55	0.0070	0.0080	\$0.00	\$0.09



# Recirculation Flap, Fresh Air Inlet Asm



\...

- \Fresh Air Inlet Asm, HVAC Unit Asm
- \Recirculation Flap, Fresh Air Inlet Asm
- \Recirculation Flap Process

## Process Summary

<b>Right First Time</b>	<b>99.98 %</b>
<b>Process Time (Sec)</b>	<b>7.75</b>
<b>Total Weight (kg)</b>	<b>0.04</b>
<b>Material Cost**</b>	<b>\$0.13</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.06</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.03</b>
<b>Manufacturing Cost*</b>	<b>\$0.22</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Recirculation Flap, Fresh Air Inlet Asm



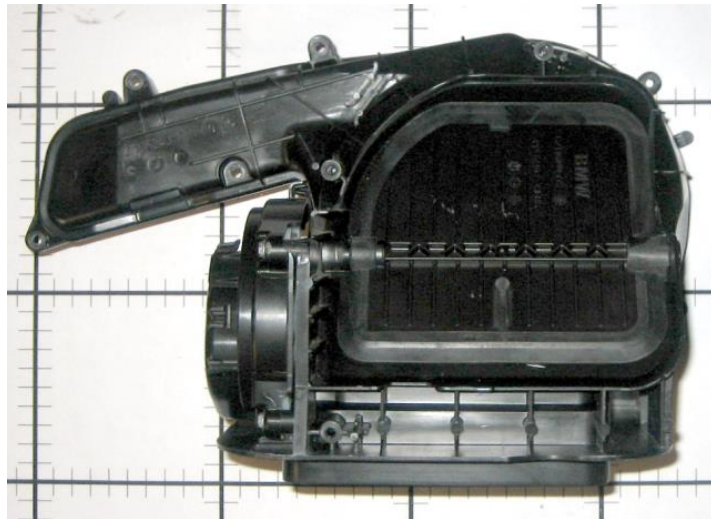
## Recirculation Flap Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
200 Ton Injection Molding Press, 2 Shot	31.00	4	0.25	28.99	CZE	\$0.06	99.98 %	\$0.00

## Recirculation Flap Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material 1, Recirculation Flap	1	PPTD40	\$2.14	0.0360	0.0390	\$0.00	\$0.08
Material 2, Recirculation Flap	1	SEBS	\$11.55	0.0040	0.0040	\$0.00	\$0.05

## No Commodity Items Required for This Process



\...  
\HVAC Unit Asm  
\Fresh Air Inlet Asm, HVAC Unit Asm  
\Assemble Fresh Air Inlet and Recirculation Flap

### Process Summary

<b>Right First Time</b>	<b>99.94 %</b>
<b>Process Time (Sec)</b>	<b>16.00</b>
<b>Total Weight (kg)</b>	<b>0.00</b>
<b>Material Cost**</b>	<b>\$0.00</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.11</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.01</b>
<b>Manufacturing Cost*</b>	<b>\$0.13</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Fresh Air Inlet and Recirculation Flap



**MUNRO**  
& ASSOCIATES, INC.

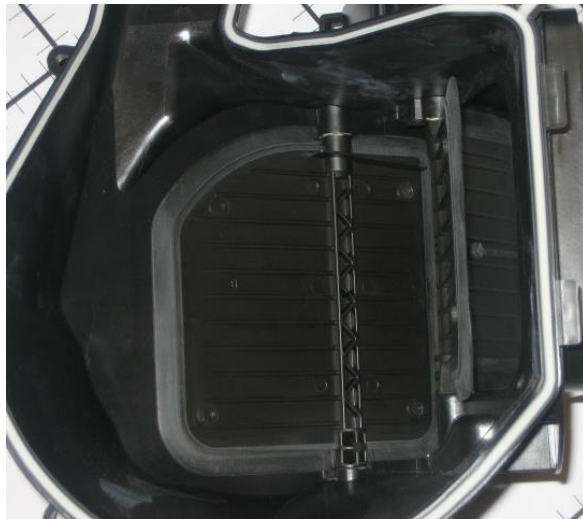
## Assemble Fresh Air Inlet and Recirculation Flap

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
<a href="#">Supplier Manual Asm</a>	16.00	1	1.00	24.59	CZE	\$0.11	99.94 %	\$0.01

## Assemble Fresh Air Inlet and Recirculation Flap

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Fresh Air Flap, Fresh Air Inlet Asm



\...

- \Fresh Air Inlet Asm, HVAC Unit Asm
- \Fresh Air Flap, Fresh Air Inlet Asm
- \Fresh Air Flap Process

## Process Summary

<b>Right First Time</b>	<b>99.98 %</b>
<b>Process Time (Sec)</b>	<b>7.71</b>
<b>Total Weight (kg)</b>	<b>0.05</b>
<b>Material Cost**</b>	<b>\$0.15</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.08</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.03</b>
<b>Manufacturing Cost*</b>	<b>\$0.26</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Fresh Air Flap, Fresh Air Inlet Asm



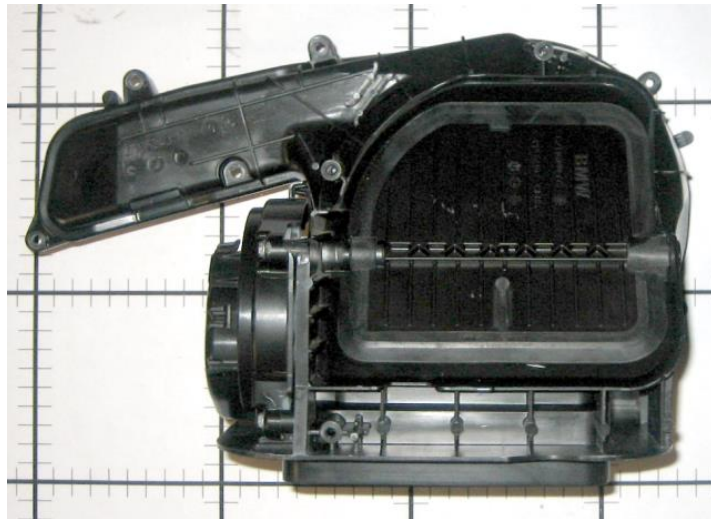
## Fresh Air Flap Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
300 Ton Injection Molding Press, 2 Shot	30.84	4	0.25	36.50	CZE	\$0.08	99.98 %	\$0.00

## Fresh Air Flap Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material 1, Fresh Air Flap	1	PPTD40	\$2.14	0.0410	0.0440	\$0.00	\$0.09
Material 2, Fresh Air Flap	1	SEBS	\$11.55	0.0040	0.0050	\$0.00	\$0.06

## No Commodity Items Required for This Process



\...  
\HVAC Unit Asm  
\Fresh Air Inlet Asm, HVAC Unit Asm  
\Assemble Fresh Air Flap

### Process Summary

<b>Right First Time</b>	<b>99.92 %</b>
<b>Process Time (Sec)</b>	<b>18.05</b>
<b>Total Weight (kg)</b>	<b>0.00</b>
<b>Material Cost**</b>	<b>\$0.00</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.12</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.02</b>
<b>Manufacturing Cost*</b>	<b>\$0.15</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Fresh Air Flap



## Assemble Fresh Air Flap

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	18.05	1	1.00	24.59	CZE	\$0.12	99.92%	\$0.01

## Assemble Fresh Air Flap

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Damper Gear, Fresh Air Inlet Asm



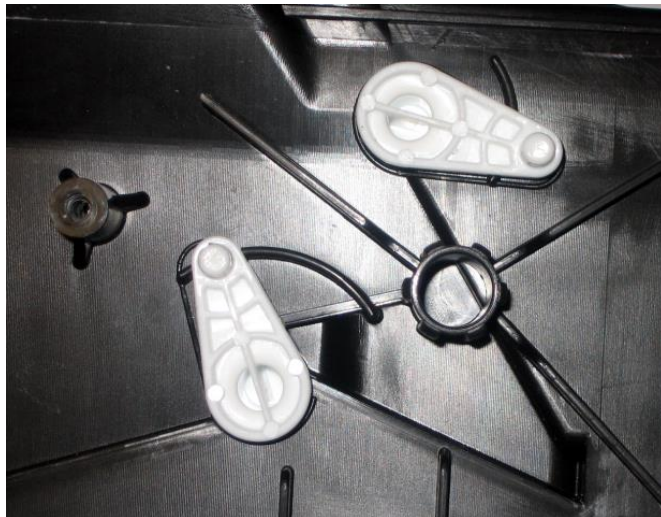
\...

- \Fresh Air Inlet Asm, HVAC Unit Asm
- \Damper Gear, Fresh Air Inlet Asm
- \Damper Gear Process

## Process Summary

<b>Right First Time</b>	<b>99.99 %</b>
<b>Process Time (Sec)</b>	<b>2.63</b>
<b>Total Weight (kg)</b>	<b>0.00</b>

<b>Material Cost**</b>	<b>\$0.01</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.01</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.00</b>
<b>Manufacturing Cost*</b>	<b>\$0.03</b>



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Damper Gear, Fresh Air Inlet Asm



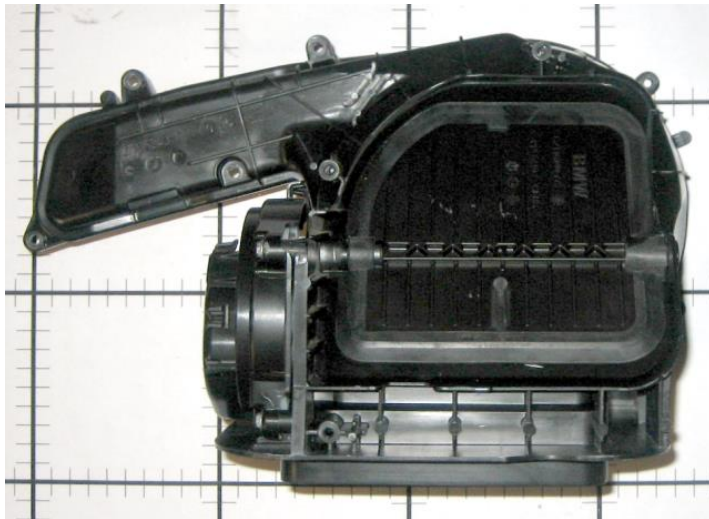
## Damper Gear Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
55Ton Injection Molding Press	10.52	4	0.25	14.88	CZE	\$0.01	99.99%	\$0.00

## Damper Gear Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Damper Gear	1	PBT	\$3.06	0.0032	0.0033	\$0.00	\$0.01

## No Commodity Items Required for This Process



\...

\HVAC Unit Asm

\Fresh Air Inlet Asm, HVAC Unit Asm

\Assemble Damper Gear

### Process Summary

<b>Right First Time</b>	<b>99.92 %</b>
<b>Process Time (Sec)</b>	<b>16.00</b>
<b>Total Weight (kg)</b>	<b>0.00</b>
<b>Material Cost**</b>	<b>\$0.00</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.11</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.01</b>
<b>Manufacturing Cost*</b>	<b>\$0.14</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Damper Gear



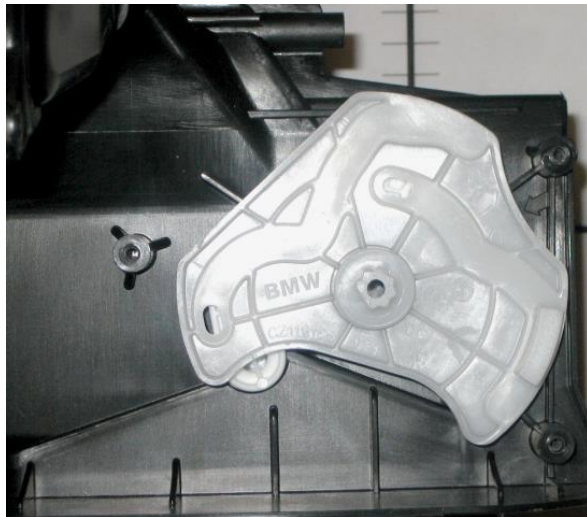
## Assemble Damper Gear

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	16.00	1	1.00	24.59	CZE	\$0.11	99.92%	\$0.01

## Assemble Damper Gear

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Damper Cam, Fresh Air Inlet Asm



\...

- \Fresh Air Inlet Asm, HVAC Unit Asm
- \Damper Cam, Fresh Air Inlet Asm
- \Damper Cam Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	3.32
Total Weight (kg)	0.03
Material Cost**	\$0.09
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.02
Q Burden	\$0.00
SG&A	\$0.01
Manufacturing Cost*	\$0.12

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Damper Cam, Fresh Air Inlet Asm



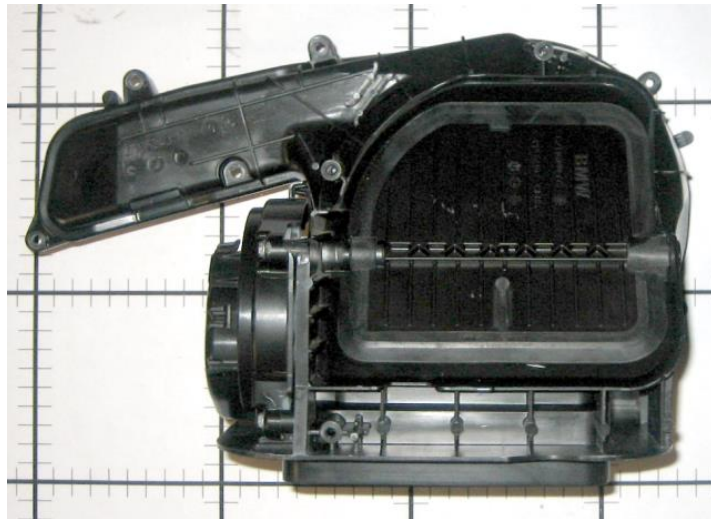
## Damper Cam Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
110 Ton Injection Molding Press	13.28	4	0.25	17.57	CZE	\$0.02	99.99%	\$0.00

## Damper Cam Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Damper Cam	1	POM	\$3.18	0.0260	0.0280	\$0.00	\$0.09

## No Commodity Items Required for This Process



\...

\HVAC Unit Asm

\Fresh Air Inlet Asm, HVAC Unit Asm

\Assemble Damper Cam

### Process Summary

<b>Right First Time</b>	<b>99.98 %</b>
<b>Process Time (Sec)</b>	<b>8.00</b>
<b>Total Weight (kg)</b>	<b>0.00</b>
<b>Material Cost**</b>	<b>\$0.00</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.05</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.01</b>
<b>Manufacturing Cost*</b>	<b>\$0.07</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Damper Cam



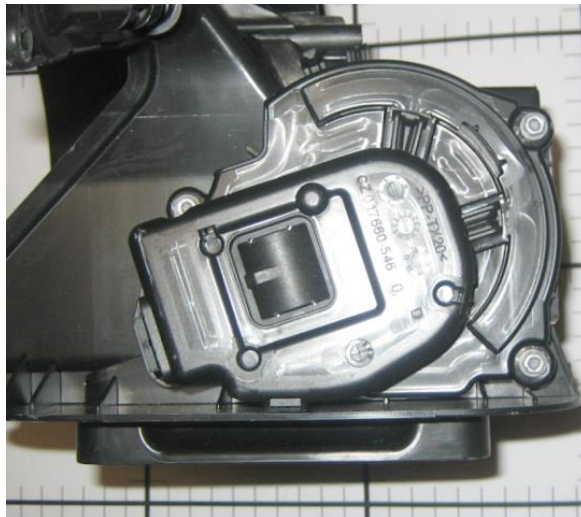
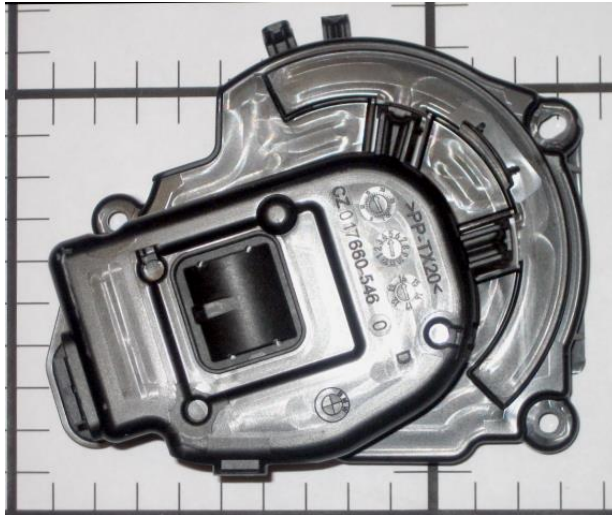
## Assemble Damper Cam

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	8.00	1	1.00	24.59	CZE	\$0.05	99.98 %	\$0.00

## Assemble Damper Cam

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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- \...
- \HVAC Unit Asm
- \Fresh Air Inlet Asm, HVAC Unit Asm
- \Motor-Cover Asm, Fresh Air Inlet Asm

## Assembly Summary

<b>Parts</b>	<b>3</b>
<b>Fasteners</b>	<b>1</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>8</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.71 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>0.52</b>
<b>Total Weight (kg)</b>	<b>0.10</b>

<b>Material Cost**</b>	<b>\$23.66</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.21</b>
<b>Q Burden</b>	<b>\$0.04</b>
<b>SG&amp;A</b>	<b>\$3.10</b>
<b>Manufacturing Cost*</b>	<b>\$27.01</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Motor-Cover Asm, Fresh Air Inlet Asm



## Motor-Cover Asm, Fresh Air Inlet Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Motor Cover, Motor-Cover Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.09	0.0432
Assemble Motor-Cover Asm	1	2	2	6	2	99.72 %	0.00	0.00	0.43	0.00	0.0614

## Motor-Cover Asm, Fresh Air Inlet Asm

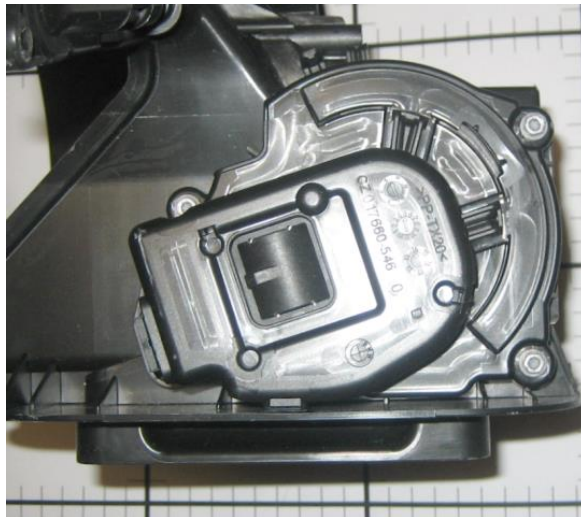
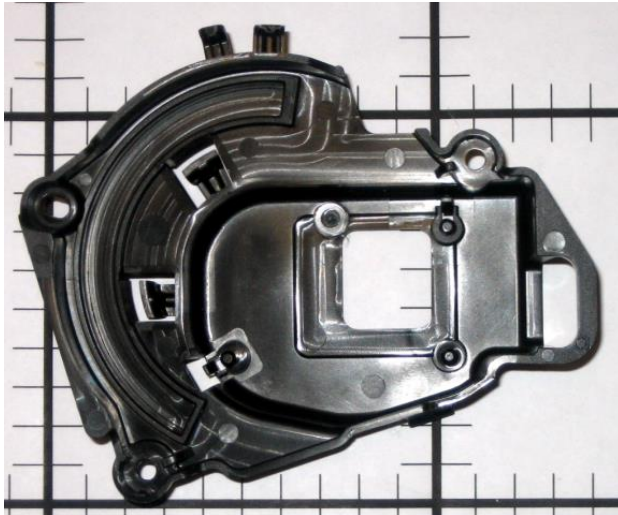
Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Motor Cover, Motor-Cover Asm	\$0.00	\$0.12	\$0.00	\$0.00	\$0.00	\$0.03	\$0.00	\$0.02	\$0.17
Assemble Motor-Cover Asm	\$0.02	\$23.52	\$0.00	\$0.00	\$0.18	\$0.00	\$0.04	\$3.08	\$26.84

## Detailed Summary

<b>Parts</b>	<b>3</b>
<b>Fasteners</b>	<b>1</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>8</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.71%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.43</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.09</b>
<b>Total Weight (kg)</b>	<b>0.10</b>
<b>Purchased Part Cost</b>	<b>\$0.02</b>
<b>Material Cost</b>	<b>\$23.64</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.18</b>
<b>Supplier Fab. Cost</b>	<b>\$0.03</b>
<b>Q Burden</b>	<b>\$0.04</b>
<b>SG&amp;A</b>	<b>\$3.10</b>
<b>Manufacturing Cost*</b>	<b>\$27.01</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



\...

- \Motor-Cover Asm, Fresh Air Inlet Asm
- \Motor Cover, Motor-Cover Asm
- \Motor Cover Process

## Process Summary

<b>Right First Time</b>	<b>99.99 %</b>
<b>Process Time (Sec)</b>	<b>5.31</b>
<b>Total Weight (kg)</b>	<b>0.04</b>

<b>Material Cost**</b>	<b>\$0.12</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.03</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.02</b>
<b>Manufacturing Cost*</b>	<b>\$0.17</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Motor Cover, Motor-Cover Asm



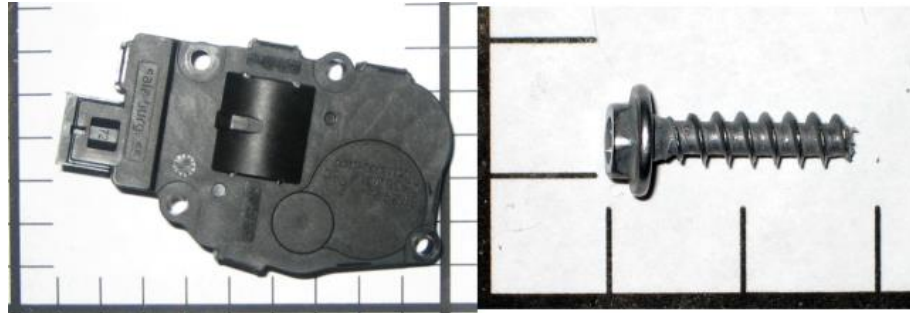
## Motor Cover Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
200 Ton Injection Molding Press	21.24	4	0.25	21.32	CZE	\$0.03	99.99%	\$0.00

## Motor Cover Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Motor Cover	1	PPTD20	\$2.54	0.0432	0.0460	\$0.00	\$0.12

# Assemble Motor-Cover Asm



- \...
- \Fresh Air Inlet Asm, HVAC Unit Asm
- \Motor-Cover Asm, Fresh Air Inlet Asm
- \Assemble Motor-Cover Asm

## Process Summary

Right First Time	99.72 %
Process Time (Sec)	26.00
Total Weight (kg)	0.06

Material Cost**	\$23.54
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.18
Q Burden	\$0.04
SG&A	\$3.08
Manufacturing Cost*	\$26.84



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Motor-Cover Asm

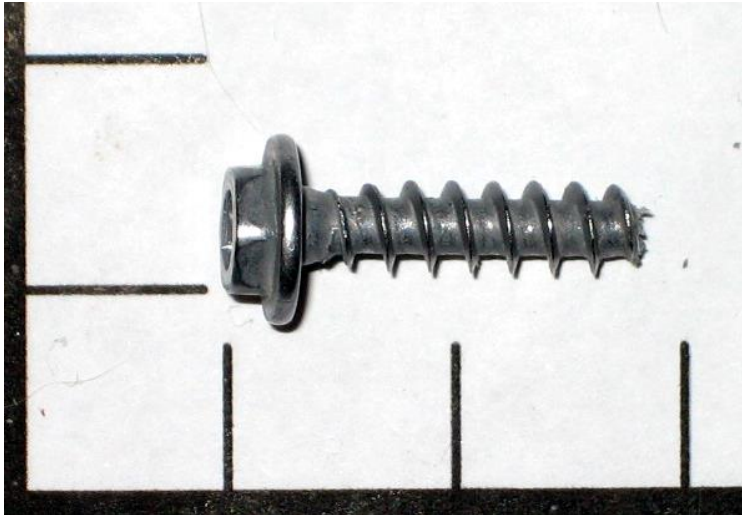


Assemble Motor-Cover Asm									
Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden	
Supplier Manual Asm	26.00	1	1.00	24.59	CZE	\$0.18	99.72 %	\$0.04	

Assemble Motor-Cover Asm									
Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost		
Damper Motor, HVAC	1	See Appendix	-	0.0600	-	\$0.00	\$23.52		
M4x15-Torx Screw	1	Commodity Item	Purchased	0.0014	-	\$0.02	\$0.00		

[Click Here for TechInsights Electronics Report on Damper Motor](#)

# Assemble Motor-Cover Asm

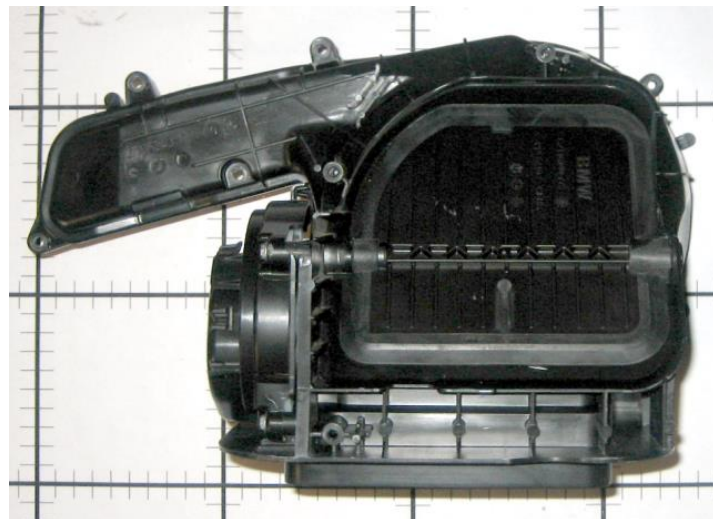


\...  
\HVAC Unit Asm  
\Fresh Air Inlet Asm, HVAC Unit Asm  
\Assemble Motor-Cover Asm

## Process Summary

Right First Time	99.34 %
Process Time (Sec)	49.00
Total Weight (kg)	0.00

Material Cost**	\$0.06
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.33
Q Burden	\$0.10
SG&A	\$0.05
Manufacturing Cost*	\$0.54



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Assemble Motor-Cover Asm



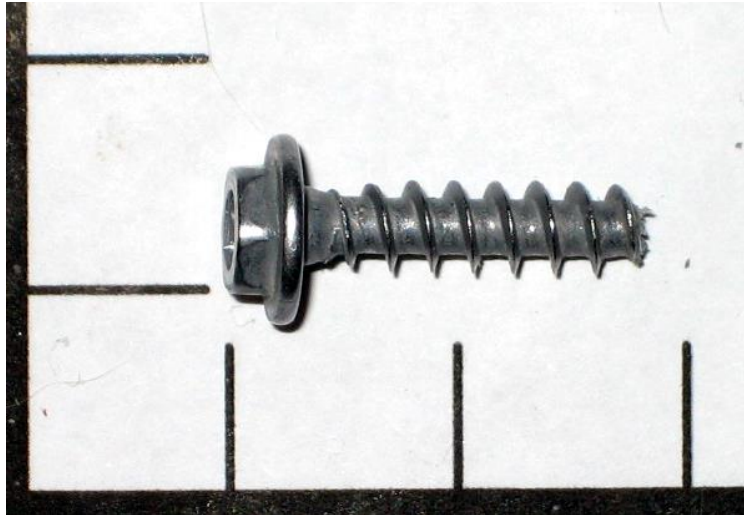
## Assemble Motor-Cover Asm

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	49.00	1	1.00	24.59	CZE	\$0.33	99.34%	\$0.10

## Assemble Motor-Cover Asm

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
M4x15-Torx Screw	3	Commodity Item	Purchased	0.0014	-	\$0.02	\$0.00

# Assemble Fresh Air Inlet

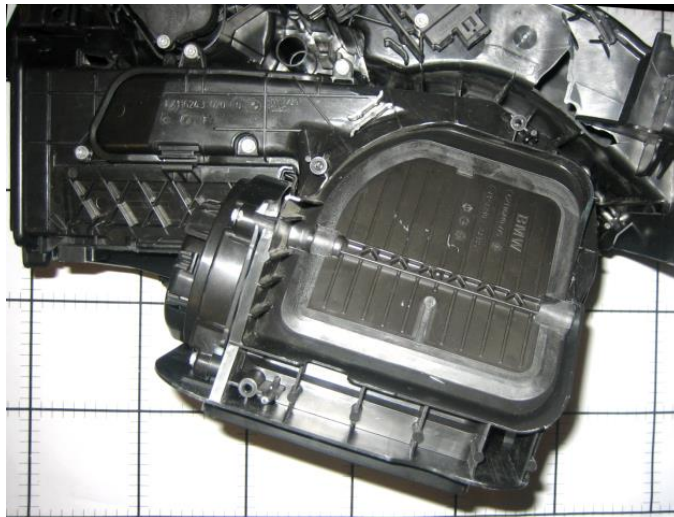


\...  
\HVAC  
\HVAC Unit Asm  
\Assemble Fresh Air Inlet

## Process Summary

Right First Time	98.75 %
Process Time (Sec)	77.00
Total Weight (kg)	0.01

Material Cost**	\$0.12
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.53
Q Burden	\$0.19
SG&A	\$0.07
Manufacturing Cost*	\$0.91



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Fresh Air Inlet



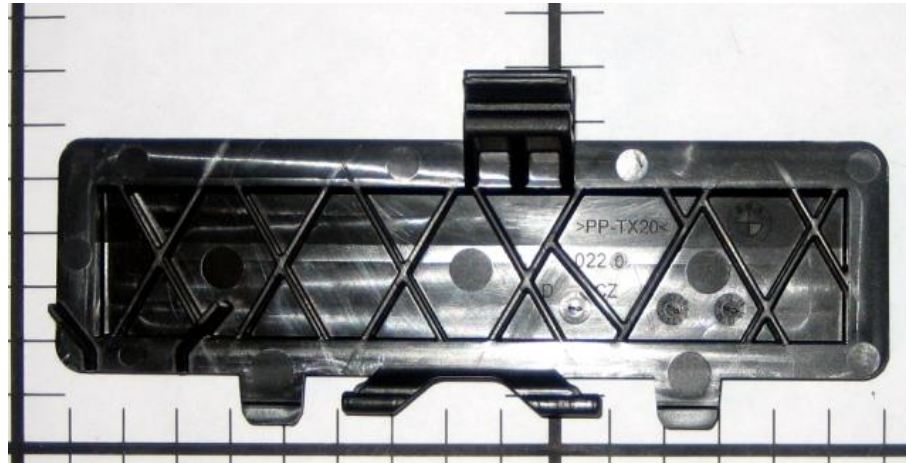
## Assemble Fresh Air Inlet

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	77.00	1	1.00	24.59	CZE	\$0.53	98.75%	\$0.19

## Assemble Fresh Air Inlet

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
M4x15-Torx Screw	6	Commodity Item	Purchased	0.0014	-	\$0.02	\$0.00

# Microfilter Service Door, HVAC Unit Asm



\...

\HVAC Unit Asm

\Microfilter Service Door, HVAC Unit Asm

\MicroFilter Service Door Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	3.75
Total Weight (kg)	0.02

Material Cost**	\$0.06
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.02
Q Burden	\$0.00
SG&A	\$0.01
Manufacturing Cost*	\$0.09

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Microfilter Service Door, HVAC Unit Asm



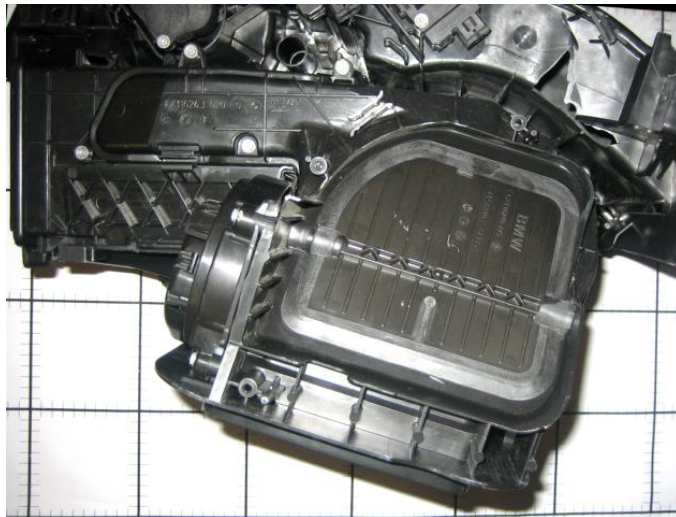
## MicroFilter Service Door Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
150 Ton Injection Molding Press	15.00	4	0.25	18.58	CZE	\$0.02	99.99%	\$0.00

## MicroFilter Service Door Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Microfilter Service Door	1	PPTD20	\$2.54	0.0200	0.0220	\$0.00	\$0.06

## No Commodity Items Required for This Process



\...  
\HVAC  
\HVAC Unit Asm  
\Assemble Microfilter Service Door

### Process Summary

Right First Time	99.96 %
Process Time (Sec)	13.00
Total Weight (kg)	0.00
Material Cost**	\$0.00
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.09
Q Burden	\$0.01
SG&A	\$0.01
Manufacturing Cost*	\$0.11

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Microfilter Service Door



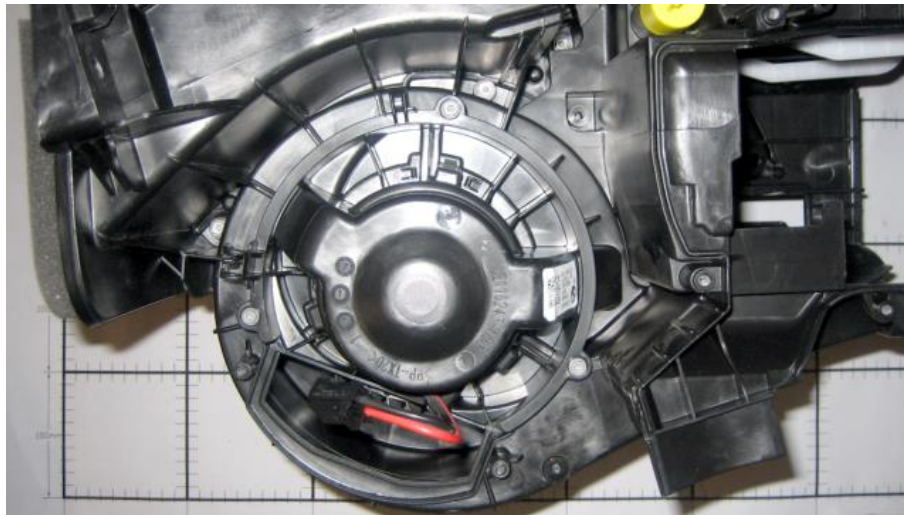
## Assemble Microfilter Service Door

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	13.00	1	1.00	24.59	CZE	\$0.09	99.96%	\$0.01

## Assemble Microfilter Service Door

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Blower Asm, HVAC Unit Asm



\...  
 \HVAC  
 \HVAC Unit Asm  
 \Blower Asm, HVAC Unit Asm

## Assembly Summary

<b>Parts</b>	<b>8</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>6</b>
<b>Steps</b>	<b>30</b>
<b>Fastenings</b>	<b>9</b>
<b>Right First Time</b>	<b>99.60 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>2.27</b>
<b>Total Weight (kg)</b>	<b>1.21</b>

<b>Material Cost**</b>	<b>\$13.23</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.91</b>
<b>Q Burden</b>	<b>\$0.06</b>
<b>SG&amp;A</b>	<b>\$0.57</b>
<b>Manufacturing Cost*</b>	<b>\$14.77</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Blower Asm, HVAC Unit Asm



## Blower Asm, HVAC Unit Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Cover, Blower Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.15	0.1038
Retaining Ring, BlowerAsm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.03	0.0102
Squirrel Cage, BlowerAsm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.11	0.0850
Assemble Blower	1	5	9	24	9	99.63 %	0.00	0.00	1.98	0.00	1.0107

## Blower Asm, HVAC Unit Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Cover, Blower Asm	\$0.00	\$0.28	\$0.00	\$0.00	\$0.00	\$0.05	\$0.00	\$0.04	\$0.37
Retaining Ring, BlowerAsm	\$0.00	\$0.03	\$0.00	\$0.00	\$0.00	\$0.01	\$0.00	\$0.00	\$0.04
Squirrel Cage, BlowerAsm	\$0.00	\$0.25	\$0.00	\$0.00	\$0.00	\$0.04	\$0.00	\$0.04	\$0.33
Assemble Blower	\$12.67	\$0.00	\$0.00	\$0.00	\$0.81	\$0.00	\$0.06	\$0.49	\$14.02

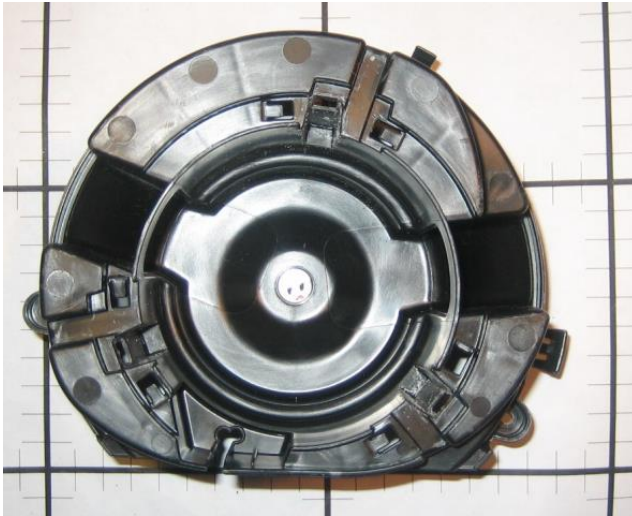
## Detailed Summary

<b>Parts</b>	<b>8</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>6</b>
<b>Steps</b>	<b>30</b>
<b>Fastenings</b>	<b>9</b>
<b>Right First Time</b>	<b>99.6%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>1.98</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.29</b>
<b>Total Weight (kg)</b>	<b>1.21</b>
<b>Purchased Part Cost</b>	
	<b>\$12.67</b>
<b>Material Cost</b>	<b>\$0.56</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.81</b>
<b>Supplier Fab. Cost</b>	<b>\$0.09</b>
<b>Q Burden</b>	<b>\$0.06</b>
<b>SG&amp;A</b>	<b>\$0.57</b>
<b>Manufacturing Cost*</b>	<b>\$14.77</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Cover, Blower Asm



\...

\Blower Asm, HVAC Unit Asm

\Cover, Blower Asm

\Cover Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	9.15
Total Weight (kg)	0.10

Material Cost**	\$0.28
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.05
Q Burden	\$0.00
SG&A	\$0.04
Manufacturing Cost*	\$0.37



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Cover, Blower Asm

## Cover Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
150 Ton Injection Molding Press	18.30	2	0.25	18.58	CZE	\$0.05	99.99%	\$0.00

## Cover Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Cover	1	PPTD20	\$2.54	0.1038	0.1120	\$0.00	\$0.28

# Retaining Ring, Blower Asm



\...

- \Blower Asm, HVAC Unit Asm
- \Retaining Ring, Blower Asm
- \Retaining Ring Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	1.66
Total Weight (kg)	0.01

Material Cost**	\$0.03
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.01
Q Burden	\$0.00
SG&A	\$0.00
Manufacturing Cost*	\$0.04

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Retaining Ring, Blower Asm



## Retaining Ring Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
55Ton Injection Molding Press	13.28	8	0.25	14.88	CZE	\$0.01	99.99%	\$0.00

## Retaining Ring Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Retaining Ring	1	PPTD20	\$2.54	0.0102	0.0110	\$0.00	\$0.03

# Squirrel Cage, Blower Asm



\...  
\Blower Asm, HVAC Unit Asm  
\Squirrel Cage, Blower Asm  
\Squirrel Cage Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	6.44
Total Weight (kg)	0.09
Material Cost**	\$0.25
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.04
Q Burden	\$0.00
SG&A	\$0.04
Manufacturing Cost*	\$0.33

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Squirrel Cage, Blower Asm



## Squirrel Cage Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
200 Ton Injection Molding Press	12.88	2	0.25	21.32	CZE	\$0.04	99.99%	\$0.00

## Squirrel Cage Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Squirrel Cage	1	PPGF20	\$2.78	0.0850	0.0910	\$0.00	\$0.25



# Assemble Blower



\...  
 \HVAC Unit Asm  
   \Blower Asm, HVAC Unit Asm  
     \Assemble Blower

## Process Summary

Right First Time	99.63 %
Process Time (Sec)	119.00
Total Weight (kg)	1.01

Material Cost**	\$12.67
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.81
Q Burden	\$0.06
SG&A	\$0.49
Manufacturing Cost*	\$14.02



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Blower

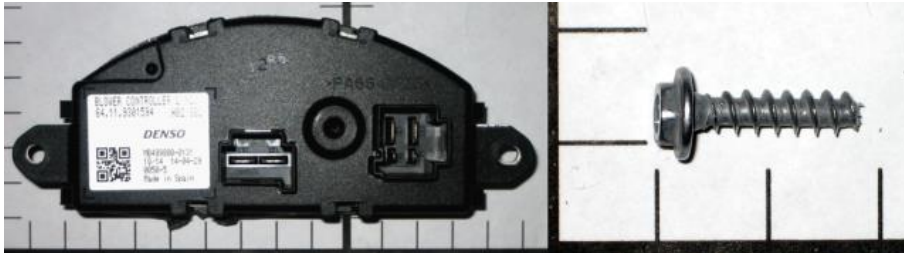
## Assemble Blower

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	119.00	1	1.00	24.59	CZE	\$0.81	99.63%	\$0.06

## Assemble Blower

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Blower Motor	1	Commodity Item	Purchased	1.0100	-	\$12.50	\$0.00
Clip-on Weight	3	Commodity Item	Purchased	0.0002	-	\$0.04	\$0.00
Label, Blower Asm	1	Commodity Item	Purchased	0.0001	-	\$0.05	\$0.00

# Assemble Blower

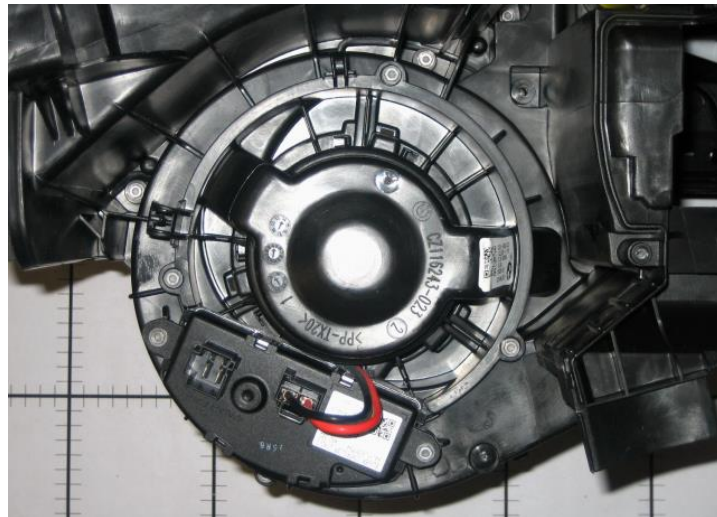


\...  
 \HVAC  
 \HVAC Unit Asm  
 \Assemble Blower

## Process Summary

Right First Time	98.91 %
Process Time (Sec)	76.00
Total Weight (kg)	0.15

Material Cost**	\$14.79
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.52
Q Burden	\$0.16
SG&A	\$1.98
Manufacturing Cost*	\$17.45



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Blower



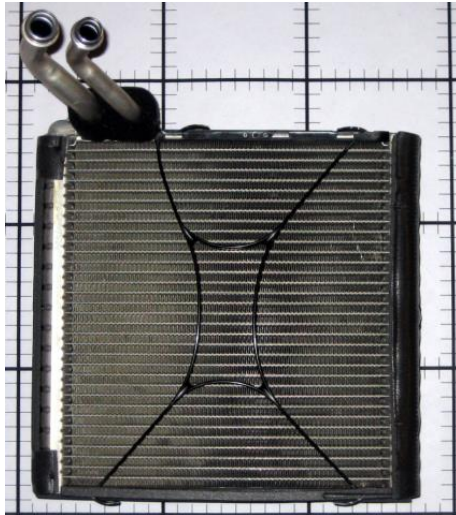
## Assemble Blower

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	76.00	1	1.00	24.59	CZE	\$0.52	98.91 %	\$0.16

## Assemble Blower

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
M4x15-Torx Screw	3	Commodity Item	Purchased	0.0014	-	\$0.02	\$0.00
Blower Controller, HVAC	1	See Appendix	-	0.1400	-	\$0.00	\$14.69
M4x15-Torx Screw	2	Commodity Item	Purchased	0.0014	-	\$0.02	\$0.00

[Click Here for TechInsights Electronics Report on Blower Controller](#)



\...  
 \HVAC  
 \HVAC Unit Asm  
 \Evaporator Asm, HVAC Unit Asm  
**Assembly Summary**

<b>Parts</b>	<b>125</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>22</b>
<b>Steps</b>	<b>710</b>
<b>Fastenings</b>	<b>22</b>
<b>Right First Time</b>	<b>94.64 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>12.86</b>
<b>Total Weight (kg)</b>	<b>0.71</b>

<b>Material Cost**</b>	<b>\$14.09</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$7.15</b>
<b>Q Burden</b>	<b>\$0.83</b>
<b>SG&amp;A</b>	<b>\$2.62</b>
<b>Manufacturing Cost*</b>	<b>\$24.69</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Evaporator Asm, HVAC Unit Asm



**MUNRO**  
& ASSOCIATES, INC.

## Evaporator Asm, HVAC Unit Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
End Cap Sub Asm, Evaporator Asm	1	4	3	40	3	99.63 %	0.00	0.00	0.33	0.55	0.1600
Tube End Cap Asm, Evaporator Asm	1	3	2	30	2	99.74 %	0.00	0.00	0.23	0.45	0.1530
Tube Interface Asm, Evaporator Asm	1	5	2	69	2	99.42 %	0.00	0.00	0.33	1.06	0.0960
Top Plate, Evaporator Asm	1	1	0	7	0	99.97 %	0.00	0.00	0.00	0.18	0.0370
Bottom Plate, Evaporator Asm	1	1	0	7	0	99.97 %	0.00	0.00	0.00	0.18	0.0370
Microtubes, Evaporator Asm	66	1	0	3	0	99.97 %	0.00	0.00	0.00	0.02	0.0004
Cooling Fins, Evaporator Asm	34	1	0	3	0	99.97 %	0.00	0.00	0.00	0.10	0.0048
Assemble Evaporator	1	0	2	123	2	99.53 %	0.00	0.00	2.37	0.20	0.0000
Plastic Guard, Evaporator Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.09	0.0181
Assemble Evaporator NVHFoam	1	10	13	27	13	99.49 %	0.00	0.00	2.36	0.00	0.0161

## Evaporator Asm, HVAC Unit Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
End Cap Sub Asm, Evaporator Asm	\$0.00	\$0.66	\$0.00	\$0.00	\$0.12	\$0.12	\$0.06	\$0.12	\$1.08
Tube End Cap Asm, Evaporator Asm	\$0.00	\$0.63	\$0.00	\$0.00	\$0.09	\$0.10	\$0.04	\$0.11	\$0.96
Tube Interface Asm, Evaporator Asm	\$0.00	\$0.48	\$0.00	\$0.00	\$0.11	\$0.35	\$0.09	\$0.12	\$1.15
Top Plate, Evaporator Asm	\$0.00	\$0.15	\$0.00	\$0.00	\$0.00	\$0.04	\$0.00	\$0.02	\$0.22
Bottom Plate, Evaporator Asm	\$0.00	\$0.15	\$0.00	\$0.00	\$0.00	\$0.04	\$0.00	\$0.02	\$0.22
Microtubes, Evaporator Asm	\$0.00	\$0.14	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.02	\$0.17
Cooling Fins, Evaporator Asm	\$0.00	\$0.04	\$0.00	\$0.00	\$0.00	\$0.03	\$0.00	\$0.01	\$0.08
Assemble Evaporator	\$0.00	\$0.00	\$0.00	\$0.00	\$3.79	\$0.07	\$0.07	\$0.50	\$4.43
Plastic Guard, Evaporator Asm	\$0.00	\$0.05	\$0.00	\$0.00	\$0.00	\$0.02	\$0.00	\$0.01	\$0.08
Assemble Evaporator NVHFoam	\$1.37	\$0.00	\$0.00	\$0.00	\$0.97	\$0.00	\$0.08	\$0.17	\$2.58

## Detailed Summary

<b>Parts</b>	<b>125</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>22</b>
<b>Steps</b>	<b>710</b>
<b>Fastenings</b>	<b>22</b>
<b>Right First Time</b>	<b>94.64%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>5.64</b>
<b>Supplier Fab. Time (Min)</b>	<b>7.22</b>
<b>Total Weight (kg)</b>	<b>0.71</b>
<b>Purchased Part Cost</b>	
	<b>\$1.37</b>
<b>Material Cost</b>	
	<b>\$12.72</b>
<b>OEM Asm. Cost</b>	
	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	
	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	
	<b>\$5.08</b>
<b>Supplier Fab. Cost</b>	
	<b>\$2.07</b>
<b>Q Burden</b>	
	<b>\$0.83</b>
<b>SG&amp;A</b>	
	<b>\$2.62</b>
<b>Manufacturing Cost*</b>	
	<b>\$24.69</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# End Cap Sub Asm, Evaporator Asm



\...  
 \HVAC Unit Asm  
   \Evaporator Asm, HVAC Unit Asm  
     \End Cap Sub Asm, Evaporator Asm  
**Assembly Summary**

<b>Parts</b>	<b>4</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>40</b>
<b>Fastenings</b>	<b>3</b>
<b>Right First Time</b>	<b>99.63 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>0.88</b>
<b>Total Weight (kg)</b>	<b>0.16</b>

<b>Material Cost**</b>	<b>\$0.66</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.24</b>
<b>Q Burden</b>	<b>\$0.06</b>
<b>SG&amp;A</b>	<b>\$0.12</b>
<b>Manufacturing Cost*</b>	<b>\$1.08</b>

\* Excluding tooling, ER&D, logistics, and profit margin  
 \*\* Includes material cost and purchased parts cost



# End Cap Sub Asm, Evaporator Asm



## End Cap Sub Asm, Evaporator Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
End Cap, End Cap Sub Asm	1	1	0	7	0	99.97 %	0.00	0.00	0.00	0.18	0.0800
End Plate, End Cap Sub Asm	1	1	0	7	0	99.97 %	0.00	0.00	0.00	0.18	0.0660
End Cap Cover, End Cap Sub Asm	2	1	0	7	0	99.97 %	0.00	0.00	0.00	0.09	0.0070
Assemble End Cap Cover	1	0	3	8	3	99.75 %	0.00	0.00	0.33	0.00	0.0000

## End Cap Sub Asm, Evaporator Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
End Cap, End Cap Sub Asm	\$0.00	\$0.33	\$0.00	\$0.00	\$0.00	\$0.04	\$0.00	\$0.05	\$0.43
End Plate, End Cap Sub Asm	\$0.00	\$0.27	\$0.00	\$0.00	\$0.00	\$0.04	\$0.00	\$0.04	\$0.36
End Cap Cover, End Cap Sub Asm	\$0.00	\$0.03	\$0.00	\$0.00	\$0.00	\$0.02	\$0.00	\$0.01	\$0.06
Assemble End Cap Cover	\$0.00	\$0.00	\$0.00	\$0.00	\$0.12	\$0.00	\$0.04	\$0.02	\$0.18

## Detailed Summary

<b>Parts</b>	<b>4</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>40</b>
<b>Fastenings</b>	<b>3</b>
<b>Right First Time</b>	<b>99.63%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.33</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.55</b>
<b>Total Weight (kg)</b>	<b>0.16</b>
<b>Purchased Part Cost</b>	
	<b>\$0.00</b>
<b>Material Cost</b>	<b>\$0.66</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.12</b>
<b>Supplier Fab. Cost</b>	<b>\$0.12</b>
<b>Q Burden</b>	<b>\$0.06</b>
<b>SG&amp;A</b>	<b>\$0.12</b>
<b>Manufacturing Cost*</b>	<b>\$1.08</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# End Cap, End Cap Sub Asm



\...

- \End Cap Sub Asm, Evaporator Asm
- \End Cap, End Cap Sub Asm
- \End Cap Process

## Process Summary

<b>Right First Time</b>	<b>99.97 %</b>
<b>Process Time (Sec)</b>	<b>10.82</b>
<b>Total Weight (kg)</b>	<b>0.08</b>

<b>Material Cost**</b>	<b>\$0.33</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.04</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.05</b>
<b>Manufacturing Cost*</b>	<b>\$0.43</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# End Cap, End Cap Sub Asm



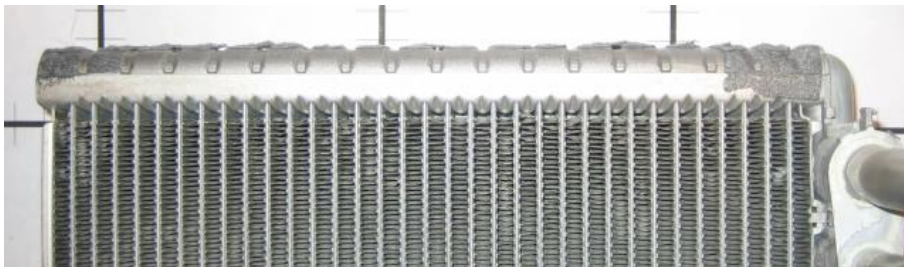
## End Cap Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.94	CZE	\$0.02	99.99%	\$0.00
Deburr	4.00	1	0.25	4.79	CZE	\$0.01	99.99%	\$0.00
300 Ton Stamping Press	1.82	1	0.25	40.86	CZE	\$0.02	99.99%	\$0.00

## End Cap Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, End Cap	1	Aluminum 3003-O - Coil Stock	\$4.08	0.0800	0.0800	\$0.00	\$0.33

# End Plate, End Cap Sub Asm



\...

- \End Cap Sub Asm, Evaporator Asm
- \End Plate, End Cap Sub Asm
- \End Plate Process

## Process Summary

Right First Time	99.97 %
Process Time (Sec)	10.82
Total Weight (kg)	0.07

Material Cost**	\$0.27
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.04
Q Burden	\$0.00
SG&A	\$0.04
Manufacturing Cost*	\$0.36

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# End Plate, End Cap Sub Asm



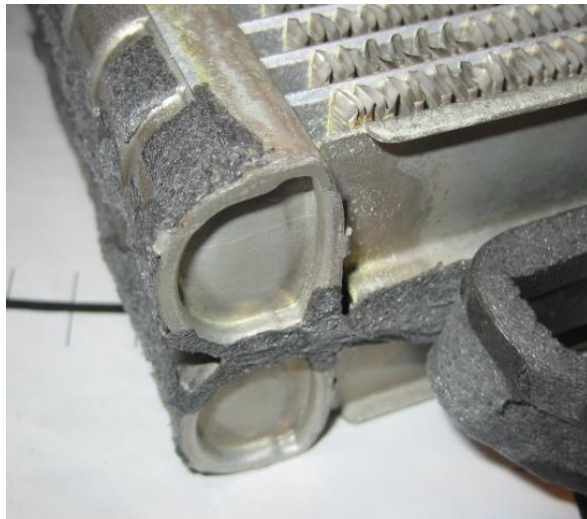
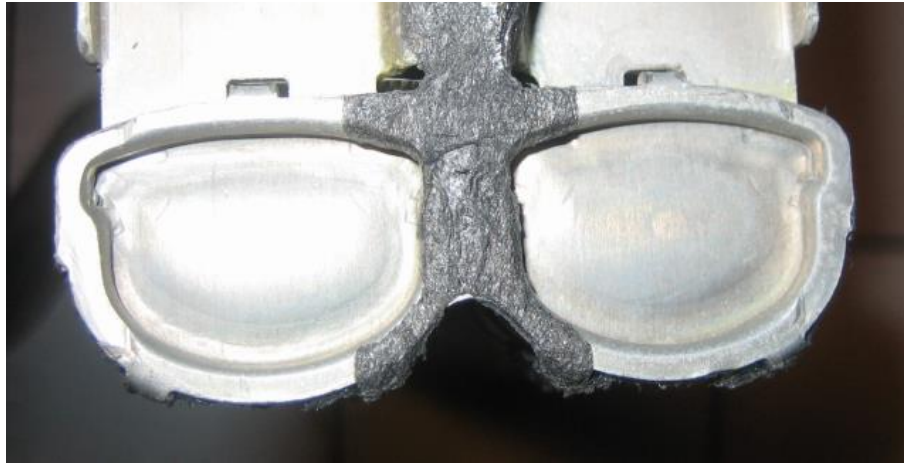
## End Plate Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.94	CZE	\$0.02	99.99%	\$0.00
Deburr	4.00	1	0.25	4.79	CZE	\$0.01	99.99%	\$0.00
300 Ton Stamping Press	1.82	1	0.25	40.86	CZE	\$0.02	99.99%	\$0.00

## End Plate Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, End Plate	1	Aluminum 3003-O - Coil Stock	\$4.08	0.0660	0.0660	\$0.00	\$0.27

# End Cap Cover, End Cap Sub Asm



\...

- \End Cap Sub Asm, Evaporator Asm
- \End Cap Cover, End Cap Sub Asm
- \End Cap Cover Process

## Process Summary

Right First Time	99.97 %
Process Time (Sec)	5.60
Total Weight (kg)	0.01
Material Cost**	\$0.03
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.02
Q Burden	\$0.00
SG&A	\$0.01
Manufacturing Cost*	\$0.06

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# End Cap Cover, End Cap Sub Asm



## End Cap Cover Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	3.50	1	0.25	11.94	CZE	\$0.01	99.99%	\$0.00
Deburr	1.50	1	0.25	4.79	CZE	\$0.00	99.99%	\$0.00
25 Ton Stamping Press	0.60	1	0.25	13.85	CZE	\$0.00	99.99%	\$0.00

## End Cap Cover Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, End Cap Cover	1	Aluminum 3003-O - Coil Stock	\$4.08	0.0070	0.0070	\$0.00	\$0.03



No Commodity Items  
Required for This  
Process



\...

- \Evaporator Asm, HVAC Unit Asm
- \End Cap Sub Asm, Evaporator Asm
- \Assemble End Cap Cover

## Process Summary

<b>Right First Time</b>	<b>99.75 %</b>
<b>Process Time (Sec)</b>	<b>20.00</b>
<b>Total Weight (kg)</b>	<b>0.00</b>
<b>Material Cost**</b>	<b>\$0.00</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.12</b>
<b>Q Burden</b>	<b>\$0.04</b>
<b>SG&amp;A</b>	<b>\$0.02</b>
<b>Manufacturing Cost*</b>	<b>\$0.18</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble End Cap Cover



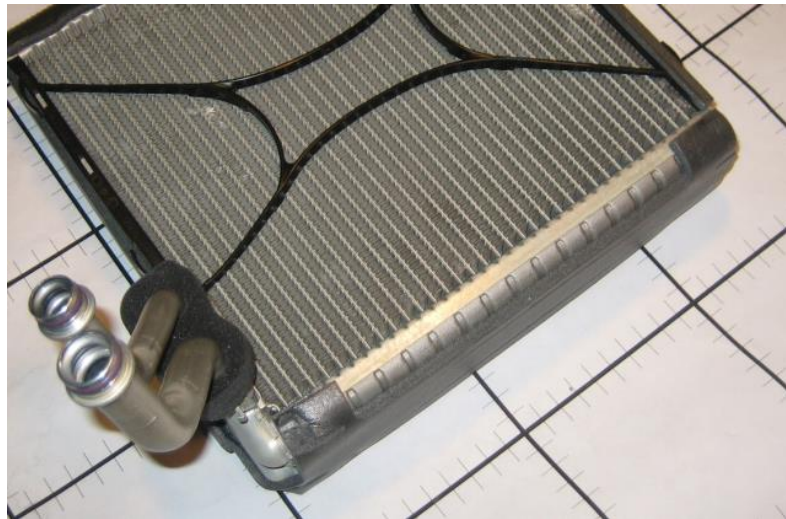
## Assemble End Cap Cover

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Automated Asm	20.00	1	0.25	22.49	CZE	\$0.12	99.75%	\$0.04

## Assemble End Cap Cover

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Tube End Cap Asm, Evaporator Asm



\...  
 \HVAC Unit Asm  
   \Evaporator Asm, HVAC Unit Asm  
     \Tube End Cap Asm, Evaporator Asm

## Assembly Summary

<b>Parts</b>	<b>3</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>30</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.74 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>0.69</b>
<b>Total Weight (kg)</b>	<b>0.15</b>

<b>Material Cost**</b>	<b>\$0.63</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.19</b>
<b>Q Burden</b>	<b>\$0.04</b>
<b>SG&amp;A</b>	<b>\$0.11</b>
<b>Manufacturing Cost*</b>	<b>\$0.96</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Tube End Cap Asm, Evaporator Asm



**MUNRO**  
& ASSOCIATES, INC.

## Tube End Cap Asm, Evaporator Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
End Cap, End Cap Sub Asm	1	1	0	7	0	99.97 %	0.00	0.00	0.00	0.18	0.0800
End Plate, Evaporator Asm	1	1	0	7	0	99.97 %	0.00	0.00	0.00	0.18	0.0660
Endcap Cover, Evaporator Asm	1	1	0	7	0	99.97 %	0.00	0.00	0.00	0.09	0.0070
Assemble Tube Endcap Asm	1	0	2	6	2	99.83 %	0.00	0.00	0.23	0.00	0.0000

## Tube End Cap Asm, Evaporator Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
End Cap, End Cap Sub Asm	\$0.00	\$0.33	\$0.00	\$0.00	\$0.00	\$0.04	\$0.00	\$0.05	\$0.43
End Plate, Evaporator Asm	\$0.00	\$0.27	\$0.00	\$0.00	\$0.00	\$0.04	\$0.00	\$0.04	\$0.36
Endcap Cover, Evaporator Asm	\$0.00	\$0.03	\$0.00	\$0.00	\$0.00	\$0.02	\$0.00	\$0.01	\$0.06
Assemble Tube Endcap Asm	\$0.00	\$0.00	\$0.00	\$0.00	\$0.09	\$0.00	\$0.03	\$0.01	\$0.12

## Detailed Summary

<b>Parts</b>	<b>3</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>30</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.74%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.23</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.45</b>
<b>Total Weight (kg)</b>	<b>0.15</b>
<b>Purchased Part Cost</b>	<b>\$0.00</b>
<b>Material Cost</b>	<b>\$0.63</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.09</b>
<b>Supplier Fab. Cost</b>	<b>\$0.10</b>
<b>Q Burden</b>	<b>\$0.04</b>
<b>SG&amp;A</b>	<b>\$0.11</b>
<b>Manufacturing Cost*</b>	<b>\$0.96</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# End Cap, End Cap Sub Asm



\...

- \Tube End Cap Asm, Evaporator Asm
- \End Cap, End Cap Sub Asm
- \End Cap Process

## Process Summary

Right First Time	99.97 %
Process Time (Sec)	10.82
Total Weight (kg)	0.08

Material Cost**	\$0.33
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.04
Q Burden	\$0.00
SG&A	\$0.05
Manufacturing Cost*	\$0.43

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# End Cap, End Cap Sub Asm

## End Cap Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.94	CZE	\$0.02	99.99%	\$0.00
Deburr	4.00	1	0.25	4.79	CZE	\$0.01	99.99%	\$0.00
300 Ton Stamping Press	1.82	1	0.25	40.86	CZE	\$0.02	99.99%	\$0.00

## End Cap Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, End Cap	1	Aluminum 3003-O - Coil Stock	\$4.08	0.0800	0.0800	\$0.00	\$0.33

# End Plate, Evaporator Asm

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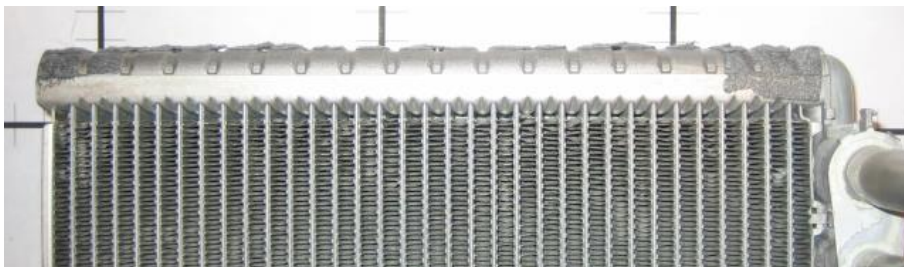
- \Tube End Cap Asm, Evaporator Asm
- \End Plate, Evaporator Asm
- \End Plate Process



## Process Summary

Right First Time	99.97 %
Process Time (Sec)	10.82
Total Weight (kg)	0.07

Material Cost**	\$0.27
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.04
Q Burden	\$0.00
SG&A	\$0.04
Manufacturing Cost*	\$0.36



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# End Plate, Evaporator Asm

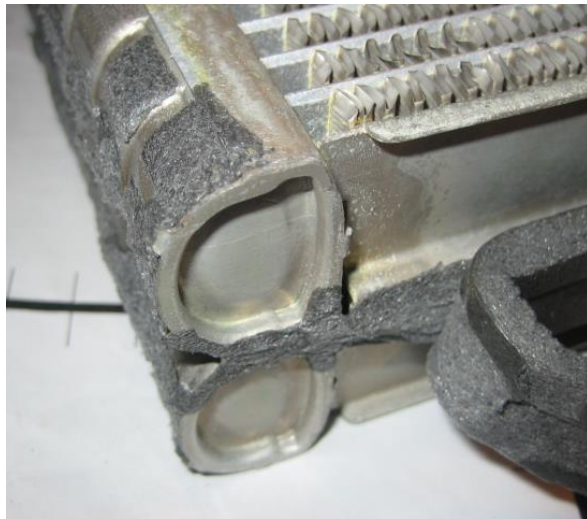
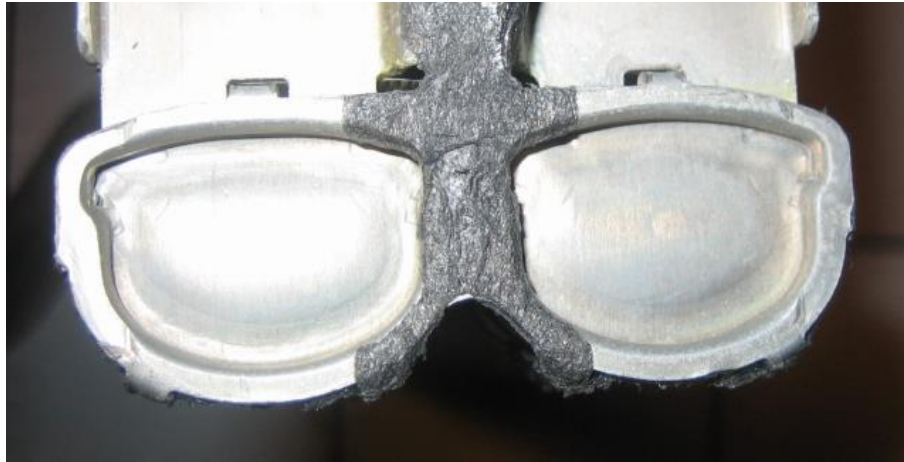
## End Plate Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.94	CZE	\$0.02	99.99%	\$0.00
Deburr	4.00	1	0.25	4.79	CZE	\$0.01	99.99%	\$0.00
300 Ton Stamping Press	1.82	1	0.25	40.86	CZE	\$0.02	99.99%	\$0.00

## End Plate Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, End Plate	1	Aluminum 3003-O - Coil Stock	\$4.08	0.0660	0.0660	\$0.00	\$0.27

# Endcap Cover, Evaporator Asm



\...

- \Tube End Cap Asm, Evaporator Asm
- \Endcap Cover, Evaporator Asm
- \Endcap Cover Process

## Process Summary

Right First Time	99.97 %
Process Time (Sec)	5.60
Total Weight (kg)	0.01
Material Cost**	\$0.03
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.02
Q Burden	\$0.00
SG&A	\$0.01
Manufacturing Cost*	\$0.06

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Endcap Cover, Evaporator Asm



## Endcap Cover Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	3.50	1	0.25	11.94	CZE	\$0.01	99.99%	\$0.00
Deburr	1.50	1	0.25	4.79	CZE	\$0.00	99.99%	\$0.00
25 Ton Stamping Press	0.60	1	0.25	13.85	CZE	\$0.00	99.99%	\$0.00

## Endcap Cover Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Endcap Cover	1	Aluminum 3003-O - Coil Stock	\$4.08	0.0070	0.0070	\$0.00	\$0.03

No Commodity Items  
Required for This  
Process



\...

- \Evaporator Asm, HVAC Unit Asm
- \Tube End Cap Asm, Evaporator Asm
- \Assemble Tube Endcap Asm

## Process Summary

<b>Right First Time</b>	<b>99.83 %</b>
<b>Process Time (Sec)</b>	<b>14.00</b>
<b>Total Weight (kg)</b>	<b>0.00</b>
<b>Material Cost**</b>	<b>\$0.00</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.09</b>
<b>Q Burden</b>	<b>\$0.03</b>
<b>SG&amp;A</b>	<b>\$0.01</b>
<b>Manufacturing Cost*</b>	<b>\$0.12</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Tube Endcap Asm



## Assemble Tube Endcap Asm

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Automated Asm	14.00	1	0.25	22.49	CZE	\$0.09	99.83%	\$0.03

## Assemble Tube Endcap Asm

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Tube Interface Asm, Evaporator Asm



\...

\HVAC Unit Asm

\Evaporator Asm, HVAC Unit Asm

\Tube Interface Asm, Evaporator Asm

## Assembly Summary

<b>Parts</b>	<b>5</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>5</b>
<b>Steps</b>	<b>69</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.42 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>1.40</b>
<b>Total Weight (kg)</b>	<b>0.10</b>

<b>Material Cost**</b>	<b>\$0.48</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.46</b>
<b>Q Burden</b>	<b>\$0.09</b>
<b>SG&amp;A</b>	<b>\$0.12</b>
<b>Manufacturing Cost*</b>	<b>\$1.15</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Tube Interface Asm, Evaporator Asm



**MUNRO**  
& ASSOCIATES, INC.

## Tube Interface Asm, Evaporator Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Tube Interface Btm, Tube Interface Asm	1	1	0	7	0	99.97 %	0.00	0.00	0.00	0.11	0.0150
Tube Interface Top, Tube Interface Asm	1	1	0	7	0	99.97 %	0.00	0.00	0.00	0.11	0.0250
Assemble Tube Interface	1	0	1	4	1	99.91 %	0.00	0.00	0.13	0.00	0.0000
Bridge, Tube Interface Asm	1	1	0	7	0	99.97 %	0.00	0.00	0.00	0.09	0.0050
15mm Tube, Tube Interface Asm	1	1	0	17	0	99.85 %	0.00	0.00	0.00	0.38	0.0287
12mm Tube, Tube Interface Asm	1	1	0	17	0	99.85 %	0.00	0.00	0.00	0.37	0.0223
Assemble Tubes to Interface	1	0	1	5	1	99.91 %	0.00	0.00	0.20	0.00	0.0000

## Tube Interface Asm, Evaporator Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Tube Interface Btm, Tube Interface Asm	\$0.00	\$0.06	\$0.00	\$0.00	\$0.00	\$0.02	\$0.00	\$0.01	\$0.09
Tube Interface Top, Tube Interface Asm	\$0.00	\$0.10	\$0.00	\$0.00	\$0.00	\$0.02	\$0.00	\$0.02	\$0.14
Assemble Tube Interface	\$0.00	\$0.00	\$0.00	\$0.00	\$0.04	\$0.00	\$0.01	\$0.01	\$0.06
Bridge, Tube Interface Asm	\$0.00	\$0.02	\$0.00	\$0.00	\$0.00	\$0.02	\$0.00	\$0.00	\$0.05
15mm Tube, Tube Interface Asm	\$0.00	\$0.17	\$0.00	\$0.00	\$0.00	\$0.15	\$0.02	\$0.04	\$0.38
12mm Tube, Tube Interface Asm	\$0.00	\$0.13	\$0.00	\$0.00	\$0.00	\$0.15	\$0.02	\$0.04	\$0.34
Assemble Tubes to Interface	\$0.00	\$0.00	\$0.00	\$0.00	\$0.07	\$0.00	\$0.01	\$0.01	\$0.10

## Detailed Summary

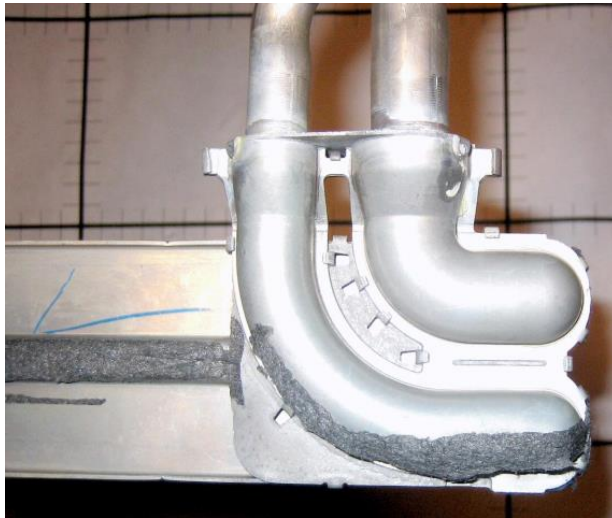
<b>Parts</b>	<b>5</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>5</b>
<b>Steps</b>	<b>69</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.42%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.33</b>
<b>Supplier Fab. Time (Min)</b>	<b>1.06</b>
<b>Total Weight (kg)</b>	<b>0.10</b>
<b>Purchased Part Cost</b>	
	<b>\$0.00</b>
<b>Material Cost</b>	<b>\$0.48</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.11</b>
<b>Supplier Fab. Cost</b>	<b>\$0.35</b>
<b>Q Burden</b>	<b>\$0.09</b>
<b>SG&amp;A</b>	<b>\$0.12</b>
<b>Manufacturing Cost*</b>	<b>\$1.15</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Tube Interface Btm, Tube Interface Asm



\...

- \Tube Interface Asm, Evaporator Asm
- \Tube Interface Btm, Tube Interface Asm
- \Tube Interface Btm Process

## Process Summary

Right First Time	99.97 %
Process Time (Sec)	6.60
Total Weight (kg)	0.02

Material Cost**	\$0.06
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.02
Q Burden	\$0.00
SG&A	\$0.01
Manufacturing Cost*	\$0.09

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Tube Interface Btm, Tube Interface Asm



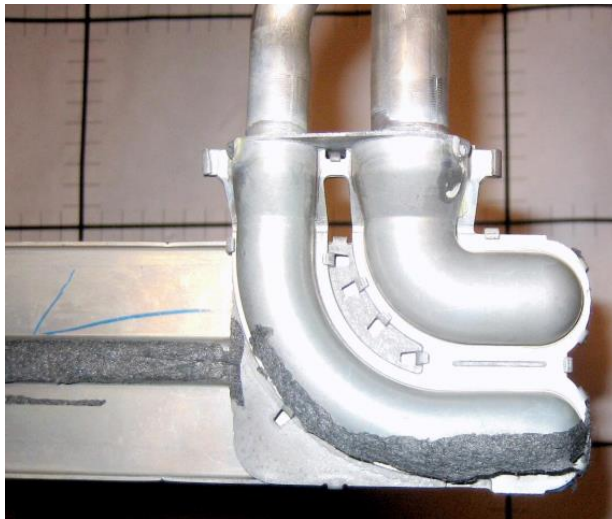
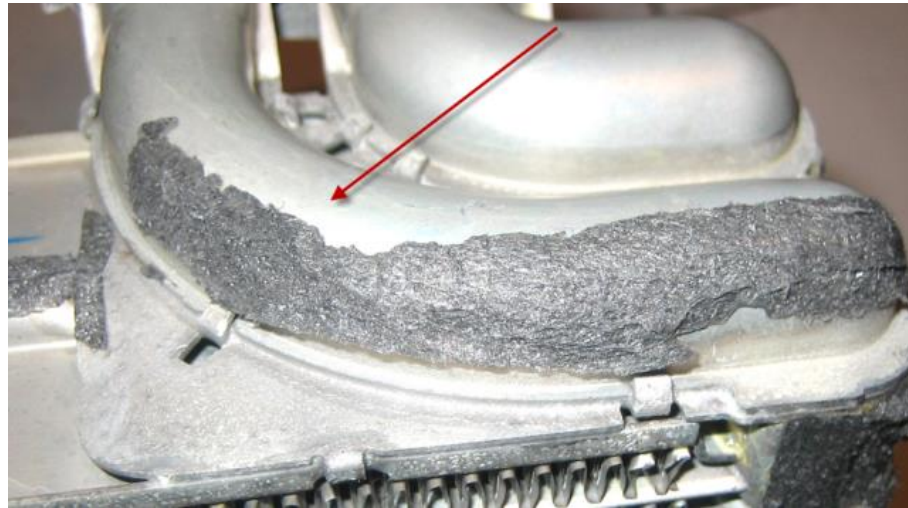
## Tube Interface Btm Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	3.50	1	0.25	11.94	CZE	\$0.01	99.99%	\$0.00
Deburr	2.50	1	0.25	4.79	CZE	\$0.00	99.99%	\$0.00
25 Ton Stamping Press	0.60	1	0.25	13.85	CZE	\$0.00	99.99%	\$0.00

## Tube Interface Btm Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Tube Interface Btm	1	Aluminum 3003-O - Coil Stock	\$4.08	0.0150	0.0150	\$0.00	\$0.06

# Tube Interface Top, Tube Interface Asm



\...

- \Tube Interface Asm, Evaporator Asm
- \Tube Interface Top, Tube Interface Asm
- \Tube Interface Top Process

## Process Summary

Right First Time	99.97 %
Process Time (Sec)	6.60
Total Weight (kg)	0.03
Material Cost**	\$0.10
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.02
Q Burden	\$0.00
SG&A	\$0.02
Manufacturing Cost*	\$0.14

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Tube Interface Top, Tube Interface Asm



## Tube Interface Top Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	3.50	1	0.25	11.94	CZE	\$0.01	99.99%	\$0.00
Deburr	2.50	1	0.25	4.79	CZE	\$0.00	99.99%	\$0.00
25 Ton Stamping Press	0.60	1	0.25	13.85	CZE	\$0.00	99.99%	\$0.00

## Tube Interface Top Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Tube Interface Top	1	Aluminum 3003-O - Coil Stock	\$4.08	0.0250	0.0250	\$0.00	\$0.10

## No Commodity Items Required for This Process



\...

- \Evaporator Asm, HVAC Unit Asm
- \Tube Interface Asm, Evaporator Asm
- \Assemble Tube Interface

### Process Summary

<b>Right First Time</b>	<b>99.91 %</b>
<b>Process Time (Sec)</b>	<b>8.00</b>
<b>Total Weight (kg)</b>	<b>0.00</b>
<b>Material Cost**</b>	<b>\$0.00</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.04</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.01</b>
<b>Manufacturing Cost*</b>	<b>\$0.06</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Tube Interface



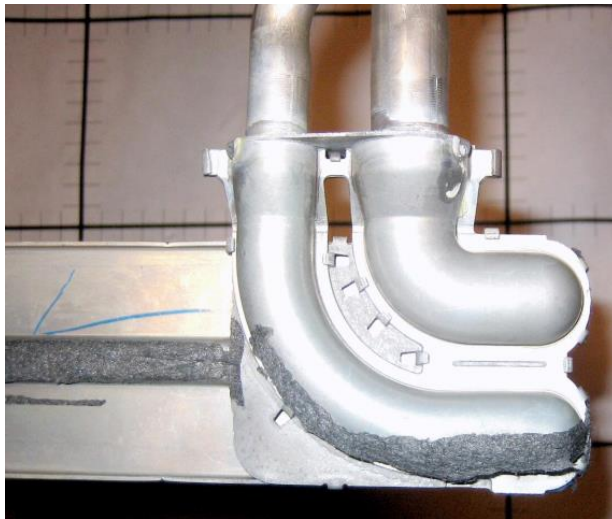
## Assemble Tube Interface

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Automated Asm	8.00	1	0.25	17.86	CZE	\$0.04	99.91 %	\$0.01

## Assemble Tube Interface

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Bridge, Tube Interface Asm



\...

- \Tube Interface Asm, Evaporator Asm
- \Bridge, Tube Interface Asm
- \Bridge Process

## Process Summary

Right First Time	99.97 %
Process Time (Sec)	5.60
Total Weight (kg)	0.01

Material Cost**	\$0.02
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.02
Q Burden	\$0.00
SG&A	\$0.00
Manufacturing Cost*	\$0.05

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Bridge, Tube Interface Asm



## Bridge Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	3.50	1	0.25	11.94	CZE	\$0.01	99.99%	\$0.00
Deburr	1.50	1	0.25	4.79	CZE	\$0.00	99.99%	\$0.00
25 Ton Stamping Press	0.60	1	0.25	13.85	CZE	\$0.00	99.99%	\$0.00

## Bridge Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Bridge	1	Aluminum 3003-O - Coil Stock	\$4.08	0.0050	0.0050	\$0.00	\$0.02



# 15mm Tube, Tube Interface Asm



**MUNRO**  
& ASSOCIATES, INC.



\...

\Tube Interface Asm, Evaporator Asm

\15mm Tube, Tube Interface Asm

\15mm Tube Process

## Process Summary

<b>Right First Time</b>	<b>99.85 %</b>
<b>Process Time (Sec)</b>	<b>22.60</b>
<b>Total Weight (kg)</b>	<b>0.03</b>

<b>Material Cost**</b>	<b>\$0.17</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.15</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.04</b>
<b>Manufacturing Cost*</b>	<b>\$0.38</b>



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# 15mm Tube, Tube Interface Asm



15mm Tube Process									
Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden	
Wash	5.00	1	0.25	21.76	CZE	\$0.03	99.99%	\$0.00	
Deburr	4.00	1	0.25	22.72	CZE	\$0.03	99.99%	\$0.00	
Tube Bending	12.00	1	0.25	26.08	CZE	\$0.09	99.90%	\$0.02	
Saw Cut	1.60	1	0.25	16.76	CZE	\$0.01	99.97%	\$0.00	

15mm Tube Process								
Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost	
Material, 15mm Tube	1	Aluminum 3003 - Seamless Tube	\$6.00	0.0287	0.0287	\$0.00	\$0.17	

# 12mm Tube, Tube Interface Asm



\...

\Tube Interface Asm, Evaporator Asm

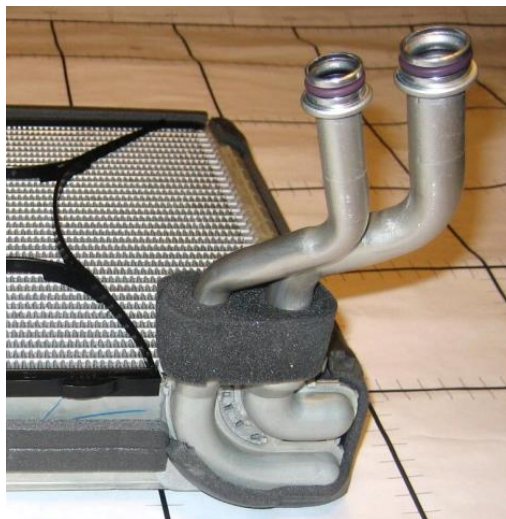
\12mm Tube, Tube Interface Asm

\12mm Tube Process

## Process Summary

Right First Time	99.85 %
Process Time (Sec)	22.48
Total Weight (kg)	0.02

Material Cost**	\$0.13
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.15
Q Burden	\$0.02
SG&A	\$0.04
Manufacturing Cost*	\$0.34



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# 12mm Tube, Tube Interface Asm



12mm Tube Process									
Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden	
Wash	5.00	1	0.25	21.76	CZE	\$0.03	99.99%	\$0.00	
Deburr	4.00	1	0.25	22.72	CZE	\$0.03	99.99%	\$0.00	
Tube Bending	12.00	1	0.25	26.08	CZE	\$0.09	99.90%	\$0.02	
Saw Cut	1.48	1	0.25	16.76	CZE	\$0.01	99.97%	\$0.00	

12mm Tube Process								
Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost	
Material, 12mm Tube	1	Aluminum 3003 - Seamless Tube	\$6.00	0.0223	0.0223	\$0.00	\$0.13	

## No Commodity Items Required for This Process



\...

- \Evaporator Asm, HVAC Unit Asm
- \Tube Interface Asm, Evaporator Asm
- \Assemble Tubes to Interface

### Process Summary

<b>Right First Time</b>	<b>99.91 %</b>
<b>Process Time (Sec)</b>	<b>12.00</b>
<b>Total Weight (kg)</b>	<b>0.00</b>

<b>Material Cost**</b>	<b>\$0.00</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.07</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.01</b>
<b>Manufacturing Cost*</b>	<b>\$0.10</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Tubes to Interface



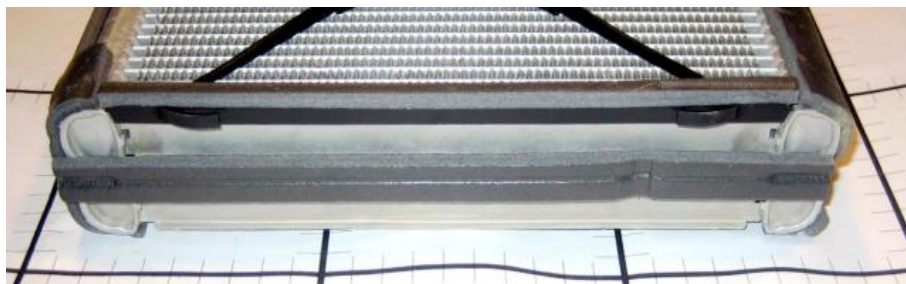
## Assemble Tubes to Interface

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Automated Asm	12.00	1	0.25	22.49	CZE	\$0.07	99.91 %	\$0.01

## Assemble Tubes to Interface

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Top Plate, Evaporator Asm



- \...
- \Evaporator Asm, HVAC Unit Asm
- \Top Plate, Evaporator Asm
- \Top Plate Process

## Process Summary

<b>Right First Time</b>	<b>99.97 %</b>
<b>Process Time (Sec)</b>	<b>10.71</b>
<b>Total Weight (kg)</b>	<b>0.04</b>
<b>Material Cost**</b>	<b>\$0.15</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.04</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.02</b>
<b>Manufacturing Cost*</b>	<b>\$0.22</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Top Plate, Evaporator Asm



## Top Plate Process

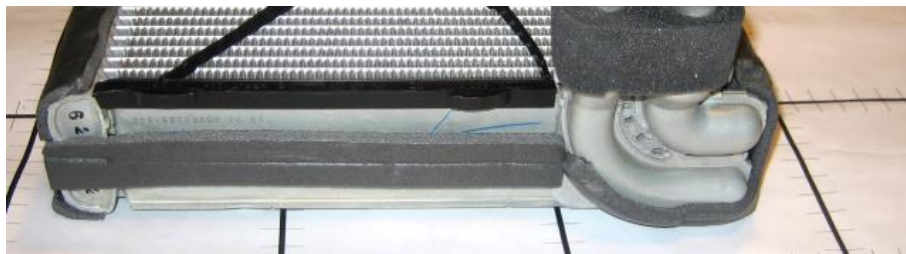
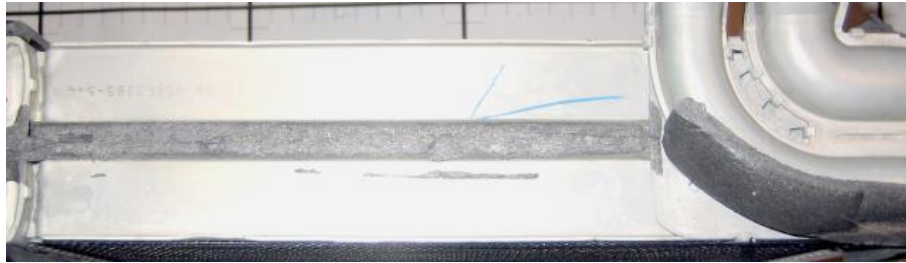
Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.94	CZE	\$0.02	99.99%	\$0.00
Deburr	4.00	1	0.25	4.79	CZE	\$0.01	99.99%	\$0.00
200 Ton Stamping Press	1.71	1	0.25	31.00	CZE	\$0.01	99.99%	\$0.00

## Top Plate Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Top Plate	1	Aluminum 3003-O - Coil Stock	\$4.08	0.0370	0.0370	\$0.00	\$0.15



# Bottom Plate, Evaporator Asm



\...  
\Evaporator Asm, HVAC Unit Asm  
\Bottom Plate, Evaporator Asm  
\Bottom Plate Process

## Process Summary

Right First Time	99.97 %
Process Time (Sec)	10.71
Total Weight (kg)	0.04

Material Cost**	\$0.15
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.04
Q Burden	\$0.00
SG&A	\$0.02
Manufacturing Cost*	\$0.22

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Bottom Plate, Evaporator Asm



## Bottom Plate Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.94	CZE	\$0.02	99.99%	\$0.00
Deburr	4.00	1	0.25	4.79	CZE	\$0.01	99.99%	\$0.00
200 Ton Stamping Press	1.71	1	0.25	31.00	CZE	\$0.01	99.99%	\$0.00

## Bottom Plate Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Bottom Plate	1	Aluminum 3003-O - Coil Stock	\$4.08	0.0370	0.0370	\$0.00	\$0.15



\...  
 \Evaporator Asm, HVAC Unit Asm  
 \Microtubes, Evaporator Asm  
 \Microtubes Process

## Process Summary

<b>Right First Time</b>	<b>99.97 %</b>
<b>Process Time (Sec)</b>	<b>1.07</b>
<b>Total Weight (kg)</b>	<b>0.00</b>
<b>Material Cost**</b>	<b>\$0.14</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.00</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.02</b>
<b>Manufacturing Cost*</b>	<b>\$0.17</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Microtubes, Evaporator Asm



## Microtubes Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Saw Cut	1.07	1	0.25	16.76	CZE	\$0.00	99.97%	\$0.00

## Microtubes Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Microtubes	1	Aluminum 3003 -MPE Tube	\$5.00	0.0004	0.0278	\$0.00	\$0.14

- \...
- \Evaporator Asm, HVAC Unit Asm
- \Cooling Fins, Evaporator Asm
- \Cooling Fins Process



## Process Summary

<b>Right First Time</b>	<b>99.97 %</b>
<b>Process Time (Sec)</b>	<b>5.88</b>
<b>Total Weight (kg)</b>	<b>0.00</b>

<b>Material Cost**</b>	<b>\$0.04</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.03</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.01</b>
<b>Manufacturing Cost*</b>	<b>\$0.08</b>



\* Excluding tooling, ER&D, logistics, and profit margin  
 \*\* Includes material cost and purchased parts cost

# Cooling Fins, Evaporator Asm



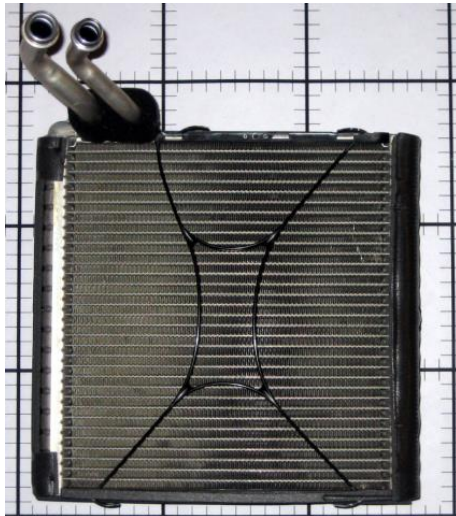
## Cooling Fins Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Roll Form Fins	5.88	1	0.25	18.06	CZE	\$0.03	99.97%	\$0.00

## Cooling Fins Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Cooling Fins	1	Aluminum 3003 - Fin Stock	\$8.00	0.0048	0.0048	\$0.00	\$0.04

## No Commodity Items Required for This Process



\...

\HVAC Unit Asm

\Evaporator Asm, HVAC Unit Asm

\Assemble Evaporator

### Process Summary

<b>Right First Time</b>	<b>99.53 %</b>
<b>Process Time (Sec)</b>	<b>154.44</b>
<b>Total Weight (kg)</b>	<b>0.00</b>

<b>Material Cost**</b>	<b>\$0.00</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$3.86</b>
<b>Q Burden</b>	<b>\$0.07</b>
<b>SG&amp;A</b>	<b>\$0.50</b>
<b>Manufacturing Cost*</b>	<b>\$4.43</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Evaporator

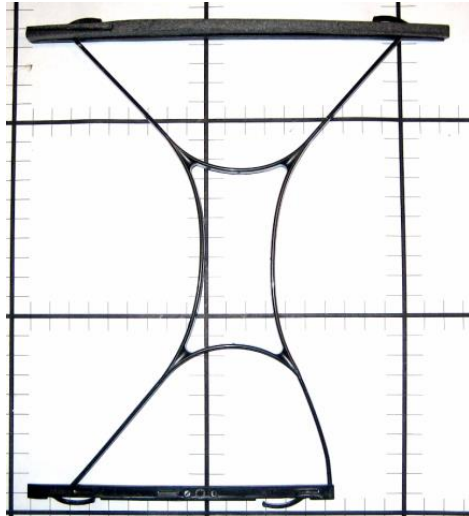


Assemble Evaporator									
Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden	
Wash	12.00	1	0.25	21.76	CZE	\$0.07	99.99 %	\$0.00	
Braze, Oven	7.11	1	0.25	202.87	CZE	\$0.40	99.98 %	\$0.00	
Intercooler Oven Dry Station	7.11	1	0.25	89.80	CZE	\$0.18	99.98 %	\$0.00	
Flux Application	7.11	1	0.25	35.38	CZE	\$0.07	99.98 %	\$0.00	
Degrease	7.11	1	0.25	69.86	CZE	\$0.14	99.98 %	\$0.00	
Supplier Intercooler Asm	114.00	1	0.25	94.78	CZE	\$3.00	99.65 %	\$0.05	

Assemble Evaporator							
Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost



# Plastic Guard, Evaporator Asm



- \...
- \Evaporator Asm, HVAC Unit Asm
- \Plastic Guard, Evaporator Asm
- \Plastic Guard Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	5.22
Total Weight (kg)	0.02

Material Cost**	\$0.05
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.02
Q Burden	\$0.00
SG&A	\$0.01
Manufacturing Cost*	\$0.08

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Plastic Guard, Evaporator Asm



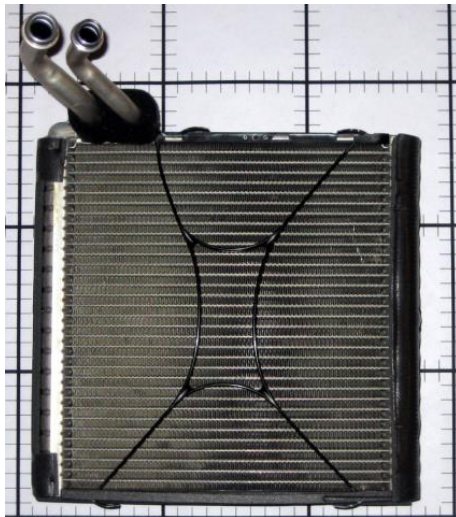
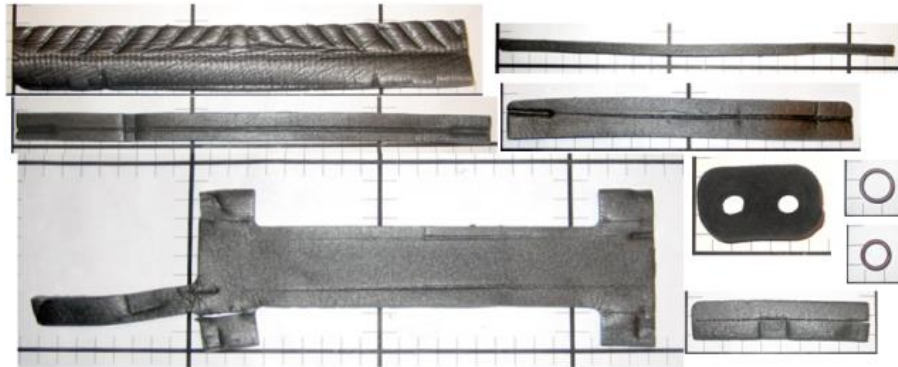
## Plastic Guard Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
55Ton Injection Molding Press	20.88	4	0.25	14.88	CZE	\$0.02	99.99%	\$0.00

## Plastic Guard Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Plastic Guard	1	PPTD20	\$2.54	0.0181	0.0190	\$0.00	\$0.05

# Assemble Evaporator NVH Foam



\...

\HVAC Unit Asm

\Evaporator Asm, HVAC Unit Asm

\Assemble Evaporator NVH Foam

## Process Summary

<b>Right First Time</b>	<b>99.49 %</b>
<b>Process Time (Sec)</b>	<b>141.83</b>
<b>Total Weight (kg)</b>	<b>0.02</b>
<b>Material Cost**</b>	<b>\$1.37</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.97</b>
<b>Q Burden</b>	<b>\$0.08</b>
<b>SG&amp;A</b>	<b>\$0.17</b>
<b>Manufacturing Cost*</b>	<b>\$2.58</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Evaporator NVH Foam



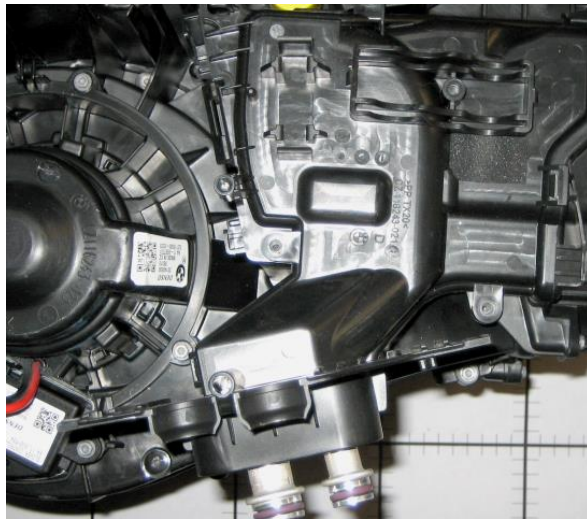
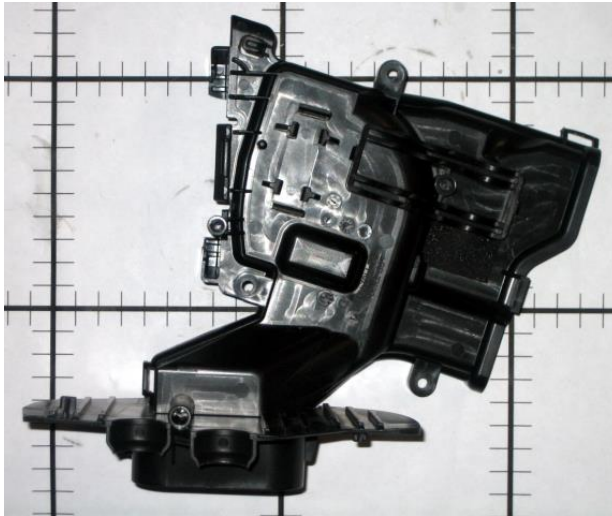
## Assemble Evaporator NVH Foam

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	141.83	1	1.00	24.59	CZE	\$0.97	99.49%	\$0.08

## Assemble Evaporator NVH Foam

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Tube Joint Foam	1	Commodity Item	Purchased	0.0022	-	\$0.01	\$0.00
Guard Foam Strip	1	Commodity Item	Purchased	0.0003	-	\$0.01	\$0.00
Endcap Foam Strip	1	Commodity Item	Purchased	0.0028	-	\$0.04	\$0.00
Endcap Foam Strip	1	Commodity Item	Purchased	0.0017	-	\$0.02	\$0.00
Short Foam Strip	2	Commodity Item	Purchased	0.0004	-	\$0.28	\$0.00
Top Foam Strip	1	Commodity Item	Purchased	0.0009	-	\$0.01	\$0.00
Bottom Foam Strip	1	Commodity Item	Purchased	0.0070	-	\$0.01	\$0.00
14mm O-Ring	1	Commodity Item	Purchased	0.0002	-	\$0.04	\$0.00
11mm O-Ring	1	Commodity Item	Purchased	0.0002	-	\$0.67	\$0.00

# Side Cover, HVAC Unit Asm



\...

\HVAC Unit Asm

\Side Cover, HVAC Unit Asm

\Side Cover Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	12.12
Total Weight (kg)	0.11

Material Cost**	\$0.29
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.07
Q Burden	\$0.00
SG&A	\$0.05
Manufacturing Cost*	\$0.41

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Side Cover, HVAC Unit Asm

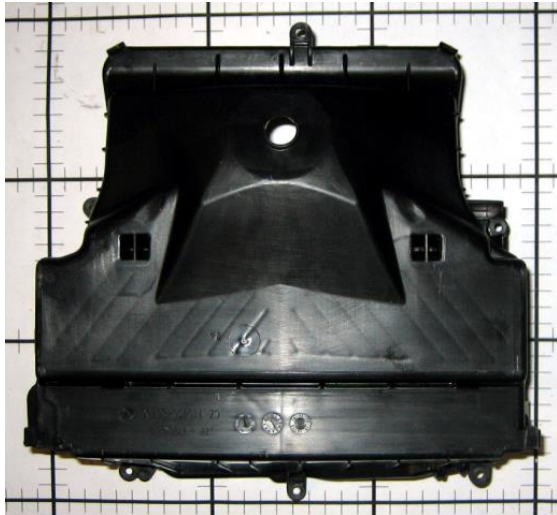
## Side Cover Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
200 Ton Injection Molding Press	24.24	2	0.25	21.32	CZE	\$0.07	99.99%	\$0.00

## Side Cover Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Side Cover	1	PPTD20	\$2.54	0.1050	0.1130	\$0.00	\$0.29

# Bottom Cover, HVAC Unit Asm



\...

\HVAC Unit Asm

\Bottom Cover, HVAC Unit Asm

\Bottom Cover Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	12.69
Total Weight (kg)	0.26

Material Cost**	\$0.69
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.15
Q Burden	\$0.00
SG&A	\$0.11
Manufacturing Cost*	\$0.95



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Bottom Cover, HVAC Unit Asm



## Bottom Cover Process

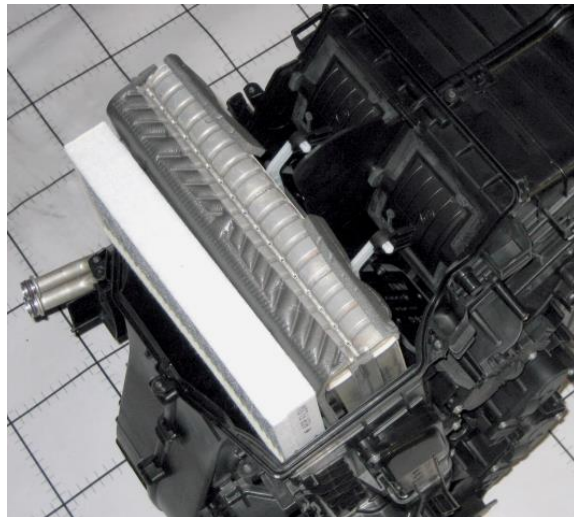
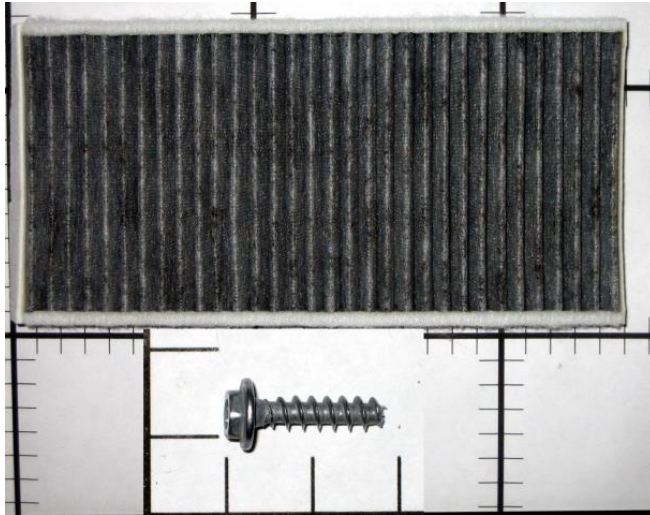
Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
500 Ton Injection Molding Press	25.38	2	0.25	43.20	CZE	\$0.15	99.99%	\$0.00

## Bottom Cover Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Bottom Cover	1	PPTD20	\$2.54	0.2550	0.2730	\$0.00	\$0.69



# Assemble Evaporator



\...  
\HVAC  
\HVAC Unit Asm  
\Assemble Evaporator

## Process Summary

<b>Right First Time</b>	<b>97.96 %</b>
<b>Process Time (Sec)</b>	<b>160.00</b>
<b>Total Weight (kg)</b>	<b>0.28</b>

<b>Material Cost**</b>	<b>\$8.18</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$1.09</b>
<b>Q Burden</b>	<b>\$0.31</b>
<b>SG&amp;A</b>	<b>\$0.39</b>
<b>Manufacturing Cost*</b>	<b>\$9.97</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Evaporator



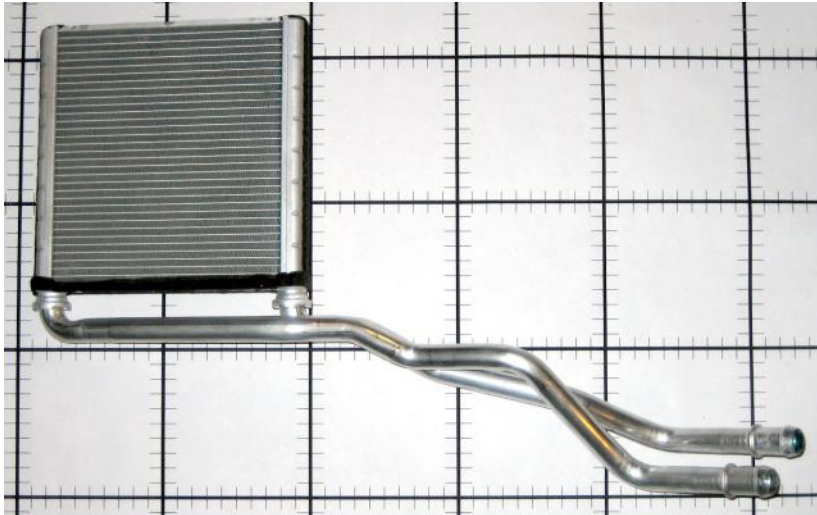
## Assemble Evaporator

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	160.00	1	1.00	24.59	CZE	\$1.09	97.96%	\$0.31

## Assemble Evaporator

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
M4x15-Torx Screw	3	Commodity Item	Purchased	0.0014	-	\$0.02	\$0.00
Microfilter, HVAC	2	Commodity Item	Purchased	0.1340	-	\$4.00	\$0.00
M4x15-Torx Screw	6	Commodity Item	Purchased	0.0014	-	\$0.02	\$0.00

# Heat Exchanger Asm, HVAC Unit Asm



\...  
 \HVAC  
 \HVAC Unit Asm  
 \Heat Exchanger Asm, HVAC Unit Asm  
**Assembly Summary**

<b>Parts</b>	<b>79</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>11</b>
<b>Steps</b>	<b>483</b>
<b>Fastenings</b>	<b>7</b>
<b>Right First Time</b>	<b>96.51 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>9.75</b>
<b>Total Weight (kg)</b>	<b>0.80</b>

<b>Material Cost**</b>	<b>\$5.26</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$5.25</b>
<b>Q Burden</b>	<b>\$0.53</b>
<b>SG&amp;A</b>	<b>\$1.26</b>
<b>Manufacturing Cost*</b>	<b>\$12.30</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Heat Exchanger Asm, HVAC Unit Asm



**MUNRO**  
& ASSOCIATES, INC.

## Heat Exchanger Asm, HVAC Unit Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Heat Exchanger Module Asm, Heat Exchanger Asm	1	73	1	419	1	97.36 %	0.00	0.00	1.79	5.13	0.6630
Long Tube, HeatExchanger Asm	1	1	0	21	0	99.69 %	0.00	0.00	0.00	0.48	0.0778
Short Tube, HeatExchanger Asm	1	1	0	20	0	99.73 %	0.00	0.00	0.00	0.44	0.0546
Assemble Heat Exchanger Tubing	1	4	6	20	6	99.71 %	0.00	0.00	1.90	0.00	0.0004

## Heat Exchanger Asm, HVAC Unit Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Heat Exchanger Module Asm, Heat Exchanger Asm	\$0.00	\$3.36	\$0.00	\$0.00	\$2.71	\$1.39	\$0.40	\$0.97	\$8.83
Long Tube, HeatExchanger Asm	\$0.00	\$0.47	\$0.00	\$0.00	\$0.00	\$0.19	\$0.05	\$0.09	\$0.80
Short Tube, HeatExchanger Asm	\$0.00	\$0.33	\$0.00	\$0.00	\$0.00	\$0.18	\$0.04	\$0.07	\$0.62
Assemble Heat Exchanger Tubing	\$1.10	\$0.00	\$0.00	\$0.00	\$0.78	\$0.00	\$0.04	\$0.13	\$2.06

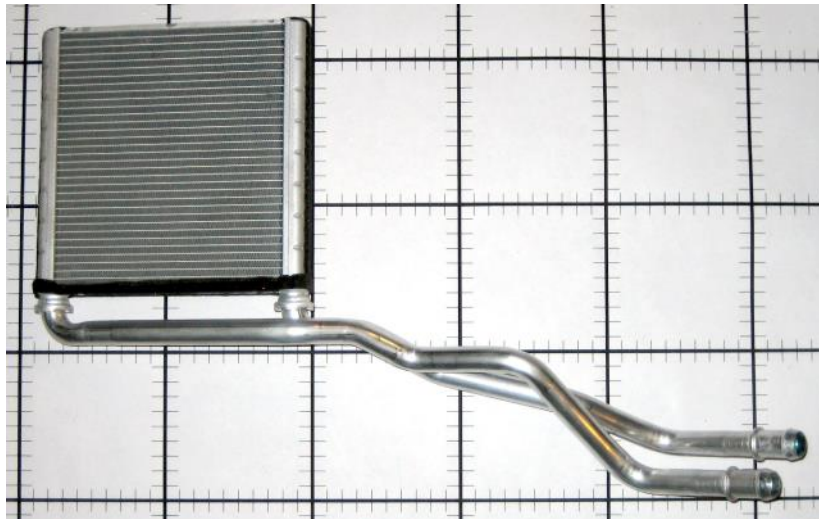
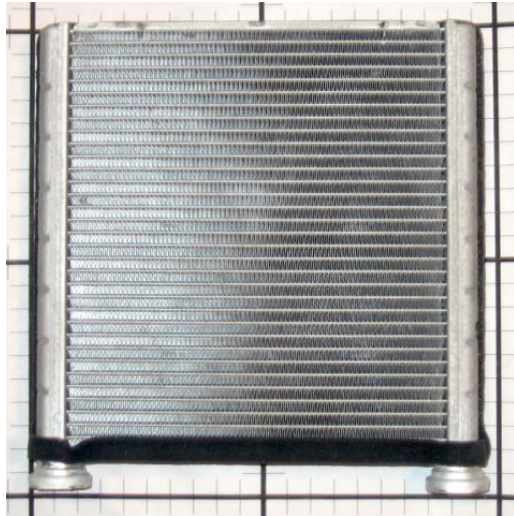
## Detailed Summary

<b>Parts</b>	<b>79</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>11</b>
<b>Steps</b>	<b>483</b>
<b>Fastenings</b>	<b>7</b>
<b>Right First Time</b>	<b>96.51%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>3.70</b>
<b>Supplier Fab. Time (Min)</b>	<b>6.05</b>
<b>Total Weight (kg)</b>	<b>0.80</b>
<b>Purchased Part Cost</b>	
	<b>\$1.10</b>
<b>Material Cost</b>	
	<b>\$4.16</b>
<b>OEM Asm. Cost</b>	
	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	
	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	
	<b>\$3.49</b>
<b>Supplier Fab. Cost</b>	
	<b>\$1.76</b>
<b>Q Burden</b>	
	<b>\$0.53</b>
<b>SG&amp;A</b>	
	<b>\$1.26</b>
<b>Manufacturing Cost*</b>	
	<b>\$12.30</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Heat Exchanger Module Asm, Heat Exchanger Asm



\...

\HVAC Unit Asm

\Heat Exchanger Asm, HVAC Unit Asm

\Heat Exchanger Module Asm, Heat Exchanger Asm

## Assembly Summary

<b>Parts</b>	<b>73</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>7</b>
<b>Steps</b>	<b>419</b>
<b>Fastenings</b>	<b>1</b>
<b>Right First Time</b>	<b>97.36 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>6.92</b>
<b>Total Weight (kg)</b>	<b>0.66</b>

<b>Material Cost**</b>	<b>\$3.36</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$4.10</b>
<b>Q Burden</b>	<b>\$0.40</b>
<b>SG&amp;A</b>	<b>\$0.97</b>
<b>Manufacturing Cost*</b>	<b>\$8.83</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Heat Exchanger Module Asm, Heat Exchanger Asm



## Heat Exchanger Module Asm, Heat Exchanger Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Btm Plate-Fitting Asm, Heat Exchanger Module Asm	1	3	0	30	0	99.90 %	0.00	0.00	0.13	0.35	0.0430
Top Plate, HeatExchanger Module Asm	1	1	0	7	0	99.97 %	0.00	0.00	0.00	0.16	0.0190
End Cap, HeatExchanger Module Asm	2	1	0	7	0	99.97 %	0.00	0.00	0.00	0.16	0.0360
End Plate, HeatExchanger Module Asm	2	1	0	7	0	99.97 %	0.00	0.00	0.00	0.18	0.0280
Cooling Fins, HeatExchanger Module Asm	33	1	0	3	0	99.97 %	0.00	0.00	0.00	0.10	0.0026
Micro Tube, HeatExchanger Module Asm	32	1	0	3	0	99.97 %	0.00	0.00	0.00	0.02	0.0121
Assemble Heat Exchanger Module	1	0	1	88	1	99.70 %	0.00	0.00	1.66	0.20	0.0000

## Heat Exchanger Module Asm, Heat Exchanger Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Btm Plate-Fitting Asm, Heat Exchanger Module Asm	\$0.00	\$0.18	\$0.00	\$0.00	\$0.05	\$0.06	\$0.02	\$0.04	\$0.34
Top Plate, HeatExchanger Module Asm	\$0.00	\$0.08	\$0.00	\$0.00	\$0.00	\$0.03	\$0.00	\$0.01	\$0.12
End Cap, HeatExchanger Module Asm	\$0.00	\$0.15	\$0.00	\$0.00	\$0.00	\$0.03	\$0.00	\$0.02	\$0.20
End Plate, HeatExchanger Module Asm	\$0.00	\$0.11	\$0.00	\$0.00	\$0.00	\$0.04	\$0.00	\$0.02	\$0.17
Cooling Fins, HeatExchanger Module Asm	\$0.00	\$0.02	\$0.00	\$0.00	\$0.00	\$0.03	\$0.00	\$0.01	\$0.06
Micro Tube, HeatExchanger Module Asm	\$0.00	\$0.06	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.01	\$0.08
Assemble Heat Exchanger Module	\$0.00	\$0.00	\$0.00	\$0.00	\$2.66	\$0.07	\$0.05	\$0.35	\$3.13

## Detailed Summary

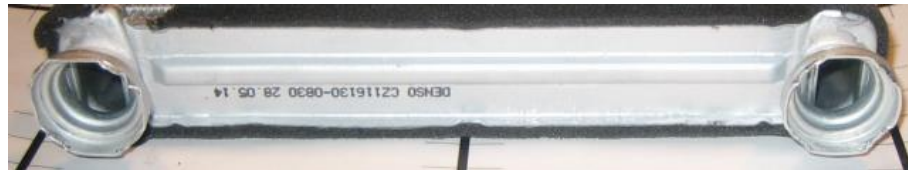
<b>Parts</b>	<b>73</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>7</b>
<b>Steps</b>	<b>419</b>
<b>Fastenings</b>	<b>1</b>
<b>Right First Time</b>	<b>97.36%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>1.79</b>
<b>Supplier Fab. Time (Min)</b>	<b>5.13</b>
<b>Total Weight (kg)</b>	<b>0.66</b>
<b>Purchased Part Cost</b>	
	<b>\$0.00</b>
<b>Material Cost</b>	
	<b>\$3.36</b>
<b>OEM Asm. Cost</b>	
	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	
	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	
	<b>\$2.71</b>
<b>Supplier Fab. Cost</b>	
	<b>\$1.39</b>
<b>Q Burden</b>	
	<b>\$0.40</b>
<b>SG&amp;A</b>	
	<b>\$0.97</b>
<b>Manufacturing Cost*</b>	
	<b>\$8.83</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Btm Plate-Fitting Asm, Heat Exchanger Module Asm



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- \Heat Exchanger Asm, HVAC Unit Asm
- \Heat Exchanger Module Asm, Heat Exchanger Asm
- \Btm Plate-Fitting Asm, Heat Exchanger Module Asm

## Assembly Summary

<b>Parts</b>	<b>3</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>2</b>
<b>Steps</b>	<b>30</b>
<b>Fastenings</b>	<b>0</b>
<b>Right First Time</b>	<b>99.90 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>0.48</b>
<b>Total Weight (kg)</b>	<b>0.04</b>

<b>Material Cost**</b>	<b>\$0.18</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.11</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.04</b>
<b>Manufacturing Cost*</b>	<b>\$0.34</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Btm Plate-Fitting Asm, Heat Exchanger Module Asm



## Btm Plate-Fitting Asm, Heat Exchanger Module Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Bottom Plate, Btm Plate-Fitting Asm	1	1	0	7	0	99.97 %	0.00	0.00	0.00	0.16	0.0190
Tube Fitting, Btm Plate-Fitting Asm	2	1	0	7	0	99.97 %	0.00	0.00	0.00	0.09	0.0120
Bottom Plate-Tube Fitting Assembly	1	0	0	6	0	99.99 %	0.00	0.00	0.13	0.00	0.0000

## Btm Plate-Fitting Asm, Heat Exchanger Module Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Bottom Plate, Btm Plate-Fitting Asm	\$0.00	\$0.08	\$0.00	\$0.00	\$0.00	\$0.03	\$0.00	\$0.01	\$0.12
Tube Fitting, Btm Plate-Fitting Asm	\$0.00	\$0.05	\$0.00	\$0.00	\$0.00	\$0.02	\$0.00	\$0.01	\$0.08
Bottom Plate-Tube Fitting Assembly	\$0.00	\$0.00	\$0.00	\$0.00	\$0.05	\$0.00	\$0.00	\$0.01	\$0.06

# Btm Plate-Fitting Asm, Heat Exchanger Module Asm

## Detailed Summary

<b>Parts</b>	<b>3</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>2</b>
<b>Steps</b>	<b>30</b>
<b>Fastenings</b>	<b>0</b>
<b>Right First Time</b>	<b>99.9%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.13</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.35</b>
<b>Total Weight (kg)</b>	<b>0.04</b>
<b>Purchased Part Cost</b>	
	<b>\$0.00</b>
<b>Material Cost</b>	<b>\$0.18</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.05</b>
<b>Supplier Fab. Cost</b>	<b>\$0.06</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.04</b>
<b>Manufacturing Cost*</b>	<b>\$0.34</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Bottom Plate, Btm Plate-Fitting Asm



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- \Btm Plate-Fitting Asm, Heat Exchanger Module Asm
- \Bottom Plate, Btm Plate-Fitting Asm
- \Bottom Plate Process

## Process Summary

<b>Right First Time</b>	<b>99.97 %</b>
<b>Process Time (Sec)</b>	<b>9.67</b>
<b>Total Weight (kg)</b>	<b>0.02</b>
<b>Material Cost**</b>	<b>\$0.08</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.03</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.01</b>
<b>Manufacturing Cost*</b>	<b>\$0.12</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Bottom Plate, Btm Plate-Fitting Asm



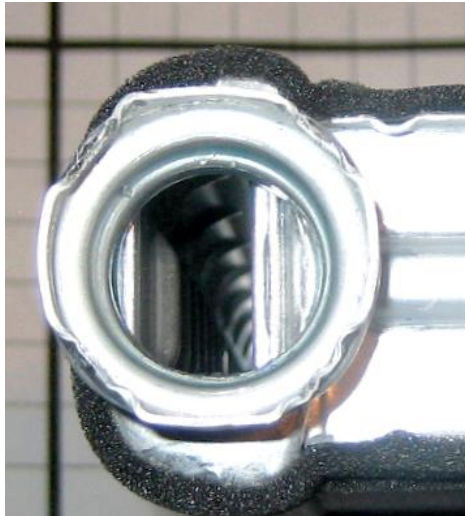
## Bottom Plate Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.94	CZE	\$0.02	99.99%	\$0.00
Deburr	4.00	1	0.25	4.79	CZE	\$0.01	99.99%	\$0.00
60 Ton Stamping Press	0.67	1	0.25	17.32	CZE	\$0.00	99.99%	\$0.00

## Bottom Plate Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Bottom Plate	1	Aluminum 3003-O - Coil Stock	\$4.08	0.0190	0.0190	\$0.00	\$0.08

# Tube Fitting, Btm Plate-Fitting Asm



- \...
- \Btm Plate-Fitting Asm, Heat Exchanger Module Asm
- \Tube Fitting, Btm Plate-Fitting Asm
- \Tube Fitting Process

## Process Summary

Right First Time	99.97 %
Process Time (Sec)	5.60
Total Weight (kg)	0.01

Material Cost**	\$0.05
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.02
Q Burden	\$0.00
SG&A	\$0.01
Manufacturing Cost*	\$0.08

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Tube Fitting, Btm Plate-Fitting Asm



## Tube Fitting Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	3.50	1	0.25	11.94	CZE	\$0.01	99.99%	\$0.00
Deburr	1.50	1	0.25	4.79	CZE	\$0.00	99.99%	\$0.00
25 Ton Stamping Press	0.60	1	0.25	13.85	CZE	\$0.00	99.99%	\$0.00

## Tube Fitting Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Tube Fitting	1	Aluminum 3003-O - Coil Stock	\$4.08	0.0120	0.0120	\$0.00	\$0.05

No Commodity Items  
Required for This  
Process

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- \Heat Exchanger Module Asm, Heat Exchanger Asm
- \Btm Plate-Fitting Asm, Heat Exchanger Module Asm
- \Bottom Plate-Tube Fitting Assembly

## Process Summary

<b>Right First Time</b>	<b>99.99 %</b>
<b>Process Time (Sec)</b>	<b>8.00</b>
<b>Total Weight (kg)</b>	<b>0.00</b>

<b>Material Cost**</b>	<b>\$0.00</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.05</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.01</b>
<b>Manufacturing Cost*</b>	<b>\$0.06</b>



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Bottom Plate-Tube Fitting Assembly



## Bottom Plate-Tube Fitting Assembly

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Automated Asm	8.00	1	0.25	22.49	CZE	\$0.05	99.99%	\$0.00

## Bottom Plate-Tube Fitting Assembly

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Top Plate, Heat Exchanger Module Asm



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\Heat Exchanger Module Asm, Heat Exchanger Asm  
\Top Plate, Heat Exchanger Module Asm  
\Top Plate Process

## Process Summary

<b>Right First Time</b>	<b>99.97 %</b>
<b>Process Time (Sec)</b>	<b>9.67</b>
<b>Total Weight (kg)</b>	<b>0.02</b>

<b>Material Cost**</b>	<b>\$0.08</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.03</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.01</b>
<b>Manufacturing Cost*</b>	<b>\$0.12</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Top Plate, Heat Exchanger Module Asm



**MUNRO**  
& ASSOCIATES, INC.

## Top Plate Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.94	CZE	\$0.02	99.99%	\$0.00
Deburr	4.00	1	0.25	4.79	CZE	\$0.01	99.99%	\$0.00
60 Ton Stamping Press	0.67	1	0.25	17.32	CZE	\$0.00	99.99%	\$0.00

## Top Plate Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Top Plate	1	Aluminum 3003-O - Coil Stock	\$4.08	0.0190	0.0190	\$0.00	\$0.08

# End Cap, Heat Exchanger Module Asm



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- \Heat Exchanger Module Asm, Heat Exchanger Asm
- \End Cap, Heat Exchanger Module Asm
- \End Cap Process

## Process Summary

Right First Time	99.97 %
Process Time (Sec)	9.67
Total Weight (kg)	0.04

Material Cost**	\$0.15
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.03
Q Burden	\$0.00
SG&A	\$0.02
Manufacturing Cost*	\$0.20

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# End Cap, Heat Exchanger Module Asm



## End Cap Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.94	CZE	\$0.02	99.99%	\$0.00
Deburr	4.00	1	0.25	4.79	CZE	\$0.01	99.99%	\$0.00
60 Ton Stamping Press	0.67	1	0.25	17.32	CZE	\$0.00	99.99%	\$0.00

## End Cap Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, End Cap	1	Aluminum 3003-O - Coil Stock	\$4.08	0.0360	0.0360	\$0.00	\$0.15

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\Heat Exchanger Module Asm, Heat Exchanger Asm  
 \End Plate, Heat Exchanger Module Asm  
 \End Plate Process



## Process Summary

<b>Right First Time</b>	<b>99.97 %</b>
<b>Process Time (Sec)</b>	<b>10.71</b>
<b>Total Weight (kg)</b>	<b>0.03</b>

<b>Material Cost**</b>	<b>\$0.11</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.04</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.02</b>
<b>Manufacturing Cost*</b>	<b>\$0.17</b>



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# End Plate, Heat Exchanger Module Asm



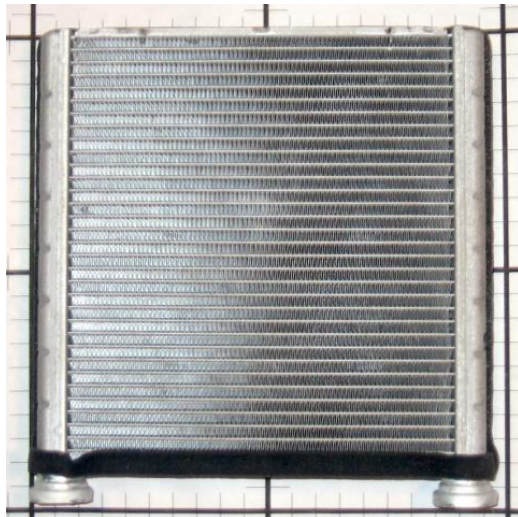
**MUNRO**  
& ASSOCIATES, INC.

## End Plate Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.94	CZE	\$0.02	99.99%	\$0.00
Deburr	4.00	1	0.25	4.79	CZE	\$0.01	99.99%	\$0.00
200 Ton Stamping Press	1.71	1	0.25	31.00	CZE	\$0.01	99.99%	\$0.00

## End Plate Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, End Plate	1	Aluminum 3003-O - Coil Stock	\$4.08	0.0280	0.0280	\$0.00	\$0.11



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- \Heat Exchanger Module Asm, Heat Exchanger Asm
- \Cooling Fins, Heat Exchanger Module Asm
- \Cooling Fins Process

## Process Summary

Right First Time	99.97 %
Process Time (Sec)	5.78
Total Weight (kg)	0.00

Material Cost**	\$0.02
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.03
Q Burden	\$0.00
SG&A	\$0.01
Manufacturing Cost*	\$0.06

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Cooling Fins, Heat Exchanger Module Asm

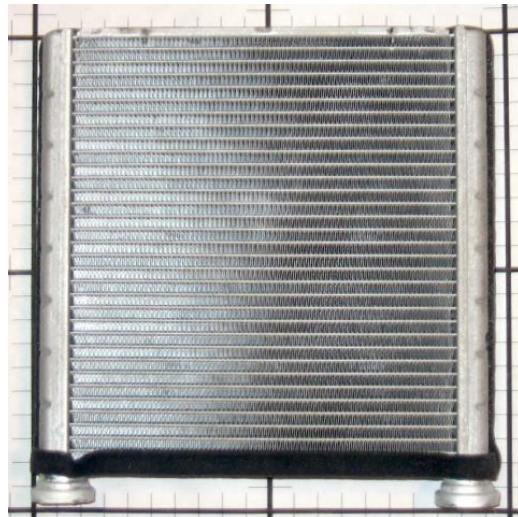


## Cooling Fins Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Roll Form Fins	5.78	1	0.25	18.06	CZE	\$0.03	99.97%	\$0.00

## Cooling Fins Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Cooling Fins	1	Aluminum 3003 - Fin Stock	\$8.00	0.0026	0.0026	\$0.00	\$0.02



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- Heat Exchanger Module Asm, Heat Exchanger Asm
- Micro Tube, Heat Exchanger Module Asm
- Micro Tube Process

## Process Summary

Right First Time	99.97 %
Process Time (Sec)	1.05
Total Weight (kg)	0.01

Material Cost**	\$0.06
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.00
Q Burden	\$0.00
SG&A	\$0.01
Manufacturing Cost*	\$0.08

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Micro Tube, Heat Exchanger Module Asm



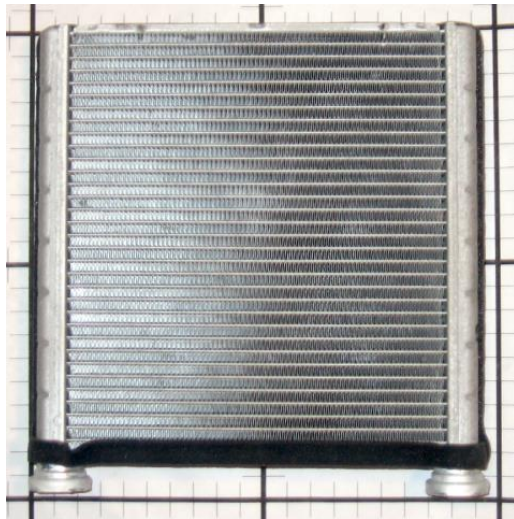
## Micro Tube Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Saw Cut	1.05	1	0.25	16.76	CZE	\$0.00	99.97%	\$0.00

## Micro Tube Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Micro Tube	1	Aluminum 3003 -MPE Tube	\$5.00	0.0121	0.0121	\$0.00	\$0.06

## No Commodity Items Required for This Process



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- \Heat Exchanger Asm, HVAC Unit Asm
- \Heat Exchanger Module Asm, Heat Exchanger Asm
- \Assemble Heat Exchanger Module

### Process Summary

Right First Time	99.70 %
Process Time (Sec)	111.67
Total Weight (kg)	0.00
Material Cost**	\$0.00
OEM Process Cost	\$0.00
Supplier Process Cost	\$2.73
Q Burden	\$0.05
SG&A	\$0.35
Manufacturing Cost*	\$3.13

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Heat Exchanger Module



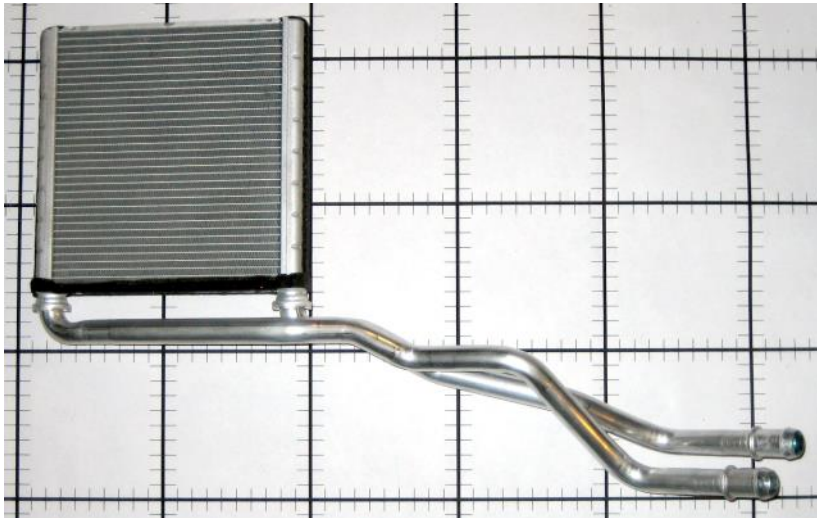
## Assemble Heat Exchanger Module

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	12.00	1	0.25	21.76	CZE	\$0.07	99.99 %	\$0.00
Braze, Oven	6.17	1	0.25	202.87	CZE	\$0.35	99.98 %	\$0.00
Intercooler Oven Dry Station	6.17	1	0.25	89.80	CZE	\$0.15	99.98 %	\$0.00
Flux Application	6.17	1	0.25	35.38	CZE	\$0.06	99.98 %	\$0.00
Degrease	6.17	1	0.25	69.86	CZE	\$0.12	99.98 %	\$0.00
Supplier Intercooler Asm	75.00	1	0.25	94.78	CZE	\$1.97	99.81 %	\$0.03

## Assemble Heat Exchanger Module

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Long Tube, Heat Exchanger Asm



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\Heat Exchanger Asm, HVAC Unit Asm

\Long Tube, Heat Exchanger Asm

\Long Tube Process

## Process Summary

Right First Time	99.69 %
Process Time (Sec)	28.68
Total Weight (kg)	0.08

Material Cost**	\$0.47
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.19
Q Burden	\$0.05
SG&A	\$0.09
Manufacturing Cost*	\$0.80

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Long Tube, Heat Exchanger Asm



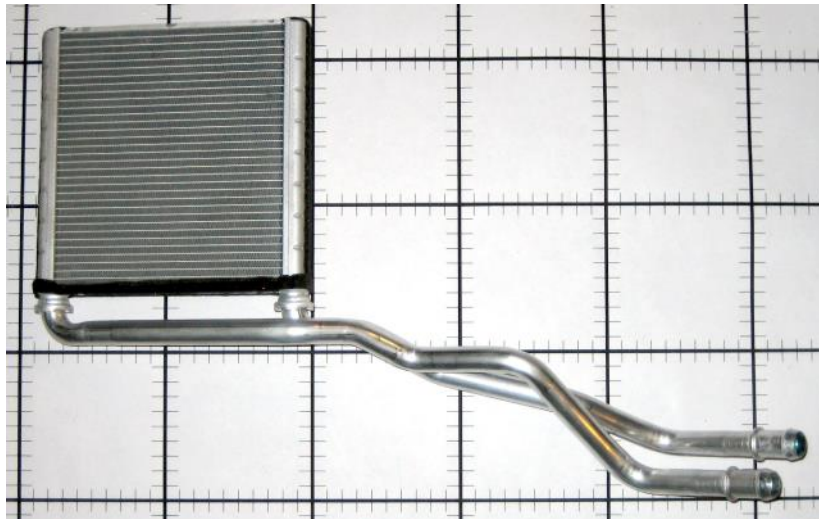
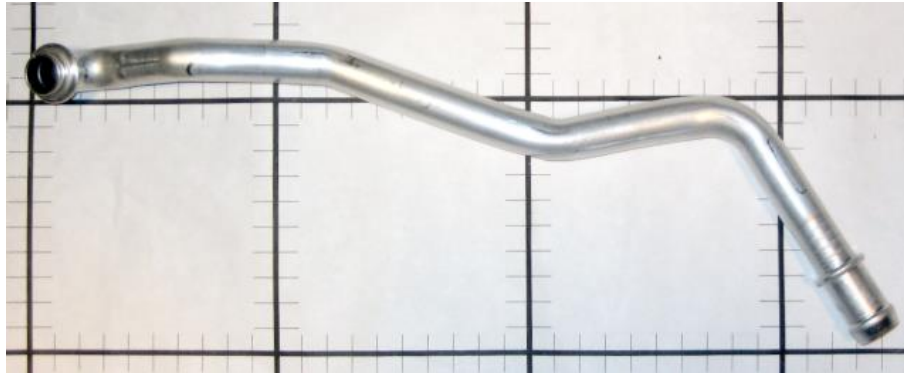
## Long Tube Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	21.76	CZE	\$0.03	99.99 %	\$0.00
Deburr	4.00	1	0.25	22.72	CZE	\$0.03	99.99 %	\$0.00
Tube Bending	18.00	1	0.25	26.08	CZE	\$0.13	99.74 %	\$0.04
Saw Cut	1.68	1	0.25	16.76	CZE	\$0.01	99.97 %	\$0.00

## Long Tube Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Long Tube	1	Aluminum 3003 - Seamless Tube	\$6.00	0.0778	0.0778	\$0.00	\$0.47

# Short Tube, Heat Exchanger Asm



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- \Heat Exchanger Asm, HVAC Unit Asm
- \Short Tube, Heat Exchanger Asm
- \Short Tube Process

## Process Summary

Right First Time	99.73 %
Process Time (Sec)	26.68
Total Weight (kg)	0.05

Material Cost**	\$0.33
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.18
Q Burden	\$0.04
SG&A	\$0.07
Manufacturing Cost*	\$0.62

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Short Tube, Heat Exchanger Asm



## Short Tube Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	21.76	CZE	\$0.03	99.99 %	\$0.00
Deburr	4.00	1	0.25	22.72	CZE	\$0.03	99.99 %	\$0.00
Tube Bending	16.00	1	0.25	26.08	CZE	\$0.12	99.78 %	\$0.03
Saw Cut	1.68	1	0.25	16.76	CZE	\$0.01	99.97 %	\$0.00

## Short Tube Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Short Tube	1	Aluminum 3003 - Seamless Tube	\$6.00	0.0546	0.0546	\$0.00	\$0.33

# Assemble Heat Exchanger Tubing



\...

\HVAC Unit Asm

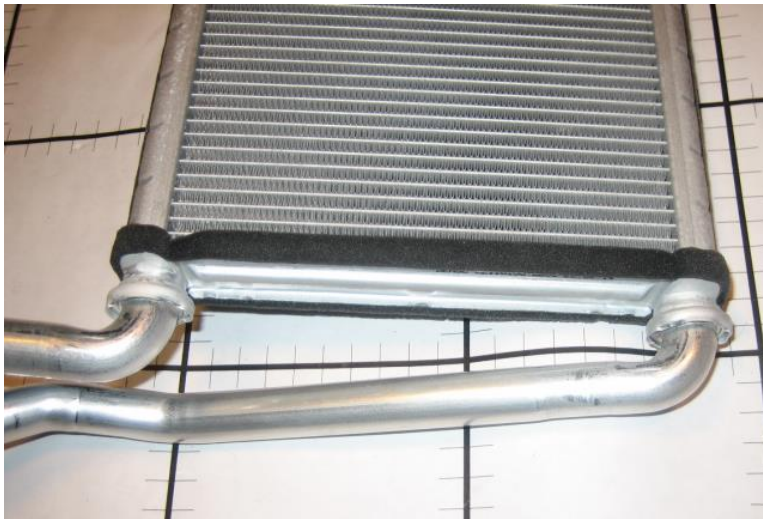
\Heat Exchanger Asm, HVAC Unit Asm

\Assemble Heat Exchanger Tubing

## Process Summary

Right First Time	99.71 %
Process Time (Sec)	114.25
Total Weight (kg)	0.00

Material Cost**	\$1.10
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.78
Q Burden	\$0.04
SG&A	\$0.13
Manufacturing Cost*	\$2.06



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Heat Exchanger Tubing



## Assemble Heat Exchanger Tubing

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	35.00	1	1.00	24.59	CZE	\$0.24	99.87 %	\$0.02
Supplier Manual Asm	32.00	1	1.00	24.59	CZE	\$0.22	99.91 %	\$0.01
Supplier Manual Asm	47.25	1	1.00	24.59	CZE	\$0.32	99.93 %	\$0.01

## Assemble Heat Exchanger Tubing

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
16mm O-Ring	1	Commodity Item	Purchased	0.0001	-	\$0.53	\$0.00
16mm O-Ring	1	Commodity Item	Purchased	0.0001	-	\$0.53	\$0.00
Heat Exchanger Foam Strip	2	Commodity Item	Purchased	0.0001	-	\$0.02	\$0.00

## No Commodity Items Required for This Process



\...  
\HVAC  
\HVAC Unit Asm  
\Assemble Heat Exchanger

### Process Summary

<b>Right First Time</b>	<b>99.96 %</b>
<b>Process Time (Sec)</b>	<b>10.00</b>
<b>Total Weight (kg)</b>	<b>0.00</b>
<b>Material Cost**</b>	<b>\$0.00</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.07</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.01</b>
<b>Manufacturing Cost*</b>	<b>\$0.08</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Heat Exchanger

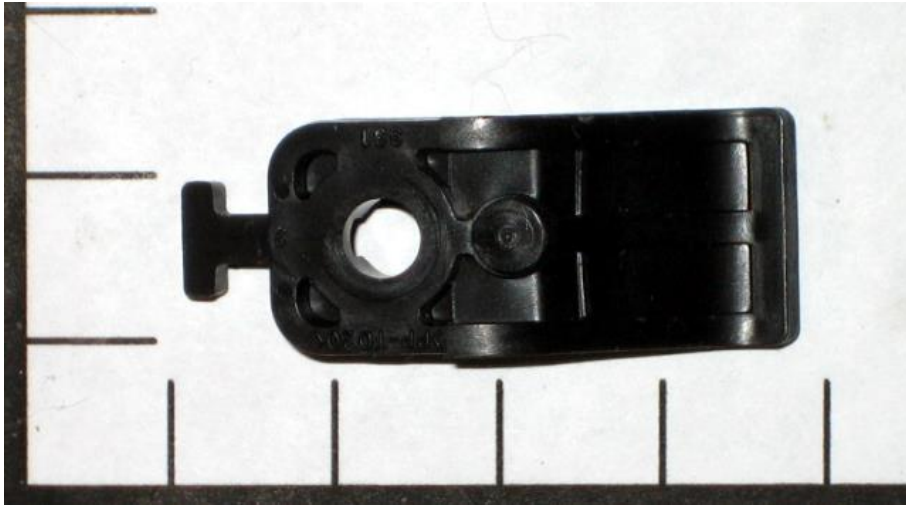


## Assemble Heat Exchanger

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
<a href="#">Supplier Manual Asm</a>	10.00	1	1.00	24.59	CZE	\$0.07	99.96%	\$0.01

## Assemble Heat Exchanger

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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\...

\HVAC Unit Asm

\Heat Exchanger Retainer, HVAC Unit Asm

\Heat Exchanger Retainer Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	2.59
Total Weight (kg)	0.01

Material Cost**	\$0.01
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.01
Q Burden	\$0.00
SG&A	\$0.00
Manufacturing Cost*	\$0.02

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Heat Exchanger Retainer, HVAC Unit Asm



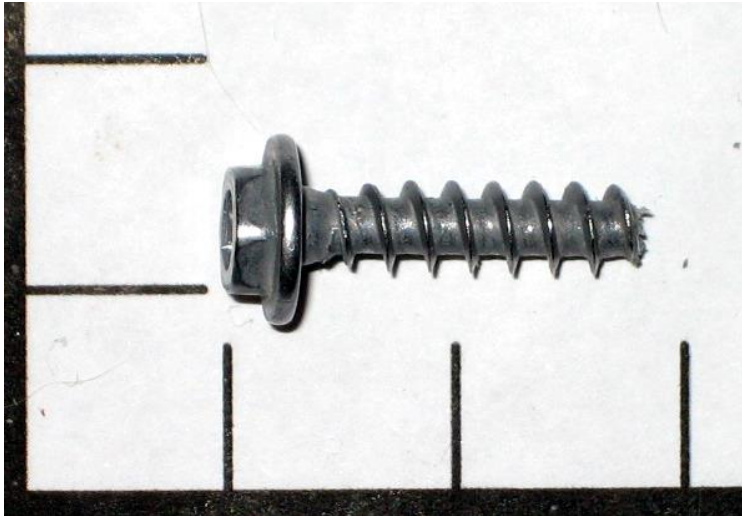
## Heat Exchanger Retainer Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
55Ton Injection Molding Press	20.72	8	0.25	14.88	CZE	\$0.01	99.99%	\$0.00

## Heat Exchanger Retainer Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Heat Exchanger Retainer	1	PPTD20	\$2.54	0.0050	0.0050	\$0.00	\$0.01

# Assemble Heat Exchanger Retainer



\...

\HVAC

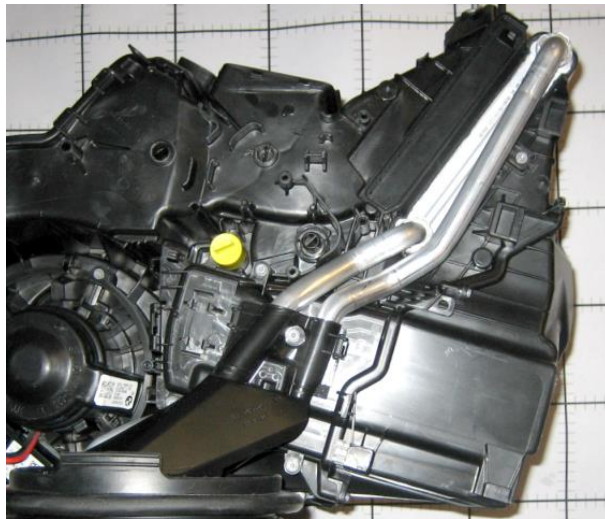
\HVAC Unit Asm

\Assemble Heat Exchanger Retainer

## Process Summary

Right First Time	99.78 %
Process Time (Sec)	20.00
Total Weight (kg)	0.00

Material Cost**	\$0.02
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.14
Q Burden	\$0.03
SG&A	\$0.02
Manufacturing Cost*	\$0.21



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Assemble Heat Exchanger Retainer



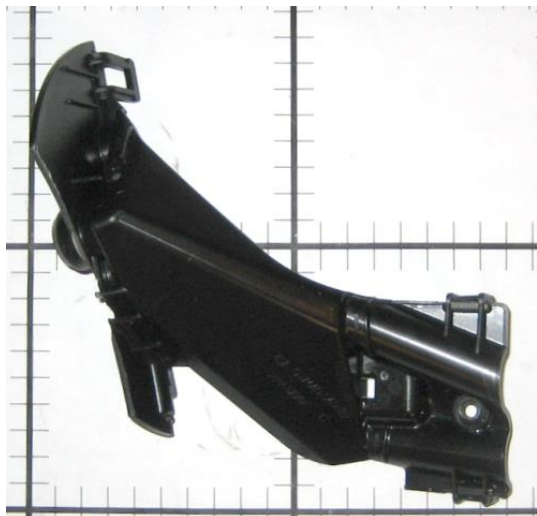
## Assemble Heat Exchanger Retainer

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	20.00	1	1.00	24.59	CZE	\$0.14	99.78 %	\$0.03

## Assemble Heat Exchanger Retainer

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
M4x15-Torx Screw	1	Commodity Item	Purchased	0.0014	-	\$0.02	\$0.00

# Heat Exchanger Cover, HVAC Unit Asm



\...

\HVAC Unit Asm

\Heat Exchanger Cover, HVAC Unit Asm

\Heat Exchanger Cover Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	7.66
Total Weight (kg)	0.04

Material Cost**	\$0.10
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.04
Q Burden	\$0.00
SG&A	\$0.02
Manufacturing Cost*	\$0.16

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Heat Exchanger Cover, HVAC Unit Asm



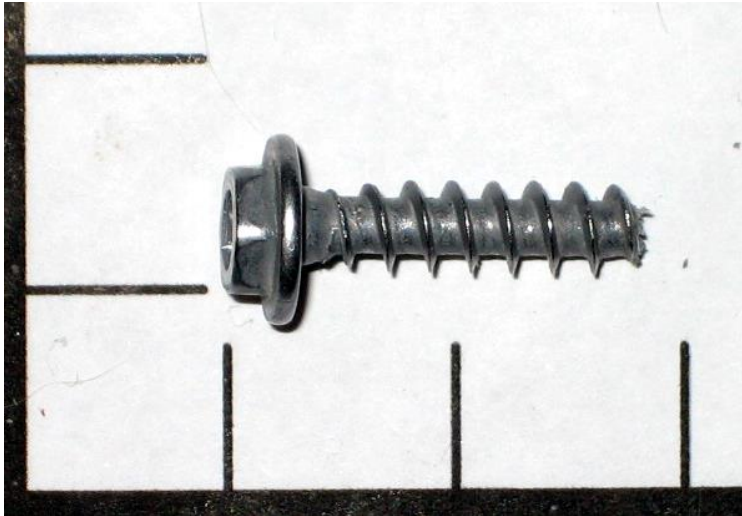
## Heat Exchanger Cover Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
150 Ton Injection Molding Press	15.32	2	0.25	18.58	CZE	\$0.04	99.99%	\$0.00

## Heat Exchanger Cover Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Heat Exchanger Cover	1	PPTD20	\$2.54	0.0350	0.0380	\$0.00	\$0.10

# Assemble Heat Exchanger Cover



\...  
\HVAC  
\HVAC Unit Asm  
\Assemble Heat Exchanger Cover

## Process Summary

Right First Time	99.74 %
Process Time (Sec)	26.00
Total Weight (kg)	0.00

Material Cost**	\$0.02
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.18
Q Burden	\$0.04
SG&A	\$0.02
Manufacturing Cost*	\$0.26



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Heat Exchanger Cover



## Assemble Heat Exchanger Cover

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	26.00	1	1.00	24.59	CZE	\$0.18	99.74 %	\$0.04

## Assemble Heat Exchanger Cover

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
M4x15-Torx Screw	1	Commodity Item	Purchased	0.0014	-	\$0.02	\$0.00



\...  
 \HVAC Unit Asm  
 \Seal, HVAC Unit Asm  
 \Seal Process

## Process Summary

<b>Right First Time</b>	<b>99.99 %</b>
<b>Process Time (Sec)</b>	<b>17.89</b>
<b>Total Weight (kg)</b>	<b>0.39</b>

<b>Material Cost**</b>	<b>\$1.67</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.30</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.26</b>
<b>Manufacturing Cost*</b>	<b>\$2.23</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Seal, HVAC Unit Asm

## Seal Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
720 Ton Injection Molding Press	71.56	4	0.25	60.14	CZE	\$0.30	99.99%	\$0.00

## Seal Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Seal	1	EPDM	\$4.04	0.3850	0.4130	\$0.00	\$1.67

## No Commodity Items Required for This Process



\...  
\HVAC  
\HVAC Unit Asm  
\Assemble Seal

### Process Summary

<b>Right First Time</b>	<b>99.66 %</b>
<b>Process Time (Sec)</b>	<b>27.00</b>
<b>Total Weight (kg)</b>	<b>0.00</b>
<b>Material Cost**</b>	<b>\$0.00</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.18</b>
<b>Q Burden</b>	<b>\$0.05</b>
<b>SG&amp;A</b>	<b>\$0.02</b>
<b>Manufacturing Cost*</b>	<b>\$0.26</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Assemble Seal



## Assemble Seal

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	27.00	1	1.00	24.59	CZE	\$0.18	99.66%	\$0.05

## Assemble Seal

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
-------------	-----	----------	----------------------------	-----------------	----------------------------	---------------------	---------------

# Back Plate, HVAC Unit Asm



\...  
\HVAC Unit Asm  
\Back Plate, HVAC Unit Asm  
\Back Plate Process

## Process Summary

Right First Time	99.96 %
Process Time (Sec)	12.93
Total Weight (kg)	0.02

Material Cost**	\$0.10
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.06
Q Burden	\$0.01
SG&A	\$0.02
Manufacturing Cost*	\$0.19

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Back Plate, HVAC Unit Asm

## Back Plate Process

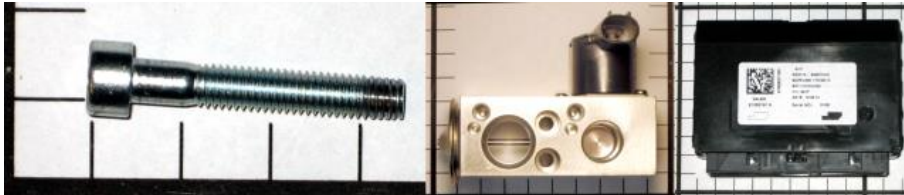
Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	11.94	CZE	\$0.02	99.99%	\$0.00
Deburr	4.00	1	0.25	4.79	CZE	\$0.01	99.99%	\$0.00
CNC Machine	3.33	1	0.25	38.73	CZE	\$0.04	99.99%	\$0.00
25 Ton Stamping Press	0.60	1	0.25	13.85	CZE	\$0.00	99.99%	\$0.00

## Back Plate Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Back Plate	1	Steel 1008 - Galvanized - Coil Stock	\$1.06	0.0184	0.0970	\$0.00	\$0.10

# Assemble Back Plate

\...  
 \HVAC  
 \HVAC Unit Asm  
 \Assemble Back Plate



## Process Summary

<b>Right First Time</b>	<b>99.48 %</b>
<b>Process Time (Sec)</b>	<b>50.00</b>
<b>Total Weight (kg)</b>	<b>0.34</b>

<b>Material Cost**</b>	<b>\$46.49</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.34</b>
<b>Q Burden</b>	<b>\$0.08</b>
<b>SG&amp;A</b>	<b>\$3.56</b>
<b>Manufacturing Cost*</b>	<b>\$50.47</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Back Plate



## Assemble Back Plate

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	50.00	1	1.00	24.59	CZE	\$0.34	99.48 %	\$0.08

## Assemble Back Plate

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
ETXV asm, HVAC	1	Commodity Item	Purchased	0.2400	-	\$25.00	\$0.00
M5x30 SocketHD Cap	2	Commodity Item	Purchased	0.0054	-	\$0.14	\$0.00
ECU Asm, HVAC	1	See Appendix	-	0.0850	-	\$0.00	\$21.21

[Click Here for TechInsights Electronics Report on HVAC ECU](#)

# Side Divert Duct, HVAC Unit Asm



\...

\HVAC Unit Asm

\Side Divert Duct, HVAC Unit Asm

\Side Divert Duct Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	8.31
Total Weight (kg)	0.13

Material Cost**	\$0.35
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.07
Q Burden	\$0.00
SG&A	\$0.05
Manufacturing Cost*	\$0.47

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Side Divert Duct, HVAC Unit Asm



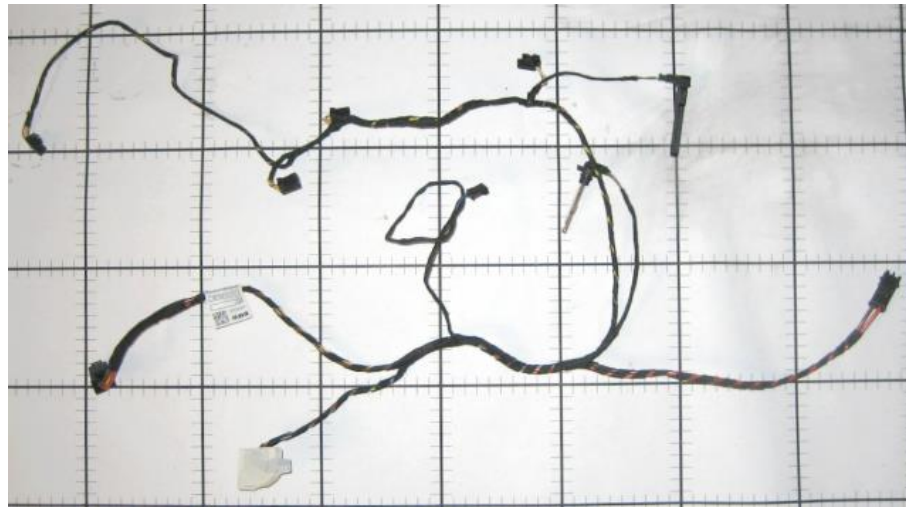
## Side Divert Duct Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
300 Ton Injection Molding Press	16.62	2	0.25	28.83	CZE	\$0.07	99.99%	\$0.00

## Side Divert Duct Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Side Divert Duct	1	ABS	\$2.60	0.1250	0.1340	\$0.00	\$0.35

# Assemble Side Divert Duct



\...  
\HVAC  
\HVAC Unit Asm  
\Assemble Side Divert Duct

## Process Summary

Right First Time	98.81 %
Process Time (Sec)	296.00
Total Weight (kg)	0.15

Material Cost**	\$10.13
OEM Process Cost	\$0.00
Supplier Process Cost	\$2.02
Q Burden	\$0.18
SG&A	\$1.58
Manufacturing Cost*	\$13.91

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Assemble Side Divert Duct



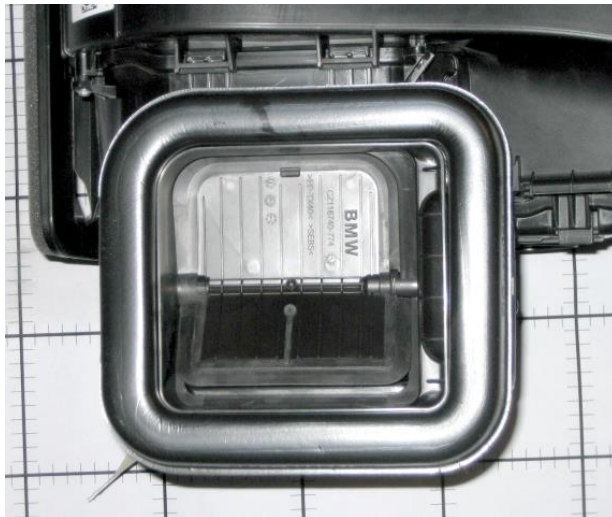
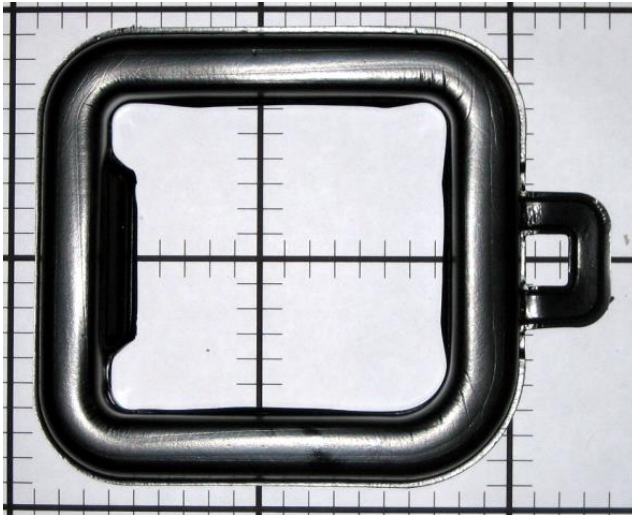
## Assemble Side Divert Duct

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	296.00	1	1.00	24.59	CZE	\$2.02	98.81 %	\$0.18

## Assemble Side Divert Duct

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Wire Harn Asm, HVAC	1	See Appendix	-	0.1500	-	\$0.00	\$10.13

[Click Here for Munro & Associates Wire Harness Report on HVAC Wire Harness](#)



\...

- \HVAC Unit Asm
- \Fresh Air Seal, HVAC Unit Asm
- \Fresh Air Seal Process

## Process Summary

<b>Right First Time</b>	<b>99.95 %</b>
<b>Process Time (Sec)</b>	<b>89.69</b>
<b>Total Weight (kg)</b>	<b>0.05</b>

<b>Material Cost**</b>	<b>\$0.21</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.42</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.08</b>
<b>Manufacturing Cost*</b>	<b>\$0.72</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Fresh Air Seal, HVAC Unit Asm



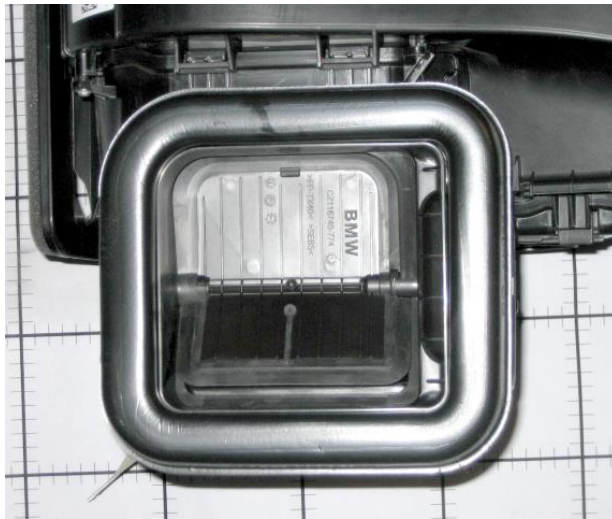
## Fresh Air Seal Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Foam Cure	69.76	1	0.00	3.97	CZE	\$0.08	99.96%	\$0.01
Foam Molding	19.93	1	3.00	61.43	CZE	\$0.34	99.99%	\$0.00

## Fresh Air Seal Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Fresh Air Seal	1	PUR Foam	\$4.08	0.0500	0.0520	\$0.00	\$0.21

## No Commodity Items Required for This Process



\...  
 \HVAC  
 \HVAC Unit Asm  
 \Assemble Fresh Air Seal

### Process Summary

<b>Right First Time</b>	<b>99.96 %</b>
<b>Process Time (Sec)</b>	<b>8.00</b>
<b>Total Weight (kg)</b>	<b>0.00</b>
<b>Material Cost**</b>	<b>\$0.00</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.05</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.01</b>
<b>Manufacturing Cost*</b>	<b>\$0.07</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Fresh Air Seal



## Assemble Fresh Air Seal

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	8.00	1	1.00	24.59	CZE	\$0.05	99.96%	\$0.01

## Assemble Fresh Air Seal

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Assemble Plugs, Foam Seal, & Labels

- \...
- \HVAC
- \HVAC Unit Asm
- \Assemble Plugs, Foam Seal, & Labels



## Process Summary

<b>Right First Time</b>	<b>99.82 %</b>
<b>Process Time (Sec)</b>	<b>55.50</b>
<b>Total Weight (kg)</b>	<b>0.01</b>

<b>Material Cost**</b>	<b>\$0.38</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.38</b>
<b>Q Burden</b>	<b>\$0.03</b>
<b>SG&amp;A</b>	<b>\$0.06</b>
<b>Manufacturing Cost*</b>	<b>\$0.85</b>



\* Excluding tooling, ER&D, logistics, and profit margin  
 \*\* Includes material cost and purchased parts cost

# Assemble Plugs, Foam Seal, & Labels

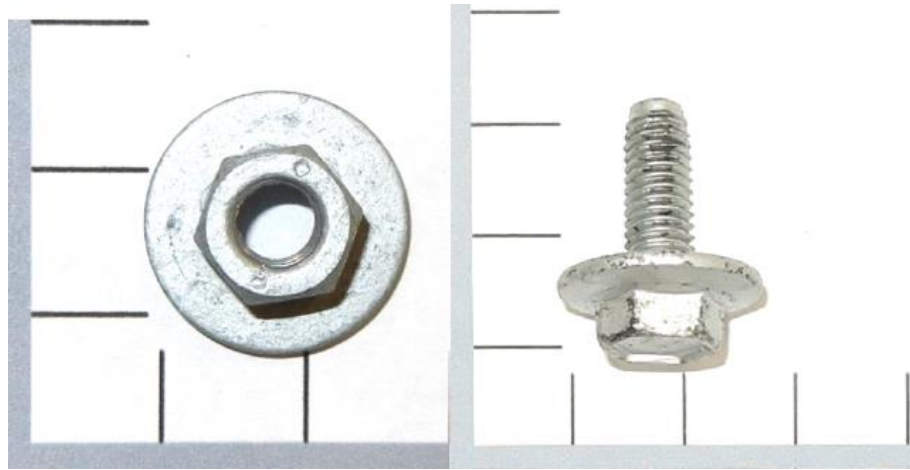


## Assemble Plugs, Foam Seal, & Labels

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	55.50	1	1.00	24.59	CZE	\$0.38	99.82 %	\$0.03

## Assemble Plugs, Foam Seal, & Labels

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Cap Plug, HVAC	1	Commodity Item	Purchased	0.0023	-	\$0.06	\$0.00
Cap Plug, HVAC	1	Commodity Item	Purchased	0.0023	-	\$0.06	\$0.00
Foam Seal, HVAC	1	Commodity Item	Purchased	0.0058	-	\$0.01	\$0.00
Label, HVAC UnitQR Code	1	Commodity Item	Purchased	0.0001	-	\$0.05	\$0.00
Label, Denso Supplier PN	1	Commodity Item	Purchased	0.0001	-	\$0.10	\$0.00
Label, OEM PN, HVAC	1	Commodity Item	Purchased	0.0001	-	\$0.10	\$0.00



\...  
 \Zone 6 Cooling Pack & HVAC  
 \HVAC  
 \HVAC Unit Installation

## Process Summary

<b>Right First Time</b>	<b>99.16 %</b>
<b>Process Time (Sec)</b>	<b>52.00</b>
<b>Total Weight (kg)</b>	<b>0.03</b>

<b>Material Cost**</b>	<b>\$0.10</b>
<b>OEM Process Cost</b>	<b>\$1.32</b>
<b>Supplier Process Cost</b>	<b>\$0.00</b>
<b>Q Burden</b>	<b>\$0.13</b>
<b>SG&amp;A</b>	<b>\$0.17</b>
<b>Manufacturing Cost*</b>	<b>\$1.72</b>



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# HVAC Unit Installation



## HVAC Unit Installation

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
OEM Manual Asm	52.00	1	1.00	91.41	GER	\$1.32	99.16%	\$0.13

## HVAC Unit Installation

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
M6x6mm-Hex KEPS Nut	2	Commodity Item	Purchased	0.0049	-	\$0.02	\$0.00
M6x16mm-Flanged Hex Bolt	2	Commodity Item	Purchased	0.0087	-	\$0.03	\$0.00

# HVAC Unit Drain Valve Asm



\...

\Zone 6 Cooling Pack & HVAC

\HVAC

\HVAC Unit Drain Valve Asm

## Assembly Summary

<b>Parts</b>	<b>3</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>9</b>
<b>Fastenings</b>	<b>1</b>
<b>Right First Time</b>	<b>99.88 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>0.29</b>
<b>Total Weight (kg)</b>	<b>0.03</b>

<b>Material Cost**</b>	<b>\$0.11</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.15</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.03</b>
<b>Manufacturing Cost*</b>	<b>\$0.31</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# HVAC Unit Drain Valve Asm



## HVAC Unit Drain Valve Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Drain, HVAC Unit Drain Valve Asm	1	2	0	2	0	99.98 %	0.00	0.00	0.00	0.16	0.0269
Snap In Stiffener, HVAC Unit Drain Valve Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.03	0.0038
Assemble HVAC Unit Drain Valve	1	0	1	4	1	99.91 %	0.00	0.00	0.10	0.00	0.0000

## HVAC Unit Drain Valve Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Drain, HVAC Unit Drain Valve Asm	\$0.00	\$0.09	\$0.00	\$0.00	\$0.00	\$0.09	\$0.00	\$0.02	\$0.21
Snap In Stiffener, HVAC Unit Drain Valve Asm	\$0.00	\$0.02	\$0.00	\$0.00	\$0.00	\$0.01	\$0.00	\$0.00	\$0.04
Assemble HVAC Unit Drain Valve	\$0.00	\$0.00	\$0.00	\$0.00	\$0.04	\$0.00	\$0.01	\$0.01	\$0.06

## Detailed Summary

<b>Parts</b>	<b>3</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>9</b>
<b>Fastenings</b>	<b>1</b>
<b>Right First Time</b>	<b>99.88%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.10</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.19</b>
<b>Total Weight (kg)</b>	<b>0.03</b>
<b>Purchased Part Cost</b>	<b>\$0.00</b>
<b>Material Cost</b>	<b>\$0.11</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.04</b>
<b>Supplier Fab. Cost</b>	<b>\$0.10</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.03</b>
<b>Manufacturing Cost*</b>	<b>\$0.31</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Drain, HVAC Unit Drain Valve Asm



\...  
\HVAC Unit Drain Valve Asm  
\Drain, HVAC Unit Drain Valve Asm  
\Drain Process

## Process Summary

Right First Time	99.98 %
Process Time (Sec)	9.38
Total Weight (kg)	0.03
Material Cost**	\$0.09
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.09
Q Burden	\$0.00
SG&A	\$0.02
Manufacturing Cost*	\$0.21

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Drain, HVAC Unit Drain Valve Asm



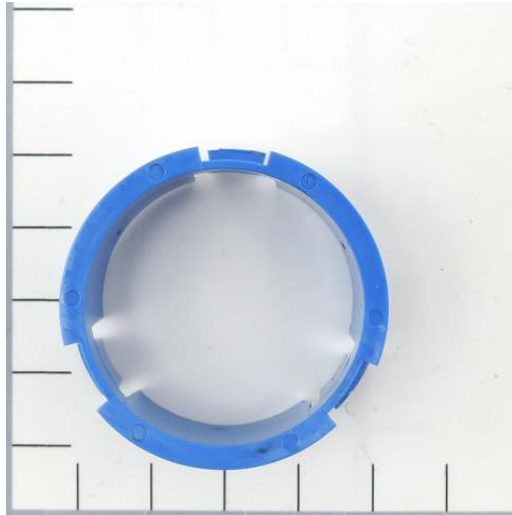
## Drain Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
110 Ton Injection Molding Press, 2 Shot	56.28	6	0.25	35.01	GER	\$0.09	99.98 %	\$0.00

## Drain Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material 1, Drain	1	POM	\$3.18	0.0214	0.0230	\$0.00	\$0.07
Material 2, Drain	1	EPDM	\$4.04	0.0055	0.0059	\$0.00	\$0.02

# Snap In Stiffener, HVAC Unit Drain Valve Asm



\...

\HVAC Unit Drain Valve Asm

\Snap In Stiffener, HVAC Unit Drain Valve Asm

\Snap In Stiffener Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	2.04
Total Weight (kg)	0.00

Material Cost**	\$0.02
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.01
Q Burden	\$0.00
SG&A	\$0.00
Manufacturing Cost*	\$0.04

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Snap In Stiffener, HVAC Unit Drain Valve Asm



## Snap In Stiffener Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
55Ton Injection Molding Press	16.32	8	0.25	23.71	GER	\$0.01	99.99%	\$0.00

## Snap In Stiffener Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Snap In Stiffener	1	PA6	\$4.39	0.0038	0.0041	\$0.00	\$0.02



No Commodity Items  
Required for This  
Process



\...  
\HVAC  
\HVAC Unit Drain Valve Asm  
\Assemble HVAC Unit Drain Valve

## Process Summary

Right First Time	99.91 %
Process Time (Sec)	6.00
Total Weight (kg)	0.00

Material Cost**	\$0.00
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.04
Q Burden	\$0.01
SG&A	\$0.01
Manufacturing Cost*	\$0.06

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble HVAC Unit Drain Valve



## Assemble HVAC Unit Drain Valve

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Automated Asm	6.00	1	0.25	25.62	GER	\$0.04	99.91 %	\$0.01

## Assemble HVAC Unit Drain Valve

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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## No Commodity Items Required for This Process



\...  
\Zone 6 Cooling Pack & HVAC  
\HVAC  
\HVAC Unit Drain Valve Installation

### Process Summary

Right First Time	99.96 %
Process Time (Sec)	7.00
Total Weight (kg)	0.00

Material Cost**	\$0.00
OEM Process Cost	\$0.18
Supplier Process Cost	\$0.00
Q Burden	\$0.01
SG&A	\$0.02
Manufacturing Cost*	\$0.21

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# HVAC Unit Drain Valve Installation

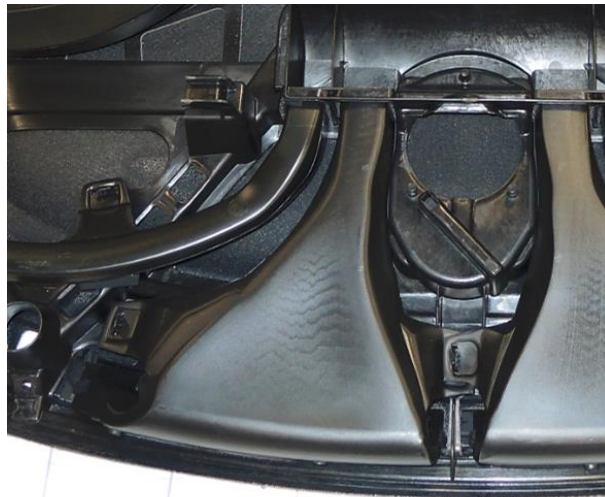
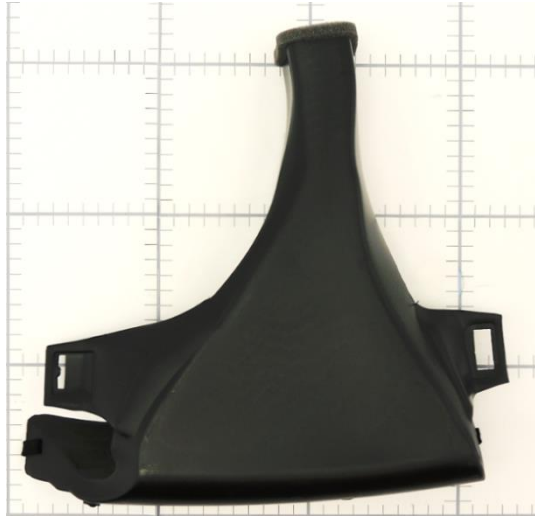


## HVAC Unit Drain Valve Installation

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
OEM Manual Asm	7.00	1	1.00	91.41	GER	\$0.18	99.96%	\$0.01

## HVAC Unit Drain Valve Installation

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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\...  
 \Zone 6 Cooling Pack & HVAC  
 \HVAC  
 \Driver Windshield Duct Asm

## Assembly Summary

<b>Parts</b>	<b>5</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>4</b>
<b>Steps</b>	<b>12</b>
<b>Fastenings</b>	<b>4</b>
<b>Right First Time</b>	<b>99.88 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>1.25</b>
<b>Total Weight (kg)</b>	<b>0.23</b>

<b>Material Cost**</b>	<b>\$0.62</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$2.34</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.38</b>
<b>Manufacturing Cost*</b>	<b>\$3.36</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Driver Windshield Duct Asm



## Driver Windshield Duct Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Windshield Duct, Driver Windshield Duct Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.72	0.2260
Assemble Driver Windshield Duct	1	4	4	10	4	99.89 %	0.00	0.00	0.53	0.00	0.0026

## Driver Windshield Duct Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Windshield Duct, Driver Windshield Duct Asm	\$0.00	\$0.58	\$0.00	\$0.00	\$0.00	\$1.86	\$0.00	\$0.32	\$2.76
Assemble Driver Windshield Duct	\$0.04	\$0.00	\$0.00	\$0.00	\$0.48	\$0.00	\$0.02	\$0.06	\$0.59

## Detailed Summary

<b>Parts</b>	<b>5</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>4</b>
<b>Steps</b>	<b>12</b>
<b>Fastenings</b>	<b>4</b>
<b>Right First Time</b>	<b>99.88%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.53</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.72</b>
<b>Total Weight (kg)</b>	<b>0.23</b>
<b>Purchased Part Cost</b>	<b>\$0.04</b>
<b>Material Cost</b>	<b>\$0.58</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.48</b>
<b>Supplier Fab. Cost</b>	<b>\$1.86</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.38</b>
<b>Manufacturing Cost*</b>	<b>\$3.36</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Windshield Duct, Driver Windshield Duct Asm



\...

- \Driver Windshield Duct Asm
- \Windshield Duct, Driver Windshield Duct Asm
- \Windshield Duct Process

## Process Summary

<b>Right First Time</b>	<b>99.99 %</b>
<b>Process Time (Sec)</b>	<b>43.27</b>
<b>Total Weight (kg)</b>	<b>0.23</b>

<b>Material Cost**</b>	<b>\$0.58</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$1.86</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.32</b>
<b>Manufacturing Cost*</b>	<b>\$2.76</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Windshield Duct, Driver Windshield Duct Asm



## Windshield Duct Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
45Ton Blow Molding Press	43.27	1	0.25	154.97	GER	\$1.86	99.99%	\$0.00

## Windshield Duct Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Windshield Duct	1	HDPE (Blow Mold Grade)	\$2.34	0.2260	0.2480	\$0.00	\$0.58

# Assemble Driver Windshield Duct



\...

\HVAC

\Driver Windshield Duct Asm

\Assemble Driver Windshield Duct

## Process Summary

Right First Time	99.89 %
Process Time (Sec)	31.50
Total Weight (kg)	0.00

Material Cost**	\$0.04
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.48
Q Burden	\$0.02
SG&A	\$0.06
Manufacturing Cost*	\$0.59



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Driver Windshield Duct



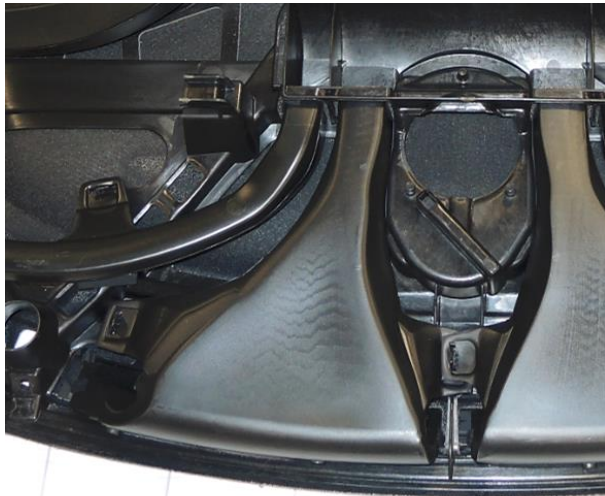
## Assemble Driver Windshield Duct

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	31.50	1	1.00	54.32	GER	\$0.48	99.89%	\$0.02

## Assemble Driver Windshield Duct

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
35mmx10mm Felt Tape	2	Commodity Item	Purchased	0.0001	-	\$0.01	\$0.00
240mmx30mm Felt Tape	1	Commodity Item	Purchased	0.0022	-	\$0.01	\$0.00
Inlet Foam Seal	1	Commodity Item	Purchased	0.0002	-	\$0.01	\$0.00

## No Commodity Items Required for This Process



\...  
 \Zone 6 Cooling Pack & HVAC  
 \HVAC  
 \Driver Windshield Duct Installation

### Process Summary

<b>Right First Time</b>	<b>99.96 %</b>
<b>Process Time (Sec)</b>	<b>6.00</b>
<b>Total Weight (kg)</b>	<b>0.00</b>
<b>Material Cost**</b>	<b>\$0.00</b>
<b>OEM Process Cost</b>	<b>\$0.15</b>
<b>Supplier Process Cost</b>	<b>\$0.00</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.02</b>
<b>Manufacturing Cost*</b>	<b>\$0.18</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Driver Windshield Duct Installation



## Driver Windshield Duct Installation

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
OEM Manual Asm	6.00	1	1.00	91.41	GER	\$0.15	99.96%	\$0.01

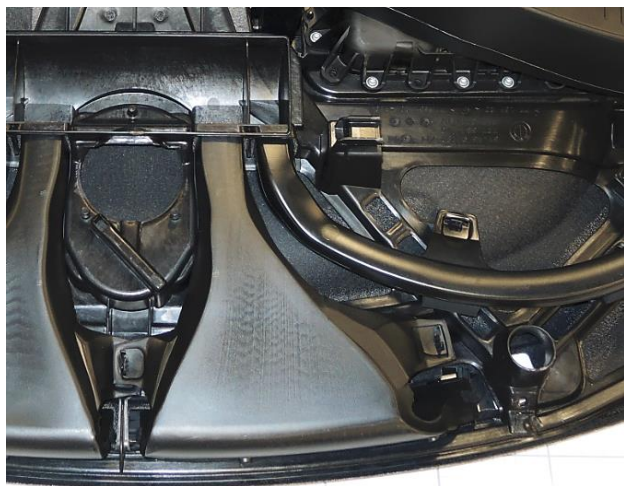
## Driver Windshield Duct Installation

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Passenger Windshield Duct Asm



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\Zone 6 Cooling Pack & HVAC

\HVAC

\Passenger Windshield Duct Asm

## Assembly Summary

<b>Parts</b>	<b>5</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>4</b>
<b>Steps</b>	<b>12</b>
<b>Fastenings</b>	<b>4</b>
<b>Right First Time</b>	<b>99.88 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>1.25</b>
<b>Total Weight (kg)</b>	<b>0.23</b>

<b>Material Cost**</b>	<b>\$0.62</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$2.34</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.38</b>
<b>Manufacturing Cost*</b>	<b>\$3.36</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Passenger Windshield Duct Asm



## Passenger Windshield Duct Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Windshield Duct, Passenger Windshield Duct Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.72	0.2260
Assemble Passenger Windshield Duct	1	4	4	10	4	99.89 %	0.00	0.00	0.53	0.00	0.0026

## Passenger Windshield Duct Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Windshield Duct, Passenger Windshield Duct Asm	\$0.00	\$0.58	\$0.00	\$0.00	\$0.00	\$1.86	\$0.00	\$0.32	\$2.76
Assemble Passenger Windshield Duct	\$0.04	\$0.00	\$0.00	\$0.00	\$0.48	\$0.00	\$0.02	\$0.06	\$0.59

## Detailed Summary

<b>Parts</b>	<b>5</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>4</b>
<b>Steps</b>	<b>12</b>
<b>Fastenings</b>	<b>4</b>
<b>Right First Time</b>	<b>99.88%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.53</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.72</b>
<b>Total Weight (kg)</b>	<b>0.23</b>
<hr/>	
<b>Purchased Part Cost</b>	<b>\$0.04</b>
<b>Material Cost</b>	<b>\$0.58</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.48</b>
<b>Supplier Fab. Cost</b>	<b>\$1.86</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.38</b>
<b>Manufacturing Cost*</b>	<b>\$3.36</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Windshield Duct, Passenger Windshield Duct Asm



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- \Passenger Windshield Duct Asm
- \Windshield Duct, Passenger Windshield Duct Asm
- \Windshield Duct Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	43.27
Total Weight (kg)	0.23

Material Cost**	\$0.58
OEM Process Cost	\$0.00
Supplier Process Cost	\$1.86
Q Burden	\$0.00
SG&A	\$0.32
Manufacturing Cost*	\$2.76

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Windshield Duct, Passenger Windshield Duct Asm



## Windshield Duct Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
45Ton Blow Molding Press	43.27	1	0.25	154.97	GER	\$1.86	99.99%	\$0.00

## Windshield Duct Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Windshield Duct	1	HDPE (Blow Mold Grade)	\$2.34	0.2260	0.2480	\$0.00	\$0.58

# Assemble Passenger Windshield Duct



\...  
\HVAC  
\Passenger Windshield Duct Asm  
\Assemble Passenger Windshield Duct

## Process Summary

Right First Time	99.89 %
Process Time (Sec)	31.50
Total Weight (kg)	0.00

Material Cost**	\$0.04
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.48
Q Burden	\$0.02
SG&A	\$0.06
Manufacturing Cost*	\$0.59



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Passenger Windshield Duct



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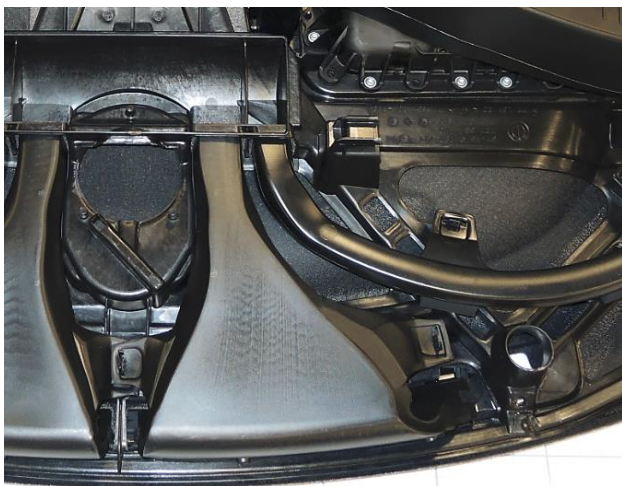
## Assemble Passenger Windshield Duct

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	31.50	1	1.00	54.32	GER	\$0.48	99.89%	\$0.02

## Assemble Passenger Windshield Duct

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
35mmx10mm Felt Tape	2	Commodity Item	Purchased	0.0001	-	\$0.01	\$0.00
240mmx30mm Felt Tape	1	Commodity Item	Purchased	0.0022	-	\$0.01	\$0.00
Inlet Foam Seal	1	Commodity Item	Purchased	0.0002	-	\$0.01	\$0.00

## No Commodity Items Required for This Process



\...  
\Zone 6 Cooling Pack & HVAC  
\HVAC  
\Passenger Windshield Duct Installation

### Process Summary

Right First Time	99.96 %
Process Time (Sec)	6.00
Total Weight (kg)	0.00
Material Cost**	\$0.00
OEM Process Cost	\$0.15
Supplier Process Cost	\$0.00
Q Burden	\$0.01
SG&A	\$0.02
Manufacturing Cost*	\$0.18

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Passenger Windshield Duct Installation



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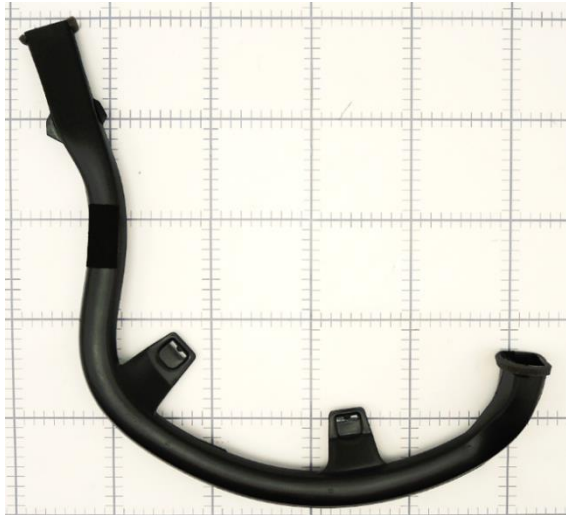
## Passenger Windshield Duct Installation

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
OEM Manual Asm	6.00	1	1.00	91.41	GER	\$0.15	99.96%	\$0.01

## Passenger Windshield Duct Installation

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Driver Demist Duct Asm



\...  
 \Zone 6 Cooling Pack & HVAC  
 \HVAC  
 \Driver Demist Duct Asm

## Assembly Summary

<b>Parts</b>	<b>9</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>8</b>
<b>Steps</b>	<b>26</b>
<b>Fastenings</b>	<b>10</b>
<b>Right First Time</b>	<b>99.70 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>1.89</b>
<b>Total Weight (kg)</b>	<b>0.21</b>

<b>Material Cost**</b>	<b>\$0.61</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$3.14</b>
<b>Q Burden</b>	<b>\$0.05</b>
<b>SG&amp;A</b>	<b>\$0.48</b>
<b>Manufacturing Cost*</b>	<b>\$4.27</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Driver Demist Duct Asm



## Driver Demist Duct Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Demist Duct, Driver Demist Duct Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.85	0.1980
Assemble Demist Duct	1	8	10	24	10	99.71 %	0.00	0.00	1.05	0.00	0.0103

## Driver Demist Duct Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Demist Duct, Driver Demist Duct Asm	\$0.00	\$0.51	\$0.00	\$0.00	\$0.00	\$2.19	\$0.00	\$0.35	\$3.05
Assemble Demist Duct	\$0.10	\$0.00	\$0.00	\$0.00	\$0.95	\$0.00	\$0.04	\$0.13	\$1.22



## Detailed Summary

<b>Parts</b>	<b>9</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>8</b>
<b>Steps</b>	<b>26</b>
<b>Fastenings</b>	<b>10</b>
<b>Right First Time</b>	<b>99.7%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>1.05</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.85</b>
<b>Total Weight (kg)</b>	<b>0.21</b>
<b>Purchased Part Cost</b>	<b>\$0.10</b>
<b>Material Cost</b>	<b>\$0.51</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.95</b>
<b>Supplier Fab. Cost</b>	<b>\$2.19</b>
<b>Q Burden</b>	<b>\$0.05</b>
<b>SG&amp;A</b>	<b>\$0.48</b>
<b>Manufacturing Cost*</b>	<b>\$4.27</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Demist Duct, Driver Demist Duct Asm



\...

- \Driver Demist Duct Asm
- \Demist Duct, Driver Demist Duct Asm
- \Demist Duct Process

## Process Summary

<b>Right First Time</b>	<b>99.99 %</b>
<b>Process Time (Sec)</b>	<b>50.91</b>
<b>Total Weight (kg)</b>	<b>0.20</b>

<b>Material Cost**</b>	<b>\$0.51</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$2.19</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.35</b>
<b>Manufacturing Cost*</b>	<b>\$3.05</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Demist Duct, Driver Demist Duct Asm



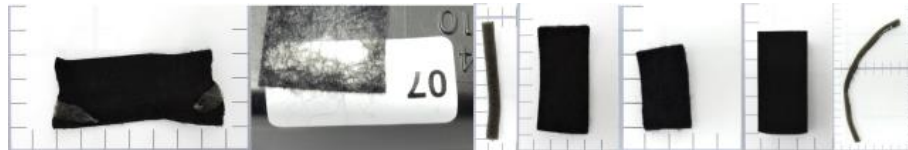
## Demist Duct Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
45Ton Blow Molding Press	50.91	1	0.25	154.97	GER	\$2.19	99.99%	\$0.00

## Demist Duct Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Demist Duct	1	HDPE (Blow Mold Grade)	\$2.34	0.1980	0.2180	\$0.00	\$0.51

# Assemble Demist Duct



\...

\HVAC

\Driver Demist Duct Asm

\Assemble Demist Duct

## Process Summary

<b>Right First Time</b>	<b>99.71 %</b>
<b>Process Time (Sec)</b>	<b>62.70</b>
<b>Total Weight (kg)</b>	<b>0.01</b>

<b>Material Cost**</b>	<b>\$0.10</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.95</b>
<b>Q Burden</b>	<b>\$0.04</b>
<b>SG&amp;A</b>	<b>\$0.13</b>
<b>Manufacturing Cost*</b>	<b>\$1.22</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Demist Duct



## Assemble Demist Duct

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	62.70	1	1.00	54.32	GER	\$0.95	99.71 %	\$0.04

## Assemble Demist Duct

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
70mmx30mm Felt Tape	1	Commodity Item	Purchased	0.0006	-	\$0.01	\$0.00
Inlet Foam Seal	1	Commodity Item	Purchased	0.0003	-	\$0.01	\$0.00
Foam Bumper	2	Commodity Item	Purchased	0.0040	-	\$0.01	\$0.00
Label, Supplier Inspection	1	Commodity Item	Purchased	0.0001	-	\$0.03	\$0.00
30mmx20mm Felt Pad	1	Commodity Item	Purchased	0.0003	-	\$0.01	\$0.00
Outlet Foam Seal	1	Commodity Item	Purchased	0.0001	-	\$0.01	\$0.00
60mmx30mm Felt Pad	1	Commodity Item	Purchased	0.0009	-	\$0.01	\$0.00

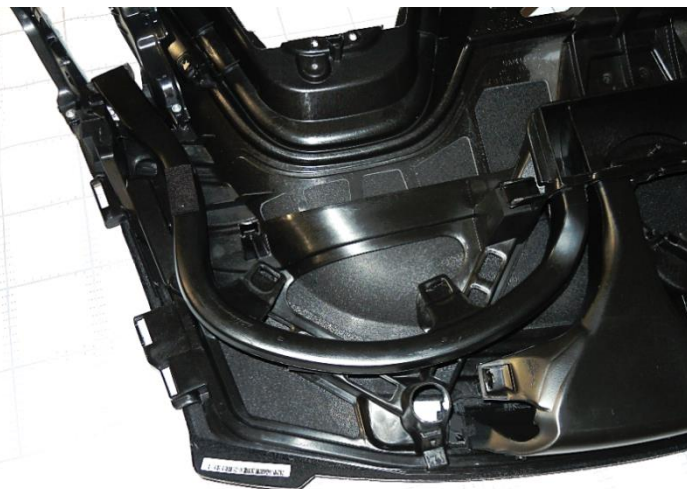
## No Commodity Items Required for This Process

\...  
 \Zone 6 Cooling Pack & HVAC  
 \HVAC  
 \Driver Demist Duct Installation

### Process Summary

<b>Right First Time</b>	<b>99.96 %</b>
<b>Process Time (Sec)</b>	<b>8.00</b>
<b>Total Weight (kg)</b>	<b>0.00</b>

<b>Material Cost**</b>	<b>\$0.00</b>
<b>OEM Process Cost</b>	<b>\$0.20</b>
<b>Supplier Process Cost</b>	<b>\$0.00</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.03</b>
<b>Manufacturing Cost*</b>	<b>\$0.24</b>



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Driver Demist Duct Installation



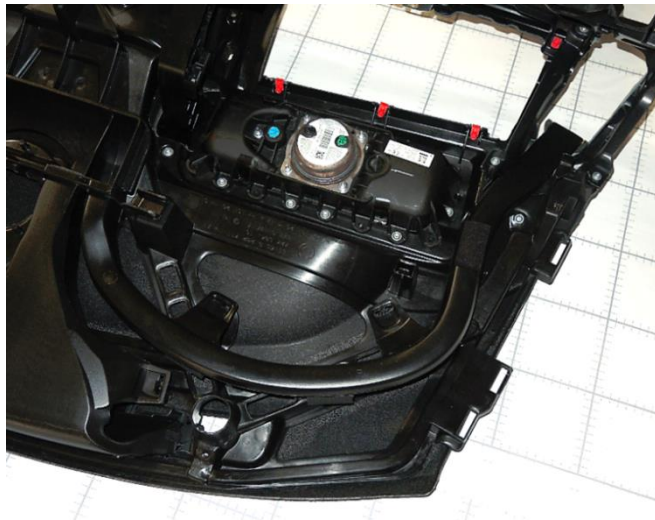
## Driver Demist Duct Installation

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
OEM Manual Asm	8.00	1	1.00	91.41	GER	\$0.20	99.96%	\$0.01

## Driver Demist Duct Installation

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Passenger Demist Duct Asm



\...  
 \Zone 6 Cooling Pack & HVAC  
 \HVAC  
 \Passenger Demist Duct Asm

## Assembly Summary

<b>Parts</b>	<b>9</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>8</b>
<b>Steps</b>	<b>26</b>
<b>Fastenings</b>	<b>10</b>
<b>Right First Time</b>	<b>99.70 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>1.89</b>
<b>Total Weight (kg)</b>	<b>0.21</b>

<b>Material Cost**</b>	<b>\$0.61</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$3.14</b>
<b>Q Burden</b>	<b>\$0.05</b>
<b>SG&amp;A</b>	<b>\$0.48</b>
<b>Manufacturing Cost*</b>	<b>\$4.27</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Passenger Demist Duct Asm



## Passenger Demist Duct Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Demist Duct, Passenger Demist Duct Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.85	0.1980
Assemble Demist Duct	1	8	10	24	10	99.71 %	0.00	0.00	1.05	0.00	0.0103

## Passenger Demist Duct Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Demist Duct, Passenger Demist Duct Asm	\$0.00	\$0.51	\$0.00	\$0.00	\$0.00	\$2.19	\$0.00	\$0.35	\$3.05
Assemble Demist Duct	\$0.10	\$0.00	\$0.00	\$0.00	\$0.95	\$0.00	\$0.04	\$0.13	\$1.22

## Detailed Summary

<b>Parts</b>	<b>9</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>8</b>
<b>Steps</b>	<b>26</b>
<b>Fastenings</b>	<b>10</b>
<b>Right First Time</b>	<b>99.7%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>1.05</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.85</b>
<b>Total Weight (kg)</b>	<b>0.21</b>
<b>Purchased Part Cost</b>	
	<b>\$0.10</b>
<b>Material Cost</b>	
	<b>\$0.51</b>
<b>OEM Asm. Cost</b>	
	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	
	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	
	<b>\$0.95</b>
<b>Supplier Fab. Cost</b>	
	<b>\$2.19</b>
<b>Q Burden</b>	
	<b>\$0.05</b>
<b>SG&amp;A</b>	
	<b>\$0.48</b>
<b>Manufacturing Cost*</b>	
	<b>\$4.27</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Demist Duct, Passenger Demist Duct Asm



\...

- \Passenger Demist Duct Asm
- \Demist Duct, Passenger Demist Duct Asm
- \Demist Duct Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	50.91
Total Weight (kg)	0.20
Material Cost**	\$0.51
OEM Process Cost	\$0.00
Supplier Process Cost	\$2.19
Q Burden	\$0.00
SG&A	\$0.35
Manufacturing Cost*	\$3.05

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Demist Duct, Passenger Demist Duct Asm



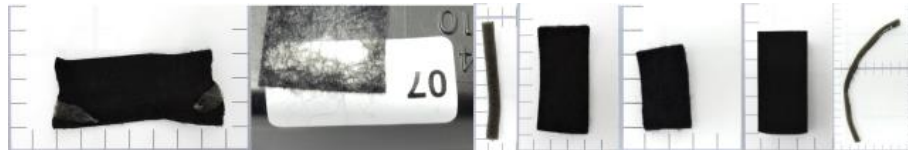
## Demist Duct Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
45Ton Blow Molding Press	50.91	1	0.25	154.97	GER	\$2.19	99.99%	\$0.00

## Demist Duct Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Demist Duct	1	HDPE (Blow Mold Grade)	\$2.34	0.1980	0.2180	\$0.00	\$0.51

# Assemble Demist Duct



\...

\HVAC

\Passenger Demist Duct Asm

\Assemble Demist Duct

## Process Summary

Right First Time	99.71 %
Process Time (Sec)	62.70
Total Weight (kg)	0.01

Material Cost**	\$0.10
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.95
Q Burden	\$0.04
SG&A	\$0.13
Manufacturing Cost*	\$1.22

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Demist Duct

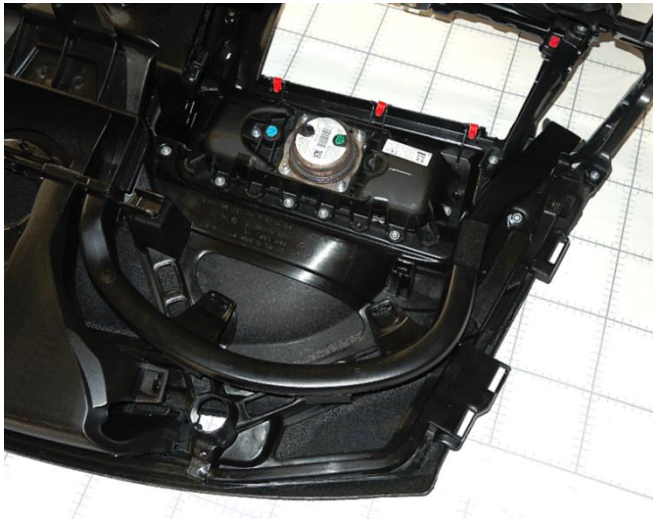
## Assemble Demist Duct

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	62.70	1	1.00	54.32	GER	\$0.95	99.71 %	\$0.04

## Assemble Demist Duct

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
70mmx30mm Felt Tape	1	Commodity Item	Purchased	0.0006	-	\$0.01	\$0.00
Inlet Foam Seal	1	Commodity Item	Purchased	0.0003	-	\$0.01	\$0.00
Foam Bumper	2	Commodity Item	Purchased	0.0040	-	\$0.01	\$0.00
Label, Supplier Inspection	1	Commodity Item	Purchased	0.0001	-	\$0.03	\$0.00
30mmx20mm Felt Pad	1	Commodity Item	Purchased	0.0003	-	\$0.01	\$0.00
Outlet Foam Seal	1	Commodity Item	Purchased	0.0001	-	\$0.01	\$0.00
60mmx30mm Felt Pad	1	Commodity Item	Purchased	0.0009	-	\$0.01	\$0.00

## No Commodity Items Required for This Process



\...  
\Zone 6 Cooling Pack & HVAC  
\HVAC  
\Passenger Demist Duct Installation

### Process Summary

<b>Right First Time</b>	<b>99.96 %</b>
<b>Process Time (Sec)</b>	<b>8.00</b>
<b>Total Weight (kg)</b>	<b>0.00</b>

<b>Material Cost**</b>	<b>\$0.00</b>
<b>OEM Process Cost</b>	<b>\$0.20</b>
<b>Supplier Process Cost</b>	<b>\$0.00</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.03</b>
<b>Manufacturing Cost*</b>	<b>\$0.24</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Passenger Demist Duct Installation



## Passenger Demist Duct Installation

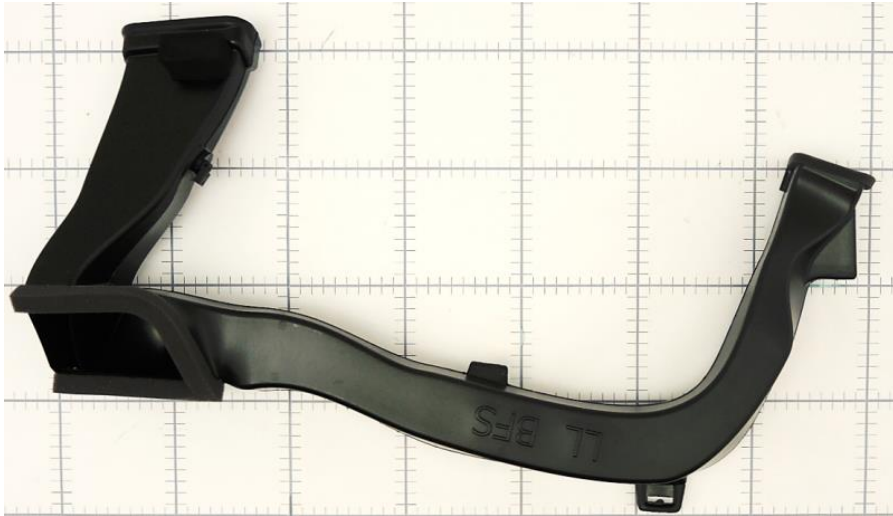
Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
OEM Manual Asm	8.00	1	1.00	91.41	GER	\$0.20	99.96%	\$0.01

## Passenger Demist Duct Installation

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Passenger IP Duct Asm



\...  
 \Zone 6 Cooling Pack & HVAC  
 \HVAC  
 \Passenger IP Duct Asm

## Assembly Summary

<b>Parts</b>	<b>9</b>
<b>Fasteners</b>	<b>1</b>
<b>Part Numbers</b>	<b>9</b>
<b>Steps</b>	<b>27</b>
<b>Fastenings</b>	<b>10</b>
<b>Right First Time</b>	<b>99.71 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>2.64</b>
<b>Total Weight (kg)</b>	<b>0.42</b>

<b>Material Cost**</b>	<b>\$3.10</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$4.73</b>
<b>Q Burden</b>	<b>\$0.04</b>
<b>SG&amp;A</b>	<b>\$0.81</b>
<b>Manufacturing Cost*</b>	<b>\$8.68</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Passenger IP Duct Asm



## Passenger IP Duct Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
IP Duct, Passenger IP Duct Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	1.42	0.4000
Air Directional Guide, IP Duct Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.08	0.0107
Assemble Duct	1	7	10	23	10	99.73 %	0.00	0.00	1.14	0.00	0.0130

## Passenger IP Duct Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
IP Duct, Passenger IP Duct Asm	\$0.00	\$1.01	\$0.00	\$0.00	\$0.00	\$3.66	\$0.00	\$0.61	\$5.27
Air Directional Guide, IP Duct Asm	\$0.00	\$0.03	\$0.00	\$0.00	\$0.00	\$0.04	\$0.00	\$0.01	\$0.08
Assemble Duct	\$2.06	\$0.00	\$0.00	\$0.00	\$1.04	\$0.00	\$0.04	\$0.20	\$3.33

## Detailed Summary

<b>Parts</b>	<b>9</b>
<b>Fasteners</b>	<b>1</b>
<b>Part Numbers</b>	<b>9</b>
<b>Steps</b>	<b>27</b>
<b>Fastenings</b>	<b>10</b>
<b>Right First Time</b>	<b>99.71%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>1.14</b>
<b>Supplier Fab. Time (Min)</b>	<b>1.49</b>
<b>Total Weight (kg)</b>	<b>0.42</b>
<b>Purchased Part Cost</b>	
	<b>\$2.06</b>
<b>Material Cost</b>	
	<b>\$1.04</b>
<b>OEM Asm. Cost</b>	
	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	
	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	
	<b>\$1.04</b>
<b>Supplier Fab. Cost</b>	
	<b>\$3.69</b>
<b>Q Burden</b>	
	<b>\$0.04</b>
<b>SG&amp;A</b>	
	<b>\$0.81</b>
<b>Manufacturing Cost*</b>	
	<b>\$8.68</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# IP Duct, Passenger IP Duct Asm



\...

- \Passenger IP Duct Asm
- \IP Duct, Passenger IP Duct Asm
- \IP Duct Process

## Process Summary

<b>Right First Time</b>	<b>99.99 %</b>
<b>Process Time (Sec)</b>	<b>84.94</b>
<b>Total Weight (kg)</b>	<b>0.40</b>

<b>Material Cost**</b>	<b>\$1.01</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$3.66</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.61</b>
<b>Manufacturing Cost*</b>	<b>\$5.27</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# IP Duct, Passenger IP Duct Asm

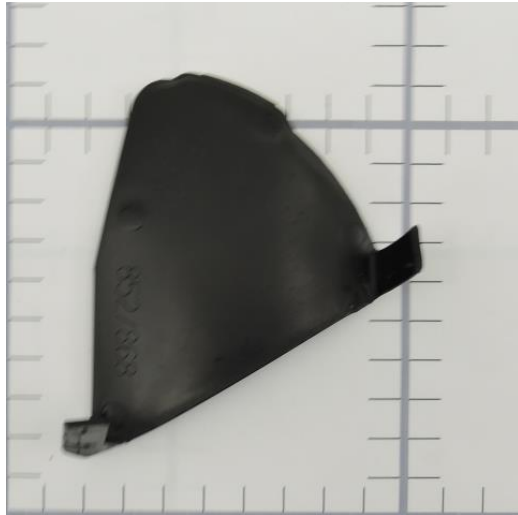


## IP Duct Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
45Ton Blow Molding Press	84.94	1	0.25	154.97	GER	\$3.66	99.99%	\$0.00

## IP Duct Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, IP Duct	1	HDPE (Blow Mold Grade)	\$2.34	0.4000	0.4320	\$0.00	\$1.01



\...

- \Passenger IP Duct Asm
- \Air Directional Guide, IP Duct Asm
- \Air Directional Guide Process

## Process Summary

<b>Right First Time</b>	<b>99.99 %</b>
<b>Process Time (Sec)</b>	<b>4.62</b>
<b>Total Weight (kg)</b>	<b>0.01</b>
<b>Material Cost**</b>	<b>\$0.03</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.04</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.01</b>
<b>Manufacturing Cost*</b>	<b>\$0.08</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

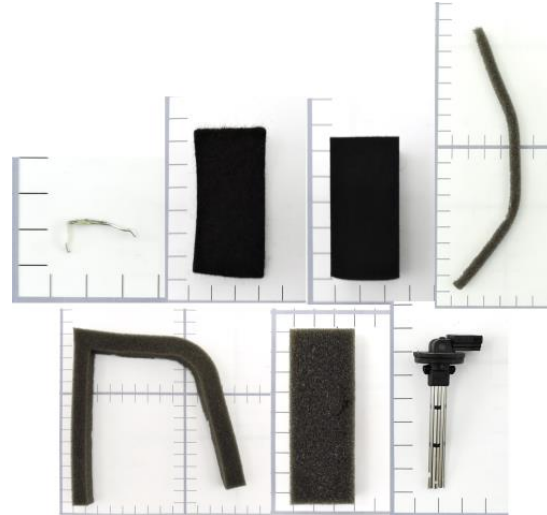
# Air Directional Guide, IP Duct Asm

## Air Directional Guide Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
150 Ton Injection Molding Press	27.72	6	0.25	27.82	GER	\$0.04	99.99%	\$0.00

## Air Directional Guide Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Air Directional Guide	1	PP	\$2.38	0.0107	0.0120	\$0.00	\$0.03



\...  
 \HVAC  
 \Passenger IP Duct Asm  
 \Assemble Duct

## Process Summary

Right First Time	99.73 %
Process Time (Sec)	68.68
Total Weight (kg)	0.01
Material Cost**	\$2.06
OEM Process Cost	\$0.00
Supplier Process Cost	\$1.04
Q Burden	\$0.04
SG&A	\$0.20
Manufacturing Cost*	\$3.33

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Assemble Duct

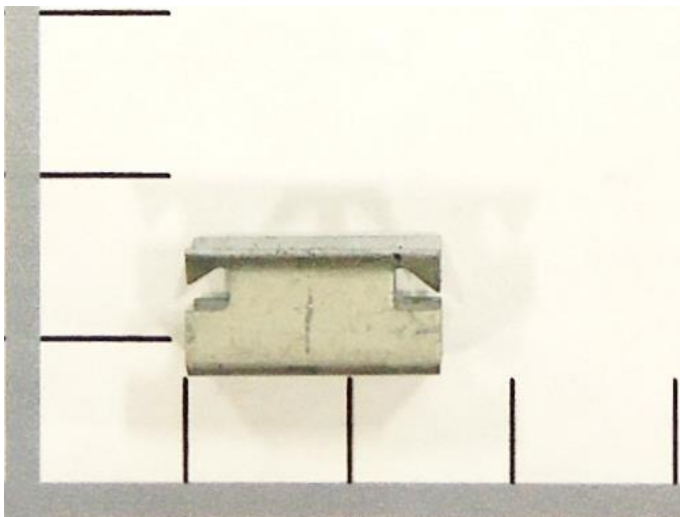
## Assemble Duct

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	68.68	1	1.00	54.32	GER	\$1.04	99.73 %	\$0.04

## Assemble Duct

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Set of Two Staples, IP Duct Asm	1	Commodity Item	Purchased	0.0001	-	\$0.01	\$0.00
Foam Bumper	1	Commodity Item	Purchased	0.0040	-	\$0.01	\$0.00
Inlet Foam Seal	1	Commodity Item	Purchased	0.0021	-	\$0.01	\$0.00
60mmx30mm Felt Pad	1	Commodity Item	Purchased	0.0009	-	\$0.01	\$0.00
Outlet Foam Seal	1	Commodity Item	Purchased	0.0002	-	\$0.01	\$0.00
80mmx30mm Foam Block	1	Commodity Item	Purchased	0.0010	-	\$0.01	\$0.00
Temperature Sensor	1	Commodity Item	Purchased	0.0047	-	\$2.00	\$0.00

# Passenger IP Duct Installation



\...  
\Zone 6 Cooling Pack & HVAC  
\HVAC  
\Passenger IP Duct Installation

## Process Summary

Right First Time	99.93 %
Process Time (Sec)	19.00
Total Weight (kg)	0.00

Material Cost**	\$0.04
OEM Process Cost	\$0.48
Supplier Process Cost	\$0.00
Q Burden	\$0.01
SG&A	\$0.06
Manufacturing Cost*	\$0.60

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost


# Passenger IP Duct Installation



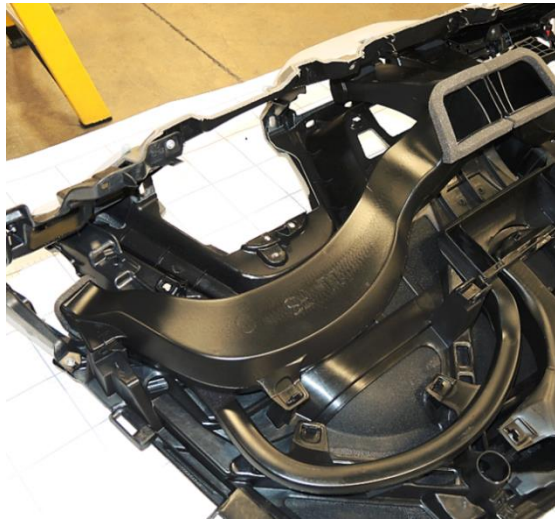
## Passenger IP Duct Installation

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
OEM Manual Asm	19.00	1	1.00	91.41	GER	\$0.48	99.93%	\$0.01

## Passenger IP Duct Installation

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
 Metal Edge Biter Clip	1	Commodity Item	Purchased	0.0014	-	\$0.04	\$0.00

# Driver IP Duct Asm



\...  
 \Zone 6 Cooling Pack & HVAC  
 \HVAC  
 \Driver IP Duct Asm

## Assembly Summary

<b>Parts</b>	<b>8</b>
<b>Fasteners</b>	<b>1</b>
<b>Part Numbers</b>	<b>8</b>
<b>Steps</b>	<b>25</b>
<b>Fastenings</b>	<b>9</b>
<b>Right First Time</b>	<b>99.73 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>2.54</b>
<b>Total Weight (kg)</b>	<b>0.54</b>

<b>Material Cost**</b>	<b>\$1.40</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$4.64</b>
<b>Q Burden</b>	<b>\$0.04</b>
<b>SG&amp;A</b>	<b>\$0.78</b>
<b>Manufacturing Cost*</b>	<b>\$6.86</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Driver IP Duct Asm



## Driver IP Duct Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
IP Duct Asm, Driver IP Duct Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	1.42	0.5200
Air Directional Guide, IP Duct Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.08	0.0107
Assemble Duct	1	6	9	21	9	99.75 %	0.00	0.00	1.04	0.00	0.0083

## Driver IP Duct Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
IP Duct Asm, Driver IP Duct Asm	\$0.00	\$1.31	\$0.00	\$0.00	\$0.00	\$3.66	\$0.00	\$0.65	\$5.61
Air Directional Guide, IP Duct Asm	\$0.00	\$0.03	\$0.00	\$0.00	\$0.00	\$0.04	\$0.00	\$0.01	\$0.08
Assemble Duct	\$0.06	\$0.00	\$0.00	\$0.00	\$0.95	\$0.00	\$0.04	\$0.12	\$1.17

## Detailed Summary

<b>Parts</b>	<b>8</b>
<b>Fasteners</b>	<b>1</b>
<b>Part Numbers</b>	<b>8</b>
<b>Steps</b>	<b>25</b>
<b>Fastenings</b>	<b>9</b>
<b>Right First Time</b>	<b>99.73%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>1.04</b>
<b>Supplier Fab. Time (Min)</b>	<b>1.49</b>
<b>Total Weight (kg)</b>	<b>0.54</b>
<b>Purchased Part Cost</b>	<b>\$0.06</b>
<b>Material Cost</b>	<b>\$1.34</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.95</b>
<b>Supplier Fab. Cost</b>	<b>\$3.69</b>
<b>Q Burden</b>	<b>\$0.04</b>
<b>SG&amp;A</b>	<b>\$0.78</b>
<b>Manufacturing Cost*</b>	<b>\$6.86</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



\...

- \Driver IP Duct Asm
- \IP Duct Asm, Driver IP Duct Asm
- \IP Duct Process

## Process Summary

<b>Right First Time</b>	<b>99.99 %</b>
<b>Process Time (Sec)</b>	<b>84.94</b>
<b>Total Weight (kg)</b>	<b>0.52</b>

<b>Material Cost**</b>	<b>\$1.31</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$3.66</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.65</b>
<b>Manufacturing Cost*</b>	<b>\$5.61</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# IP Duct Asm, Driver IP Duct Asm



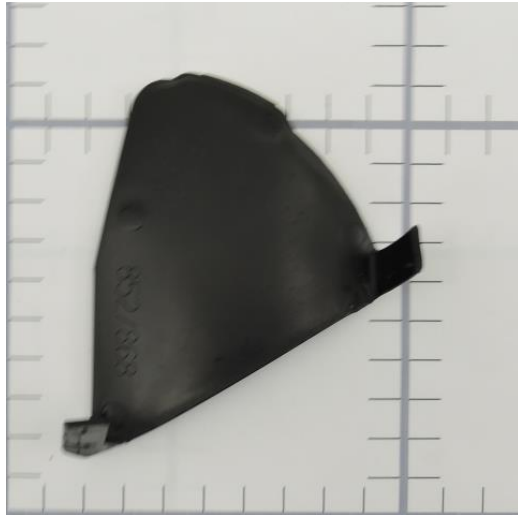
## IP Duct Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
45Ton Blow Molding Press	84.94	1	0.25	154.97	GER	\$3.66	99.99%	\$0.00

## IP Duct Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, IP Duct	1	HDPE (Blow Mold Grade)	\$2.34	0.5200	0.5580	\$0.00	\$1.31





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- \Driver IP Duct Asm
- \Air Directional Guide, IP Duct Asm
- \Air Directional Guide Process

## Process Summary

<b>Right First Time</b>	<b>99.99 %</b>
<b>Process Time (Sec)</b>	<b>4.62</b>
<b>Total Weight (kg)</b>	<b>0.01</b>
<b>Material Cost**</b>	<b>\$0.03</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.04</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.01</b>
<b>Manufacturing Cost*</b>	<b>\$0.08</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Air Directional Guide, IP Duct Asm



## Air Directional Guide Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
150 Ton Injection Molding Press	27.72	6	0.25	27.82	GER	\$0.04	99.99%	\$0.00

## Air Directional Guide Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Air Directional Guide	1	PP	\$2.38	0.0107	0.0120	\$0.00	\$0.03



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 \HVAC  
 \Driver IP Duct Asm  
 \Assemble Duct

## Process Summary

<b>Right First Time</b>	<b>99.75 %</b>
<b>Process Time (Sec)</b>	<b>62.68</b>
<b>Total Weight (kg)</b>	<b>0.01</b>

<b>Material Cost**</b>	<b>\$0.06</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.95</b>
<b>Q Burden</b>	<b>\$0.04</b>
<b>SG&amp;A</b>	<b>\$0.12</b>
<b>Manufacturing Cost*</b>	<b>\$1.17</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

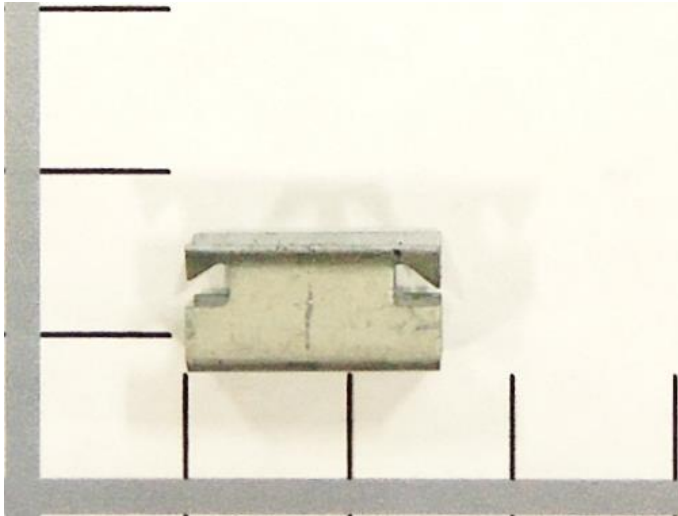
# Assemble Duct

## Assemble Duct

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	62.68	1	1.00	54.32	GER	\$0.95	99.75%	\$0.04

## Assemble Duct

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Set of Two Staples, IP Duct Asm	1	Commodity Item	Purchased	0.0001	-	\$0.01	\$0.00
Foam Bumper	1	Commodity Item	Purchased	0.0040	-	\$0.01	\$0.00
Inlet Foam Seal	1	Commodity Item	Purchased	0.0021	-	\$0.01	\$0.00
60mmx30mm Felt Pad	1	Commodity Item	Purchased	0.0009	-	\$0.01	\$0.00
Outlet Foam Seal	1	Commodity Item	Purchased	0.0002	-	\$0.01	\$0.00
80mmx30mm Foam Block	1	Commodity Item	Purchased	0.0010	-	\$0.01	\$0.00



\...  
 \Zone 6 Cooling Pack & HVAC  
 \HVAC  
 \Driver IP Duct Installation

## Process Summary

<b>Right First Time</b>	<b>99.93 %</b>
<b>Process Time (Sec)</b>	<b>19.00</b>
<b>Total Weight (kg)</b>	<b>0.00</b>

<b>Material Cost**</b>	<b>\$0.04</b>
<b>OEM Process Cost</b>	<b>\$0.48</b>
<b>Supplier Process Cost</b>	<b>\$0.00</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.06</b>
<b>Manufacturing Cost*</b>	<b>\$0.60</b>



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost


# Driver IP Duct Installation



## Driver IP Duct Installation

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
OEM Manual Asm	19.00	1	1.00	91.41	GER	\$0.48	99.93%	\$0.01

## Driver IP Duct Installation

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
 Metal Edge Biter Clip	1	Commodity Item	Purchased	0.0014	-	\$0.04	\$0.00

# Cabin Heater Coolant Reservoir Asm



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 \Zone 6 Cooling Pack & HVAC  
 \HVAC  
 \Cabin Heater Coolant Reservoir Asm

## Assembly Summary

<b>Parts</b>	<b>23</b>
<b>Fasteners</b>	<b>8</b>
<b>Part Numbers</b>	<b>20</b>
<b>Steps</b>	<b>100</b>
<b>Fastenings</b>	<b>24</b>
<b>Right First Time</b>	<b>98.42 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>4.91</b>
<b>Total Weight (kg)</b>	<b>0.77</b>

<b>Material Cost**</b>	<b>\$5.65</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$3.71</b>
<b>Q Burden</b>	<b>\$0.24</b>
<b>SG&amp;A</b>	<b>\$0.94</b>
<b>Manufacturing Cost*</b>	<b>\$10.54</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Cabin Heater Coolant Reservoir Asm



## Cabin Heater Coolant Reservoir Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Bracket Asm, Cabin Heater Coolant Reservoir Asm	1	4	2	22	2	99.85 %	0.00	0.00	0.24	0.94	0.1168
Reservoir Asm, Cabin Heater Coolant Reservoir Asm	1	17	19	67	19	99.05 %	0.00	0.00	2.50	0.63	0.6346
Assemble Cabin Heater Coolant Reservoir	1	2	3	9	3	99.52 %	0.00	0.00	0.60	0.00	0.0184

## Cabin Heater Coolant Reservoir Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Bracket Asm, Cabin Heater Coolant Reservoir Asm	\$0.10	\$0.87	\$0.00	\$0.00	\$0.14	\$0.43	\$0.02	\$0.19	\$1.76
Reservoir Asm, Cabin Heater Coolant Reservoir Asm	\$2.58	\$2.02	\$0.00	\$0.00	\$2.19	\$0.40	\$0.14	\$0.68	\$8.01
Assemble Cabin Heater Coolant Reservoir	\$0.08	\$0.00	\$0.00	\$0.00	\$0.54	\$0.00	\$0.07	\$0.07	\$0.77



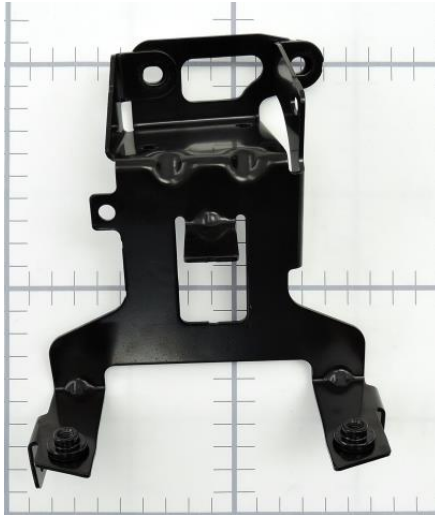
## Detailed Summary

<b>Parts</b>	<b>23</b>
<b>Fasteners</b>	<b>8</b>
<b>Part Numbers</b>	<b>20</b>
<b>Steps</b>	<b>100</b>
<b>Fastenings</b>	<b>24</b>
<b>Right First Time</b>	<b>98.42%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>3.33</b>
<b>Supplier Fab. Time (Min)</b>	<b>1.58</b>
<b>Total Weight (kg)</b>	<b>0.77</b>
<b>Purchased Part Cost</b>	<b>\$2.76</b>
<b>Material Cost</b>	<b>\$2.89</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$2.88</b>
<b>Supplier Fab. Cost</b>	<b>\$0.83</b>
<b>Q Burden</b>	<b>\$0.24</b>
<b>SG&amp;A</b>	<b>\$0.94</b>
<b>Manufacturing Cost*</b>	<b>\$10.54</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Bracket Asm, Cabin Heater Coolant Reservoir Asm



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\HVAC

\Cabin Heater Coolant Reservoir Asm

\Bracket Asm, Cabin Heater Coolant Reservoir Asm

## Assembly Summary

<b>Parts</b>	<b>4</b>
<b>Fasteners</b>	<b>2</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>22</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.85 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>1.18</b>
<b>Total Weight (kg)</b>	<b>0.12</b>

<b>Material Cost**</b>	<b>\$0.97</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.57</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.19</b>
<b>Manufacturing Cost*</b>	<b>\$1.76</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Bracket Asm, Cabin Heater Coolant Reservoir Asm



## Bracket Asm, Cabin Heater Coolant Reservoir Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Bracket, Bracket Asm	1	1	0	7	0	99.97 %	0.00	0.00	0.00	0.33	0.1128
Assemble Bracket Asm	1	3	2	14	2	99.88 %	0.00	0.00	0.24	0.62	0.0040

## Bracket Asm, Cabin Heater Coolant Reservoir Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Bracket, Bracket Asm	\$0.00	\$0.74	\$0.00	\$0.00	\$0.00	\$0.10	\$0.01	\$0.11	\$0.95
Assemble Bracket Asm	\$0.10	\$0.13	\$0.00	\$0.00	\$0.14	\$0.33	\$0.02	\$0.08	\$0.80

## Detailed Summary

<b>Parts</b>	<b>4</b>
<b>Fasteners</b>	<b>2</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>22</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.85%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.24</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.94</b>
<b>Total Weight (kg)</b>	<b>0.12</b>
<b>Purchased Part Cost</b>	
	<b>\$0.10</b>
<b>Material Cost</b>	
	<b>\$0.87</b>
<b>OEM Asm. Cost</b>	
	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	
	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	
	<b>\$0.14</b>
<b>Supplier Fab. Cost</b>	
	<b>\$0.43</b>
<b>Q Burden</b>	
	<b>\$0.02</b>
<b>SG&amp;A</b>	
	<b>\$0.19</b>
<b>Manufacturing Cost*</b>	
	<b>\$1.76</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



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- \Bracket Asm, Cabin Heater Coolant Reservoir Asm
- \Bracket, Bracket Asm
- \Bracket Process

## Process Summary

Right First Time	99.97 %
Process Time (Sec)	19.71
Total Weight (kg)	0.11

Material Cost**	\$0.74
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.10
Q Burden	\$0.01
SG&A	\$0.11
Manufacturing Cost*	\$0.95



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Bracket, Bracket Asm

## Bracket Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	9.00	1	0.25	20.00	GER	\$0.05	99.99%	\$0.00
Deburr	9.00	1	0.25	12.36	GER	\$0.03	99.99%	\$0.00
200 Ton Stamping Press	1.71	1	0.25	39.32	GER	\$0.02	99.99%	\$0.00

## Bracket Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Bracket	1	Aluminum 3003-O - Coil Stock	\$4.08	0.1128	0.1820	\$0.00	\$0.74



\...  
 \Cabin Heater Coolant Reservoir Asm  
 \Bracket Asm, Cabin Heater Coolant Reservoir Asm  
 \Assemble Bracket Asm

## Process Summary

<b>Right First Time</b>	<b>99.88 %</b>
<b>Process Time (Sec)</b>	<b>51.18</b>
<b>Total Weight (kg)</b>	<b>0.00</b>

<b>Material Cost**</b>	<b>\$0.23</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.47</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.08</b>
<b>Manufacturing Cost*</b>	<b>\$0.80</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Bracket Asm



## Assemble Bracket Asm

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Cure Paint	32.57	1	0.25	17.08	GER	\$0.15	99.97 %	\$0.01
Dip Painting Line	4.41	1	0.25	143.33	GER	\$0.18	99.99 %	\$0.00
Supplier Projection Welding Station	14.20	1	0.25	36.19	GER	\$0.14	99.93 %	\$0.01

## Assemble Bracket Asm

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost	
Material, Paint	1	Paint - Basecoat		By Area	0.0000	-	\$0.00	\$0.13
M6x7mm-Flanged Nut	2	Commodity Item		Purchased	0.0020	-	\$0.05	\$0.00



# Reservoir Asm, Cabin Heater Coolant Reservoir Asm



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\HVAC

\Cabin Heater Coolant Reservoir Asm

\Reservoir Asm, Cabin Heater Coolant Reservoir Asm

## Assembly Summary

<b>Parts</b>	<b>17</b>
<b>Fasteners</b>	<b>4</b>
<b>Part Numbers</b>	<b>16</b>
<b>Steps</b>	<b>67</b>
<b>Fastenings</b>	<b>19</b>
<b>Right First Time</b>	<b>99.05 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>3.13</b>
<b>Total Weight (kg)</b>	<b>0.63</b>

<b>Material Cost**</b>	<b>\$4.60</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$2.59</b>
<b>Q Burden</b>	<b>\$0.14</b>
<b>SG&amp;A</b>	<b>\$0.68</b>
<b>Manufacturing Cost*</b>	<b>\$8.01</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Reservoir Asm, Cabin Heater Coolant Reservoir Asm



## Reservoir Asm, Cabin Heater Coolant Reservoir Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Coolant Reservoir Asm, Reservoir Asm	1	4	3	19	3	99.69 %	0.00	0.00	0.62	0.39	0.2983
Coolant Hose 1 Asm, Reservoir Asm	1	7	4	16	4	99.75 %	0.00	0.00	0.62	0.11	0.1592
Coolant Hose 2 Asm, Reservoir Asm	1	5	6	18	6	99.76 %	0.00	0.00	0.80	0.14	0.1667
Assemble Reservoir	1	1	6	11	6	99.85 %	0.00	0.00	0.47	0.00	0.0104

## Reservoir Asm, Cabin Heater Coolant Reservoir Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Coolant Reservoir Asm, Reservoir Asm	\$2.00	\$1.09	\$0.00	\$0.00	\$0.49	\$0.20	\$0.05	\$0.29	\$4.11
Coolant Hose 1 Asm, Reservoir Asm	\$0.25	\$0.42	\$0.00	\$0.00	\$0.56	\$0.10	\$0.04	\$0.15	\$1.51
Coolant Hose 2 Asm, Reservoir Asm	\$0.28	\$0.51	\$0.00	\$0.00	\$0.72	\$0.10	\$0.04	\$0.18	\$1.83
Assemble Reservoir	\$0.05	\$0.00	\$0.00	\$0.00	\$0.42	\$0.00	\$0.02	\$0.06	\$0.55

## Detailed Summary

<b>Parts</b>	<b>17</b>
<b>Fasteners</b>	<b>4</b>
<b>Part Numbers</b>	<b>16</b>
<b>Steps</b>	<b>67</b>
<b>Fastenings</b>	<b>19</b>
<b>Right First Time</b>	<b>99.05%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>2.50</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.63</b>
<b>Total Weight (kg)</b>	<b>0.63</b>
<b>Purchased Part Cost</b>	<b>\$2.58</b>
<b>Material Cost</b>	<b>\$2.02</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$2.19</b>
<b>Supplier Fab. Cost</b>	<b>\$0.40</b>
<b>Q Burden</b>	<b>\$0.14</b>
<b>SG&amp;A</b>	<b>\$0.68</b>
<b>Manufacturing Cost*</b>	<b>\$8.01</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Coolant Reservoir Asm, Reservoir Asm



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\Cabin Heater Coolant Reservoir Asm

\Reservoir Asm, Cabin Heater Coolant Reservoir Asm

\Coolant Reservoir Asm, Reservoir Asm

## Assembly Summary

<b>Parts</b>	<b>4</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>4</b>
<b>Steps</b>	<b>19</b>
<b>Fastenings</b>	<b>3</b>
<b>Right First Time</b>	<b>99.69 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>1.01</b>
<b>Total Weight (kg)</b>	<b>0.30</b>

<b>Material Cost**</b>	<b>\$3.09</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.69</b>
<b>Q Burden</b>	<b>\$0.05</b>
<b>SG&amp;A</b>	<b>\$0.29</b>
<b>Manufacturing Cost*</b>	<b>\$4.11</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Coolant Reservoir Asm, Reservoir Asm



## Coolant Reservoir Asm, Reservoir Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Upper Housing, Coolant Reservoir Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.08	0.0627
Lower Housing, Coolant Reservoir Asm	1	2	1	8	1	99.92 %	0.00	0.00	0.15	0.31	0.1956
Assemble Coolant Reservoir	1	1	2	8	2	99.78 %	0.00	0.00	0.47	0.00	0.0400

## Coolant Reservoir Asm, Reservoir Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Upper Housing, Coolant Reservoir Asm	\$0.00	\$0.26	\$0.00	\$0.00	\$0.00	\$0.05	\$0.00	\$0.04	\$0.35
Lower Housing, Coolant Reservoir Asm	\$0.00	\$0.83	\$0.00	\$0.00	\$0.14	\$0.15	\$0.01	\$0.14	\$1.27
Assemble Coolant Reservoir	\$2.00	\$0.00	\$0.00	\$0.00	\$0.35	\$0.00	\$0.03	\$0.11	\$2.49

## Detailed Summary

<b>Parts</b>	<b>4</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>4</b>
<b>Steps</b>	<b>19</b>
<b>Fastenings</b>	<b>3</b>
<b>Right First Time</b>	<b>99.69%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.62</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.39</b>
<b>Total Weight (kg)</b>	<b>0.30</b>
<hr/>	
<b>Purchased Part Cost</b>	<b>\$2.00</b>
<b>Material Cost</b>	<b>\$1.09</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.49</b>
<b>Supplier Fab. Cost</b>	<b>\$0.20</b>
<b>Q Burden</b>	<b>\$0.05</b>
<b>SG&amp;A</b>	<b>\$0.29</b>
<b>Manufacturing Cost*</b>	<b>\$4.11</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Upper Housing, Coolant Reservoir Asm



\...

- \Coolant Reservoir Asm, Reservoir Asm
- \Upper Housing, Coolant Reservoir Asm
- \Upper Housing Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	4.64
Total Weight (kg)	0.06

Material Cost**	\$0.26
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.05
Q Burden	\$0.00
SG&A	\$0.04
Manufacturing Cost*	\$0.35

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Upper Housing, Coolant Reservoir Asm



## Upper Housing Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
300 Ton Injection Molding Press	27.84	6	0.25	39.50	GER	\$0.05	99.99%	\$0.00

## Upper Housing Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Upper Housing	1	PA66 GF30	\$3.95	0.0627	0.0667	\$0.00	\$0.26



# Lower Housing, Coolant Reservoir Asm



- \...
- \Reservoir Asm, Cabin Heater Coolant Reservoir Asm
- \Coolant Reservoir Asm, Reservoir Asm
- \Lower Housing, Coolant Reservoir Asm

## Assembly Summary

<b>Parts</b>	<b>2</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>2</b>
<b>Steps</b>	<b>8</b>
<b>Fastenings</b>	<b>1</b>
<b>Right First Time</b>	<b>99.92 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>0.46</b>
<b>Total Weight (kg)</b>	<b>0.20</b>

<b>Material Cost**</b>	<b>\$0.83</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.28</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.14</b>
<b>Manufacturing Cost*</b>	<b>\$1.27</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Lower Housing, Coolant Reservoir Asm



**MUNRO**  
& ASSOCIATES, INC.

## Lower Housing, Coolant Reservoir Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Coolant Level Indicator, Lower Housing Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.08	0.0263
Lower Housing, Lower Housing Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.24	0.1693
Assemble Lower Housing	1	0	1	4	1	99.94 %	0.00	0.00	0.15	0.00	0.0000

## Lower Housing, Coolant Reservoir Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Coolant Level Indicator, Lower Housing Asm	\$0.00	\$0.12	\$0.00	\$0.00	\$0.00	\$0.04	\$0.00	\$0.02	\$0.18
Lower Housing, Lower Housing Asm	\$0.00	\$0.71	\$0.00	\$0.00	\$0.00	\$0.11	\$0.00	\$0.11	\$0.93
Assemble Lower Housing	\$0.00	\$0.00	\$0.00	\$0.00	\$0.14	\$0.00	\$0.01	\$0.02	\$0.16

## Detailed Summary

<b>Parts</b>	<b>2</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>2</b>
<b>Steps</b>	<b>8</b>
<b>Fastenings</b>	<b>1</b>
<b>Right First Time</b>	<b>99.92%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.15</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.31</b>
<b>Total Weight (kg)</b>	<b>0.20</b>
<hr/>	
<b>Purchased Part Cost</b>	<b>\$0.00</b>
<b>Material Cost</b>	<b>\$0.83</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.14</b>
<b>Supplier Fab. Cost</b>	<b>\$0.15</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.14</b>
<b>Manufacturing Cost*</b>	<b>\$1.27</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Coolant Level Indicator, Lower Housing Asm



\...

- \Lower Housing, Coolant Reservoir Asm
- \Coolant Level Indicator, Lower Housing Asm
- \Coolant Level Indicator Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	4.54
Total Weight (kg)	0.03
Material Cost**	\$0.12
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.04
Q Burden	\$0.00
SG&A	\$0.02
Manufacturing Cost*	\$0.18

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Coolant Level Indicator, Lower Housing Asm



## Coolant Level Indicator Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
150 Ton Injection Molding Press	27.24	6	0.25	27.82	GER	\$0.04	99.99%	\$0.00

## Coolant Level Indicator Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Coolant Level Indicator	1	PA66	\$4.15	0.0263	0.0281	\$0.00	\$0.12

# Lower Housing, Lower Housing Asm



\...

- \Lower Housing, Coolant Reservoir Asm
- \Lower Housing, Lower Housing Asm
- \Lower Housing Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	14.30
Total Weight (kg)	0.17

Material Cost**	\$0.71
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.11
Q Burden	\$0.00
SG&A	\$0.11
Manufacturing Cost*	\$0.93

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Lower Housing, Lower Housing Asm



## Lower Housing Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
150 Ton Injection Molding Press	28.60	2	0.25	27.82	GER	\$0.11	99.99%	\$0.00

## Lower Housing Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Lower Housing	1	PA66 GF30	\$3.95	0.1693	0.1801	\$0.00	\$0.71

## No Commodity Items Required for This Process



- \...
- \Coolant Reservoir Asm, Reservoir Asm
- \Lower Housing, Coolant Reservoir Asm
- \Assemble Lower Housing

### Process Summary

<b>Right First Time</b>	<b>99.94 %</b>
<b>Process Time (Sec)</b>	<b>9.00</b>
<b>Total Weight (kg)</b>	<b>0.00</b>
<b>Material Cost**</b>	<b>\$0.00</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.14</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.02</b>
<b>Manufacturing Cost*</b>	<b>\$0.16</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Assemble Lower Housing



## Assemble Lower Housing

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	9.00	1	1.00	54.32	GER	\$0.14	99.94%	\$0.01

## Assemble Lower Housing

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Assemble Coolant Reservoir



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- \Reservoir Asm, Cabin Heater Coolant Reservoir Asm
- \Coolant Reservoir Asm, Reservoir Asm
- \Assemble Coolant Reservoir

## Process Summary

<b>Right First Time</b>	<b>99.78 %</b>
<b>Process Time (Sec)</b>	<b>28.00</b>
<b>Total Weight (kg)</b>	<b>0.04</b>

<b>Material Cost**</b>	<b>\$2.00</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.35</b>
<b>Q Burden</b>	<b>\$0.03</b>
<b>SG&amp;A</b>	<b>\$0.11</b>
<b>Manufacturing Cost*</b>	<b>\$2.49</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Coolant Reservoir



## Assemble Coolant Reservoir

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	19.00	1	1.00	54.32	GER	\$0.29	99.82 %	\$0.03
Supplier Vibration Welding	9.00	1	0.25	27.26	GER	\$0.07	99.97 %	\$0.01

## Assemble Coolant Reservoir

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Coolant Cap	1	Commodity Item	Purchased	0.0400	-	\$2.00	\$0.00

# Coolant Hose 1 Asm, Reservoir Asm



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\Cabin Heater Coolant Reservoir Asm

\Reservoir Asm, Cabin Heater Coolant Reservoir Asm

\Coolant Hose 1 Asm, Reservoir Asm

## Assembly Summary

<b>Parts</b>	<b>7</b>
<b>Fasteners</b>	<b>2</b>
<b>Part Numbers</b>	<b>7</b>
<b>Steps</b>	<b>16</b>
<b>Fastenings</b>	<b>4</b>
<b>Right First Time</b>	<b>99.75 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>0.72</b>
<b>Total Weight (kg)</b>	<b>0.16</b>

<b>Material Cost**</b>	<b>\$0.67</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.66</b>
<b>Q Burden</b>	<b>\$0.04</b>
<b>SG&amp;A</b>	<b>\$0.15</b>
<b>Manufacturing Cost*</b>	<b>\$1.51</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Coolant Hose 1 Asm, Reservoir Asm



## Coolant Hose 1 Asm, Reservoir Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Hose, Coolant Hose 1 Asm	1	3	0	3	0	99.97 %	0.00	0.00	0.00	0.11	0.1014
Assemble Coolant Hose	1	4	4	12	4	99.78 %	0.00	0.00	0.62	0.00	0.0578

## Coolant Hose 1 Asm, Reservoir Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Hose, Coolant Hose 1 Asm	\$0.00	\$0.42	\$0.00	\$0.00	\$0.00	\$0.10	\$0.00	\$0.07	\$0.59
Assemble Coolant Hose	\$0.25	\$0.00	\$0.00	\$0.00	\$0.56	\$0.00	\$0.03	\$0.08	\$0.92

## Detailed Summary

<b>Parts</b>	<b>7</b>
<b>Fasteners</b>	<b>2</b>
<b>Part Numbers</b>	<b>7</b>
<b>Steps</b>	<b>16</b>
<b>Fastenings</b>	<b>4</b>
<b>Right First Time</b>	<b>99.75%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.62</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.11</b>
<b>Total Weight (kg)</b>	<b>0.16</b>
<b>Purchased Part Cost</b>	<b>\$0.25</b>
<b>Material Cost</b>	<b>\$0.42</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.56</b>
<b>Supplier Fab. Cost</b>	<b>\$0.10</b>
<b>Q Burden</b>	<b>\$0.04</b>
<b>SG&amp;A</b>	<b>\$0.15</b>
<b>Manufacturing Cost*</b>	<b>\$1.51</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Hose, Coolant Hose 1 Asm



\...

\Coolant Hose 1 Asm, Reservoir Asm  
\Hose, Coolant Hose 1 Asm  
\Hose Process

## Process Summary

<b>Right First Time</b>	<b>99.97 %</b>
<b>Process Time (Sec)</b>	<b>6.34</b>
<b>Total Weight (kg)</b>	<b>0.10</b>

<b>Material Cost**</b>	<b>\$0.42</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.10</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.07</b>
<b>Manufacturing Cost*</b>	<b>\$0.59</b>



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Hose, Coolant Hose 1 Asm

## Hose Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Extrude: 32mm, 2 Layer	6.34	1	0.50	55.79	GER	\$0.10	99.97%	\$0.00

## Hose Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material 1, Hose	1	EPDM (Extrusion Grade)	\$4.43	0.0394	0.0394	\$0.00	\$0.17
Material 2, Hose	1	EPDM (Extrusion Grade)	\$4.43	0.0543	0.0543	\$0.00	\$0.24
Material 3, Hose	1	PA Thread w/PVC Coating	By Area	0.0077	-	\$0.00	\$0.01



# Assemble Coolant Hose



\...  
 \Reservoir Asm, Cabin Heater Coolant Reservoir Asm  
 \Coolant Hose 1 Asm, Reservoir Asm  
 \Assemble Coolant Hose

## Process Summary

<b>Right First Time</b>	<b>99.78 %</b>
<b>Process Time (Sec)</b>	<b>37.00</b>
<b>Total Weight (kg)</b>	<b>0.06</b>

<b>Material Cost**</b>	<b>\$0.25</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.56</b>
<b>Q Burden</b>	<b>\$0.03</b>
<b>SG&amp;A</b>	<b>\$0.08</b>
<b>Manufacturing Cost*</b>	<b>\$0.92</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Coolant Hose



## Assemble Coolant Hose

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	37.00	1	1.00	54.32	GER	\$0.56	99.78 %	\$0.03

## Assemble Coolant Hose

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
90 Degree Connector	1	Commodity Item	Purchased	0.0312	-	\$0.14	\$0.00
30mm Locking Hose Clamp	1	Commodity Item	Purchased	0.0066	-	\$0.05	\$0.00
Straight Hose Connector	1	Commodity Item	Purchased	0.0164	-	\$0.02	\$0.00
23mm Locking Hose Clamp	1	Commodity Item	Purchased	0.0036	-	\$0.04	\$0.00

# Coolant Hose 2 Asm, Reservoir Asm



\...

\Cabin Heater Coolant Reservoir Asm

\Reservoir Asm, Cabin Heater Coolant Reservoir Asm

\Coolant Hose 2 Asm, Reservoir Asm

## Assembly Summary

<b>Parts</b>	<b>5</b>
<b>Fasteners</b>	<b>2</b>
<b>Part Numbers</b>	<b>5</b>
<b>Steps</b>	<b>18</b>
<b>Fastenings</b>	<b>6</b>
<b>Right First Time</b>	<b>99.76 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>0.93</b>
<b>Total Weight (kg)</b>	<b>0.17</b>

<b>Material Cost**</b>	<b>\$0.79</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.83</b>
<b>Q Burden</b>	<b>\$0.04</b>
<b>SG&amp;A</b>	<b>\$0.18</b>
<b>Manufacturing Cost*</b>	<b>\$1.83</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Coolant Hose 2 Asm, Reservoir Asm



## Coolant Hose 2 Asm, Reservoir Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Hose, Coolant Hose 2 Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.14	0.1148
Assemble Hose	1	4	6	16	6	99.77 %	0.00	0.00	0.80	0.00	0.0519

## Coolant Hose 2 Asm, Reservoir Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Hose, Coolant Hose 2 Asm	\$0.00	\$0.51	\$0.00	\$0.00	\$0.00	\$0.10	\$0.00	\$0.08	\$0.69
Assemble Hose	\$0.28	\$0.00	\$0.00	\$0.00	\$0.72	\$0.00	\$0.04	\$0.10	\$1.14

## Detailed Summary

<b>Parts</b>	<b>5</b>
<b>Fasteners</b>	<b>2</b>
<b>Part Numbers</b>	<b>5</b>
<b>Steps</b>	<b>18</b>
<b>Fastenings</b>	<b>6</b>
<b>Right First Time</b>	<b>99.76%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.80</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.14</b>
<b>Total Weight (kg)</b>	<b>0.17</b>
<b>Purchased Part Cost</b>	<b>\$0.28</b>
<b>Material Cost</b>	<b>\$0.51</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.72</b>
<b>Supplier Fab. Cost</b>	<b>\$0.10</b>
<b>Q Burden</b>	<b>\$0.04</b>
<b>SG&amp;A</b>	<b>\$0.18</b>
<b>Manufacturing Cost*</b>	<b>\$1.83</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Hose, Coolant Hose 2 Asm



\...

\Coolant Hose 2 Asm, Reservoir Asm

\Hose, Coolant Hose 2 Asm

\Hose Process

## Process Summary

<b>Right First Time</b>	<b>99.99 %</b>
<b>Process Time (Sec)</b>	<b>8.16</b>
<b>Total Weight (kg)</b>	<b>0.11</b>

<b>Material Cost**</b>	<b>\$0.51</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.10</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.08</b>
<b>Manufacturing Cost*</b>	<b>\$0.69</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Hose, Coolant Hose 2 Asm



## Hose Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Extrude: 32mm, 1 Layer	8.16	1	0.50	45.66	GER	\$0.10	99.99%	\$0.00

## Hose Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Hose	1	EPDM (Extrusion Grade)	\$4.43	0.1148	0.1148	\$0.00	\$0.51

# Assemble Hose



\...  
 \Reservoir Asm, Cabin Heater Coolant Reservoir Asm  
 \Coolant Hose 2 Asm, Reservoir Asm  
 \Assemble Hose

## Process Summary

Right First Time	99.77 %
Process Time (Sec)	47.85
Total Weight (kg)	0.05

Material Cost**	\$0.28
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.72
Q Burden	\$0.04
SG&A	\$0.10
Manufacturing Cost*	\$1.14

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Assemble Hose



## Assemble Hose

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	47.85	1	1.00	54.32	GER	\$0.72	99.77%	\$0.04

## Assemble Hose

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Hose Sleeve	1	Commodity Item	Purchased	0.0039	-	\$0.01	\$0.00
45 Degree Hose Connector	1	Commodity Item	Purchased	0.0288	-	\$0.10	\$0.00
30mm Locking Hose Clamp	1	Commodity Item	Purchased	0.0066	-	\$0.05	\$0.00
25mm Hose Clamp	1	Commodity Item	Purchased	0.0126	-	\$0.12	\$0.00

# Assemble Reservoir



\...  
 \Cabin Heater Coolant Reservoir Asm  
 \Reservoir Asm, Cabin Heater Coolant Reservoir Asm  
 \Assemble Reservoir

## Process Summary

<b>Right First Time</b>	<b>99.85 %</b>
<b>Process Time (Sec)</b>	<b>28.00</b>
<b>Total Weight (kg)</b>	<b>0.01</b>

<b>Material Cost**</b>	<b>\$0.05</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.42</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.06</b>
<b>Manufacturing Cost*</b>	<b>\$0.55</b>



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Reservoir



## Assemble Reservoir

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	28.00	1	1.00	54.32	GER	\$0.42	99.85%	\$0.02

## Assemble Reservoir

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Coolant Path Plug	1	Commodity Item	Purchased	0.0104	-	\$0.05	\$0.00

# Assemble Cabin Heater Coolant Reservoir



\...

\HVAC

\Cabin Heater Coolant Reservoir Asm

\Assemble Cabin Heater Coolant Reservoir

## Process Summary

Right First Time	99.52 %
Process Time (Sec)	36.00
Total Weight (kg)	0.02

Material Cost**	\$0.08
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.54
Q Burden	\$0.07
SG&A	\$0.07
Manufacturing Cost*	\$0.77



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Cabin Heater Coolant Reservoir



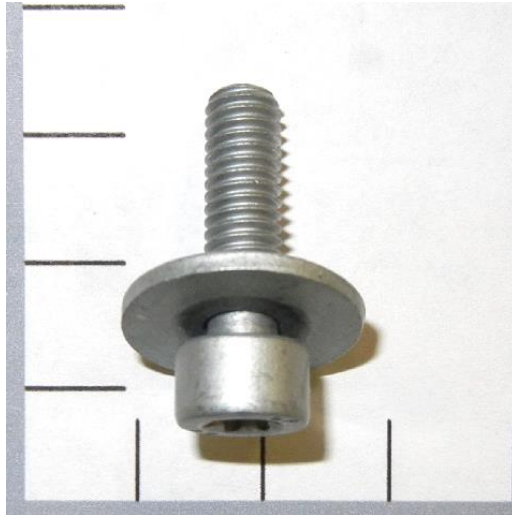
## Assemble Cabin Heater Coolant Reservoir

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	36.00	1	1.00	54.32	GER	\$0.54	99.52 %	\$0.07

## Assemble Cabin Heater Coolant Reservoir

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
M6x18mm-Torx SEMS Bolt	2	Commodity Item	Purchased	0.0092	-	\$0.04	\$0.00

# Cabin Heater Coolant Reservoir Installation



\...  
\Zone 6 Cooling Pack & HVAC  
\HVAC  
\Cabin Heater Coolant Reservoir Installation

## Process Summary

Right First Time	99.57 %
Process Time (Sec)	33.00
Total Weight (kg)	0.02

Material Cost**	\$0.08
OEM Process Cost	\$0.84
Supplier Process Cost	\$0.00
Q Burden	\$0.06
SG&A	\$0.11
Manufacturing Cost*	\$1.09



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Cabin Heater Coolant Reservoir Installation



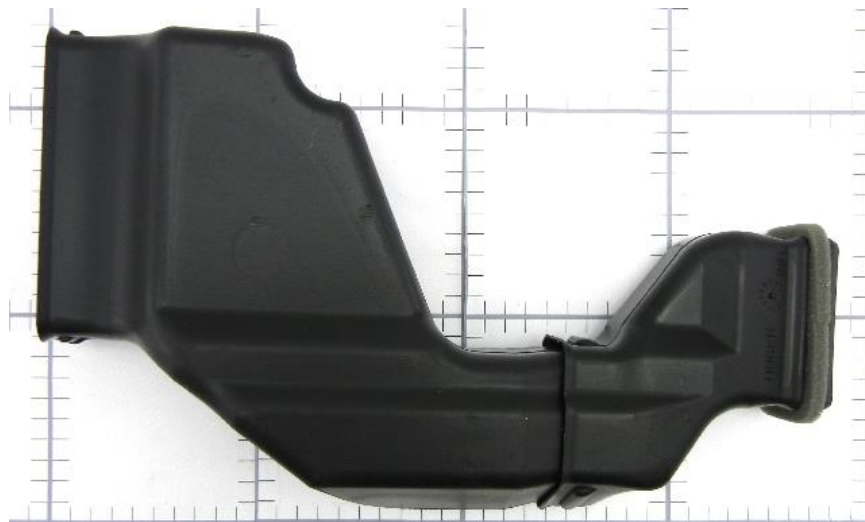
## Cabin Heater Coolant Reservoir Installation

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
OEM Manual Asm	33.00	1	1.00	91.41	GER	\$0.84	99.57%	\$0.06

## Cabin Heater Coolant Reservoir Installation

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
M6x18mm-Socket Head SEMS Torx Screw	2	Commodity Item	Purchased	0.0092	-	\$0.04	\$0.00

# Ext HVAC Duct Asm



\...  
 \Zone 6 Cooling Pack & HVAC  
 \HVAC  
 \Ext HVAC Duct Asm

## Assembly Summary

<b>Parts</b>	<b>3</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>15</b>
<b>Fastenings</b>	<b>3</b>
<b>Right First Time</b>	<b>99.85 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>1.56</b>
<b>Total Weight (kg)</b>	<b>0.18</b>

<b>Material Cost**</b>	<b>\$0.53</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$3.26</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.49</b>
<b>Manufacturing Cost*</b>	<b>\$4.31</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Ext HVAC Duct Asm



## Ext HVAC Duct Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Outlet Duct Asm, Ext HVAC Duct Asm	1	2	2	8	2	99.92 %	0.00	0.00	0.30	0.54	0.0422
Inlet Duct, Ext HVAC Duct Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.57	0.1343
Assemble Ext HVAC Duct	1	0	1	4	1	99.94 %	0.00	0.00	0.15	0.00	0.0000

## Ext HVAC Duct Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Outlet Duct Asm, Ext HVAC Duct Asm	\$0.01	\$0.13	\$0.00	\$0.00	\$0.27	\$1.39	\$0.01	\$0.23	\$2.05
Inlet Duct, Ext HVAC Duct Asm	\$0.00	\$0.39	\$0.00	\$0.00	\$0.00	\$1.47	\$0.00	\$0.24	\$2.10
Assemble Ext HVAC Duct	\$0.00	\$0.00	\$0.00	\$0.00	\$0.14	\$0.00	\$0.01	\$0.02	\$0.16

## Detailed Summary

<b>Parts</b>	<b>3</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>15</b>
<b>Fastenings</b>	<b>3</b>
<b>Right First Time</b>	<b>99.85%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.45</b>
<b>Supplier Fab. Time (Min)</b>	<b>1.11</b>
<b>Total Weight (kg)</b>	<b>0.18</b>
<b>Purchased Part Cost</b>	<b>\$0.01</b>
<b>Material Cost</b>	<b>\$0.52</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.41</b>
<b>Supplier Fab. Cost</b>	<b>\$2.85</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.49</b>
<b>Manufacturing Cost*</b>	<b>\$4.31</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Outlet Duct Asm, Ext HVAC Duct Asm



\...  
 \HVAC  
 \Ext HVAC Duct Asm  
 \Outlet Duct Asm, Ext HVAC Duct Asm  
**Assembly Summary**

<b>Parts</b>	<b>2</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>2</b>
<b>Steps</b>	<b>8</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.92 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>0.84</b>
<b>Total Weight (kg)</b>	<b>0.04</b>

<b>Material Cost**</b>	<b>\$0.14</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$1.66</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.23</b>
<b>Manufacturing Cost*</b>	<b>\$2.05</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Outlet Duct Asm, Ext HVAC Duct Asm



## Outlet Duct Asm, Ext HVAC Duct Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Duct, Outlet Duct Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.54	0.0418
Assemble Outlet Duct Asm	1	1	2	6	2	99.93 %	0.00	0.00	0.30	0.00	0.0004

## Outlet Duct Asm, Ext HVAC Duct Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Duct, Outlet Duct Asm	\$0.00	\$0.13	\$0.00	\$0.00	\$0.00	\$1.39	\$0.00	\$0.20	\$1.72
Assemble Outlet Duct Asm	\$0.01	\$0.00	\$0.00	\$0.00	\$0.27	\$0.00	\$0.01	\$0.04	\$0.33

## Detailed Summary

<b>Parts</b>	<b>2</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>2</b>
<b>Steps</b>	<b>8</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.92%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.30</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.54</b>
<b>Total Weight (kg)</b>	<b>0.04</b>
<b>Purchased Part Cost</b>	<b>\$0.01</b>
<b>Material Cost</b>	<b>\$0.13</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.27</b>
<b>Supplier Fab. Cost</b>	<b>\$1.39</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.23</b>
<b>Manufacturing Cost*</b>	<b>\$2.05</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Duct, Outlet Duct Asm



\...  
\Outlet Duct Asm, Ext HVAC Duct Asm  
\Duct, Outlet Duct Asm  
\Duct Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	32.22
Total Weight (kg)	0.04

Material Cost**	\$0.13
OEM Process Cost	\$0.00
Supplier Process Cost	\$1.39
Q Burden	\$0.00
SG&A	\$0.20
Manufacturing Cost*	\$1.72

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Duct, Outlet Duct Asm



## Duct Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
45Ton Blow Molding Press	32.22	1	0.25	154.97	GER	\$1.39	99.99%	\$0.00

## Duct Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Duct	1	PP (Blow Mold Grade)	\$2.58	0.0418	0.0500	\$0.00	\$0.13

# Assemble Outlet Duct Asm



\...

- \Ext HVAC Duct Asm
- \Outlet Duct Asm, Ext HVAC Duct Asm
- \Assemble Outlet Duct Asm

## Process Summary

Right First Time	99.93 %
Process Time (Sec)	18.10
Total Weight (kg)	0.00

Material Cost**	\$0.01
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.27
Q Burden	\$0.01
SG&A	\$0.04
Manufacturing Cost*	\$0.33

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Assemble Outlet Duct Asm



## Assemble Outlet Duct Asm

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	18.10	1	1.00	54.32	GER	\$0.27	99.93%	\$0.01

## Assemble Outlet Duct Asm

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Outlet Foam Seal	1	Commodity Item	Purchased	0.0004	-	\$0.01	\$0.00

# Inlet Duct, Ext HVAC Duct Asm



\...

- \Ext HVAC Duct Asm
- \Inlet Duct, Ext HVAC Duct Asm
- \Inlet Duct Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	34.10
Total Weight (kg)	0.13

Material Cost**	\$0.39
OEM Process Cost	\$0.00
Supplier Process Cost	\$1.47
Q Burden	\$0.00
SG&A	\$0.24
Manufacturing Cost*	\$2.10

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Inlet Duct, Ext HVAC Duct Asm



## Inlet Duct Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
45Ton Blow Molding Press	34.10	1	0.25	154.97	GER	\$1.47	99.99%	\$0.00

## Inlet Duct Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Inlet Duct	1	PP (Blow Mold Grade)	\$2.58	0.1343	0.1500	\$0.00	\$0.39

No Commodity Items  
Required for This  
Process



\...  
\HVAC  
\Ext HVAC Duct Asm  
\Assemble Ext HVAC Duct

## Process Summary

Right First Time	99.94 %
Process Time (Sec)	9.00
Total Weight (kg)	0.00

Material Cost**	\$0.00
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.14
Q Burden	\$0.01
SG&A	\$0.02
Manufacturing Cost*	\$0.16

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Ext HVAC Duct



## Assemble Ext HVAC Duct

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	9.00	1	1.00	54.32	GER	\$0.14	99.94%	\$0.01

## Assemble Ext HVAC Duct

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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## No Commodity Items Required for This Process



\...  
\Zone 6 Cooling Pack & HVAC  
\HVAC  
\Ext HVAC Duct Installation

### Process Summary

Right First Time	99.97 %
Process Time (Sec)	5.00
Total Weight (kg)	0.00

Material Cost**	\$0.00
OEM Process Cost	\$0.13
Supplier Process Cost	\$0.00
Q Burden	\$0.00
SG&A	\$0.02
Manufacturing Cost*	\$0.15

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Ext HVAC Duct Installation



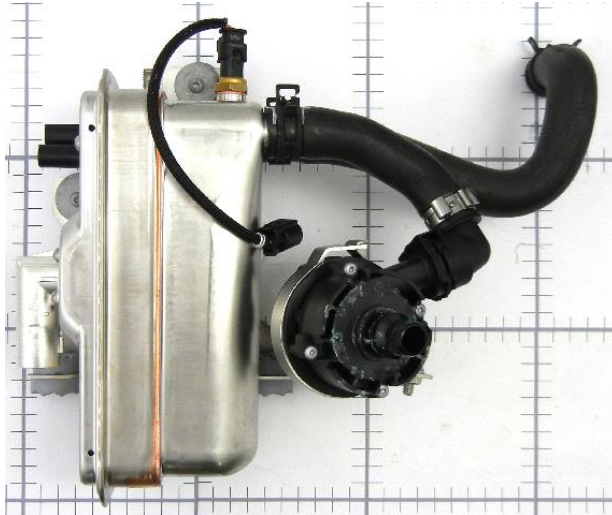
## Ext HVAC Duct Installation

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
OEM Manual Asm	5.00	1	1.00	91.41	GER	\$0.13	99.97%	\$0.00

## Ext HVAC Duct Installation

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Heat Exchanger Asm



\...  
 \Zone 6 Cooling Pack & HVAC  
 \HVAC  
 \Heat Exchanger Asm

## Assembly Summary

<b>Parts</b>	<b>83</b>
<b>Fasteners</b>	<b>36</b>
<b>Part Numbers</b>	<b>48</b>
<b>Steps</b>	<b>427</b>
<b>Fastenings</b>	<b>115</b>
<b>Right First Time</b>	<b>91.33 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>16.35</b>
<b>Total Weight (kg)</b>	<b>2.38</b>

<b>Material Cost**</b>	<b>\$105.53</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$12.13</b>
<b>Q Burden</b>	<b>\$1.36</b>
<b>SG&amp;A</b>	<b>\$5.54</b>
<b>Manufacturing Cost*</b>	<b>\$124.56</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Heat Exchanger Asm



## Heat Exchanger Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Exchanger Asm, Heat Exchanger Asm	1	54	83	316	83	93.49 %	0.00	0.00	8.98	2.79	1.5499
Bracket Asm, HeatExchanger Asm	1	11	11	48	11	99.45 %	0.00	0.00	1.33	0.49	0.6166
Assemble Exchanger and Bracket	1	4	4	11	4	99.14 %	0.00	0.00	0.90	0.00	0.0160
Input Coolant HoseAsm, Heat Exchanger Asm	1	6	5	16	5	99.84 %	0.00	0.00	0.55	0.04	0.0692
Assemble Input CoolantHose	1	0	3	5	3	99.88 %	0.00	0.00	0.20	0.00	0.0000
Coolant Outlet HoseAsm, Heat Exchanger Asm	1	5	4	14	4	99.85 %	0.00	0.00	0.35	0.04	0.1055
Assemble Outlet CoolantHose	1	3	5	13	5	99.52 %	0.00	0.00	0.68	0.00	0.0254

## Heat Exchanger Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Exchanger Asm, Heat Exchanger Asm	\$54.38	\$4.96	\$0.00	\$0.00	\$7.21	\$1.09	\$1.01	\$3.36	\$72.00
Bracket Asm, HeatExchanger Asm	\$40.13	\$1.59	\$0.00	\$0.00	\$1.16	\$0.17	\$0.08	\$1.58	\$44.71
Assemble Exchanger and Bracket	\$0.04	\$0.00	\$0.00	\$0.00	\$0.81	\$0.00	\$0.13	\$0.11	\$1.09
Input Coolant HoseAsm, Heat Exchanger Asm	\$0.25	\$0.15	\$0.00	\$0.00	\$0.50	\$0.04	\$0.02	\$0.10	\$1.06
Assemble Input CoolantHose	\$0.00	\$0.00	\$0.00	\$0.00	\$0.18	\$0.00	\$0.02	\$0.02	\$0.22
Coolant Outlet HoseAsm, Heat Exchanger Asm	\$0.22	\$0.37	\$0.00	\$0.00	\$0.32	\$0.04	\$0.02	\$0.10	\$1.07
Assemble Outlet CoolantHose	\$2.54	\$0.90	\$0.00	\$0.00	\$0.62	\$0.00	\$0.07	\$0.27	\$4.40

## Detailed Summary

<b>Parts</b>	<b>83</b>
<b>Fasteners</b>	<b>36</b>
<b>Part Numbers</b>	<b>48</b>
<b>Steps</b>	<b>427</b>
<b>Fastenings</b>	<b>115</b>
<b>Right First Time</b>	<b>91.33%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>12.99</b>
<b>Supplier Fab. Time (Min)</b>	<b>3.35</b>
<b>Total Weight (kg)</b>	<b>2.38</b>
<b>Purchased Part Cost</b>	
	<b>\$97.56</b>
<b>Material Cost</b>	<b>\$7.97</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$10.80</b>
<b>Supplier Fab. Cost</b>	<b>\$1.33</b>
<b>Q Burden</b>	<b>\$1.36</b>
<b>SG&amp;A</b>	<b>\$5.54</b>
<b>Manufacturing Cost*</b>	<b>\$124.56</b>

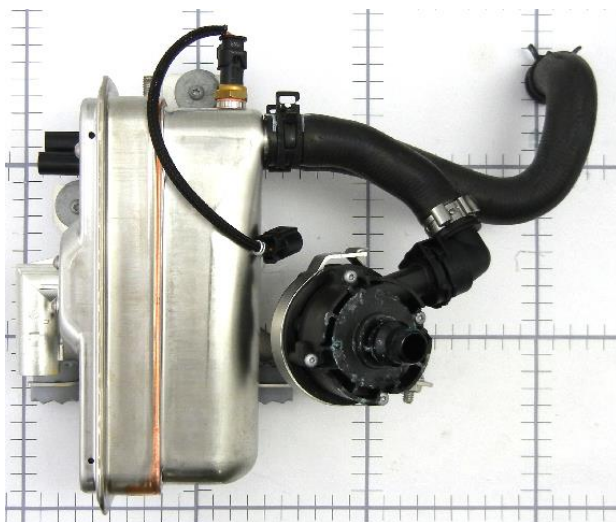
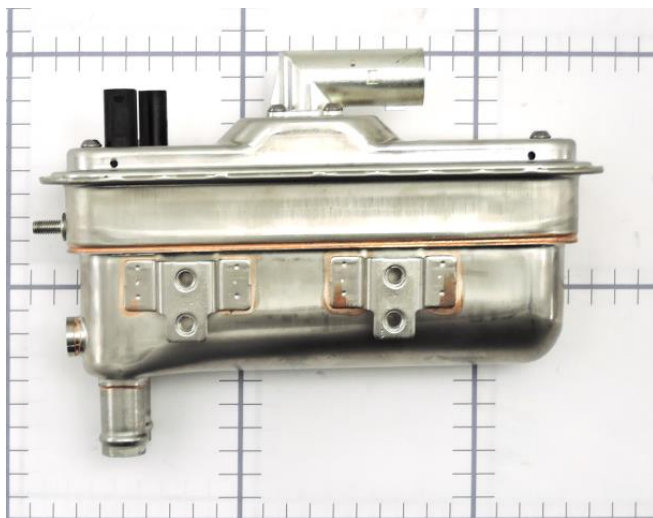
\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Exchanger Asm, Heat Exchanger Asm



**MUNRO**  
& ASSOCIATES, INC.



\...

\HVAC

\Heat Exchanger Asm

\Exchanger Asm, Heat Exchanger Asm

## Assembly Summary

<b>Parts</b>	<b>54</b>
<b>Fasteners</b>	<b>25</b>
<b>Part Numbers</b>	<b>28</b>
<b>Steps</b>	<b>316</b>
<b>Fastenings</b>	<b>83</b>
<b>Right First Time</b>	<b>93.49 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>11.77</b>
<b>Total Weight (kg)</b>	<b>1.55</b>

<b>Material Cost**</b>	<b>\$59.34</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$8.30</b>
<b>Q Burden</b>	<b>\$1.01</b>
<b>SG&amp;A</b>	<b>\$3.36</b>
<b>Manufacturing Cost*</b>	<b>\$72.00</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Exchanger Asm, Heat Exchanger Asm



## Exchanger Asm, Heat Exchanger Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Cap Asm, Exchanger Asm	1	15	14	59	14	97.96 %	0.00	0.00	2.04	0.62	0.2925
Coil Exchanger Asm, Exchanger Asm	1	39	64	243	64	95.63 %	0.00	0.00	6.40	2.18	1.2574
Assemble Exchanger	1	0	5	12	5	99.79 %	0.00	0.00	0.53	0.00	0.0000

## Exchanger Asm, Heat Exchanger Asm

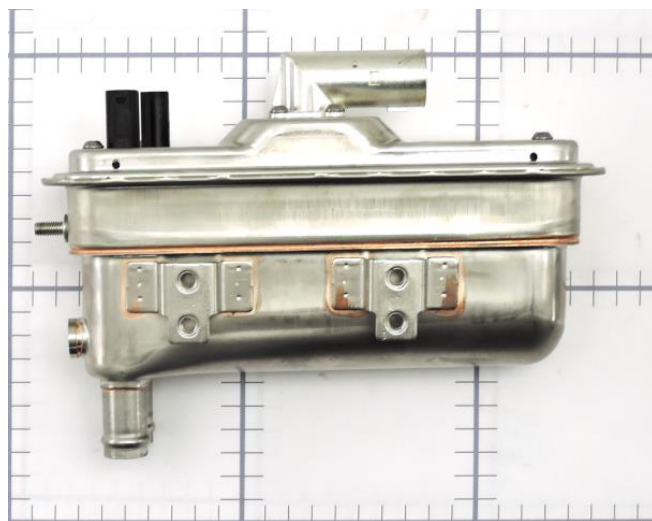
Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Cap Asm, Exchanger Asm	\$0.27	\$2.81	\$0.00	\$0.00	\$1.76	\$0.33	\$0.31	\$0.65	\$6.13
Coil Exchanger Asm, Exchanger Asm	\$54.11	\$2.15	\$0.00	\$0.00	\$4.96	\$0.75	\$0.67	\$2.65	\$65.29
Assemble Exchanger	\$0.00	\$0.00	\$0.00	\$0.00	\$0.48	\$0.00	\$0.03	\$0.06	\$0.58

## Detailed Summary

<b>Parts</b>	<b>54</b>
<b>Fasteners</b>	<b>25</b>
<b>Part Numbers</b>	<b>28</b>
<b>Steps</b>	<b>316</b>
<b>Fastenings</b>	<b>83</b>
<b>Right First Time</b>	<b>93.49%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>8.98</b>
<b>Supplier Fab. Time (Min)</b>	<b>2.79</b>
<b>Total Weight (kg)</b>	<b>1.55</b>
<b>Purchased Part Cost</b>	
	<b>\$54.38</b>
<b>Material Cost</b>	<b>\$4.96</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$7.21</b>
<b>Supplier Fab. Cost</b>	<b>\$1.09</b>
<b>Q Burden</b>	<b>\$1.01</b>
<b>SG&amp;A</b>	<b>\$3.36</b>
<b>Manufacturing Cost*</b>	<b>\$72.00</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



- \...
- \Heat Exchanger Asm
- \Exchanger Asm, Heat Exchanger Asm
- \Cap Asm, Exchanger Asm

## Assembly Summary

<b>Parts</b>	<b>15</b>
<b>Fasteners</b>	<b>7</b>
<b>Part Numbers</b>	<b>9</b>
<b>Steps</b>	<b>59</b>
<b>Fastenings</b>	<b>14</b>
<b>Right First Time</b>	<b>97.96 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>2.65</b>
<b>Total Weight (kg)</b>	<b>0.29</b>

<b>Material Cost**</b>	<b>\$3.08</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$2.10</b>
<b>Q Burden</b>	<b>\$0.31</b>
<b>SG&amp;A</b>	<b>\$0.65</b>
<b>Manufacturing Cost*</b>	<b>\$6.13</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Cap Asm, Exchanger Asm



**MUNRO**  
& ASSOCIATES, INC.

## Cap Asm, Exchanger Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Mounting Plate Asm, Cap Asm	1	3	2	8	2	99.77 %	0.00	0.00	0.17	0.12	0.0676
Cap, Cap Asm	1	1	0	7	0	99.97 %	0.00	0.00	0.00	0.31	0.1322
Assemble Cap and Mounting Plate	1	0	1	3	1	99.94 %	0.00	0.00	0.13	0.00	0.0000
Connector Asm, Cap Asm	1	3	2	16	2	99.82 %	0.00	0.00	0.47	0.19	0.0814
Assemble Connector	1	8	9	22	9	98.47 %	0.00	0.00	1.27	0.00	0.0113

## Cap Asm, Exchanger Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Mounting Plate Asm, Cap Asm	\$0.00	\$1.30	\$0.00	\$0.00	\$0.07	\$0.10	\$0.04	\$0.19	\$1.69
Cap, Cap Asm	\$0.00	\$0.68	\$0.00	\$0.00	\$0.00	\$0.09	\$0.01	\$0.10	\$0.87
Assemble Cap and Mounting Plate	\$0.00	\$0.00	\$0.00	\$0.00	\$0.12	\$0.00	\$0.01	\$0.02	\$0.15
Connector Asm, Cap Asm	\$0.03	\$0.83	\$0.00	\$0.00	\$0.42	\$0.15	\$0.03	\$0.18	\$1.65
Assemble Connector	\$0.24	\$0.00	\$0.00	\$0.00	\$1.15	\$0.00	\$0.23	\$0.16	\$1.78

## Detailed Summary

<b>Parts</b>	<b>15</b>
<b>Fasteners</b>	<b>7</b>
<b>Part Numbers</b>	<b>9</b>
<b>Steps</b>	<b>59</b>
<b>Fastenings</b>	<b>14</b>
<b>Right First Time</b>	<b>97.96%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>2.04</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.62</b>
<b>Total Weight (kg)</b>	<b>0.29</b>
<b>Purchased Part Cost</b>	
	<b>\$0.27</b>
<b>Material Cost</b>	<b>\$2.81</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$1.76</b>
<b>Supplier Fab. Cost</b>	<b>\$0.33</b>
<b>Q Burden</b>	<b>\$0.31</b>
<b>SG&amp;A</b>	<b>\$0.65</b>
<b>Manufacturing Cost*</b>	<b>\$6.13</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Mounting Plate Asm, Cap Asm



- \...
- \Exchanger Asm, Heat Exchanger Asm
- \Cap Asm, Exchanger Asm
- \Mounting Plate Asm, Cap Asm

## Assembly Summary

<b>Parts</b>	<b>3</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>8</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.77 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>0.29</b>
<b>Total Weight (kg)</b>	<b>0.07</b>

<b>Material Cost**</b>	<b>\$1.30</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.17</b>
<b>Q Burden</b>	<b>\$0.04</b>
<b>SG&amp;A</b>	<b>\$0.19</b>
<b>Manufacturing Cost*</b>	<b>\$1.69</b>

\* Excluding tooling, ER&D, logistics, and profit margin  
 \*\* Includes material cost and purchased parts cost

# Mounting Plate Asm, Cap Asm



## Mounting Plate Asm, Cap Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Plate, Mounting Plate Asm	1	2	0	2	0	99.98 %	0.00	0.00	0.00	0.12	0.0657
Assemble Mounting Plate	1	1	2	5	2	99.79 %	0.00	0.00	0.17	0.00	0.0019

## Mounting Plate Asm, Cap Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Plate, Mounting Plate Asm	\$0.00	\$0.29	\$0.00	\$0.00	\$0.00	\$0.10	\$0.00	\$0.05	\$0.44
Assemble Mounting Plate	\$0.00	\$1.01	\$0.00	\$0.00	\$0.07	\$0.00	\$0.03	\$0.14	\$1.25

## Detailed Summary

<b>Parts</b>	<b>3</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>8</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.77%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.17</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.12</b>
<b>Total Weight (kg)</b>	<b>0.07</b>
<b>Purchased Part Cost</b>	<b>\$0.00</b>
<b>Material Cost</b>	<b>\$1.30</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.07</b>
<b>Supplier Fab. Cost</b>	<b>\$0.10</b>
<b>Q Burden</b>	<b>\$0.04</b>
<b>SG&amp;A</b>	<b>\$0.19</b>
<b>Manufacturing Cost*</b>	<b>\$1.69</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Plate, Mounting Plate Asm



\...  
\Mounting Plate Asm, Cap Asm  
\Plate, Mounting Plate Asm  
\Plate Process

## Process Summary

Right First Time	99.98 %
Process Time (Sec)	7.16
Total Weight (kg)	0.07

Material Cost**	\$0.29
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.10
Q Burden	\$0.00
SG&A	\$0.05
Manufacturing Cost*	\$0.44

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Plate, Mounting Plate Asm



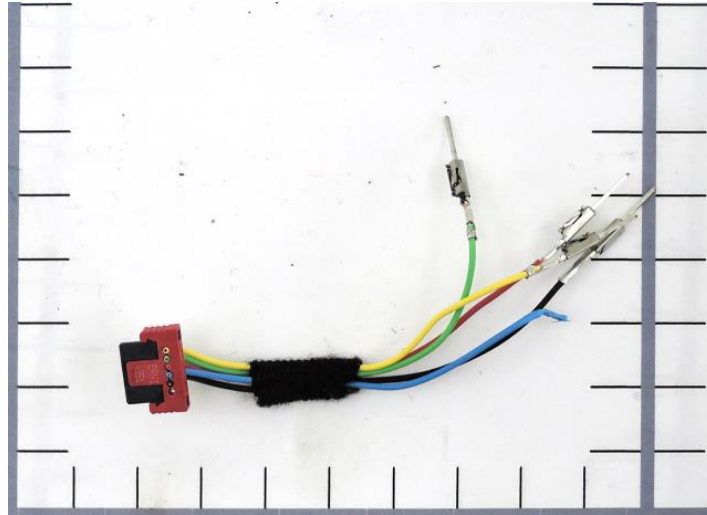
## Plate Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
300 Ton Injection Molding Press, 2 Shot	28.64	4	0.25	47.87	GER	\$0.10	99.98 %	\$0.00

## Plate Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material 1, Plate	1	PA66 GF30	\$3.95	0.0655	0.0704	\$0.00	\$0.28
Material 2, Plate	1	NBR	\$2.80	0.0002	0.0002	\$0.00	\$0.01

# Assemble Mounting Plate



- \...
- \Cap Asm, Exchanger Asm
- \Mounting Plate Asm, Cap Asm
- \Assemble Mounting Plate

## Process Summary

<b>Right First Time</b>	<b>99.79 %</b>
<b>Process Time (Sec)</b>	<b>10.00</b>
<b>Total Weight (kg)</b>	<b>0.00</b>

<b>Material Cost**</b>	<b>\$1.01</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.07</b>
<b>Q Burden</b>	<b>\$0.03</b>
<b>SG&amp;A</b>	<b>\$0.14</b>
<b>Manufacturing Cost*</b>	<b>\$1.25</b>



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Mounting Plate



## Assemble Mounting Plate

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Automated Asm	10.00	1	0.25	25.62	GER	\$0.07	99.79%	\$0.03

## Assemble Mounting Plate

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Heat Exchanger Connector Harness	1	See Appendix	-	0.0019	-	\$0.00	\$1.01

[Click Here for Munro & Associates Wire Harness Report on Heat Exchanger Connector Harness](#)

# Cap, Cap Asm



\...  
 \Cap Asm, Exchanger Asm  
 \Cap, Cap Asm  
 \Cap Process

## Process Summary

<b>Right First Time</b>	<b>99.97 %</b>
<b>Process Time (Sec)</b>	<b>18.67</b>
<b>Total Weight (kg)</b>	<b>0.13</b>

<b>Material Cost**</b>	<b>\$0.68</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.09</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.10</b>
<b>Manufacturing Cost*</b>	<b>\$0.87</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Cap, Cap Asm

## Cap Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	9.00	1	0.25	20.00	GER	\$0.05	99.99%	\$0.00
Deburr	9.00	1	0.25	12.36	GER	\$0.03	99.99%	\$0.00
60 Ton Stamping Press	0.67	1	0.25	25.22	GER	\$0.00	99.99%	\$0.00

## Cap Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Cap	1	Aluminum 3003-O - Coil Stock	\$4.08	0.1322	0.1660	\$0.00	\$0.68

## No Commodity Items Required for This Process



- \...
- \Exchanger Asm, Heat Exchanger Asm
- \Cap Asm, Exchanger Asm
- \Assemble Cap and Mounting Plate

### Process Summary

<b>Right First Time</b>	<b>99.94 %</b>
<b>Process Time (Sec)</b>	<b>8.00</b>
<b>Total Weight (kg)</b>	<b>0.00</b>
<b>Material Cost**</b>	<b>\$0.00</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.12</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.02</b>
<b>Manufacturing Cost*</b>	<b>\$0.15</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Cap and Mounting Plate

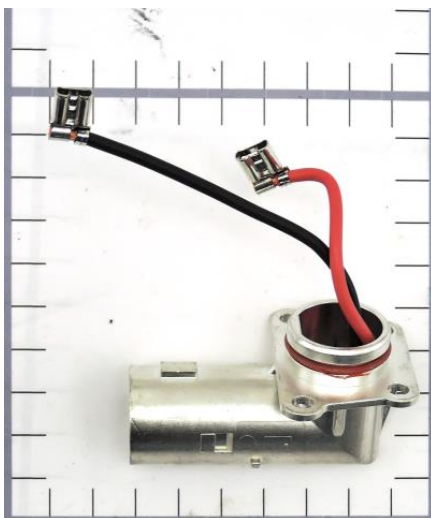


## Assemble Cap and Mounting Plate

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	8.00	1	1.00	54.32	GER	\$0.12	99.94 %	\$0.01

## Assemble Cap and Mounting Plate

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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- \...
- \Exchanger Asm, Heat Exchanger Asm
- \Cap Asm, Exchanger Asm
- \Connector Asm, Cap Asm

## Assembly Summary

<b>Parts</b>	<b>3</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>16</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.82 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>0.65</b>
<b>Total Weight (kg)</b>	<b>0.08</b>

<b>Material Cost**</b>	<b>\$0.86</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.58</b>
<b>Q Burden</b>	<b>\$0.03</b>
<b>SG&amp;A</b>	<b>\$0.18</b>
<b>Manufacturing Cost*</b>	<b>\$1.65</b>

\* Excluding tooling, ER&D, logistics, and profit margin  
 \*\* Includes material cost and purchased parts cost

# Connector Asm, Cap Asm



## Connector Asm, Cap Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Power Connector Housing, Connector Asm	1	1	0	7	0	99.95 %	0.00	0.00	0.00	0.19	0.0662
Assemble Power Connector	1	2	2	8	2	99.87 %	0.00	0.00	0.47	0.00	0.0152

## Connector Asm, Cap Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Power Connector Housing, Connector Asm	\$0.00	\$0.17	\$0.00	\$0.00	\$0.00	\$0.15	\$0.01	\$0.04	\$0.37
Assemble Power Connector	\$0.03	\$0.66	\$0.00	\$0.00	\$0.42	\$0.00	\$0.02	\$0.14	\$1.27

## Detailed Summary

<b>Parts</b>	<b>3</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>16</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.82%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.47</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.19</b>
<b>Total Weight (kg)</b>	<b>0.08</b>
<b>Purchased Part Cost</b>	<b>\$0.03</b>
<b>Material Cost</b>	<b>\$0.83</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.42</b>
<b>Supplier Fab. Cost</b>	<b>\$0.15</b>
<b>Q Burden</b>	<b>\$0.03</b>
<b>SG&amp;A</b>	<b>\$0.18</b>
<b>Manufacturing Cost*</b>	<b>\$1.65</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



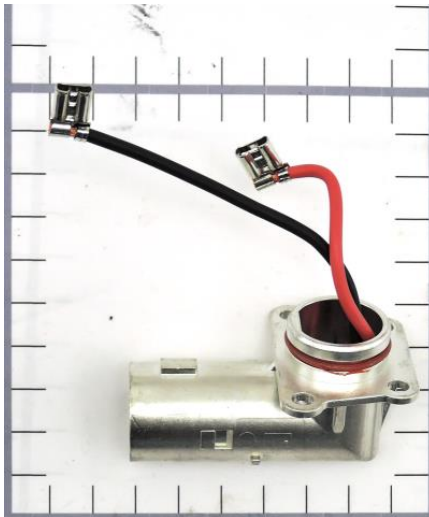
\...

- \Connector Asm, Cap Asm
- \Power Connector Housing, Connector Asm
- \Power Connector Housing Process

## Process Summary

<b>Right First Time</b>	<b>99.95 %</b>
<b>Process Time (Sec)</b>	<b>11.18</b>
<b>Total Weight (kg)</b>	<b>0.07</b>

<b>Material Cost**</b>	<b>\$0.17</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.15</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.04</b>
<b>Manufacturing Cost*</b>	<b>\$0.37</b>



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Power Connector Housing, Connector Asm



**MUNRO**  
& ASSOCIATES, INC.

## Power Connector Housing Process

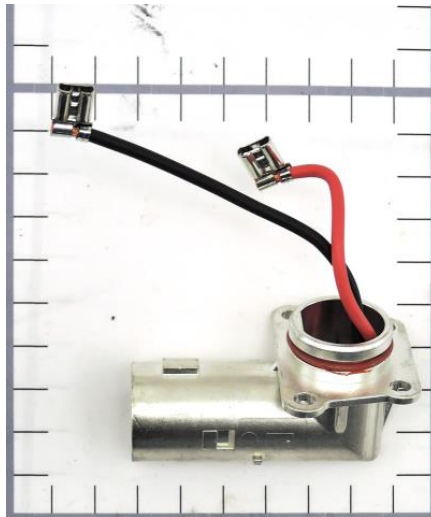
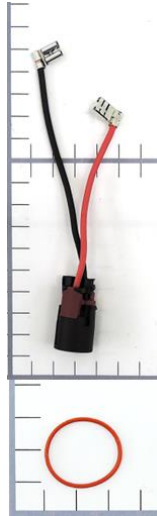
Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	30.69	GER	\$0.04	99.98 %	\$0.00
Deburr	4.00	1	0.25	35.68	GER	\$0.04	99.99 %	\$0.00
260 Ton DieCasting Machine	17.44	8	1.00	117.01	GER	\$0.07	99.99 %	\$0.00

## Power Connector Housing Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Power Connector Housing	1	Zn - Zamak3	\$2.43	0.0662	0.0682	\$0.00	\$0.17



# Assemble Power Connector



- \...
- \Cap Asm, Exchanger Asm
- \Connector Asm, Cap Asm
- \Assemble Power Connector

## Process Summary

<b>Right First Time</b>	<b>99.87 %</b>
<b>Process Time (Sec)</b>	<b>28.00</b>
<b>Total Weight (kg)</b>	<b>0.02</b>

<b>Material Cost**</b>	<b>\$0.69</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.42</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.14</b>
<b>Manufacturing Cost*</b>	<b>\$1.27</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Power Connector



Assemble Power Connector									
Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden	
<a href="#">Supplier Manual Asm</a>	28.00	1	1.00	54.32	GER	\$0.42	99.87%	\$0.02	

Assemble Power Connector								
Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost	
O-Ring, DC Power Connector	1	Commodity Item	Purchased	0.0003	-	\$0.03	\$0.00	
Heat Exchanger Power Connector Harness	1	See Appendix	-	0.0149	-	\$0.00	\$0.66	

[Click Here for Munro & Associates Wire Harness Report on Heat Exchanger Power Connector Harness](#)



- \...
- \Exchanger Asm, Heat Exchanger Asm
- \Cap Asm, Exchanger Asm
- \Assemble Connector

## Process Summary

Right First Time	98.47 %
Process Time (Sec)	76.25
Total Weight (kg)	0.01
Material Cost**	\$0.24
OEM Process Cost	\$0.00
Supplier Process Cost	\$1.15
Q Burden	\$0.23
SG&A	\$0.16
Manufacturing Cost*	\$1.78

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

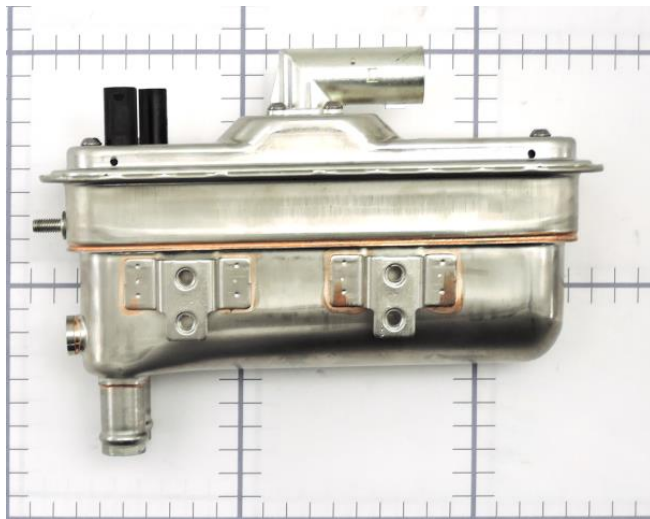
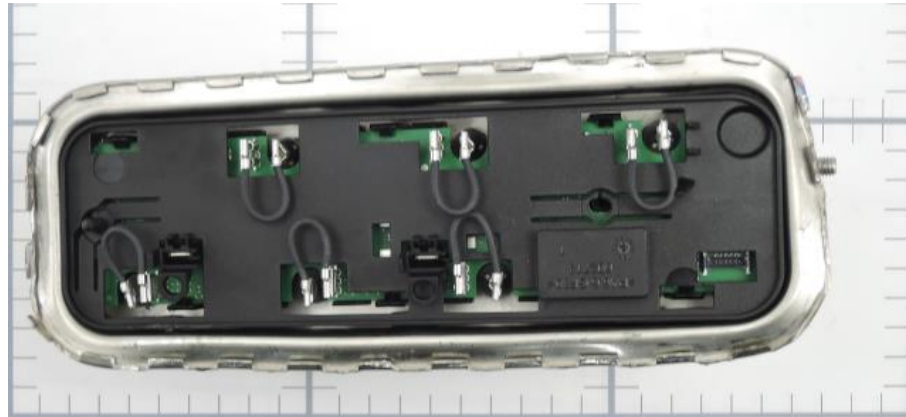
# Assemble Connector



Assemble Connector									
Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden	
Supplier Manual Asm	76.25	1	1.00	54.32	GER	\$1.15	98.47%	\$0.23	

Assemble Connector								
Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost	
M4x12mm-Torx Bolt	7	Commodity Item	Purchased	0.0016	-	\$0.02	\$0.00	
Label, Shock Warning	1	Commodity Item	Purchased	0.0001	-	\$0.10	\$0.00	

# Coil Exchanger Asm, Exchanger Asm



\...

- \Heat Exchanger Asm
- \Exchanger Asm, Heat Exchanger Asm
- \Coil Exchanger Asm, Exchanger Asm

## Assembly Summary

<b>Parts</b>	<b>39</b>
<b>Fasteners</b>	<b>18</b>
<b>Part Numbers</b>	<b>19</b>
<b>Steps</b>	<b>243</b>
<b>Fastenings</b>	<b>64</b>
<b>Right First Time</b>	<b>95.63 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>8.58</b>
<b>Total Weight (kg)</b>	<b>1.26</b>

<b>Material Cost**</b>	<b>\$56.26</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$5.72</b>
<b>Q Burden</b>	<b>\$0.67</b>
<b>SG&amp;A</b>	<b>\$2.65</b>
<b>Manufacturing Cost*</b>	<b>\$65.29</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Coil Exchanger Asm, Exchanger Asm



**MUNRO**  
& ASSOCIATES, INC.

## Coil Exchanger Asm, Exchanger Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Coil Asm, Coil Exchanger Asm	1	20	27	144	27	98.03 %	0.00	0.00	3.35	1.68	1.0800
Circuit Board Asm, Bottom Exchanger Asm	1	9	14	52	14	99.42 %	0.00	0.00	1.20	0.43	0.1344
Assemble Circuit Board	1	1	8	12	8	98.76 %	0.00	0.00	0.65	0.00	0.0017
Protection Plate, Bottom Exchanger Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.07	0.0271
Assemble Protection Plate	1	8	15	31	15	99.37 %	0.00	0.00	1.20	0.00	0.0142

## Coil Exchanger Asm, Exchanger Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Coil Asm, Coil Exchanger Asm	\$20.35	\$1.82	\$0.00	\$0.00	\$2.68	\$0.57	\$0.30	\$1.27	\$26.99
Circuit Board Asm, Bottom Exchanger Asm	\$31.60	\$0.22	\$0.00	\$0.00	\$0.61	\$0.15	\$0.09	\$1.07	\$33.73
Assemble Circuit Board	\$0.42	\$0.00	\$0.00	\$0.00	\$0.59	\$0.00	\$0.19	\$0.09	\$1.29
Protection Plate, Bottom Exchanger Asm	\$0.00	\$0.11	\$0.00	\$0.00	\$0.00	\$0.04	\$0.00	\$0.02	\$0.17
Assemble Protection Plate	\$1.74	\$0.00	\$0.00	\$0.00	\$1.09	\$0.00	\$0.09	\$0.19	\$3.11

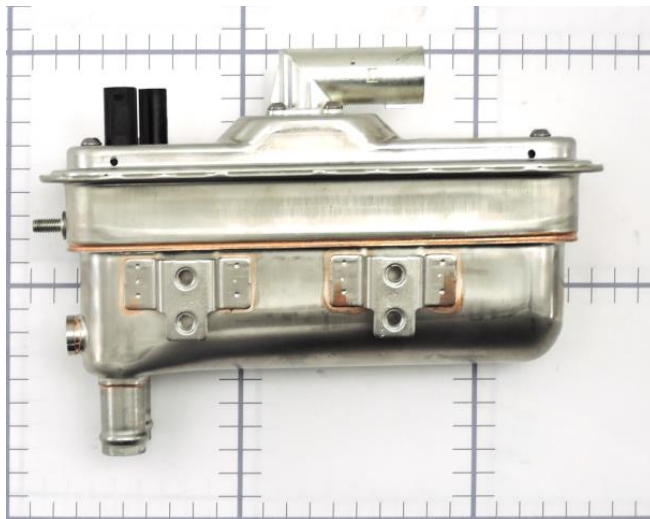
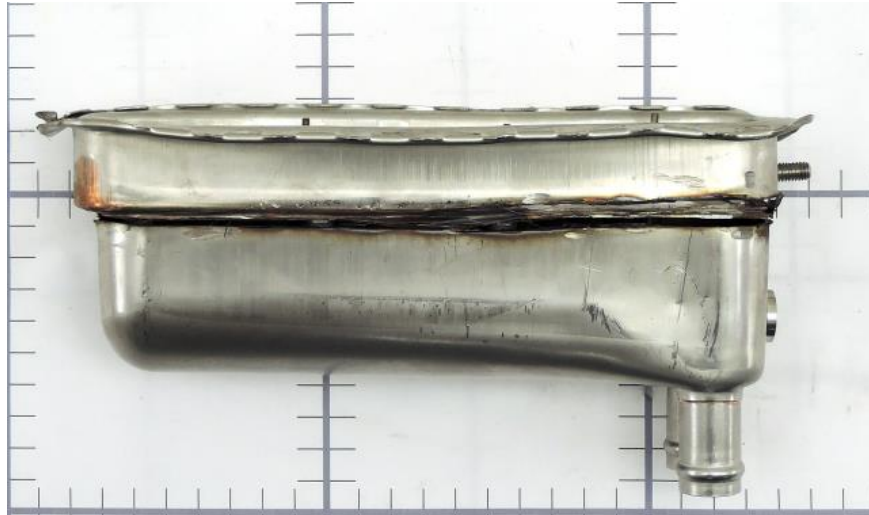
## Detailed Summary

<b>Parts</b>	<b>39</b>
<b>Fasteners</b>	<b>18</b>
<b>Part Numbers</b>	<b>19</b>
<b>Steps</b>	<b>243</b>
<b>Fastenings</b>	<b>64</b>
<b>Right First Time</b>	<b>95.63%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>6.40</b>
<b>Supplier Fab. Time (Min)</b>	<b>2.18</b>
<b>Total Weight (kg)</b>	<b>1.26</b>
<b>Purchased Part Cost</b>	
	<b>\$54.11</b>
<b>Material Cost</b>	<b>\$2.15</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$4.96</b>
<b>Supplier Fab. Cost</b>	<b>\$0.75</b>
<b>Q Burden</b>	<b>\$0.67</b>
<b>SG&amp;A</b>	<b>\$2.65</b>
<b>Manufacturing Cost*</b>	<b>\$65.29</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Coil Asm, Coil Exchanger Asm



\...

\Exchanger Asm, Heat Exchanger Asm

\Coil Exchanger Asm, Exchanger Asm

\Coil Asm, Coil Exchanger Asm

## Assembly Summary

<b>Parts</b>	<b>20</b>
<b>Fasteners</b>	<b>12</b>
<b>Part Numbers</b>	<b>11</b>
<b>Steps</b>	<b>144</b>
<b>Fastenings</b>	<b>27</b>
<b>Right First Time</b>	<b>98.03 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>5.03</b>
<b>Total Weight (kg)</b>	<b>1.08</b>

<b>Material Cost**</b>	<b>\$22.17</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$3.25</b>
<b>Q Burden</b>	<b>\$0.30</b>
<b>SG&amp;A</b>	<b>\$1.27</b>
<b>Manufacturing Cost*</b>	<b>\$26.99</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Coil Asm, Coil Exchanger Asm



## Coil Asm, Coil Exchanger Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Upper Housing Asm, Coil Asm	1	8	14	37	14	99.19 %	0.00	0.00	1.08	0.33	0.1526
Lower Housing Asm, Coil Asm	1	7	8	46	8	99.56 %	0.00	0.00	0.82	0.63	0.1558
Coolant Inlet Tube, Coil Asm	1	1	0	9	0	99.92 %	0.00	0.00	0.00	0.14	0.0300
Coolant Outlet Tube, Coil Asm	1	1	0	7	0	99.96 %	0.00	0.00	0.00	0.11	0.0250
Coolant Flow Path, Coil Asm	1	1	0	7	0	99.97 %	0.00	0.00	0.00	0.31	0.0547
Assemble Coil	1	2	5	33	5	99.43 %	0.00	0.00	1.45	0.15	0.6619

## Coil Asm, Coil Exchanger Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Upper Housing Asm, Coil Asm	\$0.26	\$0.63	\$0.00	\$0.00	\$0.65	\$0.10	\$0.12	\$0.19	\$1.95
Lower Housing Asm, Coil Asm	\$0.04	\$0.63	\$0.00	\$0.00	\$0.49	\$0.18	\$0.07	\$0.17	\$1.58
Coolant Inlet Tube, Coil Asm	\$0.00	\$0.18	\$0.00	\$0.00	\$0.00	\$0.08	\$0.01	\$0.03	\$0.30
Coolant Outlet Tube, Coil Asm	\$0.00	\$0.15	\$0.00	\$0.00	\$0.00	\$0.06	\$0.01	\$0.03	\$0.24
Coolant Flow Path, Coil Asm	\$0.00	\$0.23	\$0.00	\$0.00	\$0.00	\$0.09	\$0.01	\$0.04	\$0.36
Assemble Coil	\$20.05	\$0.00	\$0.00	\$0.00	\$1.54	\$0.08	\$0.09	\$0.81	\$22.56

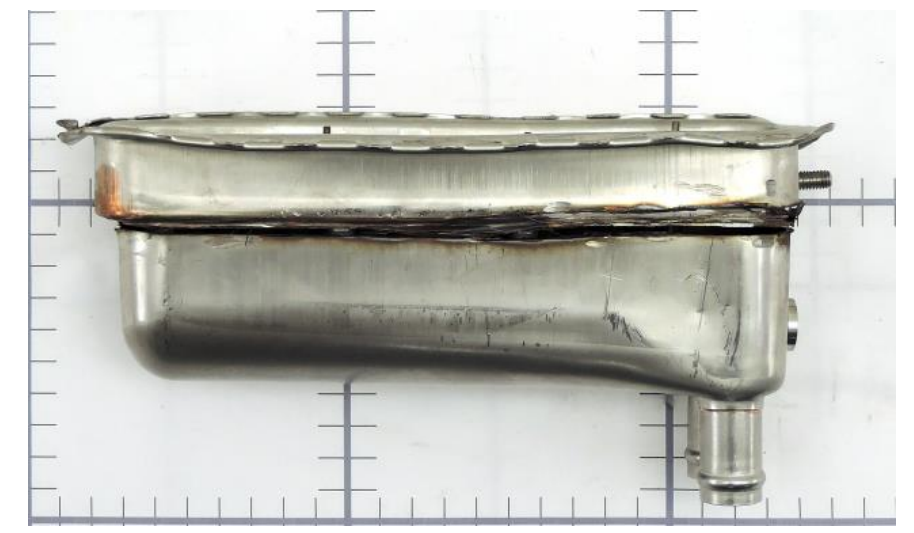
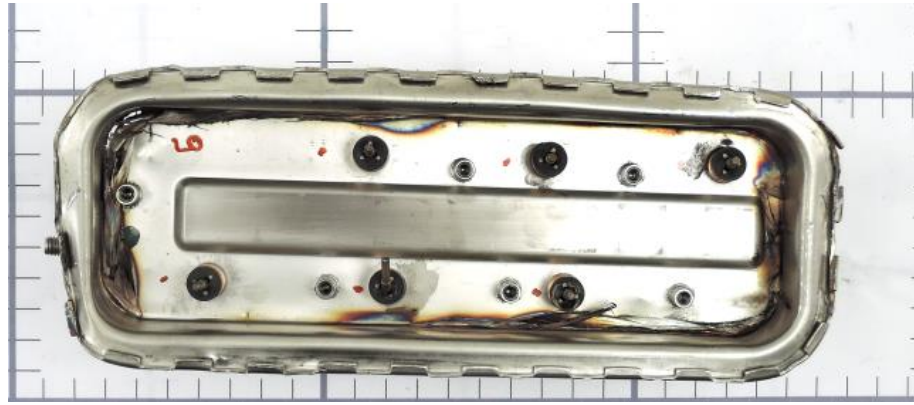
## Detailed Summary

<b>Parts</b>	<b>20</b>
<b>Fasteners</b>	<b>12</b>
<b>Part Numbers</b>	<b>11</b>
<b>Steps</b>	<b>144</b>
<b>Fastenings</b>	<b>27</b>
<b>Right First Time</b>	<b>98.03%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>3.35</b>
<b>Supplier Fab. Time (Min)</b>	<b>1.68</b>
<b>Total Weight (kg)</b>	<b>1.08</b>
<b>Purchased Part Cost</b>	
	<b>\$20.35</b>
<b>Material Cost</b>	<b>\$1.82</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$2.68</b>
<b>Supplier Fab. Cost</b>	<b>\$0.57</b>
<b>Q Burden</b>	<b>\$0.30</b>
<b>SG&amp;A</b>	<b>\$1.27</b>
<b>Manufacturing Cost*</b>	<b>\$26.99</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Upper Housing Asm, Coil Asm



- \...
- \Coil Exchanger Asm, Exchanger Asm
- \Coil Asm, Coil Exchanger Asm
- \Upper Housing Asm, Coil Asm

## Assembly Summary

<b>Parts</b>	<b>8</b>
<b>Fasteners</b>	<b>7</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>37</b>
<b>Fastenings</b>	<b>14</b>
<b>Right First Time</b>	<b>99.19 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>1.41</b>
<b>Total Weight (kg)</b>	<b>0.15</b>
<b>Material Cost**</b>	<b>\$0.89</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.75</b>
<b>Q Burden</b>	<b>\$0.12</b>
<b>SG&amp;A</b>	<b>\$0.19</b>
<b>Manufacturing Cost*</b>	<b>\$1.95</b>

\* Excluding tooling, ER&D, logistics, and profit margin  
 \*\* Includes material cost and purchased parts cost

# Upper Housing Asm, Coil Asm



## Upper Housing Asm, Coil Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Top Housing, Upper Housing Asm	1	1	0	7	0	99.97 %	0.00	0.00	0.00	0.33	0.1500
Assemble Upper Housing	1	7	14	29	14	99.23 %	0.00	0.00	1.08	0.00	0.0026

## Upper Housing Asm, Coil Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Top Housing, Upper Housing Asm	\$0.00	\$0.63	\$0.00	\$0.00	\$0.00	\$0.10	\$0.01	\$0.09	\$0.83
Assemble Upper Housing	\$0.26	\$0.00	\$0.00	\$0.00	\$0.65	\$0.00	\$0.12	\$0.09	\$1.12

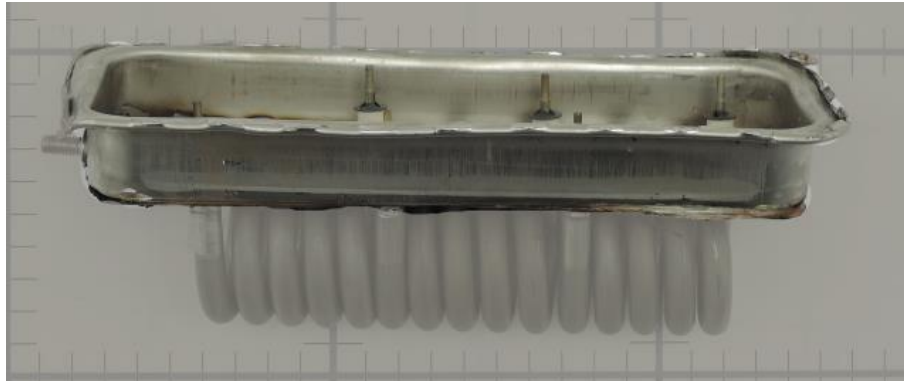
## Detailed Summary

<b>Parts</b>	<b>8</b>
<b>Fasteners</b>	<b>7</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>37</b>
<b>Fastenings</b>	<b>14</b>
<b>Right First Time</b>	<b>99.19%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>1.08</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.33</b>
<b>Total Weight (kg)</b>	<b>0.15</b>
<b>Purchased Part Cost</b>	
	<b>\$0.26</b>
<b>Material Cost</b>	
	<b>\$0.63</b>
<b>OEM Asm. Cost</b>	
	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	
	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	
	<b>\$0.65</b>
<b>Supplier Fab. Cost</b>	
	<b>\$0.10</b>
<b>Q Burden</b>	
	<b>\$0.12</b>
<b>SG&amp;A</b>	
	<b>\$0.19</b>
<b>Manufacturing Cost*</b>	
	<b>\$1.95</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Top Housing, Upper Housing Asm



- \...
- \Upper Housing Asm, Coil Asm
- \Top Housing, Upper Housing Asm
- \Top Housing Process

## Process Summary

Right First Time	99.97 %
Process Time (Sec)	19.71
Total Weight (kg)	0.15

Material Cost**	\$0.63
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.10
Q Burden	\$0.01
SG&A	\$0.09
Manufacturing Cost*	\$0.83

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Top Housing, Upper Housing Asm



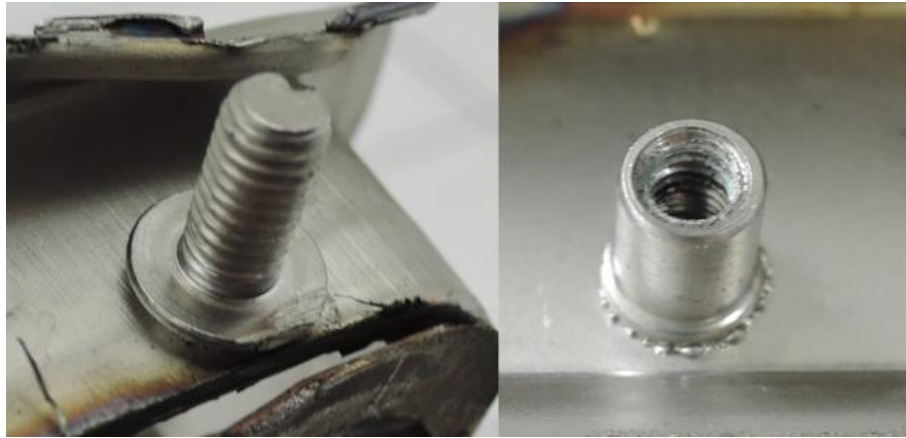
## Top Housing Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	9.00	1	0.25	20.00	GER	\$0.05	99.99%	\$0.00
Deburr	9.00	1	0.25	12.36	GER	\$0.03	99.99%	\$0.00
200 Ton Stamping Press	1.71	1	0.25	39.32	GER	\$0.02	99.99%	\$0.00

## Top Housing Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Top Housing	1	Aluminum 3003-O - Coil Stock	\$4.08	0.1500	0.1540	\$0.00	\$0.63

# Assemble Upper Housing



\...

- \Coil Asm, Coil Exchanger Asm
- \Upper Housing Asm, Coil Asm
- \Assemble Upper Housing

## Process Summary

Right First Time	99.23 %
Process Time (Sec)	64.95
Total Weight (kg)	0.00

Material Cost**	\$0.26
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.65
Q Burden	\$0.12
SG&A	\$0.09
Manufacturing Cost*	\$1.12



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Assemble Upper Housing



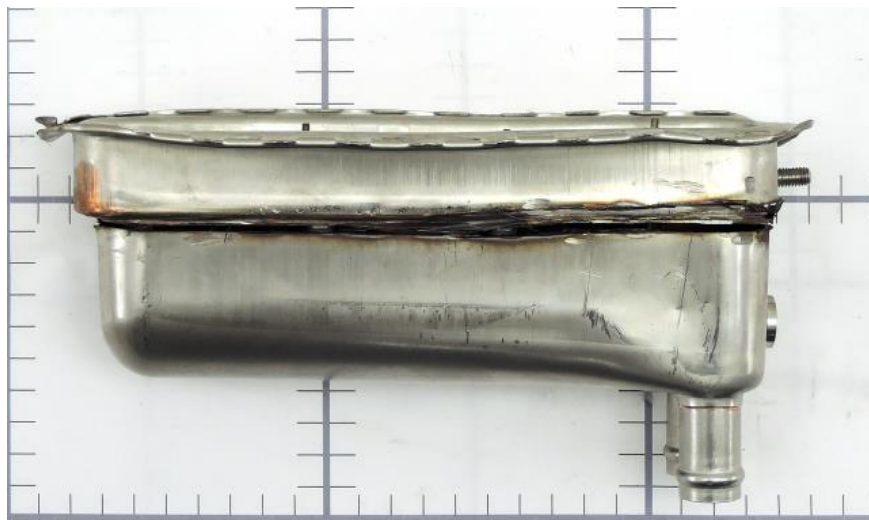
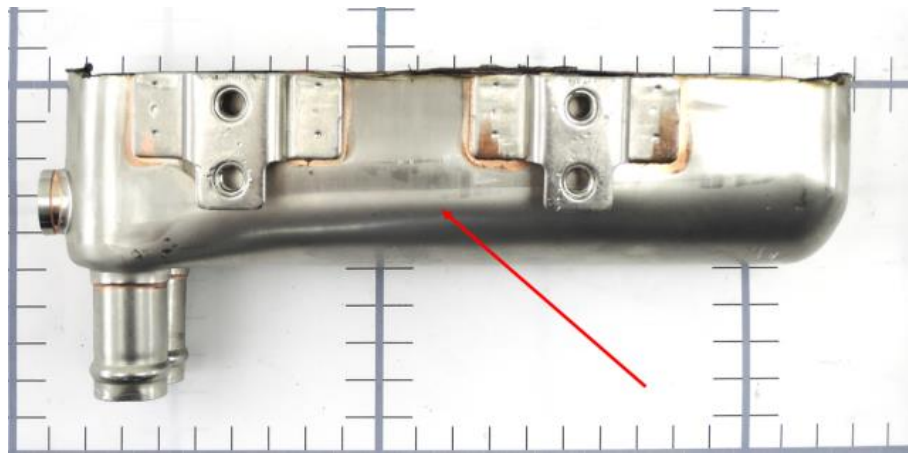
## Assemble Upper Housing

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Projection Welding Station	64.95	1	0.25	36.19	GER	\$0.65	99.23%	\$0.12

## Assemble Upper Housing

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
M4x8mm-Threaded Insert	6	Commodity Item	Purchased	0.0001	-	\$0.04	\$0.00
M6x11mm-Flanged Stud	1	Commodity Item	Purchased	0.0020	-	\$0.02	\$0.00

# Lower Housing Asm, Coil Asm



- \...
- \Coil Exchanger Asm, Exchanger Asm
- \Coil Asm, Coil Exchanger Asm
- \Lower Housing Asm, Coil Asm

## Assembly Summary

<b>Parts</b>	<b>7</b>
<b>Fasteners</b>	<b>4</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>46</b>
<b>Fastenings</b>	<b>8</b>
<b>Right First Time</b>	<b>99.56 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>1.45</b>
<b>Total Weight (kg)</b>	<b>0.16</b>

<b>Material Cost**</b>	<b>\$0.67</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.67</b>
<b>Q Burden</b>	<b>\$0.07</b>
<b>SG&amp;A</b>	<b>\$0.17</b>
<b>Manufacturing Cost*</b>	<b>\$1.58</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Lower Housing Asm, Coil Asm



## Lower Housing Asm, Coil Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Base Housing, Lower Housing Asm	1	1	0	7	0	99.97 %	0.00	0.00	0.00	0.31	0.1170
Bracket Asm, Coil Asm	2	3	2	14	2	99.91 %	0.00	0.00	0.20	0.16	0.0194
Assemble Lower Housing	1	0	4	8	4	99.78 %	0.00	0.00	0.43	0.00	0.0000

## Lower Housing Asm, Coil Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Base Housing, Lower Housing Asm	\$0.00	\$0.49	\$0.00	\$0.00	\$0.00	\$0.09	\$0.01	\$0.07	\$0.66
Bracket Asm, Coil Asm	\$0.02	\$0.07	\$0.00	\$0.00	\$0.12	\$0.05	\$0.01	\$0.03	\$0.30
Assemble Lower Housing	\$0.00	\$0.00	\$0.00	\$0.00	\$0.26	\$0.00	\$0.03	\$0.03	\$0.32

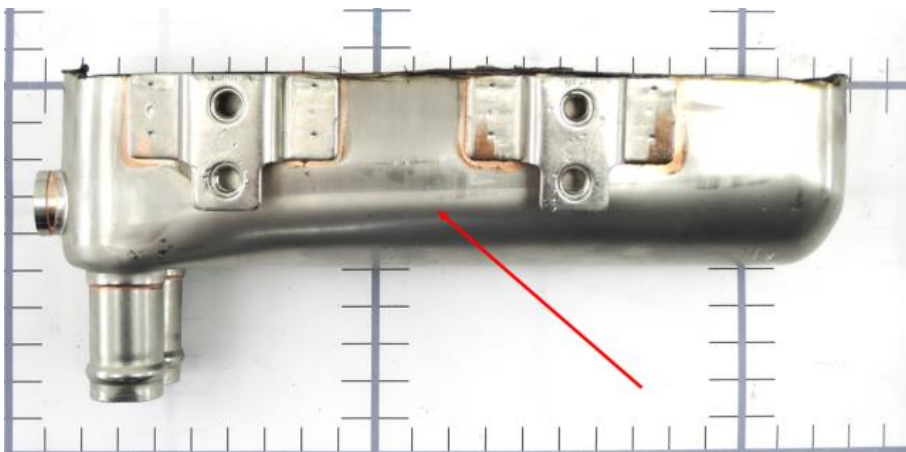
## Detailed Summary

<b>Parts</b>	<b>7</b>
<b>Fasteners</b>	<b>4</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>46</b>
<b>Fastenings</b>	<b>8</b>
<b>Right First Time</b>	<b>99.56%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.82</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.63</b>
<b>Total Weight (kg)</b>	<b>0.16</b>
<b>Purchased Part Cost</b>	
	<b>\$0.04</b>
<b>Material Cost</b>	
	<b>\$0.63</b>
<b>OEM Asm. Cost</b>	
	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	
	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	
	<b>\$0.49</b>
<b>Supplier Fab. Cost</b>	
	<b>\$0.18</b>
<b>Q Burden</b>	
	<b>\$0.07</b>
<b>SG&amp;A</b>	
	<b>\$0.17</b>
<b>Manufacturing Cost*</b>	
	<b>\$1.58</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Base Housing, Lower Housing Asm



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- \Lower Housing Asm, Coil Asm
- \Base Housing, Lower Housing Asm
- \Base Housing Process

## Process Summary

Right First Time	99.97 %
Process Time (Sec)	18.67
Total Weight (kg)	0.12
Material Cost**	\$0.49
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.09
Q Burden	\$0.01
SG&A	\$0.07
Manufacturing Cost*	\$0.66

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Base Housing, Lower Housing Asm



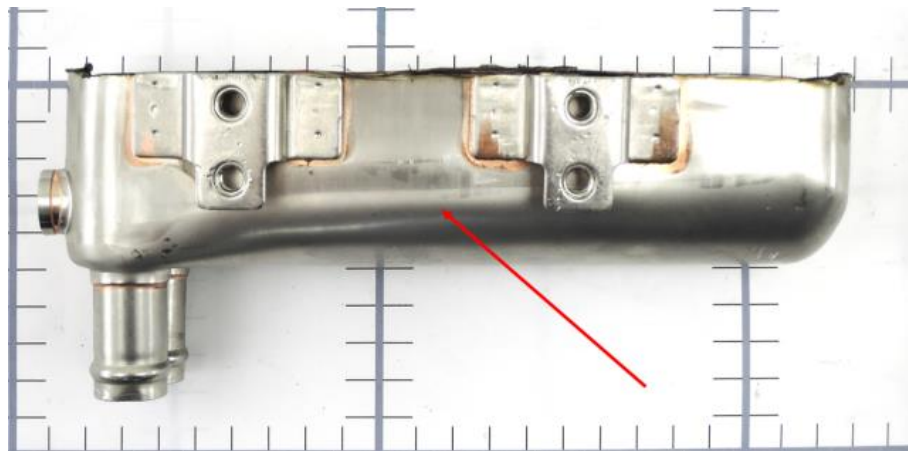
## Base Housing Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	9.00	1	0.25	20.00	GER	\$0.05	99.99%	\$0.00
Deburr	9.00	1	0.25	12.36	GER	\$0.03	99.99%	\$0.00
60 Ton Stamping Press	0.67	1	0.25	25.22	GER	\$0.00	99.99%	\$0.00

## Base Housing Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Lower Housing	1	Aluminum 3003-O - Coil Stock	\$4.08	0.1170	0.1190	\$0.00	\$0.49

# Bracket Asm, Coil Asm



- \...
- \Coil Asm, Coil Exchanger Asm
- \Lower Housing Asm, Coil Asm
- \Bracket Asm, Coil Asm

## Assembly Summary

<b>Parts</b>	<b>3</b>
<b>Fasteners</b>	<b>2</b>
<b>Part Numbers</b>	<b>2</b>
<b>Steps</b>	<b>14</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.91 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>0.36</b>
<b>Total Weight (kg)</b>	<b>0.02</b>

<b>Material Cost**</b>	<b>\$0.09</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.16</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.03</b>
<b>Manufacturing Cost*</b>	<b>\$0.30</b>

\* Excluding tooling, ER&D, logistics, and profit margin  
 \*\* Includes material cost and purchased parts cost

# Bracket Asm, Coil Asm



## Bracket Asm, Coil Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Bracket, Bracket Asm	1	1	0	7	0	99.97 %	0.00	0.00	0.00	0.16	0.0150
Assemble Bracket	1	2	2	6	2	99.94 %	0.00	0.00	0.20	0.00	0.0044

## Bracket Asm, Coil Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Bracket, Bracket Asm	\$0.00	\$0.07	\$0.00	\$0.00	\$0.00	\$0.05	\$0.00	\$0.01	\$0.13
Assemble Bracket	\$0.02	\$0.00	\$0.00	\$0.00	\$0.12	\$0.00	\$0.01	\$0.02	\$0.16



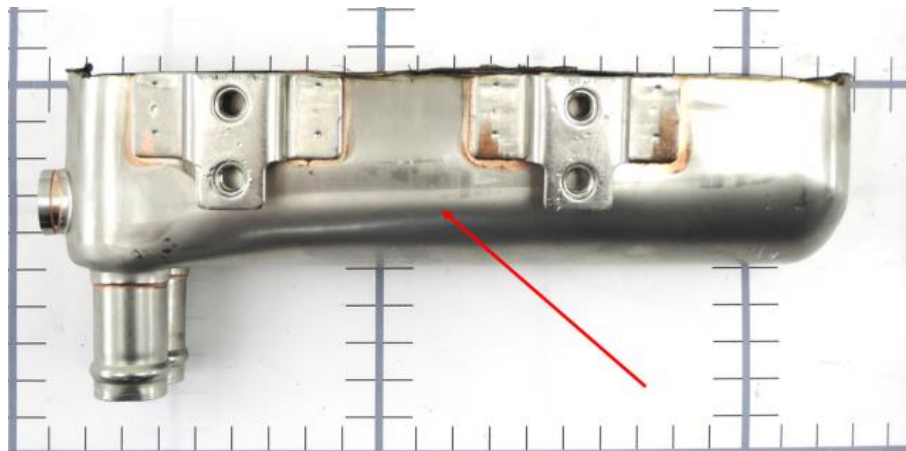
## Detailed Summary

<b>Parts</b>	<b>3</b>
<b>Fasteners</b>	<b>2</b>
<b>Part Numbers</b>	<b>2</b>
<b>Steps</b>	<b>14</b>
<b>Fastenings</b>	<b>2</b>
<b>Right First Time</b>	<b>99.91%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.20</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.16</b>
<b>Total Weight (kg)</b>	<b>0.02</b>
<b>Purchased Part Cost</b>	
	<b>\$0.02</b>
<b>Material Cost</b>	
	<b>\$0.07</b>
<b>OEM Asm. Cost</b>	
	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	
	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	
	<b>\$0.12</b>
<b>Supplier Fab. Cost</b>	
	<b>\$0.05</b>
<b>Q Burden</b>	
	<b>\$0.01</b>
<b>SG&amp;A</b>	
	<b>\$0.03</b>
<b>Manufacturing Cost*</b>	
	<b>\$0.30</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Bracket, Bracket Asm



\...

- \Bracket Asm, Coil Asm
- \Bracket, Bracket Asm
- \Bracket Process

## Process Summary

Right First Time	99.97 %
Process Time (Sec)	9.60
Total Weight (kg)	0.02

Material Cost**	\$0.07
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.05
Q Burden	\$0.00
SG&A	\$0.01
Manufacturing Cost*	\$0.13

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Bracket, Bracket Asm

## Bracket Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	20.00	GER	\$0.03	99.99%	\$0.00
Deburr	4.00	1	0.25	12.36	GER	\$0.01	99.99%	\$0.00
25 Ton Stamping Press	0.60	1	0.25	21.63	GER	\$0.00	99.99%	\$0.00

## Bracket Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Bracket	1	Aluminum 3003-O - Coil Stock	\$4.08	0.0150	0.0160	\$0.00	\$0.07

# Assemble Bracket



\...

- \Lower Housing Asm, Coil Asm
- \Bracket Asm, Coil Asm
- \Assemble Bracket

## Process Summary

Right First Time	99.94 %
Process Time (Sec)	11.70
Total Weight (kg)	0.00

Material Cost**	\$0.02
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.12
Q Burden	\$0.01
SG&A	\$0.02
Manufacturing Cost*	\$0.16

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Bracket

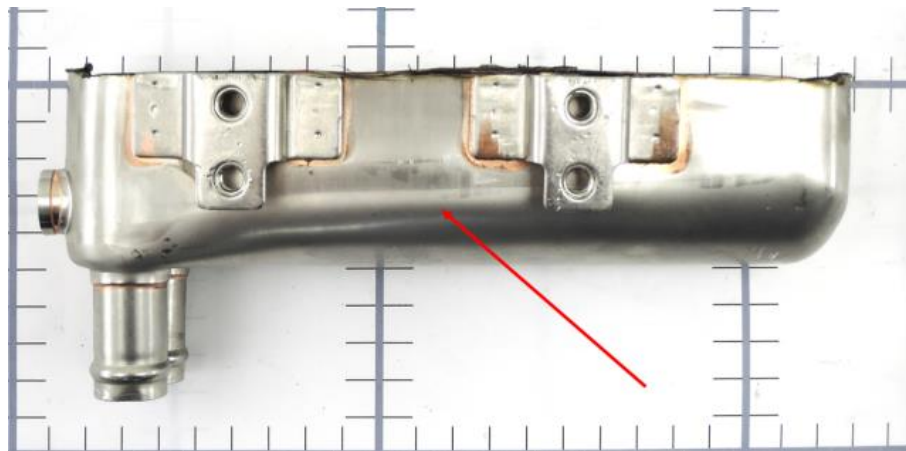
## Assemble Bracket

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Projection Welding Station	11.70	1	0.25	36.19	GER	\$0.12	99.94 %	\$0.01

## Assemble Bracket

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
M5x5mm-Nut	2	Commodity Item	Purchased	0.0022	-	\$0.01	\$0.00

## No Commodity Items Required for This Process



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- \Coil Asm, Coil Exchanger Asm
- \Lower Housing Asm, Coil Asm
- \Assemble Lower Housing

### Process Summary

Right First Time	99.78 %
Process Time (Sec)	25.70
Total Weight (kg)	0.00
Material Cost**	\$0.00
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.26
Q Burden	\$0.03
SG&A	\$0.03
Manufacturing Cost*	\$0.32

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Lower Housing



## Assemble Lower Housing

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Spot Welding Station	25.70	1	0.25	36.19	GER	\$0.26	99.78 %	\$0.03

## Assemble Lower Housing

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Coolant Inlet Tube, Coil Asm



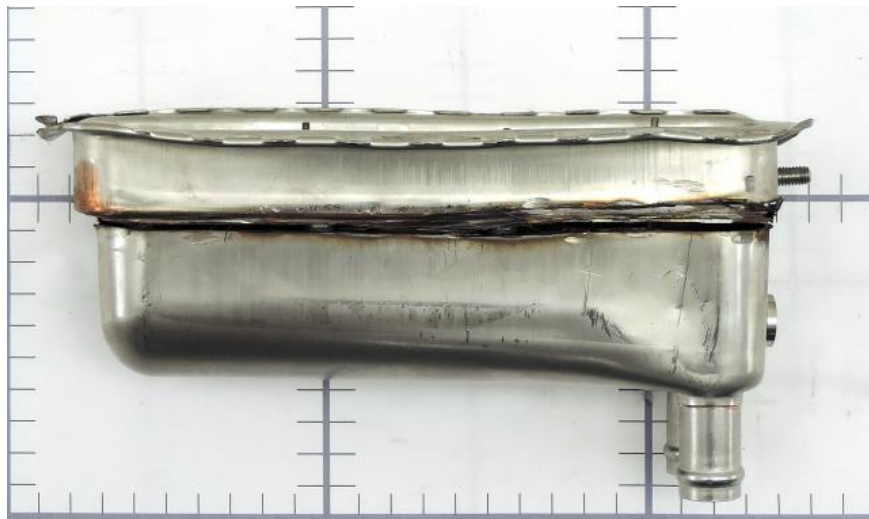
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- \Coil Asm, Coil Exchanger Asm
- \Coolant Inlet Tube, Coil Asm
- \Coolant Inlet Tube Process

## Process Summary

Right First Time	99.92 %
Process Time (Sec)	8.64
Total Weight (kg)	0.03

Material Cost**	\$0.18
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.08
Q Burden	\$0.01
SG&A	\$0.03
Manufacturing Cost*	\$0.30



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Coolant Inlet Tube, Coil Asm



## Coolant Inlet Tube Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Tube Bending	6.00	1	0.25	34.94	GER	\$0.06	99.95 %	\$0.01
Saw Cut	2.64	1	0.25	25.18	GER	\$0.02	99.97 %	\$0.01

## Coolant Inlet Tube Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Coolant Inlet Tube	1	Aluminum 3003 -Seamless Tube	\$6.00	0.0300	0.0300	\$0.00	\$0.18

# Coolant Outlet Tube, Coil Asm



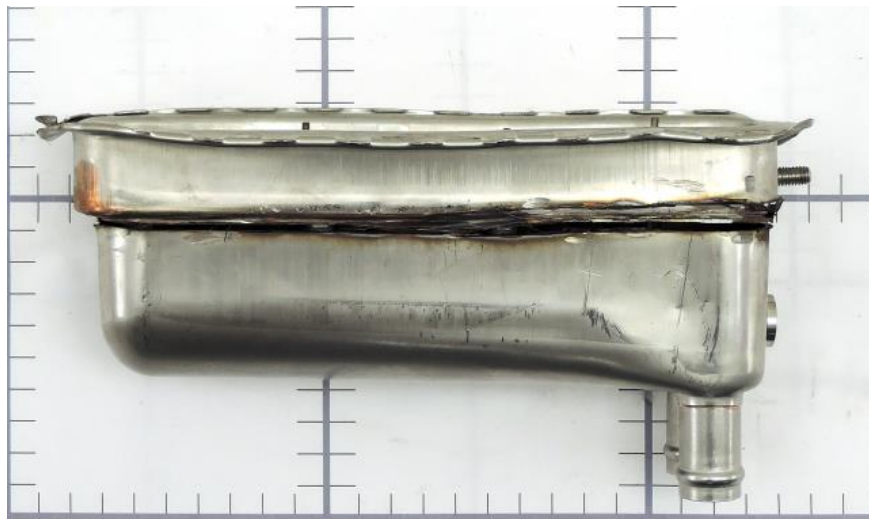
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- \Coil Asm, Coil Exchanger Asm
- \Coolant Outlet Tube, Coil Asm
- \Coolant Outlet Tube Process

## Process Summary

Right First Time	99.96 %
Process Time (Sec)	6.64
Total Weight (kg)	0.03

Material Cost**	\$0.15
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.06
Q Burden	\$0.01
SG&A	\$0.03
Manufacturing Cost*	\$0.24



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Coolant Outlet Tube, Coil Asm

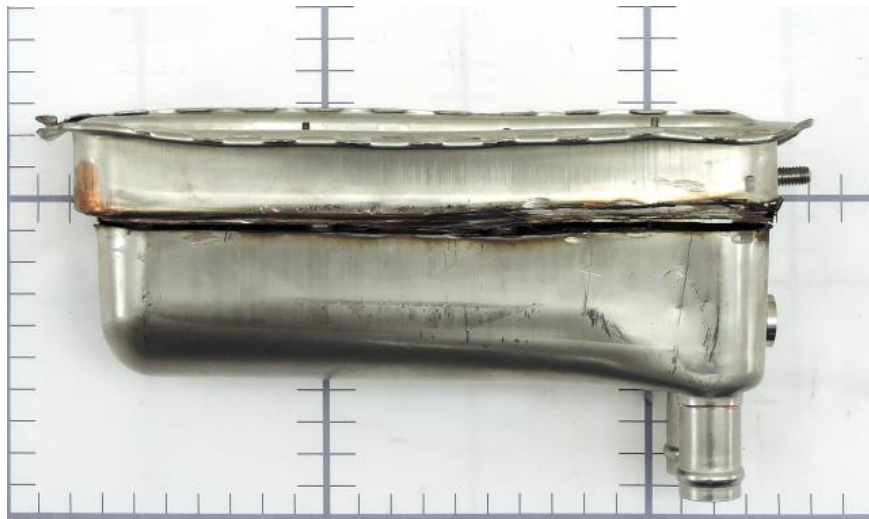
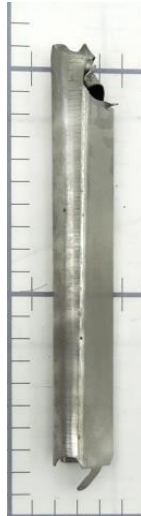
## Coolant Outlet Tube Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Tube Bending	4.00	1	0.25	34.94	GER	\$0.04	99.99%	\$0.00
Saw Cut	2.64	1	0.25	25.18	GER	\$0.02	99.97%	\$0.01

## Coolant Outlet Tube Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Coolant Outlet Tube	1	Aluminum 3003 -Seamless Tube	\$6.00	0.0250	0.0250	\$0.00	\$0.15

# Coolant Flow Path, Coil Asm



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- \Coil Asm, Coil Exchanger Asm
- \Coolant Flow Path, Coil Asm
- \Coolant Flow Path Process

## Process Summary

Right First Time	99.97 %
Process Time (Sec)	18.67
Total Weight (kg)	0.05

Material Cost**	\$0.23
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.09
Q Burden	\$0.01
SG&A	\$0.04
Manufacturing Cost*	\$0.36

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Coolant Flow Path, Coil Asm



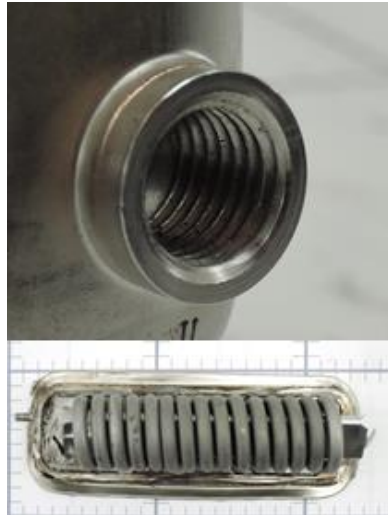
## Coolant Flow Path Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	9.00	1	0.25	20.00	GER	\$0.05	99.99%	\$0.00
Deburr	9.00	1	0.25	12.36	GER	\$0.03	99.99%	\$0.00
60 Ton Stamping Press	0.67	1	0.25	25.22	GER	\$0.00	99.99%	\$0.00

## Coolant Flow Path Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Coolant Flow Path	1	Aluminum 3003-O - Coil Stock	\$4.08	0.0547	0.0570	\$0.00	\$0.23

# Assemble Coil



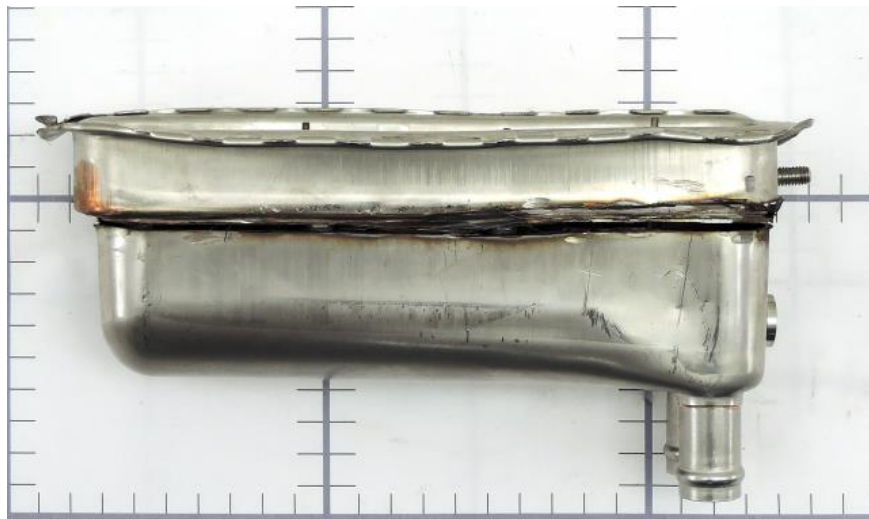
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- \Coil Exchanger Asm, Exchanger Asm
- \Coil Asm, Coil Exchanger Asm
- \Assemble Coil

## Process Summary

Right First Time	99.43 %
Process Time (Sec)	96.22
Total Weight (kg)	0.66

Material Cost**	\$20.05
OEM Process Cost	\$0.00
Supplier Process Cost	\$1.61
Q Burden	\$0.09
SG&A	\$0.81
Manufacturing Cost*	\$22.56



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Coil

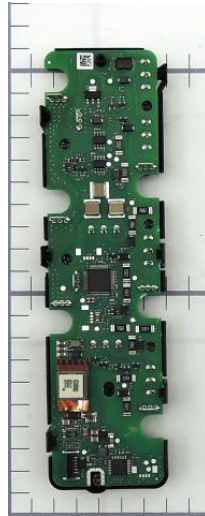


## Assemble Coil

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Leak Test	30.00	1	1.00	52.68	GER	\$0.44	99.98 %	\$0.00
Wash	9.00	1	0.25	30.69	GER	\$0.08	99.99 %	\$0.00
Supplier Oven, Brazing	6.56	1	0.25	225.90	GER	\$0.41	99.98 %	\$0.00
Supplier Oven, Dry Intercooler	6.56	1	0.25	105.20	GER	\$0.19	99.98 %	\$0.00
Supplier Flux Spraying Line	6.56	1	0.25	45.72	GER	\$0.08	99.98 %	\$0.00
Supplier Oven, Thermal Degreasing	6.56	1	0.25	82.87	GER	\$0.15	99.98 %	\$0.00
Supplier Automated Asm	31.00	1	0.25	30.27	GER	\$0.26	99.56 %	\$0.07

## Assemble Coil

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Heat Exchanger Coil	1	Commodity Item	Purchased	0.6469	-	\$20.00	\$0.00
M10x16mm-Threaded Insert	1	Commodity Item	Purchased	0.0150	-	\$0.05	\$0.00



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- \Exchanger Asm, Heat Exchanger Asm
- \Coil Exchanger Asm, Exchanger Asm
- \Circuit Board Asm, Bottom Exchanger Asm

## Assembly Summary

<b>Parts</b>	<b>9</b>
<b>Fasteners</b>	<b>6</b>
<b>Part Numbers</b>	<b>4</b>
<b>Steps</b>	<b>52</b>
<b>Fastenings</b>	<b>14</b>
<b>Right First Time</b>	<b>99.42 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>1.63</b>
<b>Total Weight (kg)</b>	<b>0.13</b>

<b>Material Cost**</b>	<b>\$31.82</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.75</b>
<b>Q Burden</b>	<b>\$0.09</b>
<b>SG&amp;A</b>	<b>\$1.07</b>
<b>Manufacturing Cost*</b>	<b>\$33.73</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Circuit Board Asm, Bottom Exchanger Asm



**MUNRO**  
& ASSOCIATES, INC.

## Circuit Board Asm, Bottom Exchanger Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Circuit Board Mounting Plate, Circuit Board Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.12	0.0367
Thermal Contact, CircuitBoard Asm	1	1	0	7	0	99.97 %	0.00	0.00	0.00	0.31	0.0061
Assemble Circuit Board	1	7	14	42	14	99.47 %	0.00	0.00	1.20	0.00	0.0916

## Circuit Board Asm, Bottom Exchanger Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Circuit Board Mounting Plate, Circuit Board Asm	\$0.00	\$0.16	\$0.00	\$0.00	\$0.00	\$0.06	\$0.00	\$0.03	\$0.25
Thermal Contact, CircuitBoard Asm	\$0.00	\$0.06	\$0.00	\$0.00	\$0.00	\$0.08	\$0.01	\$0.02	\$0.17
Assemble Circuit Board	\$31.60	\$0.00	\$0.00	\$0.00	\$0.61	\$0.00	\$0.08	\$1.03	\$33.31

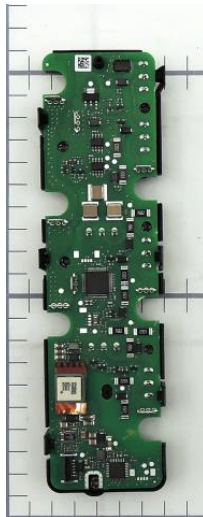
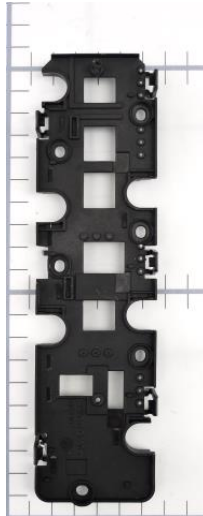
## Detailed Summary

<b>Parts</b>	<b>9</b>
<b>Fasteners</b>	<b>6</b>
<b>Part Numbers</b>	<b>4</b>
<b>Steps</b>	<b>52</b>
<b>Fastenings</b>	<b>14</b>
<b>Right First Time</b>	<b>99.42%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>1.20</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.43</b>
<b>Total Weight (kg)</b>	<b>0.13</b>
<b>Purchased Part Cost</b>	
	<b>\$31.60</b>
<b>Material Cost</b>	<b>\$0.22</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.61</b>
<b>Supplier Fab. Cost</b>	<b>\$0.15</b>
<b>Q Burden</b>	<b>\$0.09</b>
<b>SG&amp;A</b>	<b>\$1.07</b>
<b>Manufacturing Cost*</b>	<b>\$33.73</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Circuit Board Mounting Plate, Circuit Board Asm



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\Circuit Board Asm, Bottom Exchanger Asm

\Circuit Board Mounting Plate, Circuit Board Asm

\Circuit Board Mounting Plate Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	7.25
Total Weight (kg)	0.04

Material Cost**	\$0.16
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.06
Q Burden	\$0.00
SG&A	\$0.03
Manufacturing Cost*	\$0.25

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Circuit Board Mounting Plate, Circuit Board Asm



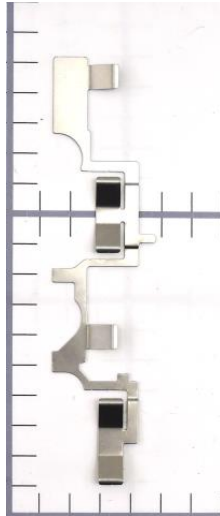
**MUNRO**  
& ASSOCIATES, INC.

## Circuit Board Mounting Plate Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
200 Ton Injection Molding Press	29.00	4	0.25	30.85	GER	\$0.06	99.99%	\$0.00

## Circuit Board Mounting Plate Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Circuit Board Mounting Plate	1	PA66 GF30	\$3.95	0.0367	0.0395	\$0.00	\$0.16



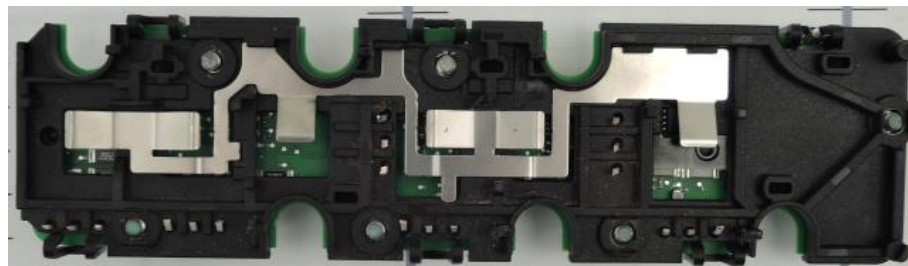
\...

- \Circuit Board Asm, Bottom Exchanger Asm
- \Thermal Contact, Circuit Board Asm
- \Thermal Contact Process

## Process Summary

<b>Right First Time</b>	<b>99.97 %</b>
<b>Process Time (Sec)</b>	<b>18.60</b>
<b>Total Weight (kg)</b>	<b>0.01</b>

<b>Material Cost**</b>	<b>\$0.06</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.08</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.02</b>
<b>Manufacturing Cost*</b>	<b>\$0.17</b>



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Thermal Contact, Circuit Board Asm



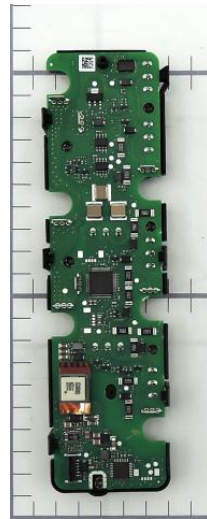
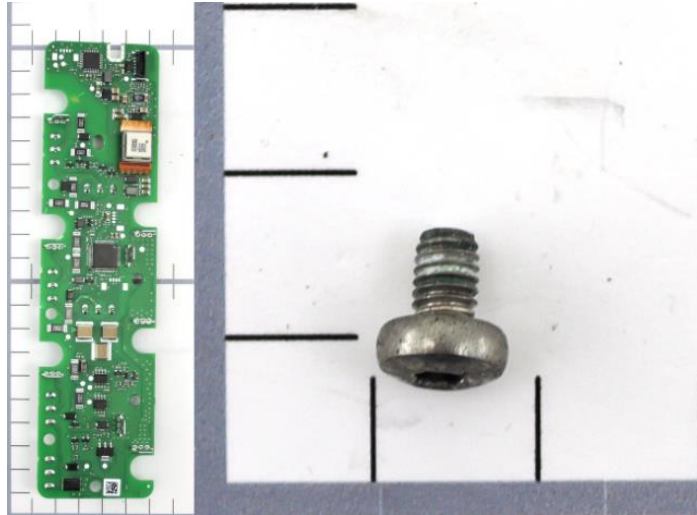
## Thermal Contact Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	9.00	1	0.25	20.00	GER	\$0.05	99.99%	\$0.00
Deburr	9.00	1	0.25	12.36	GER	\$0.03	99.99%	\$0.00
25 Ton Stamping Press	0.60	1	0.25	21.63	GER	\$0.00	99.99%	\$0.00

## Thermal Contact Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Thermal Contact	1	Steel 1018 - Coil Stock	\$1.21	0.0061	0.0510	\$0.00	\$0.06

# Assemble Circuit Board



\...

- \Coil Exchanger Asm, Exchanger Asm
- \Circuit Board Asm, Bottom Exchanger Asm
- \Assemble Circuit Board

## Process Summary

<b>Right First Time</b>	<b>99.47 %</b>
<b>Process Time (Sec)</b>	<b>72.00</b>
<b>Total Weight (kg)</b>	<b>0.09</b>

<b>Material Cost**</b>	<b>\$31.60</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.61</b>
<b>Q Burden</b>	<b>\$0.08</b>
<b>SG&amp;A</b>	<b>\$1.03</b>
<b>Manufacturing Cost*</b>	<b>\$33.31</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Circuit Board

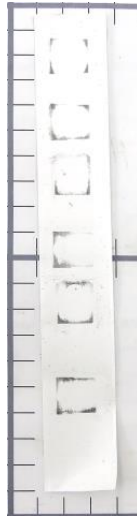


Assemble Circuit Board									
Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden	
Supplier Automated Asm	72.00	1	0.25	30.27	GER	\$0.61	99.47%	\$0.08	

Assemble Circuit Board								
Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost	
M4x6mm- Round Head Torx	6	Commodity Item	Purchased	0.0013	-	\$0.05	\$0.00	
Heat Exchanger Printed Circuit Board	1	Commodity Item	Purchased	0.0838	-	\$31.30	\$0.00	



# Assemble Circuit Board



\...

- \Exchanger Asm, Heat Exchanger Asm
- \Coil Exchanger Asm, Exchanger Asm
- \Assemble Circuit Board

## Process Summary

<b>Right First Time</b>	<b>98.76 %</b>
<b>Process Time (Sec)</b>	<b>39.00</b>
<b>Total Weight (kg)</b>	<b>0.00</b>

<b>Material Cost**</b>	<b>\$0.42</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.59</b>
<b>Q Burden</b>	<b>\$0.19</b>
<b>SG&amp;A</b>	<b>\$0.09</b>
<b>Manufacturing Cost*</b>	<b>\$1.29</b>



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Circuit Board



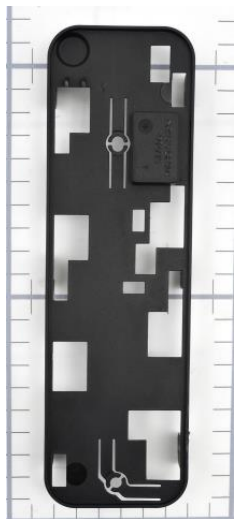
## Assemble Circuit Board

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	39.00	1	1.00	54.32	GER	\$0.59	98.76%	\$0.19

## Assemble Circuit Board

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Insulating Tape	1	Commodity Item	Purchased	0.0017	-	\$0.42	\$0.00

# Protection Plate, Bottom Exchanger Asm

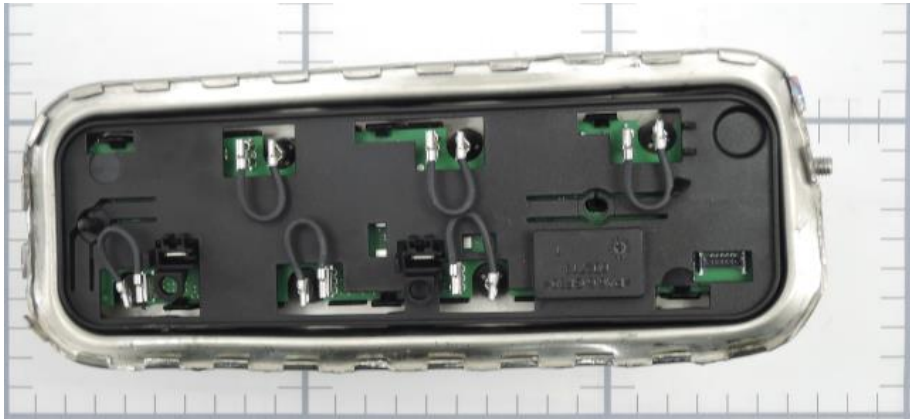


- \...
- \Coil Exchanger Asm, Exchanger Asm
- \Protection Plate, Bottom Exchanger Asm
- \Protection Plate Process

## Process Summary

<b>Right First Time</b>	<b>99.99 %</b>
<b>Process Time (Sec)</b>	<b>4.15</b>
<b>Total Weight (kg)</b>	<b>0.03</b>

<b>Material Cost**</b>	<b>\$0.11</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.04</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.02</b>
<b>Manufacturing Cost*</b>	<b>\$0.17</b>



\* Excluding tooling, ER&D, logistics, and profit margin  
 \*\* Includes material cost and purchased parts cost

# Protection Plate, Bottom Exchanger Asm



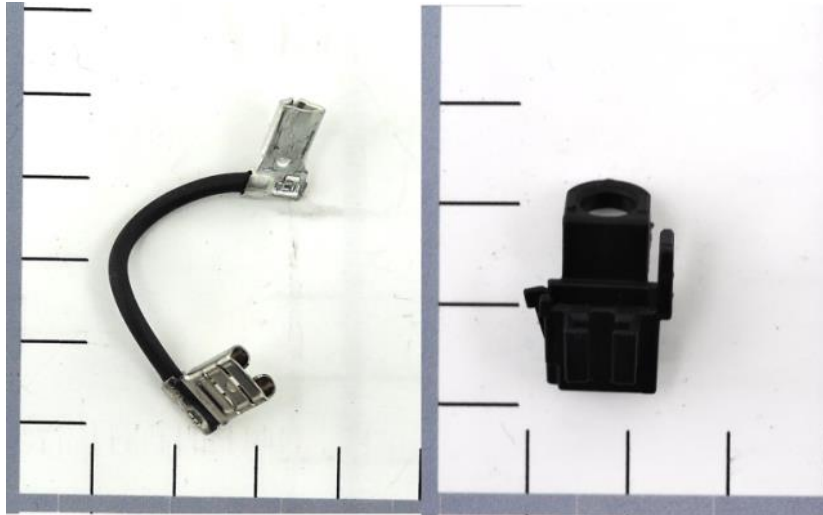
## Protection Plate Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
200 Ton Injection Molding Press	16.60	4	0.25	30.85	GER	\$0.04	99.99%	\$0.00

## Protection Plate Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Protection Plate	1	PA66 GF30	\$3.95	0.0271	0.0291	\$0.00	\$0.11

# Assemble Protection Plate

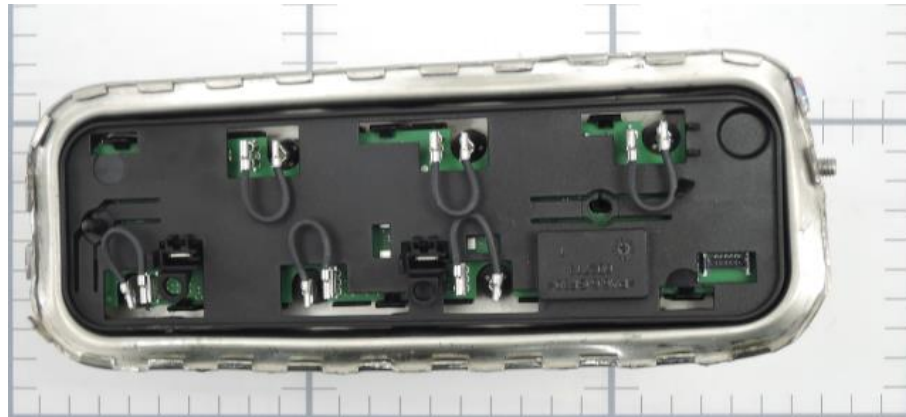


- \...
- \Exchanger Asm, Heat Exchanger Asm
- \Coil Exchanger Asm, Exchanger Asm
- \Assemble Protection Plate

## Process Summary

<b>Right First Time</b>	<b>99.37 %</b>
<b>Process Time (Sec)</b>	<b>72.00</b>
<b>Total Weight (kg)</b>	<b>0.01</b>

<b>Material Cost**</b>	<b>\$1.74</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$1.09</b>
<b>Q Burden</b>	<b>\$0.09</b>
<b>SG&amp;A</b>	<b>\$0.19</b>
<b>Manufacturing Cost*</b>	<b>\$3.11</b>



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Protection Plate



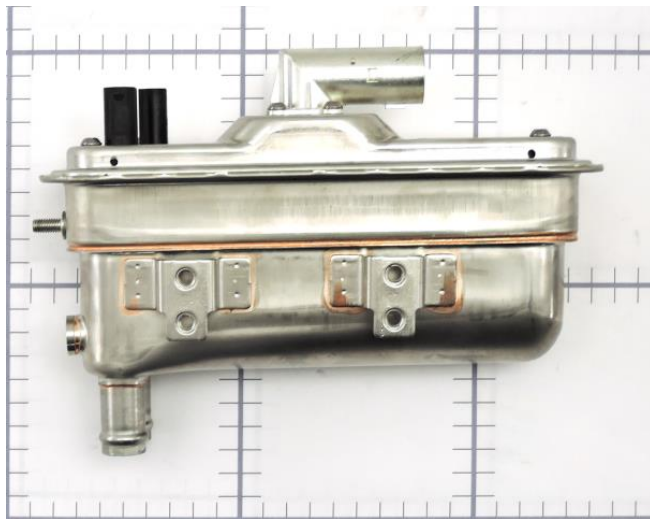
## Assemble Protection Plate

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	72.00	1	1.00	54.32	GER	\$1.09	99.37%	\$0.09

## Assemble Protection Plate

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Connector Guide	2	Commodity Item	Purchased	0.0008	-	\$0.03	\$0.00
Jumper Wire Connector	6	Commodity Item	Purchased	0.0021	-	\$0.28	\$0.00

## No Commodity Items Required for This Process



\...

- \Heat Exchanger Asm
- \Exchanger Asm, Heat Exchanger Asm
- \Assemble Exchanger

### Process Summary

<b>Right First Time</b>	<b>99.79 %</b>
<b>Process Time (Sec)</b>	<b>32.00</b>
<b>Total Weight (kg)</b>	<b>0.00</b>
<b>Material Cost**</b>	<b>\$0.00</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.48</b>
<b>Q Burden</b>	<b>\$0.03</b>
<b>SG&amp;A</b>	<b>\$0.06</b>
<b>Manufacturing Cost*</b>	<b>\$0.58</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Exchanger



## Assemble Exchanger

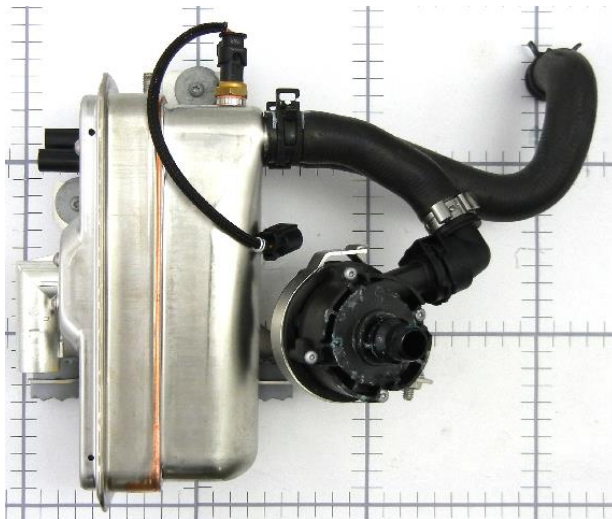
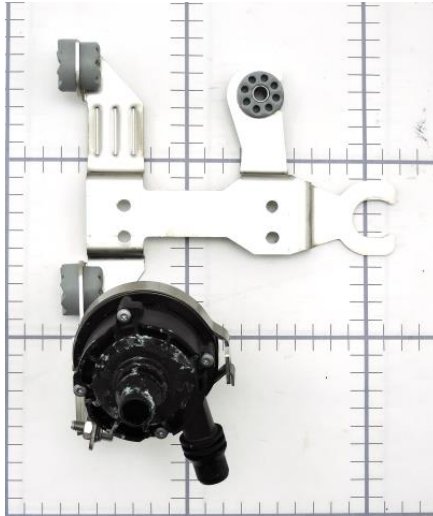
Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	32.00	1	1.00	54.32	GER	\$0.48	99.79%	\$0.03

## Assemble Exchanger

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Bracket Asm, Heat Exchanger Asm



\...  
 \HVAC  
 \Heat Exchanger Asm  
 \Bracket Asm, Heat Exchanger Asm

## Assembly Summary

<b>Parts</b>	<b>11</b>
<b>Fasteners</b>	<b>2</b>
<b>Part Numbers</b>	<b>7</b>
<b>Steps</b>	<b>48</b>
<b>Fastenings</b>	<b>11</b>
<b>Right First Time</b>	<b>99.45 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>1.82</b>
<b>Total Weight (kg)</b>	<b>0.62</b>

<b>Material Cost**</b>	<b>\$41.72</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$1.32</b>
<b>Q Burden</b>	<b>\$0.08</b>
<b>SG&amp;A</b>	<b>\$1.58</b>
<b>Manufacturing Cost*</b>	<b>\$44.71</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Bracket Asm, Heat Exchanger Asm



## Bracket Asm, Heat Exchanger Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Heat Exchanger BracketAsm, Bracket Asm	1	2	1	13	1	99.93 %	0.00	0.00	0.16	0.33	0.2626
Pump Retention Clamp, Bracket Asm	1	1	0	7	0	99.97 %	0.00	0.00	0.00	0.16	0.0131
Assemble Coolant Pump To Bracket	1	8	10	26	10	99.55 %	0.00	0.00	1.17	0.00	0.3409

## Bracket Asm, Heat Exchanger Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Heat Exchanger Bracket Asm, Bracket Asm	\$0.04	\$1.52	\$0.00	\$0.00	\$0.10	\$0.12	\$0.01	\$0.23	\$2.02
Pump Retention Clamp, Bracket Asm	\$0.00	\$0.07	\$0.00	\$0.00	\$0.00	\$0.05	\$0.00	\$0.01	\$0.13
Assemble Coolant Pump To Bracket	\$40.09	\$0.00	\$0.00	\$0.00	\$1.06	\$0.00	\$0.07	\$1.34	\$42.55

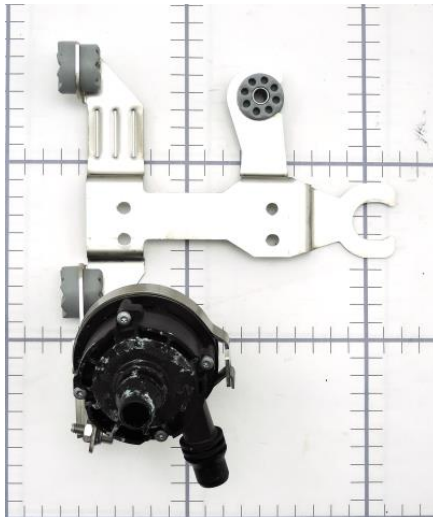
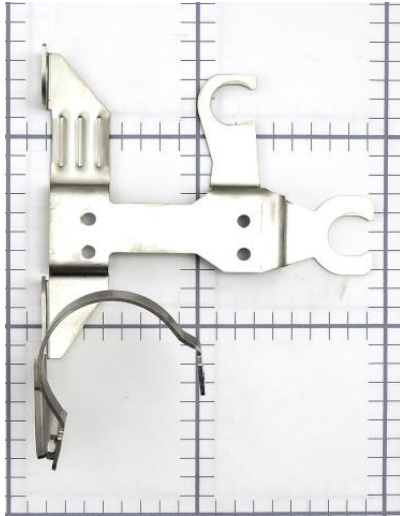
## Detailed Summary

<b>Parts</b>	<b>11</b>
<b>Fasteners</b>	<b>2</b>
<b>Part Numbers</b>	<b>7</b>
<b>Steps</b>	<b>48</b>
<b>Fastenings</b>	<b>11</b>
<b>Right First Time</b>	<b>99.45%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>1.33</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.49</b>
<b>Total Weight (kg)</b>	<b>0.62</b>
<b>Purchased Part Cost</b>	
	<b>\$40.13</b>
<b>Material Cost</b>	<b>\$1.59</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$1.16</b>
<b>Supplier Fab. Cost</b>	<b>\$0.17</b>
<b>Q Burden</b>	<b>\$0.08</b>
<b>SG&amp;A</b>	<b>\$1.58</b>
<b>Manufacturing Cost*</b>	<b>\$44.71</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Heat Exchanger Bracket Asm, Bracket Asm



\...

\Heat Exchanger Asm

\Bracket Asm, Heat Exchanger Asm

\Heat Exchanger Bracket Asm, Bracket Asm

## Assembly Summary

<b>Parts</b>	<b>2</b>
<b>Fasteners</b>	<b>1</b>
<b>Part Numbers</b>	<b>2</b>
<b>Steps</b>	<b>13</b>
<b>Fastenings</b>	<b>1</b>
<b>Right First Time</b>	<b>99.93 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>0.49</b>
<b>Total Weight (kg)</b>	<b>0.26</b>

<b>Material Cost**</b>	<b>\$1.56</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.22</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.23</b>
<b>Manufacturing Cost*</b>	<b>\$2.02</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Heat Exchanger Bracket Asm, Bracket Asm



**MUNRO**  
& ASSOCIATES, INC.

## Heat Exchanger Bracket Asm, Bracket Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Bracket, Heat Exchanger Bracket Asm	1	1	0	7	0	99.97 %	0.00	0.00	0.00	0.33	0.2606
Assemble Bracket	1	1	1	5	1	99.96 %	0.00	0.00	0.16	0.00	0.0020

## Heat Exchanger Bracket Asm, Bracket Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Bracket, Heat Exchanger Bracket Asm	\$0.00	\$1.52	\$0.00	\$0.00	\$0.00	\$0.12	\$0.01	\$0.21	\$1.86
Assemble Bracket	\$0.04	\$0.00	\$0.00	\$0.00	\$0.10	\$0.00	\$0.01	\$0.01	\$0.16

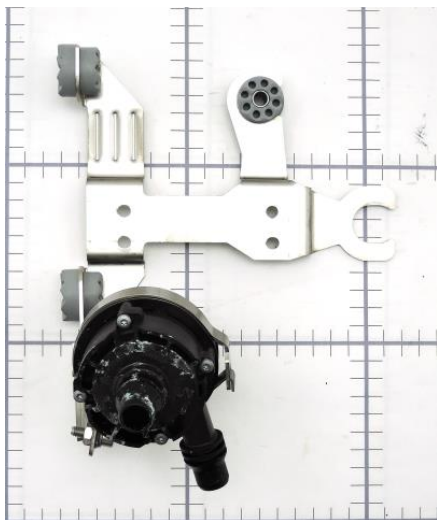
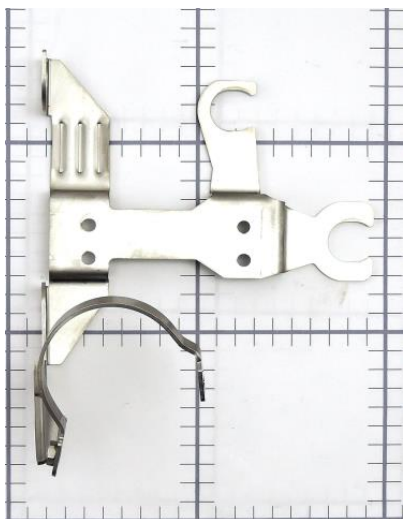
## Detailed Summary

<b>Parts</b>	<b>2</b>
<b>Fasteners</b>	<b>1</b>
<b>Part Numbers</b>	<b>2</b>
<b>Steps</b>	<b>13</b>
<b>Fastenings</b>	<b>1</b>
<b>Right First Time</b>	<b>99.93%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.16</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.33</b>
<b>Total Weight (kg)</b>	<b>0.26</b>
<hr/>	
<b>Purchased Part Cost</b>	<b>\$0.04</b>
<b>Material Cost</b>	<b>\$1.52</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.10</b>
<b>Supplier Fab. Cost</b>	<b>\$0.12</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.23</b>
<b>Manufacturing Cost*</b>	<b>\$2.02</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Bracket, Heat Exchanger Bracket Asm



\...

- \Heat Exchanger Bracket Asm, Bracket Asm
- \Bracket, Heat Exchanger Bracket Asm
- \Bracket Process

## Process Summary

<b>Right First Time</b>	<b>99.97 %</b>
<b>Process Time (Sec)</b>	<b>19.82</b>
<b>Total Weight (kg)</b>	<b>0.26</b>
<b>Material Cost**</b>	<b>\$1.52</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.12</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.21</b>
<b>Manufacturing Cost*</b>	<b>\$1.86</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Bracket, Heat Exchanger Bracket Asm



## Bracket Process

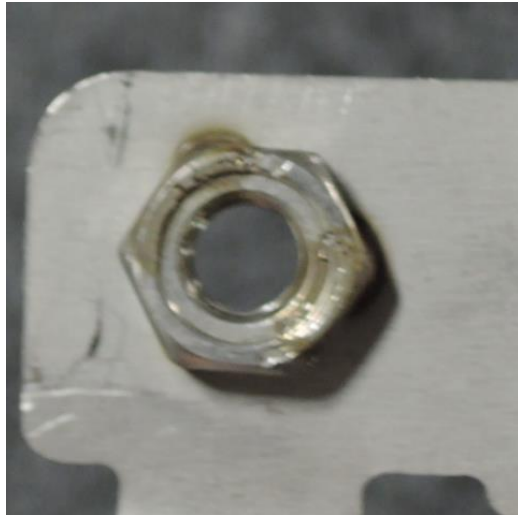
Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	9.00	1	0.25	20.00	GER	\$0.05	99.99%	\$0.00
Deburr	9.00	1	0.25	18.14	GER	\$0.05	99.99%	\$0.00
300 Ton Stamping Press	1.82	1	0.25	49.57	GER	\$0.03	99.99%	\$0.00

## Bracket Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Bracket	1	Aluminum 3003-O - Coil Stock	\$4.08	0.2606	0.3730	\$0.00	\$1.52



# Assemble Bracket



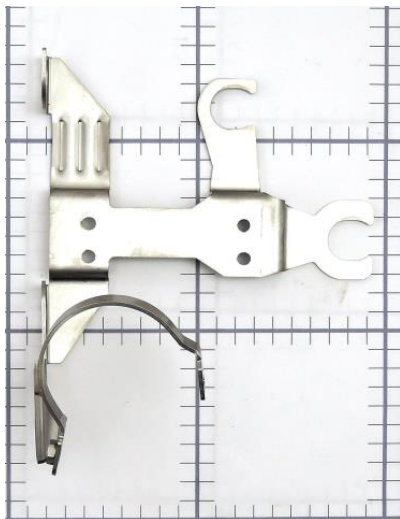
\...

- \Bracket Asm, Heat Exchanger Asm
- \Heat Exchanger Bracket Asm, Bracket Asm
- \Assemble Bracket

## Process Summary

<b>Right First Time</b>	<b>99.96 %</b>
<b>Process Time (Sec)</b>	<b>9.85</b>
<b>Total Weight (kg)</b>	<b>0.00</b>

<b>Material Cost**</b>	<b>\$0.04</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.10</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.01</b>
<b>Manufacturing Cost*</b>	<b>\$0.16</b>



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Bracket



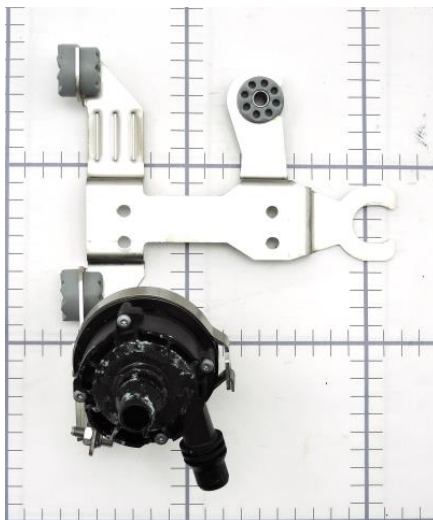
## Assemble Bracket

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Projection Welding Station	9.85	1	0.25	36.19	GER	\$0.10	99.96%	\$0.01

## Assemble Bracket

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
M5x5mm-Hex Nut	1	Commodity Item	Purchased	0.0020	-	\$0.04	\$0.00

# Pump Retention Clamp, Bracket Asm



\...

- \Bracket Asm, Heat Exchanger Asm
- \Pump Retention Clamp, Bracket Asm
- \Pump Retention Clamp Process

## Process Summary

<b>Right First Time</b>	<b>99.97 %</b>
<b>Process Time (Sec)</b>	<b>9.60</b>
<b>Total Weight (kg)</b>	<b>0.01</b>
<b>Material Cost**</b>	<b>\$0.07</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.05</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.01</b>
<b>Manufacturing Cost*</b>	<b>\$0.13</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Pump Retention Clamp, Bracket Asm



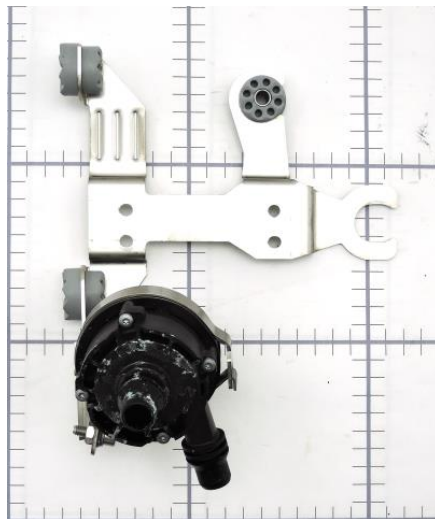
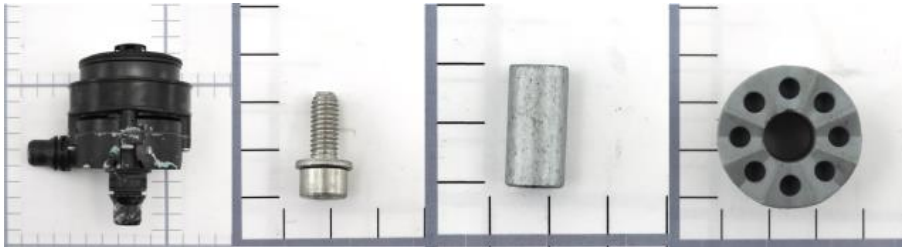
## Pump Retention Clamp Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Wash	5.00	1	0.25	20.00	GER	\$0.03	99.99%	\$0.00
Deburr	4.00	1	0.25	12.36	GER	\$0.01	99.99%	\$0.00
25 Ton Stamping Press	0.60	1	0.25	21.63	GER	\$0.00	99.99%	\$0.00

## Pump Retention Clamp Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Pump Retention Clamp	1	Aluminum 3003-O - Coil Stock	\$4.08	0.0131	0.0170	\$0.00	\$0.07

# Assemble Coolant Pump To Bracket



\...

- \Heat Exchanger Asm
- \Bracket Asm, Heat Exchanger Asm
- \Assemble Coolant Pump To Bracket

## Process Summary

Right First Time	99.55 %
Process Time (Sec)	70.00
Total Weight (kg)	0.34

Material Cost**	\$40.09
OEM Process Cost	\$0.00
Supplier Process Cost	\$1.06
Q Burden	\$0.07
SG&A	\$1.34
Manufacturing Cost*	\$42.55

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Coolant Pump To Bracket



## Assemble Coolant Pump To Bracket

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	70.00	1	1.00	54.32	GER	\$1.06	99.55%	\$0.07

## Assemble Coolant Pump To Bracket

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Electric Coolant Pump	1	Commodity Item	Purchased	0.2902	-	\$30.00	\$0.00
M6x15mm - Torx SEMs Bolt	1	Commodity Item	Purchased	0.0067	-	\$0.03	\$0.00
Isolator	4	Commodity Item	Purchased	0.0080	-	\$2.50	\$0.00
M7x20mm-Sleeve	2	Commodity Item	Purchased	0.0060	-	\$0.03	\$0.00

# Assemble Exchanger and Bracket



\...  
\HVAC  
\Heat Exchanger Asm  
\Assemble Exchanger and Bracket

## Process Summary

Right First Time	99.14 %
Process Time (Sec)	54.00
Total Weight (kg)	0.02

Material Cost**	\$0.04
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.81
Q Burden	\$0.13
SG&A	\$0.11
Manufacturing Cost*	\$1.09



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Exchanger and Bracket



## Assemble Exchanger and Bracket

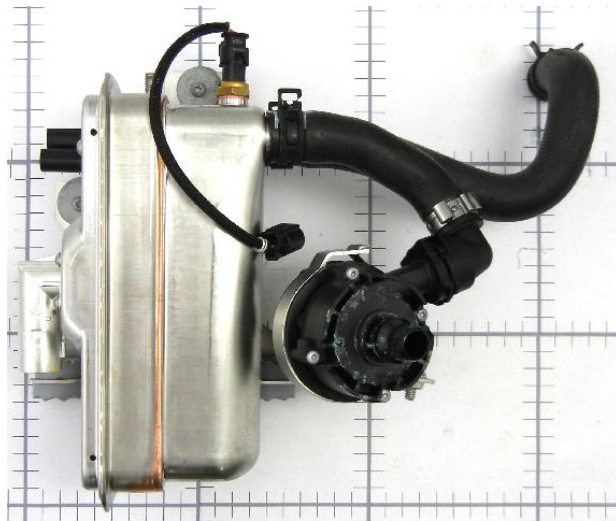
Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	54.00	1	1.00	54.32	GER	\$0.81	99.14 %	\$0.13

## Assemble Exchanger and Bracket

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
M6x12mm - Torx Bolt	4	Commodity Item	Purchased	0.0040	-	\$0.01	\$0.00



# Input Coolant Hose Asm, Heat Exchanger Asm



\...  
 \HVAC  
 \Heat Exchanger Asm  
 \Input Coolant Hose Asm, Heat Exchanger Asm

## Assembly Summary

<b>Parts</b>	<b>6</b>
<b>Fasteners</b>	<b>2</b>
<b>Part Numbers</b>	<b>6</b>
<b>Steps</b>	<b>16</b>
<b>Fastenings</b>	<b>5</b>
<b>Right First Time</b>	<b>99.84 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>0.59</b>
<b>Total Weight (kg)</b>	<b>0.07</b>

<b>Material Cost**</b>	<b>\$0.40</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.54</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.10</b>
<b>Manufacturing Cost*</b>	<b>\$1.06</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Input Coolant Hose Asm, Heat Exchanger Asm



## Input Coolant Hose Asm, Heat Exchanger Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Hose, Input Coolant Hose Asm	1	3	0	3	0	99.97 %	0.00	0.00	0.00	0.04	0.0341
Assemble Hose	1	3	5	12	5	99.87 %	0.00	0.00	0.55	0.00	0.0351

## Input Coolant Hose Asm, Heat Exchanger Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Hose, Input Coolant Hose Asm	\$0.00	\$0.15	\$0.00	\$0.00	\$0.00	\$0.04	\$0.00	\$0.02	\$0.22
Assemble Hose	\$0.25	\$0.00	\$0.00	\$0.00	\$0.50	\$0.00	\$0.02	\$0.07	\$0.84

## Detailed Summary

<b>Parts</b>	<b>6</b>
<b>Fasteners</b>	<b>2</b>
<b>Part Numbers</b>	<b>6</b>
<b>Steps</b>	<b>16</b>
<b>Fastenings</b>	<b>5</b>
<b>Right First Time</b>	<b>99.84%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.55</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.04</b>
<b>Total Weight (kg)</b>	<b>0.07</b>
<hr/>	
<b>Purchased Part Cost</b>	<b>\$0.25</b>
<b>Material Cost</b>	<b>\$0.15</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.50</b>
<b>Supplier Fab. Cost</b>	<b>\$0.04</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.10</b>
<b>Manufacturing Cost*</b>	<b>\$1.06</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Hose, Input Coolant Hose Asm



\...

\Input Coolant Hose Asm, Heat Exchanger Asm

\Hose, Input Coolant Hose Asm

\Hose Process

## Process Summary

Right First Time	99.97 %
Process Time (Sec)	2.11
Total Weight (kg)	0.03

Material Cost**	\$0.15
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.04
Q Burden	\$0.00
SG&A	\$0.02
Manufacturing Cost*	\$0.22

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Hose, Input Coolant Hose Asm



## Hose Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Extrusion: 32mm, 3 Layer	2.11	1	0.50	65.93	GER	\$0.04	99.97%	\$0.00

## Hose Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material 1, Hose	1	EPDM (Extrusion Grade)	\$4.43	0.0116	0.0116	\$0.00	\$0.05
Material 2, Hose	1	EPDM (Extrusion Grade)	\$4.43	0.0204	0.0204	\$0.00	\$0.09
Material 3, Hose	1	PA Thread w/PVC Coating	By Area	0.0021	-	\$0.00	\$0.01

# Assemble Hose



\...

\Heat Exchanger Asm

\Input Coolant Hose Asm, Heat Exchanger Asm

\Assemble Hose

## Process Summary

Right First Time	99.87 %
Process Time (Sec)	33.05
Total Weight (kg)	0.04

Material Cost**	\$0.25
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.50
Q Burden	\$0.02
SG&A	\$0.07
Manufacturing Cost*	\$0.84

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Hose



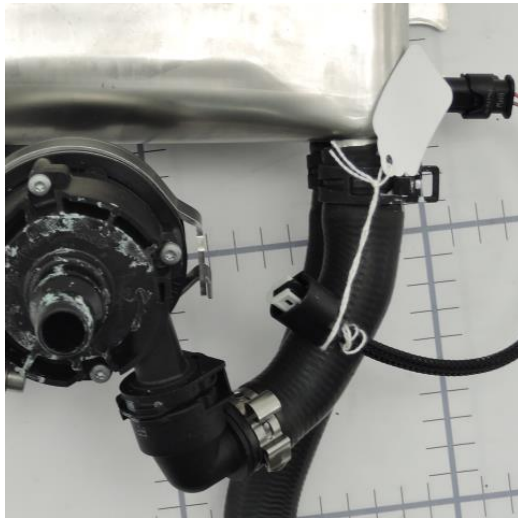
## Assemble Hose

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	33.05	1	1.00	54.32	GER	\$0.50	99.87%	\$0.02

## Assemble Hose

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Hose Connector w/Retention Clip	1	Commodity Item	Purchased	0.0193	-	\$0.10	\$0.00
38mm Hose Locking Clamp	1	Commodity Item	Purchased	0.0059	-	\$0.04	\$0.00
23mm Hose Clamp	1	Commodity Item	Purchased	0.0099	-	\$0.11	\$0.00

## No Commodity Items Required for This Process



\...  
\HVAC  
\Heat Exchanger Asm  
\Assemble Input Coolant Hose

### Process Summary

<b>Right First Time</b>	<b>99.88 %</b>
<b>Process Time (Sec)</b>	<b>12.00</b>
<b>Total Weight (kg)</b>	<b>0.00</b>
<b>Material Cost**</b>	<b>\$0.00</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.18</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.02</b>
<b>Manufacturing Cost*</b>	<b>\$0.22</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Assemble Input Coolant Hose



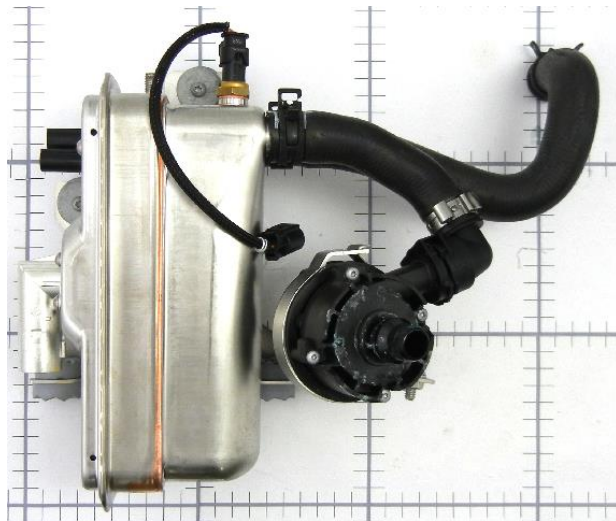
## Assemble Input Coolant Hose

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
<a href="#">Supplier Manual Asm</a>	12.00	1	1.00	54.32	GER	\$0.18	99.88 %	\$0.02

## Assemble Input Coolant Hose

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Coolant Outlet Hose Asm, Heat Exchanger Asm



\...  
 \HVAC  
 \Heat Exchanger Asm  
 \Coolant Outlet Hose Asm, Heat Exchanger Asm

## Assembly Summary

<b>Parts</b>	<b>5</b>
<b>Fasteners</b>	<b>2</b>
<b>Part Numbers</b>	<b>4</b>
<b>Steps</b>	<b>14</b>
<b>Fastenings</b>	<b>4</b>
<b>Right First Time</b>	<b>99.85 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>0.39</b>
<b>Total Weight (kg)</b>	<b>0.11</b>

<b>Material Cost**</b>	<b>\$0.59</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.36</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.10</b>
<b>Manufacturing Cost*</b>	<b>\$1.07</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Coolant Outlet Hose Asm, Heat Exchanger Asm



## Coolant Outlet Hose Asm, Heat Exchanger Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Hose, Coolant Outlet Hose Asm	1	3	0	3	0	99.97 %	0.00	0.00	0.00	0.04	0.0857
Assemble Coolant Outlet Hose	1	2	4	10	4	99.88 %	0.00	0.00	0.35	0.00	0.0198

## Coolant Outlet Hose Asm, Heat Exchanger Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Hose, Coolant Outlet Hose Asm	\$0.00	\$0.37	\$0.00	\$0.00	\$0.00	\$0.04	\$0.00	\$0.05	\$0.47
Assemble Coolant Outlet Hose	\$0.22	\$0.00	\$0.00	\$0.00	\$0.32	\$0.00	\$0.02	\$0.05	\$0.60

## Detailed Summary

<b>Parts</b>	<b>5</b>
<b>Fasteners</b>	<b>2</b>
<b>Part Numbers</b>	<b>4</b>
<b>Steps</b>	<b>14</b>
<b>Fastenings</b>	<b>4</b>
<b>Right First Time</b>	<b>99.85%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.35</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.04</b>
<b>Total Weight (kg)</b>	<b>0.11</b>
<hr/>	
<b>Purchased Part Cost</b>	<b>\$0.22</b>
<b>Material Cost</b>	<b>\$0.37</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.32</b>
<b>Supplier Fab. Cost</b>	<b>\$0.04</b>
<b>Q Burden</b>	<b>\$0.02</b>
<b>SG&amp;A</b>	<b>\$0.10</b>
<b>Manufacturing Cost*</b>	<b>\$1.07</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Hose, Coolant Outlet Hose Asm



\...

- \Coolant Outlet Hose Asm, Heat Exchanger Asm
- \Hose, Coolant Outlet Hose Asm
- \Hose Process

## Process Summary

Right First Time	99.97 %
Process Time (Sec)	2.11
Total Weight (kg)	0.09

Material Cost**	\$0.37
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.04
Q Burden	\$0.00
SG&A	\$0.05
Manufacturing Cost*	\$0.47

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Hose, Coolant Outlet Hose Asm



## Hose Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Extrusion: 32mm, 3 Layer	2.11	1	0.50	65.93	GER	\$0.04	99.97%	\$0.00

## Hose Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material 1, Hose	1	EPDM (Extrusion Grade)	\$4.43	0.0279	0.0279	\$0.00	\$0.12
Material 2, Hose	1	EPDM (Extrusion Grade)	\$4.43	0.0491	0.0491	\$0.00	\$0.22
Material 3, Hose	1	PA Thread w/PVC Coating	By Area	0.0087	-	\$0.00	\$0.03

# Assemble Coolant Outlet Hose



\...

- \Heat Exchanger Asm
- \Coolant Outlet Hose Asm, Heat Exchanger Asm
- \Assemble Coolant Outlet Hose

## Process Summary

Right First Time	99.88 %
Process Time (Sec)	21.10
Total Weight (kg)	0.02

Material Cost**	\$0.22
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.32
Q Burden	\$0.02
SG&A	\$0.05
Manufacturing Cost*	\$0.60

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Coolant Outlet Hose



## Assemble Coolant Outlet Hose

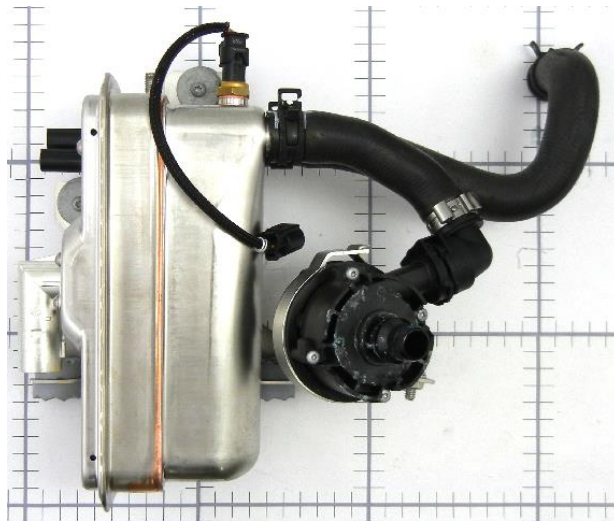
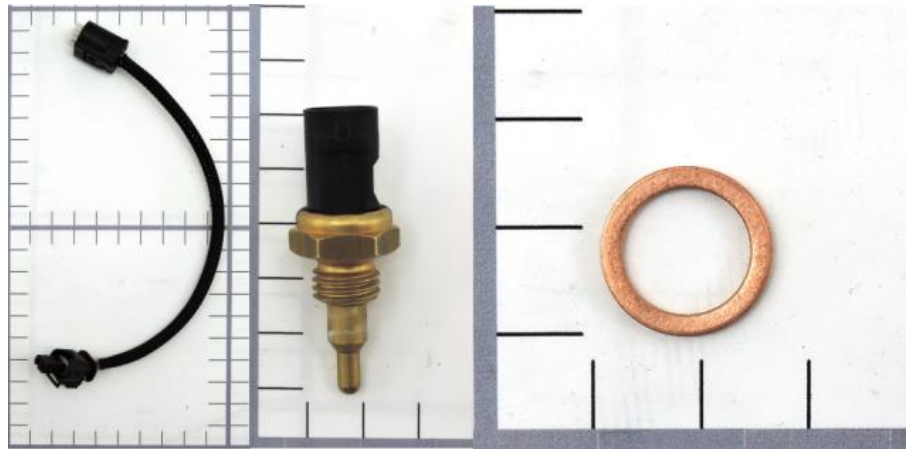
Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	21.10	1	1.00	54.32	GER	\$0.32	99.88 %	\$0.02

## Assemble Coolant Outlet Hose

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
23mm Hose Clamp	2	Commodity Item	Purchased	0.0099	-	\$0.11	\$0.00



# Assemble Outlet Coolant Hose



\...  
\HVAC  
\Heat Exchanger Asm  
\Assemble Outlet Coolant Hose

## Process Summary

Right First Time	99.52 %
Process Time (Sec)	41.00
Total Weight (kg)	0.03
Material Cost**	\$3.44
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.62
Q Burden	\$0.07
SG&A	\$0.27
Manufacturing Cost*	\$4.40

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

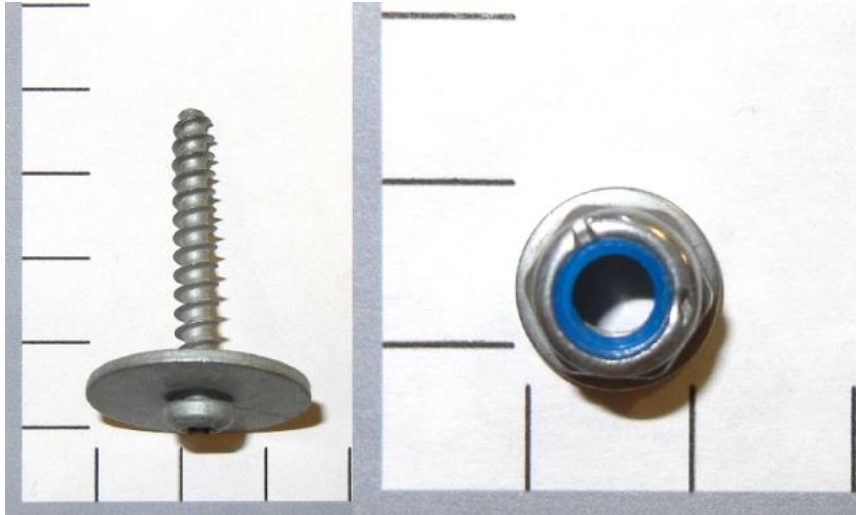
# Assemble Outlet Coolant Hose



Assemble Outlet Coolant Hose									
Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden	
Supplier Manual Asm	41.00	1	1.00	54.32	GER	\$0.62	99.52 %	\$0.07	

Assemble Outlet Coolant Hose								
Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost	
M12x1mm - Copper Washer	1	Commodity Item	Purchased	0.0010	-	\$0.04	\$0.00	
Heat Exchanger Sensor	1	Commodity Item	Purchased	0.0157	-	\$2.50	\$0.00	
Sensor Wire Harness	1	See Appendix	-	0.0087	-	\$0.00	\$0.90	

[Click Here for Munro & Associates Wire Harness Report on Heat Exchanger Sensor Harness](#)



\...  
\Zone 6 Cooling Pack & HVAC  
\HVAC  
\Heat Exchanger Installation

## Process Summary

Right First Time	99.33 %
Process Time (Sec)	54.00
Total Weight (kg)	0.02

Material Cost**	\$0.14
OEM Process Cost	\$1.37
Supplier Process Cost	\$0.00
Q Burden	\$0.10
SG&A	\$0.18
Manufacturing Cost*	\$1.79



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Heat Exchanger Installation

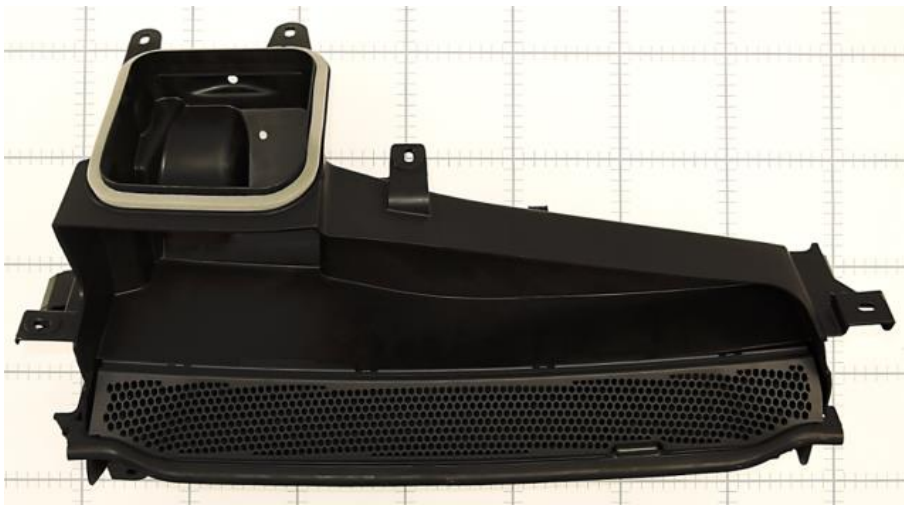


## Heat Exchanger Installation

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
OEM Manual Asm	54.00	1	1.00	91.41	GER	\$1.37	99.33%	\$0.10

## Heat Exchanger Installation

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
M5x33-SEMS Torx Screw	2	Commodity Item	Purchased	0.0090	-	\$0.03	\$0.00
M6x9- KEPS Nylock Nut	1	Commodity Item	Purchased	0.0036	-	\$0.08	\$0.00



\...  
 \Zone 6 Cooling Pack & HVAC  
 \HVAC  
 \Plenum Asm

## Assembly Summary

<b>Parts</b>	<b>13</b>
<b>Fasteners</b>	<b>4</b>
<b>Part Numbers</b>	<b>11</b>
<b>Steps</b>	<b>42</b>
<b>Fastenings</b>	<b>11</b>
<b>Right First Time</b>	<b>99.51 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>3.10</b>
<b>Total Weight (kg)</b>	<b>1.35</b>

<b>Material Cost**</b>	<b>\$3.80</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$2.68</b>
<b>Q Burden</b>	<b>\$0.07</b>
<b>SG&amp;A</b>	<b>\$0.83</b>
<b>Manufacturing Cost*</b>	<b>\$7.38</b>

\* Excluding tooling, ER&D, logistics, and profit margin  
 \*\* Includes material cost and purchased parts cost

## Plenum Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Windshield Vent Asm, Plenum Asm	1	3	1	9	1	99.91 %	0.00	0.00	0.15	0.64	0.2347
Plenum Base Asm, Plenum Asm	1	10	9	27	9	99.66 %	0.00	0.00	1.46	0.67	1.1106
Assemble Plenum	1	0	1	4	1	99.94 %	0.00	0.00	0.18	0.00	0.0000

## Plenum Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Windshield Vent Asm, Plenum Asm	\$0.00	\$0.64	\$0.00	\$0.00	\$0.14	\$0.47	\$0.01	\$0.16	\$1.43
Plenum Base Asm, Plenum Asm	\$0.14	\$3.02	\$0.00	\$0.00	\$1.32	\$0.69	\$0.05	\$0.64	\$5.76
Assemble Plenum	\$0.00	\$0.00	\$0.00	\$0.00	\$0.17	\$0.00	\$0.01	\$0.02	\$0.20

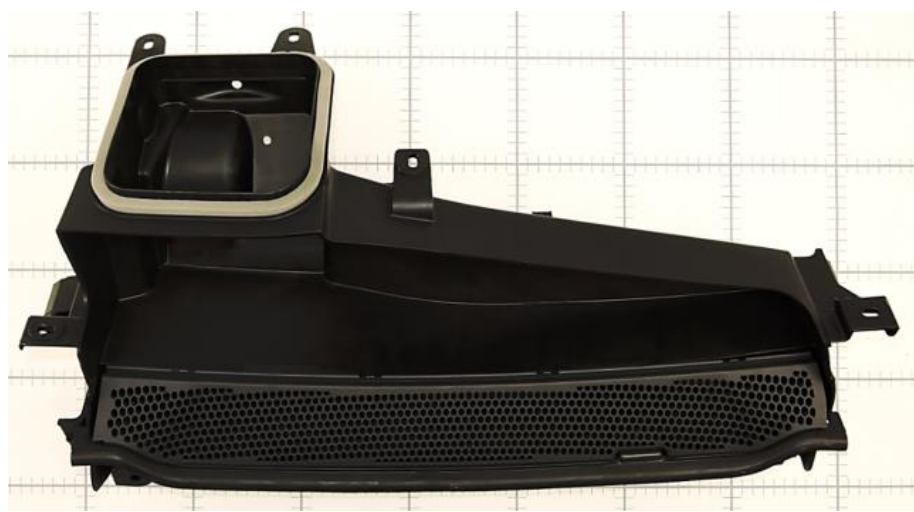
## Detailed Summary

<b>Parts</b>	<b>13</b>
<b>Fasteners</b>	<b>4</b>
<b>Part Numbers</b>	<b>11</b>
<b>Steps</b>	<b>42</b>
<b>Fastenings</b>	<b>11</b>
<b>Right First Time</b>	<b>99.51%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>1.79</b>
<b>Supplier Fab. Time (Min)</b>	<b>1.31</b>
<b>Total Weight (kg)</b>	<b>1.35</b>
<b>Purchased Part Cost</b>	<b>\$0.14</b>
<b>Material Cost</b>	<b>\$3.66</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$1.62</b>
<b>Supplier Fab. Cost</b>	<b>\$1.06</b>
<b>Q Burden</b>	<b>\$0.07</b>
<b>SG&amp;A</b>	<b>\$0.83</b>
<b>Manufacturing Cost*</b>	<b>\$7.38</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Windshield Vent Asm, Plenum Asm



\...  
 \HVAC  
 \Plenum Asm  
 \Windshield Vent Asm, Plenum Asm  
**Assembly Summary**

<b>Parts</b>	<b>3</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>9</b>
<b>Fastenings</b>	<b>1</b>
<b>Right First Time</b>	<b>99.91 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>0.79</b>
<b>Total Weight (kg)</b>	<b>0.23</b>

<b>Material Cost**</b>	<b>\$0.64</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.61</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.16</b>
<b>Manufacturing Cost*</b>	<b>\$1.43</b>

\* Excluding tooling, ER&D, logistics, and profit margin  
 \*\* Includes material cost and purchased parts cost



# Windshield Vent Asm, Plenum Asm



## Windshield Vent Asm, Plenum Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Vent, Windshield Vent Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.23	0.0986
Base, Windshield Vent Asm	1	2	0	2	0	99.98 %	0.00	0.00	0.00	0.40	0.1361
Assemble Windshield Vent	1	0	1	4	1	99.94 %	0.00	0.00	0.15	0.00	0.0000

## Windshield Vent Asm, Plenum Asm

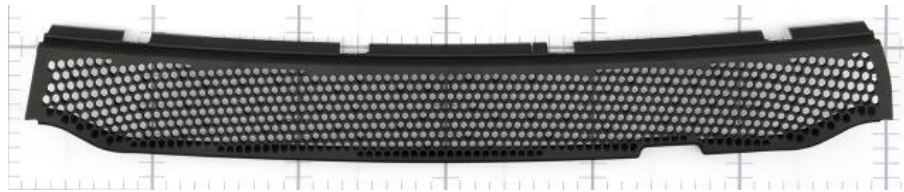
Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Vent, Windshield Vent Asm	\$0.00	\$0.27	\$0.00	\$0.00	\$0.00	\$0.15	\$0.00	\$0.06	\$0.48
Base, Windshield Vent Asm	\$0.00	\$0.37	\$0.00	\$0.00	\$0.00	\$0.32	\$0.00	\$0.09	\$0.78
Assemble Windshield Vent	\$0.00	\$0.00	\$0.00	\$0.00	\$0.14	\$0.00	\$0.01	\$0.02	\$0.16

## Detailed Summary

<b>Parts</b>	<b>3</b>
<b>Fasteners</b>	<b>0</b>
<b>Part Numbers</b>	<b>3</b>
<b>Steps</b>	<b>9</b>
<b>Fastenings</b>	<b>1</b>
<b>Right First Time</b>	<b>99.91%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>0.15</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.64</b>
<b>Total Weight (kg)</b>	<b>0.23</b>
<b>Purchased Part Cost</b>	<b>\$0.00</b>
<b>Material Cost</b>	<b>\$0.64</b>
<b>OEM Asm. Cost</b>	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	<b>\$0.14</b>
<b>Supplier Fab. Cost</b>	<b>\$0.47</b>
<b>Q Burden</b>	<b>\$0.01</b>
<b>SG&amp;A</b>	<b>\$0.16</b>
<b>Manufacturing Cost*</b>	<b>\$1.43</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



\...  
 \Windshield Vent Asm, Plenum Asm  
 \Vent, Windshield Vent Asm  
 \Vent Process

## Process Summary

<b>Right First Time</b>	<b>99.99 %</b>
<b>Process Time (Sec)</b>	<b>13.98</b>
<b>Total Weight (kg)</b>	<b>0.10</b>

<b>Material Cost**</b>	<b>\$0.27</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$0.15</b>
<b>Q Burden</b>	<b>\$0.00</b>
<b>SG&amp;A</b>	<b>\$0.06</b>
<b>Manufacturing Cost*</b>	<b>\$0.48</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Vent, Windshield Vent Asm



## Vent Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
300 Ton Injection Molding Press	27.96	2	0.25	39.50	GER	\$0.15	99.99%	\$0.00

## Vent Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Vent	1	PPTD20	\$2.54	0.0986	0.1060	\$0.00	\$0.27

# Base, Windshield Vent Asm



\...

\Windshield Vent Asm, Plenum Asm

\Base, Windshield Vent Asm

\Base Process

## Process Summary

Right First Time	99.98 %
Process Time (Sec)	24.17
Total Weight (kg)	0.14

Material Cost**	\$0.37
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.32
Q Burden	\$0.00
SG&A	\$0.09
Manufacturing Cost*	\$0.78

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Base, Windshield Vent Asm



## Base Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
300 Ton Injection Molding Press, 2 Shot	48.34	2	0.25	47.87	GER	\$0.32	99.98 %	\$0.00

## Base Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material 1, Base	1	PPTD20	\$2.54	0.1271	0.1366	\$0.00	\$0.35
Material 2, Base	1	TPE	\$2.54	0.0090	0.0097	\$0.00	\$0.02

No Commodity Items  
Required for This  
Process



\...

\Plenum Asm

\Windshield Vent Asm, Plenum Asm

\Assemble Windshield Vent

## Process Summary

Right First Time	99.94 %
Process Time (Sec)	9.00
Total Weight (kg)	0.00

Material Cost**	\$0.00
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.14
Q Burden	\$0.01
SG&A	\$0.02
Manufacturing Cost*	\$0.16

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Windshield Vent



## Assemble Windshield Vent

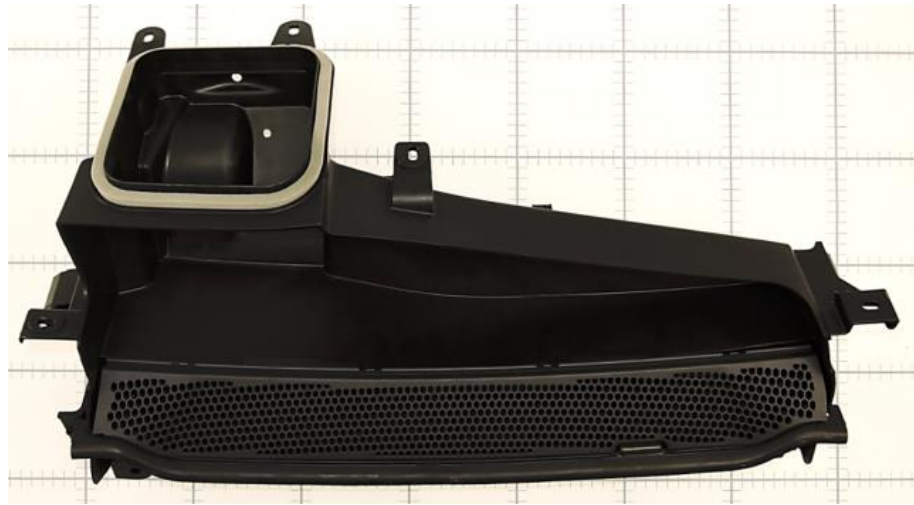
Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	9.00	1	1.00	54.32	GER	\$0.14	99.94 %	\$0.01

## Assemble Windshield Vent

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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# Plenum Base Asm, Plenum Asm



\...  
 \HVAC  
 \Plenum Asm  
 \Plenum Base Asm, Plenum Asm  
**Assembly Summary**

<b>Parts</b>	<b>10</b>
<b>Fasteners</b>	<b>4</b>
<b>Part Numbers</b>	<b>8</b>
<b>Steps</b>	<b>27</b>
<b>Fastenings</b>	<b>9</b>
<b>Right First Time</b>	<b>99.66 %</b>
<b>OEM Process Time (Min)</b>	<b>0.00</b>
<b>Supplier Process Time (Min)</b>	<b>2.13</b>
<b>Total Weight (kg)</b>	<b>1.11</b>

<b>Material Cost**</b>	<b>\$3.16</b>
<b>OEM Process Cost</b>	<b>\$0.00</b>
<b>Supplier Process Cost</b>	<b>\$1.90</b>
<b>Q Burden</b>	<b>\$0.05</b>
<b>SG&amp;A</b>	<b>\$0.64</b>
<b>Manufacturing Cost*</b>	<b>\$5.76</b>

\* Excluding tooling, ER&D, logistics, and profit margin  
 \*\* Includes material cost and purchased parts cost

# Plenum Base Asm, Plenum Asm



## Plenum Base Asm, Plenum Asm

Name	Qty	Parts	Fasteners	Steps	Fastenings	Right First Time	OEM Asm. Time (Min)	OEM Fab. Time (Min)	Supplier Asm. Time (Min)	Supplier Fab. Time (Min)	Total Weight (kg)
Plenum, Plenum Base Asm	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.59	1.0640
Bracket, Plenum Base	1	1	0	1	0	99.99 %	0.00	0.00	0.00	0.08	0.0285
Assemble Plenum	1	8	9	23	9	99.68 %	0.00	0.00	1.46	0.00	0.0181

## Plenum Base Asm, Plenum Asm

Name	Purchased Part Cost	Material Cost	OEM Asm. Cost	OEM Fab. Cost	Supplier Asm. Cost	Supplier Fab. Cost	Q Burden	SG&A	Manufacturing Cost*
Plenum, Plenum Base Asm	\$0.00	\$2.89	\$0.00	\$0.00	\$0.00	\$0.55	\$0.00	\$0.45	\$3.89
Bracket, Plenum Base	\$0.00	\$0.13	\$0.00	\$0.00	\$0.00	\$0.03	\$0.00	\$0.02	\$0.18
Assemble Plenum	\$0.14	\$0.00	\$0.00	\$0.00	\$1.32	\$0.00	\$0.05	\$0.18	\$1.68

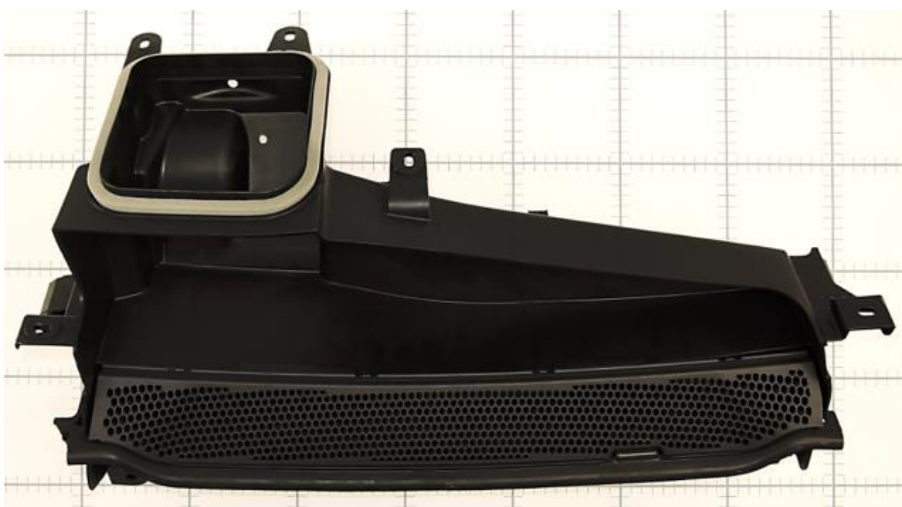
## Detailed Summary

<b>Parts</b>	<b>10</b>
<b>Fasteners</b>	<b>4</b>
<b>Part Numbers</b>	<b>8</b>
<b>Steps</b>	<b>27</b>
<b>Fastenings</b>	<b>9</b>
<b>Right First Time</b>	<b>99.66%</b>
<b>OEM Asm. Time (Min)</b>	<b>0.00</b>
<b>OEM Fab. Time (Min)</b>	<b>0.00</b>
<b>Supplier Asm. Time (Min)</b>	<b>1.46</b>
<b>Supplier Fab. Time (Min)</b>	<b>0.67</b>
<b>Total Weight (kg)</b>	<b>1.11</b>
<b>Purchased Part Cost</b>	
	<b>\$0.14</b>
<b>Material Cost</b>	
	<b>\$3.02</b>
<b>OEM Asm. Cost</b>	
	<b>\$0.00</b>
<b>OEM Fab. Cost</b>	
	<b>\$0.00</b>
<b>Supplier Asm. Cost</b>	
	<b>\$1.32</b>
<b>Supplier Fab. Cost</b>	
	<b>\$0.59</b>
<b>Q Burden</b>	
	<b>\$0.05</b>
<b>SG&amp;A</b>	
	<b>\$0.64</b>
<b>Manufacturing Cost*</b>	
	<b>\$5.76</b>

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Plenum, Plenum Base Asm



\...

\Plenum Base Asm, Plenum Asm

\Plenum, Plenum Base Asm

\Plenum Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	35.36
Total Weight (kg)	1.06

Material Cost**	\$2.89
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.55
Q Burden	\$0.00
SG&A	\$0.45
Manufacturing Cost*	\$3.89

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Plenum, Plenum Base Asm



## Plenum Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
500 Ton Injection Molding Press	35.36	1	0.25	56.33	GER	\$0.55	99.99%	\$0.00

## Plenum Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Plenum	1	PPTD20	\$2.54	1.0640	1.1385	\$0.00	\$2.89

# Bracket, Plenum Base

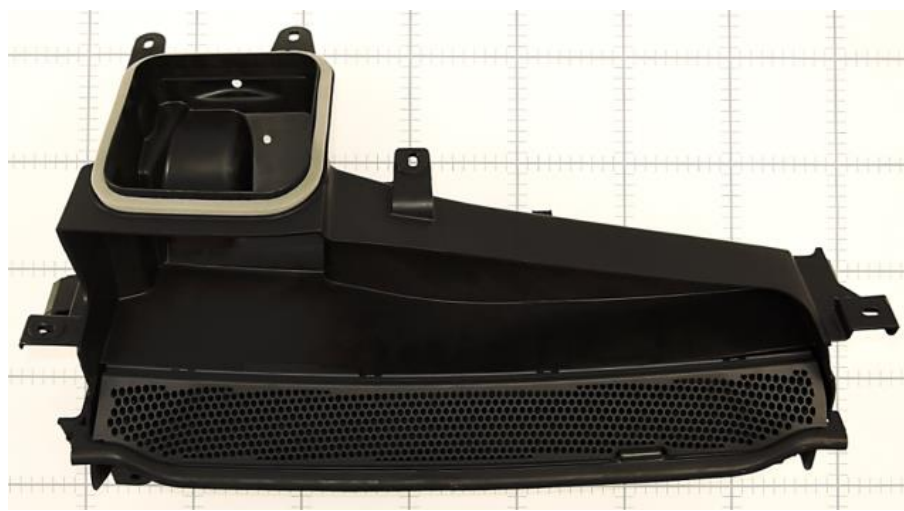


\...  
\Plenum Base Asm, Plenum Asm  
\Bracket, Plenum Base  
\Bracket Process

## Process Summary

Right First Time	99.99 %
Process Time (Sec)	4.86
Total Weight (kg)	0.03

Material Cost**	\$0.13
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.03
Q Burden	\$0.00
SG&A	\$0.02
Manufacturing Cost*	\$0.18



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Bracket, Plenum Base



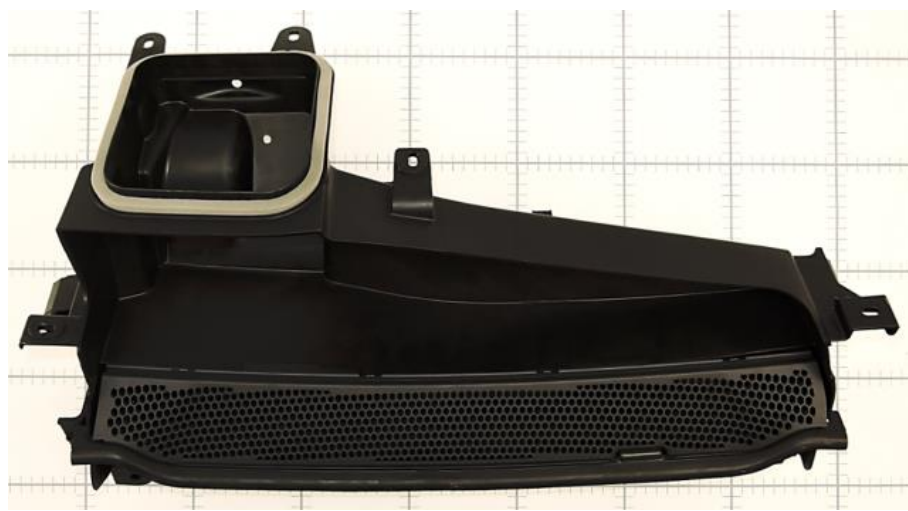
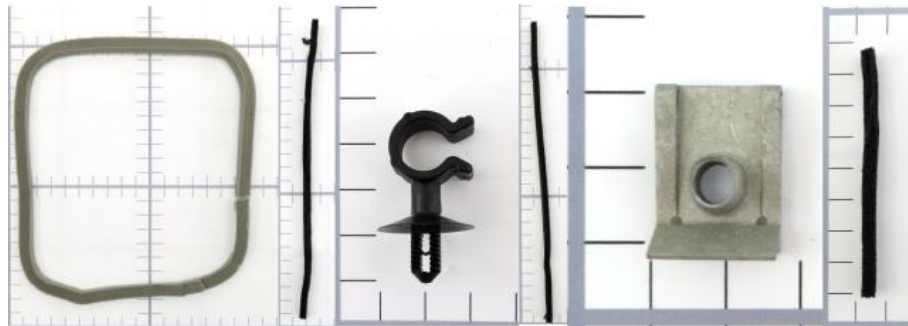
## Bracket Process

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
55Ton Injection Molding Press	29.16	6	0.25	23.71	GER	\$0.03	99.99%	\$0.00

## Bracket Process

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
Material, Bracket	1	PA6 GF30	\$4.10	0.0285	0.0306	\$0.00	\$0.13

# Assemble Plenum



\...

\Plenum Asm

\Plenum Base Asm, Plenum Asm

\Assemble Plenum

## Process Summary

Right First Time	99.68 %
Process Time (Sec)	87.38
Total Weight (kg)	0.02

Material Cost**	\$0.14
OEM Process Cost	\$0.00
Supplier Process Cost	\$1.32
Q Burden	\$0.05
SG&A	\$0.18
Manufacturing Cost*	\$1.68

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost



# Assemble Plenum



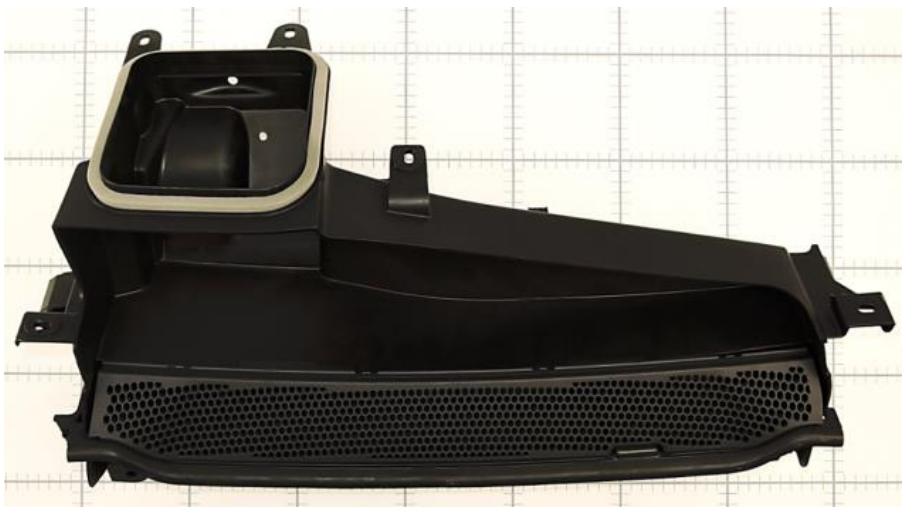
## Assemble Plenum

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	87.38	1	1.00	54.32	GER	\$1.32	99.68 %	\$0.05

## Assemble Plenum

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
M6 U-Nut	2	Commodity Item	Purchased	0.0048	-	\$0.01	\$0.00
C-Clip with Christmas Tree	2	Commodity Item	Purchased	0.0016	-	\$0.04	\$0.00
75mm Foam Seal	1	Commodity Item	Purchased	0.0005	-	\$0.01	\$0.00
230mm Foam Seal	1	Commodity Item	Purchased	0.0014	-	\$0.01	\$0.00
220mm Foam Seal	1	Commodity Item	Purchased	0.0013	-	\$0.01	\$0.00
Inlet Seal	1	Commodity Item	Purchased	0.0021	-	\$0.01	\$0.00

## No Commodity Items Required for This Process



\...  
\HVAC  
\Plenum Asm  
\Assemble Plenum

### Process Summary

Right First Time	99.94 %
Process Time (Sec)	11.00
Total Weight (kg)	0.00
Material Cost**	\$0.00
OEM Process Cost	\$0.00
Supplier Process Cost	\$0.17
Q Burden	\$0.01
SG&A	\$0.02
Manufacturing Cost*	\$0.20

\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Assemble Plenum



## Assemble Plenum

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
Supplier Manual Asm	11.00	1	1.00	54.32	GER	\$0.17	99.94 %	\$0.01

## Assemble Plenum

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
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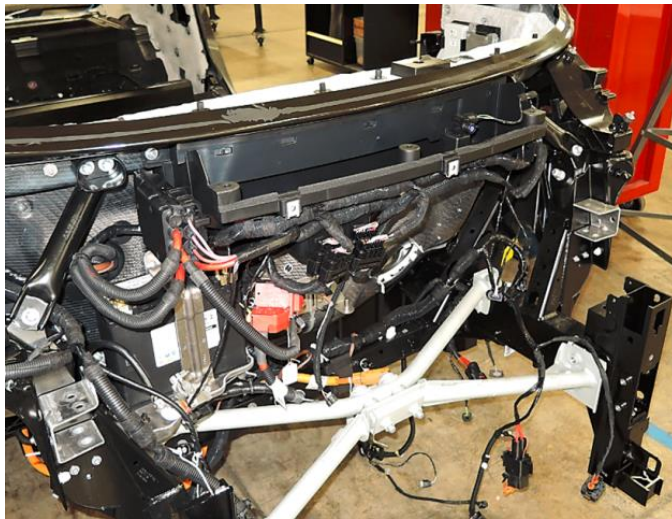


\...  
 \Zone 6 Cooling Pack & HVAC  
 \HVAC  
 \Plenum Installation

## Process Summary

<b>Right First Time</b>	<b>98.96 %</b>
<b>Process Time (Sec)</b>	<b>86.00</b>
<b>Total Weight (kg)</b>	<b>0.02</b>

<b>Material Cost**</b>	<b>\$0.10</b>
<b>OEM Process Cost</b>	<b>\$2.18</b>
<b>Supplier Process Cost</b>	<b>\$0.00</b>
<b>Q Burden</b>	<b>\$0.16</b>
<b>SG&amp;A</b>	<b>\$0.29</b>
<b>Manufacturing Cost*</b>	<b>\$2.73</b>



\* Excluding tooling, ER&D, logistics, and profit margin

\*\* Includes material cost and purchased parts cost

# Plenum Installation



## Plenum Installation

Symbol Name	Overall Cycle Time (Sec)	Parts / Cycle	Number of Operators	Workcell Rate (\$/Hr)	Country	Process Cost	Right First Time	Q Burden
OEM Manual Asm	86.00	1	1.00	91.41	GER	\$2.18	98.96%	\$0.16

## Plenum Installation

Symbol Name	Qty	Material	Material Cost / kg (\$/kg)	Net Weight (kg)	Gross Material Weight (kg)	Purchased Part Cost	Material Cost
M6x7mm-Hex Keps Nut	5	Commodity Item	Purchased	0.0048	-	\$0.02	\$0.00



# *Appendix Reports*

# *TechInsights Electronics Reports*

# Deep Dive Report

## BMW i3 Damper Motor HVAC

### 8044

Report #15900-150212-RRb



### Product Description

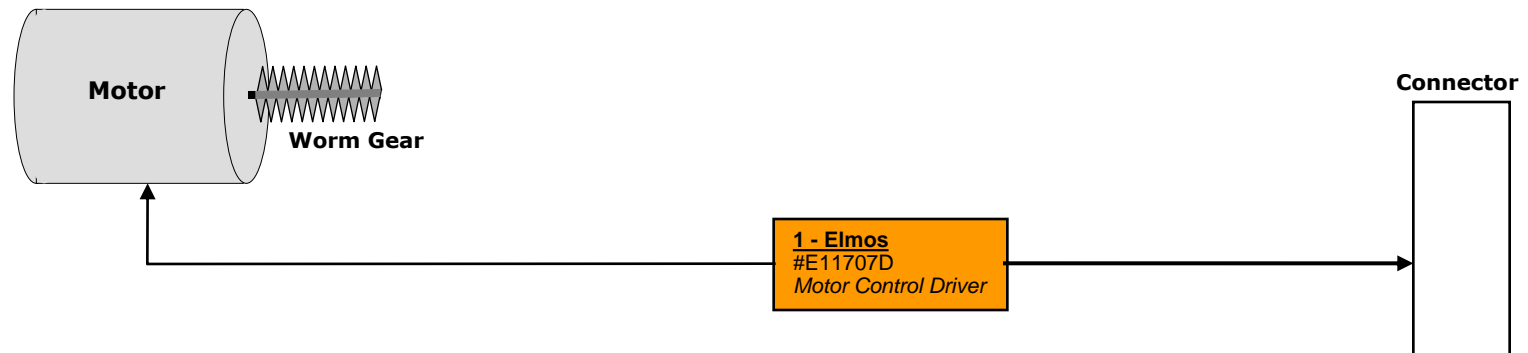
The BMW i3 Damper Motor HVAC Module is used to open and close the AC damper in the 2014 BMW i3. The Damper Motor itself is controlled by an Elmos #E11707D motor control driver.

DISCLAIMER: All company names, product names, and service names mentioned are used for identification purposes only and may be registered trademarks, trademarks, or service marks of their respective owners. All analyses are done without participation, authorization, or endorsement of the manufacturer. Any cost analyses presented in this material are estimates prepared by TechInsights from generally available data. While TechInsights believes that these estimates reflect the probable costs, the actual producer did not supply the data, and therefore the actual costs may be different from these estimates. Furthermore, TechInsights extends no warranties with respect to any information in this document, and shall bear no liability whatsoever for the use of the information.

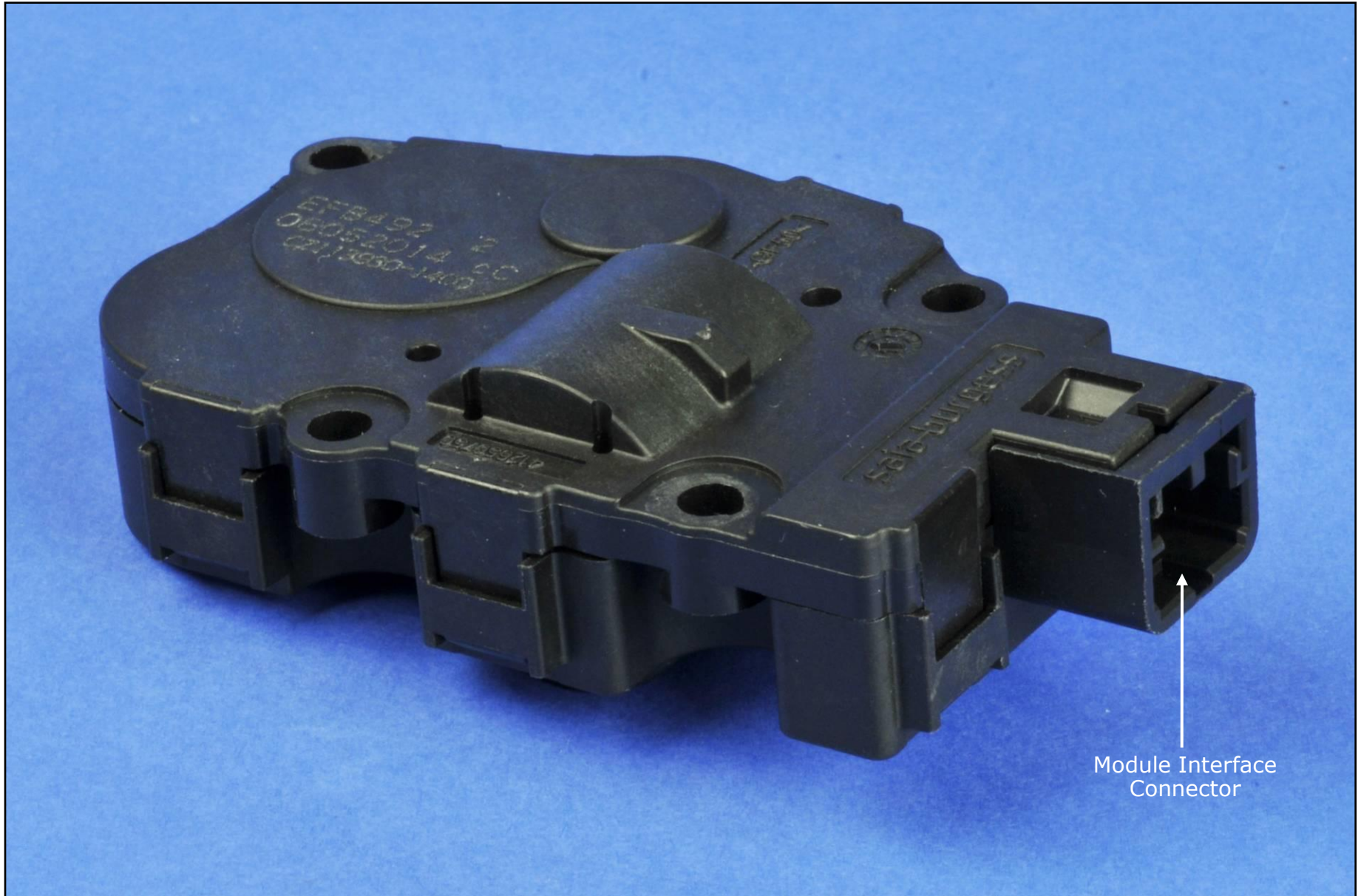
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Product Description		Integrated Circuit Metrics		
Product Type	Automotive	IC Die Count	1	
Brand	BMW	IC Package Count	1	
Product Name & Model #	i3 Damper Motor HVAC	<b>Cost Metrics</b>		
Official Release Date	5/2/2014			
Weight (grams)	60.6 (Measured)	Retail Price		
Product Dimensions (mm)	84.62 x 50.49 x 25.45 (Measured at Longest/Widest/Thickest Points)	Total Manufacturing Cost	\$23.52	
<b>Product Features</b>		Electronics Cost	\$18.94	
		<b>Manufacturing Cost Breakdown</b>		
Motor Control IC	Elmos #E11707D Motor Control Driver	Integrated Circuits	\$2.17	9.2%
		Modules, Discretes & Connectors	\$16.54	70.3%
		Substrates	\$0.07	0.3%
		Component Insertion	\$0.13	0.6%
		Card Test	\$0.03	0.1%
		Non-Electronic Parts	\$4.19	17.8%
		Final Assembly & Test	\$0.39	1.7%
		<b>Total</b>	<b>\$23.52</b>	<b>100.0%</b>



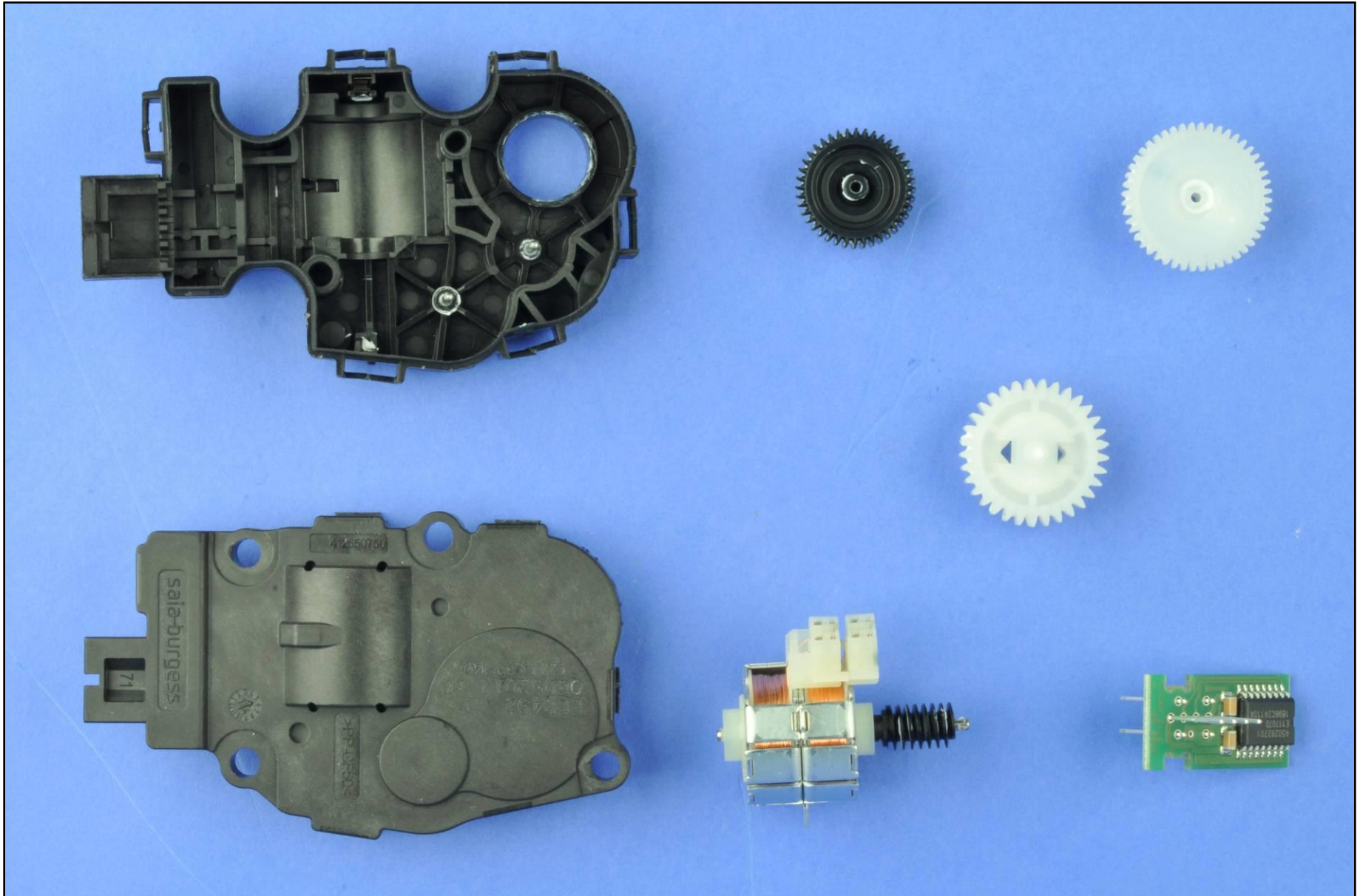
Estimated block diagram based on observation of this specific product implementation, manufacturer's data sheets where available, and best engineering judgment. Certain details of the interface circuitry are not reflected in this block diagram. Partitioning and connectivity are speculative.

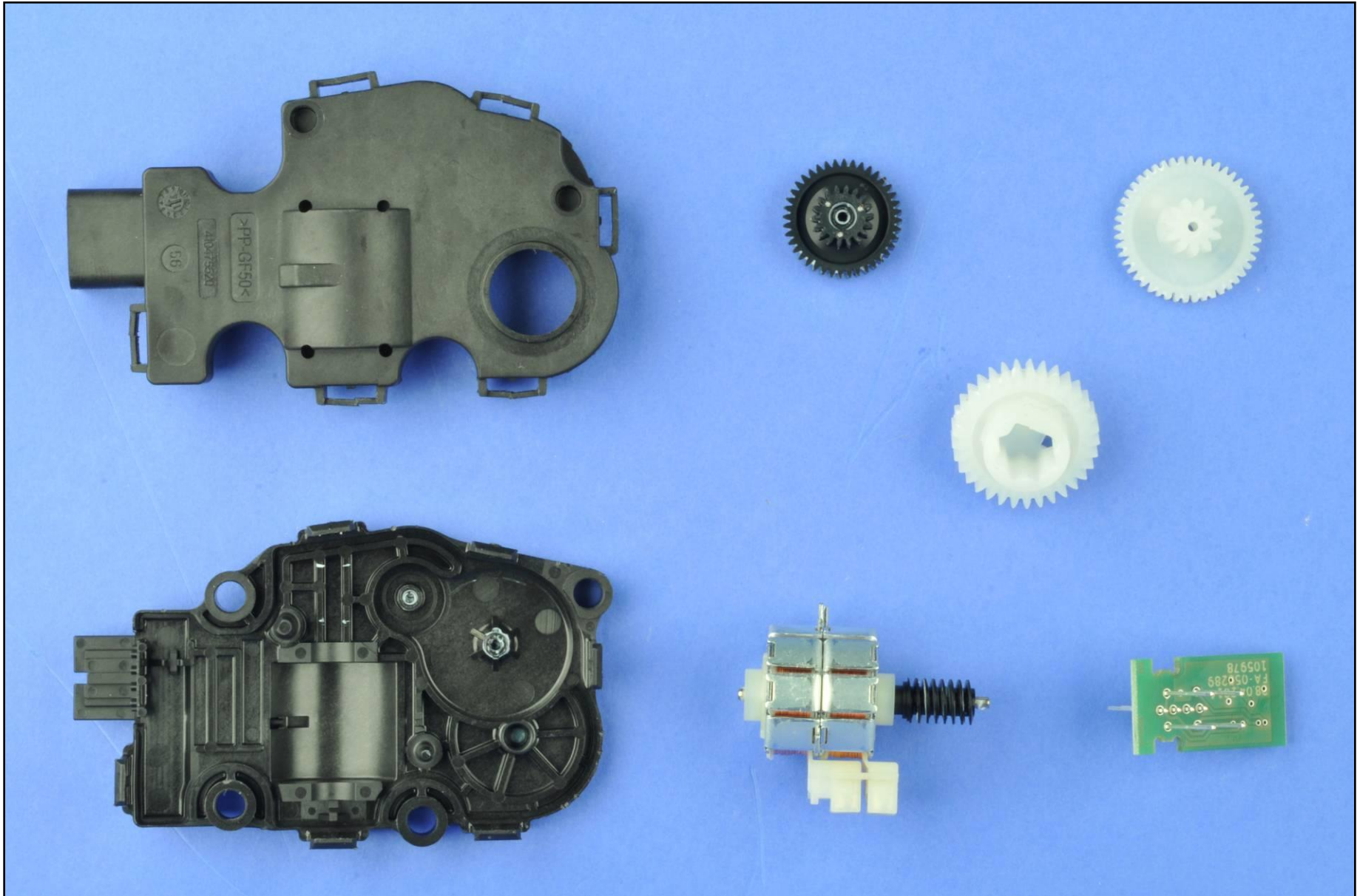


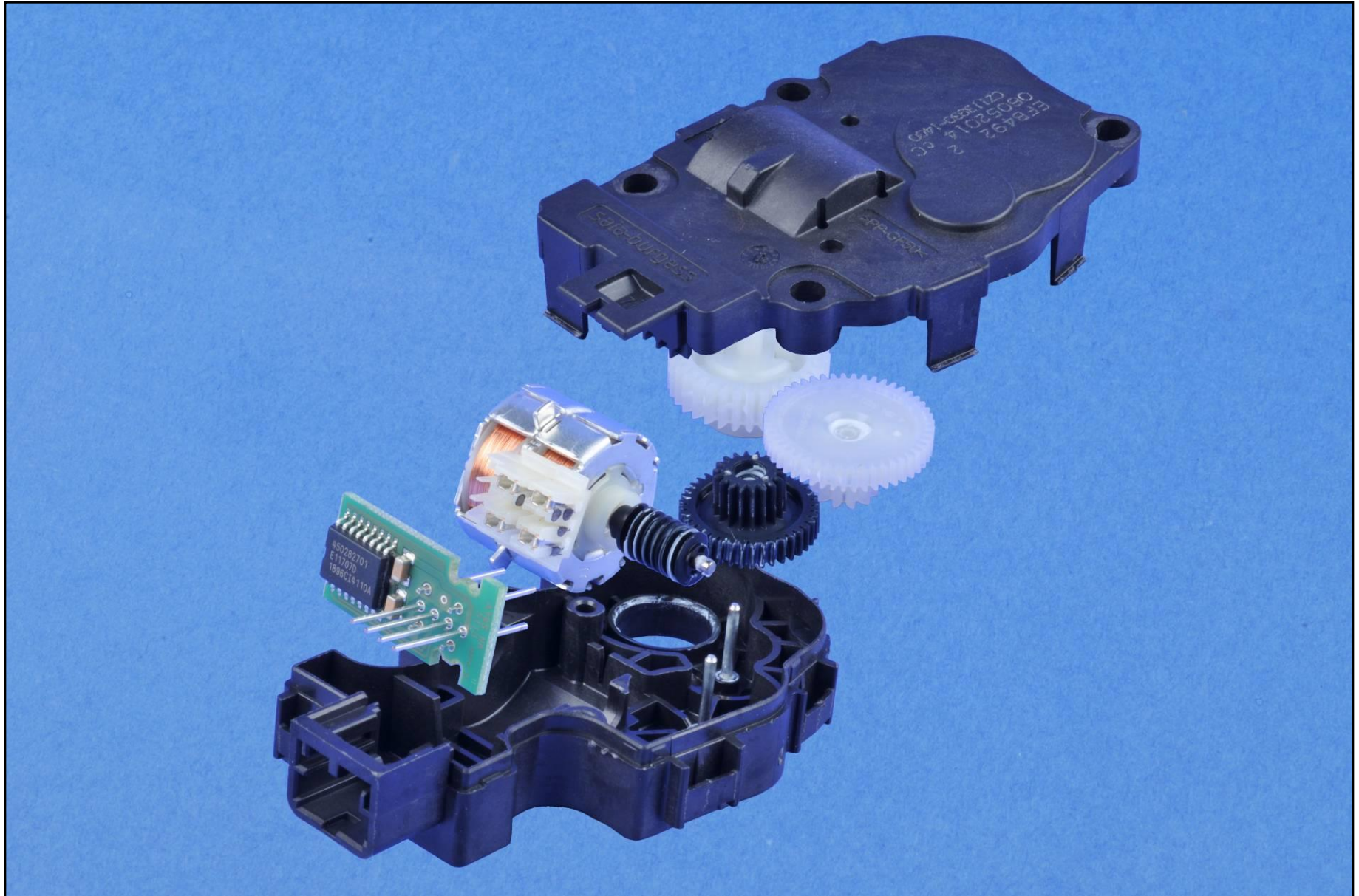
Module Interface Connector

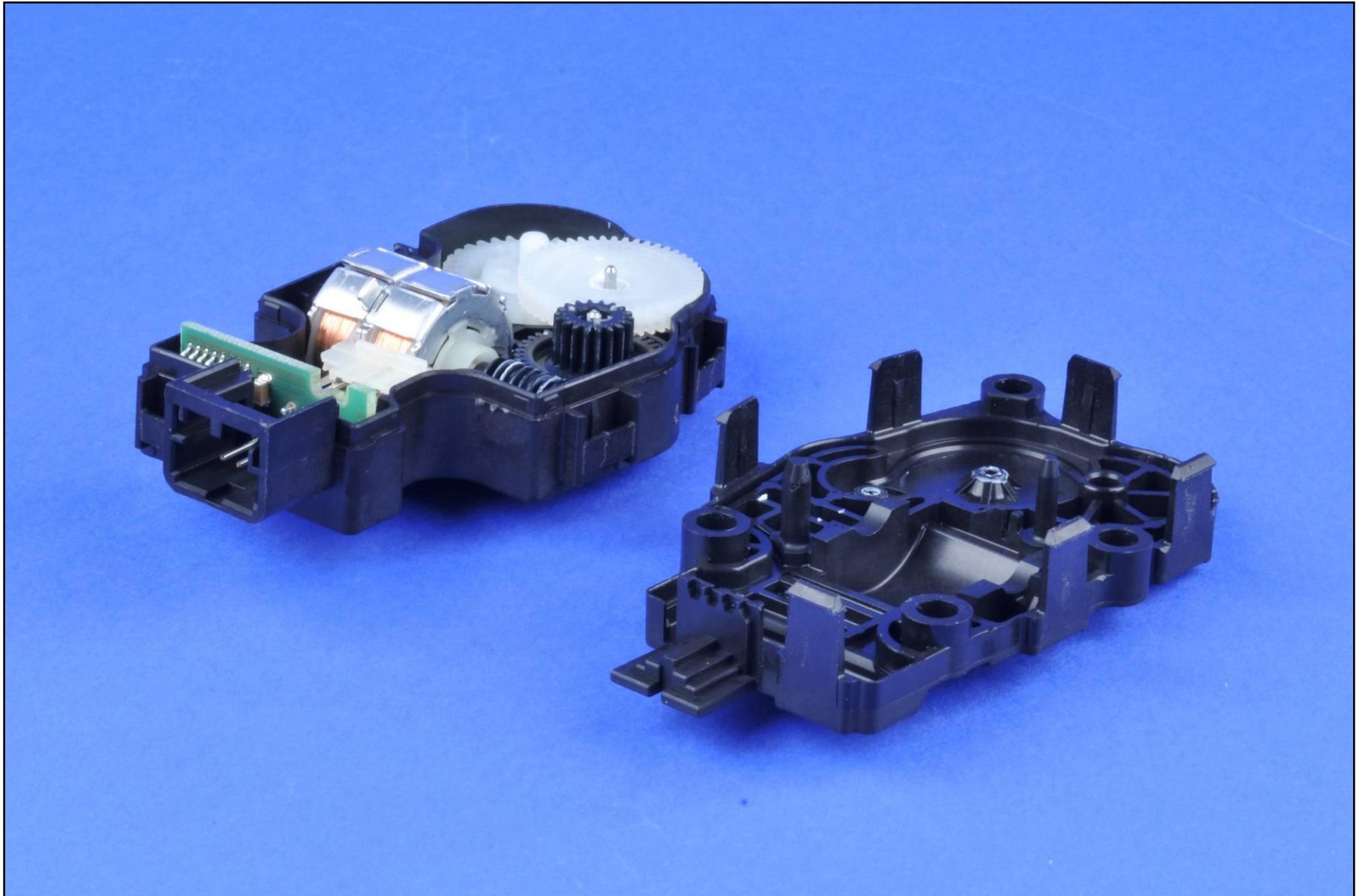


Damper Interface

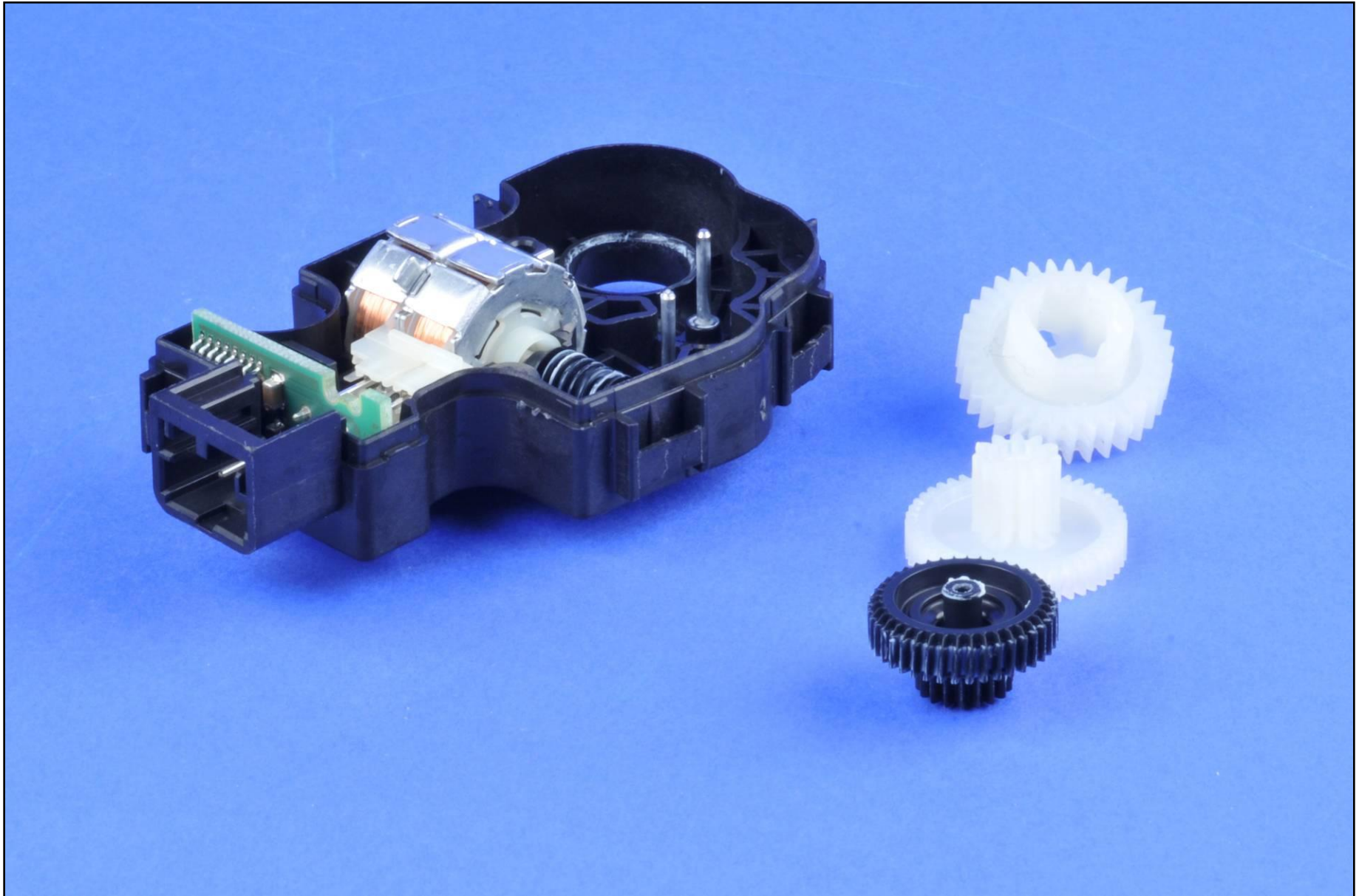


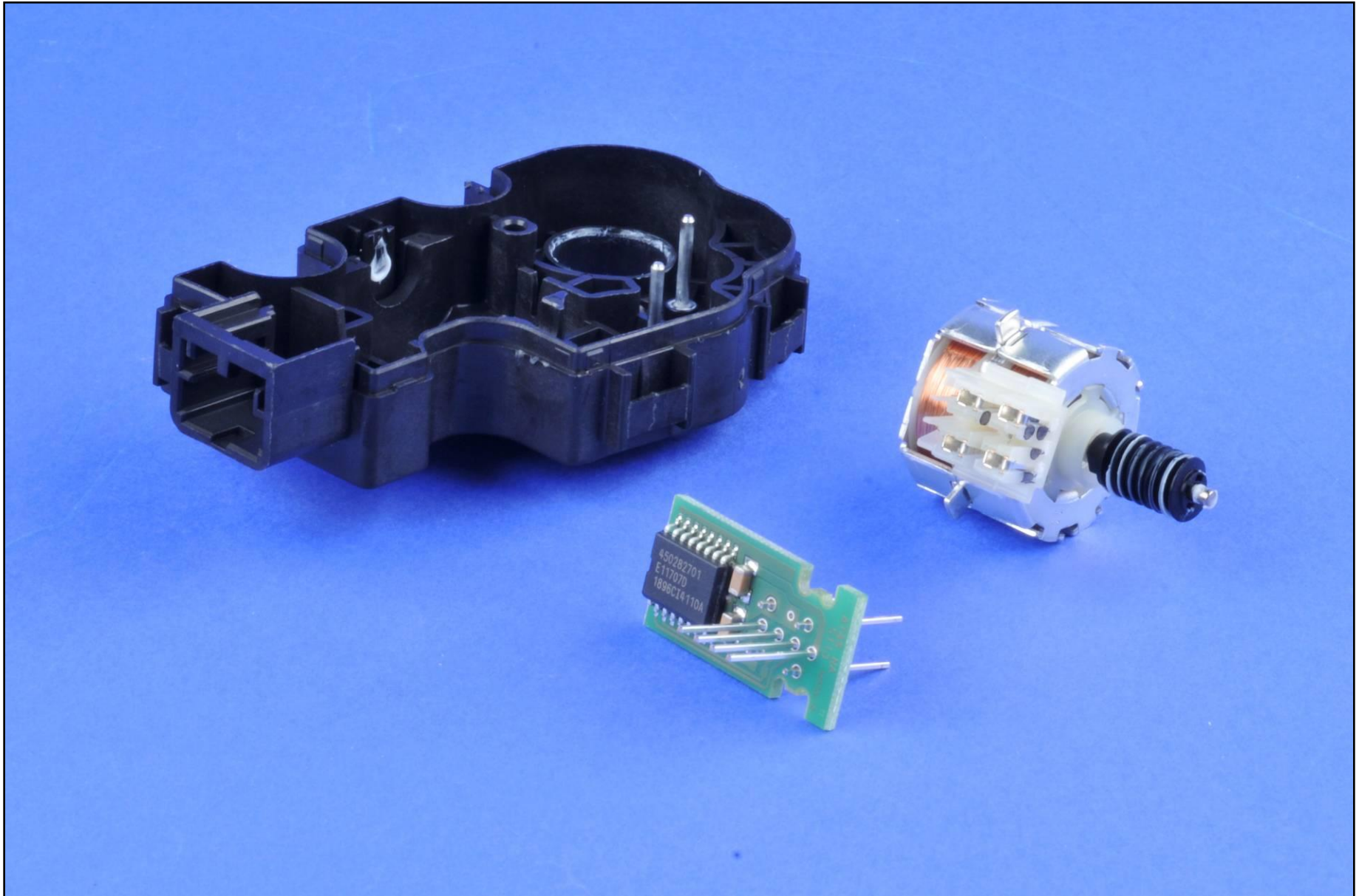


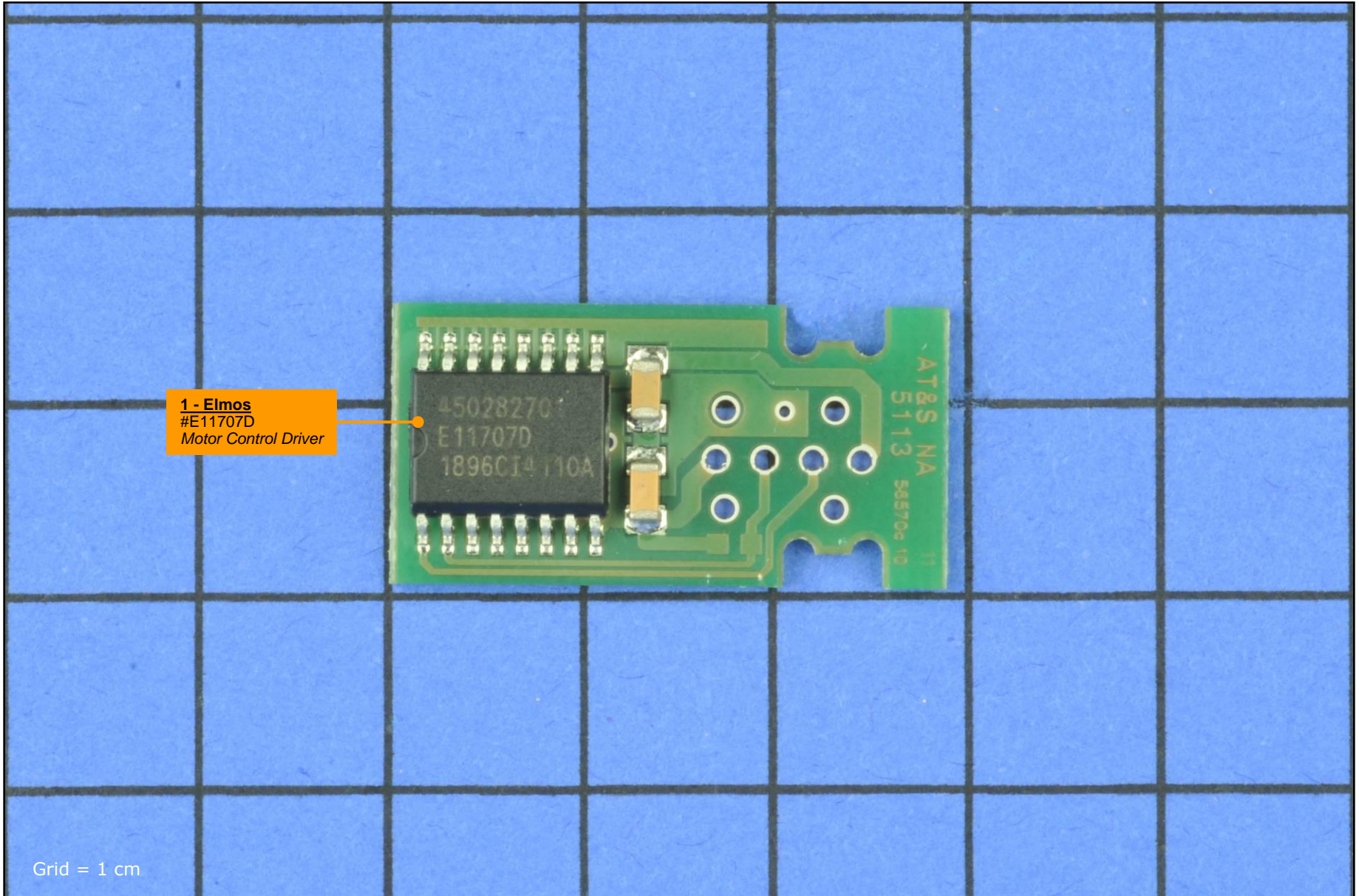






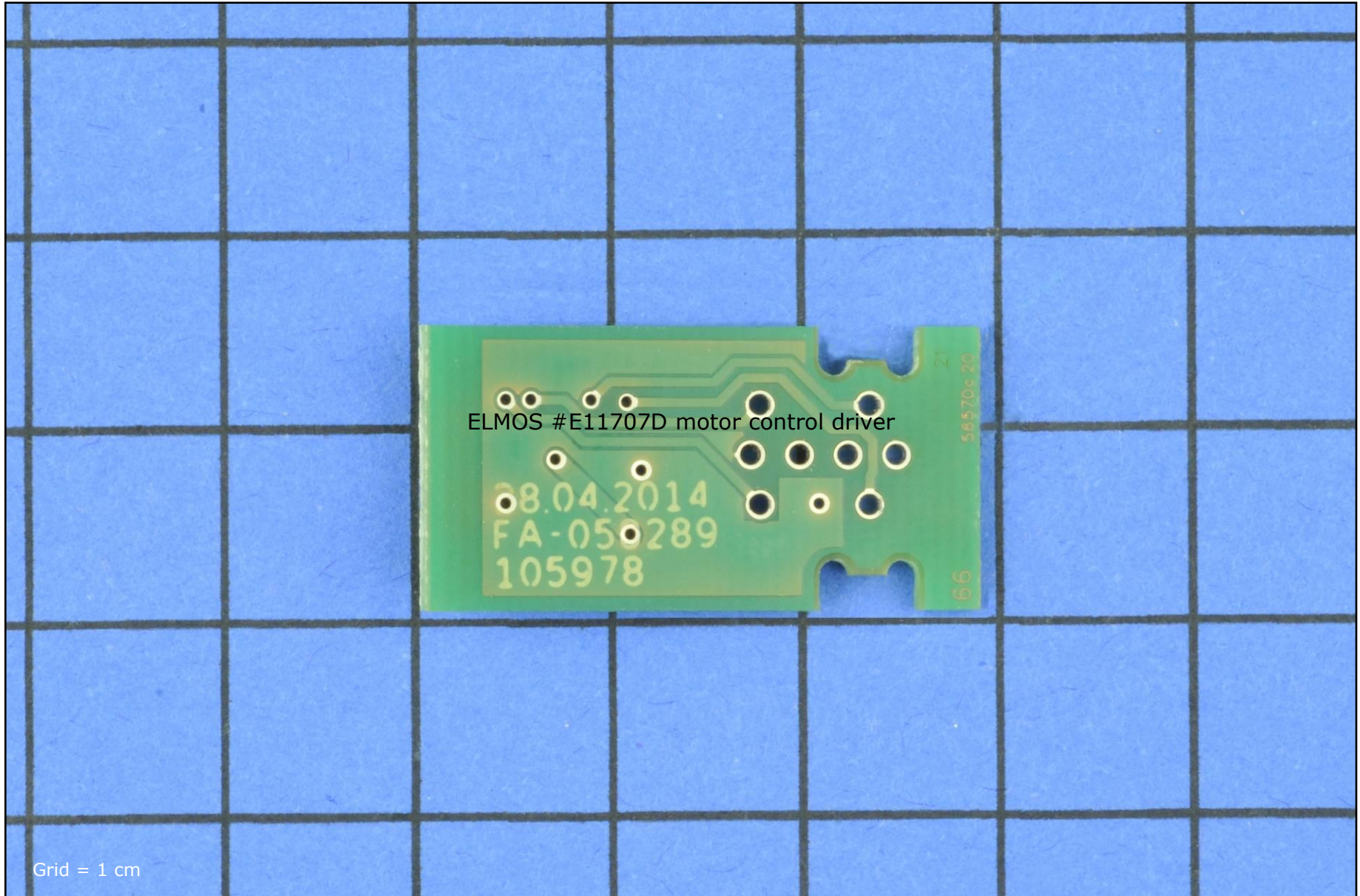




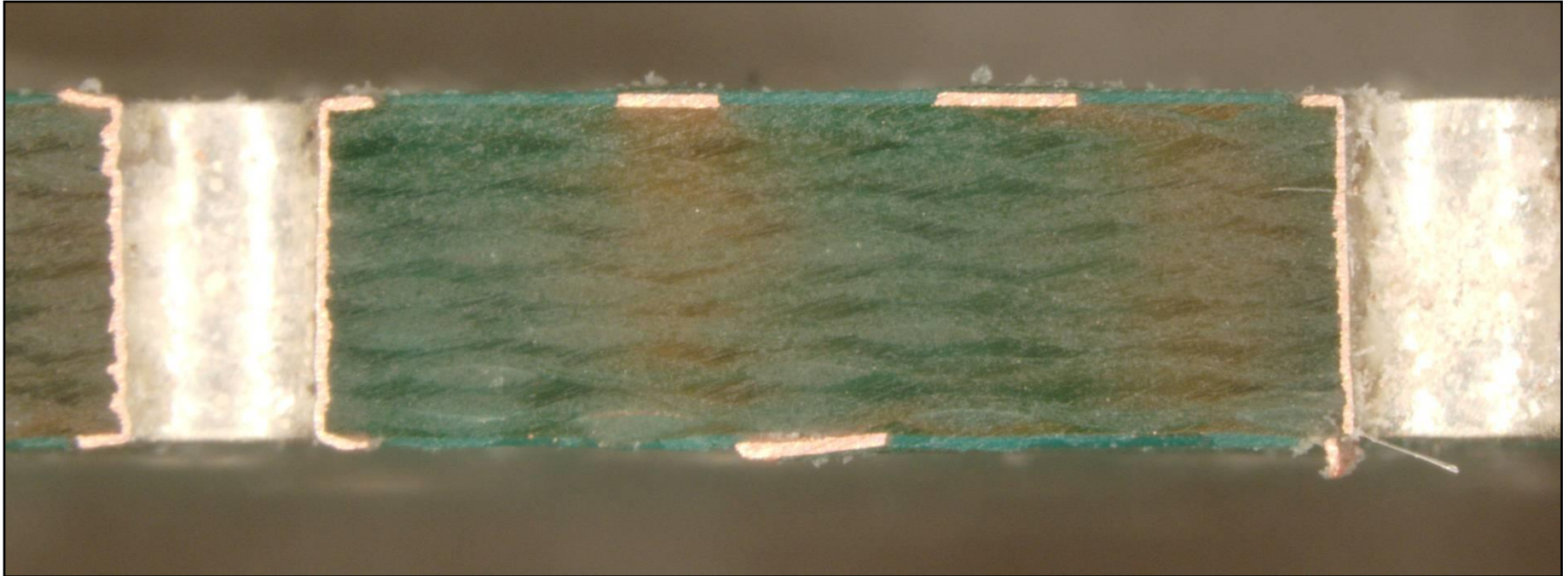


1 - Elmos  
#E11707D  
Motor Control Driver

Grid = 1 cm



Grid = 1 cm



Substrates														
Assembly Name	Manufacturer	Core Material	Mfg. Technology	Layers	Area (cm <sup>2</sup> )	Min. Trace Pitch (mm)	Min. Trace Width (mm)	ThruVia Land Dia (mm)	ThruVia Hole Dia (mm)	BlindVia Land Dia (mm)	BlindVia Hole Dia (mm)	Thickness (mm)	Routing Density	Estimated Costs
Main Board	AT&S	FR4	2 Layer Conventional FR4 / HF	2	4.3	1.00	0.45	0.90	0.60			1.6	13.4	\$ 0.07

Location	Package Info										Die Info						Estimated Costs		
	Pkg Ref. #	Pkg Qty	Brand Name	Part Number	Pkg Description	Form	Pin Count	Length (mm)	Width (mm)	Height (mm)	Die Ref #	Die Qty	Brand Name	Part Number	Description	Length (mm)	Width (mm)	Each	Total
Main Board, Side 1	1	1	Elmos	E11707D	Motor Control Driver	SOP	16	10.34	7.35	2.51	1.1	1	Elmos	E11707D	Motor Control Driver	3.74	2.88	\$ 2,170	\$ 2,170
<b>Totals</b>		<b>1</b>					<b>16</b>					<b>1</b>							<b>\$2.17</b>

Note: Supplemental information, such as IC package & die markings, is included in the Excel Bill of Materials (BOM) spreadsheet.

Location	Qty	Brand Name	Part Number	Description	Package			Estimated Costs	
					Pin Count	Length (mm)	Width (mm)	Each	Total
Main Board, Side 2	1	Unknown	None	Motor: Stepping	4	38.70	21.83	\$ 16.450	\$ 16.450
<b>TOTALS</b>	<b>1</b>				<b>4</b>				<b>\$16.45</b>



Location	Qty	Functional Description	Package		Estimated Costs	
			Form	Pin Count	Each	Total
	2	Small Passive	Cap, Res, Ferrite	2	\$0.005	\$0.010
<b>TOTALS</b>	<b>2</b>			<b>4</b>		<b>\$0.01</b>

Location	Qty	Form	Package			Estimated Costs	
			Pin Count	Length (mm)	Width (mm)	Each	Total
Main Board, Side 1	8	Connector: Pins	1	15.22	0.60	\$0.010	\$0.080
<b>TOTALS</b>	<b>8</b>		<b>8</b>				<b>\$0.08</b>

Electronic Assembly Metrics by Assembly											
General Area	Assembly Name	Substrate Area (sq.cm)	Metal Layers	Circuit Area (sq.cm)	Routing Density (cm of routing per sq.cm of substrate)	Number of Components	Number of Connections	Component Density (Components/sq.cm)	Connection Density (Connections/sq.cm)	Avg. Pin Count	Assembly Weight (grams)
Main Electronics	Main Board	4.3	2	8.5	13.4	12	32	2.8	7.5	2.7	2.30
	<b>System Totals</b>	<b>4.3</b>	<b>2</b>	<b>8.5</b>		<b>12</b>	<b>32</b>	<b>2.8</b>	<b>7.5</b>	<b>2.7</b>	<b>2.30</b>

*NOTE: Occasional inconsistencies in totals may be present due to rounding error.*

Electronics Costs by Assembly										
General Area	Assembly Name	Total	Integrated Circuits	Modular & Odd Form Components	Small Active Components	Passive Components	Connector Components	Substrates	Insertion	Card Test
Main Electronics	Main Board	\$ 18.94	\$ 2.17	\$ 16.45	\$ -	\$ 0.01	\$ 0.08	\$ 0.07	\$ 0.13	\$ 0.03
	<b>System Totals</b>	<b>\$ 18.94</b>	<b>\$ 2.17</b>	<b>\$ 16.45</b>	<b>\$ -</b>	<b>\$ 0.01</b>	<b>\$ 0.08</b>	<b>\$ 0.07</b>	<b>\$ 0.13</b>	<b>\$ 0.03</b>

NOTE: Occasional inconsistencies in totals may be present due to rounding error.

Counts by Assembly												
General Area	Assembly Name	IC Package Count	IC Connections	Modular/Odd Form Components	Modular/Odd Form Component Connections	Small Active Components	Small Active Component Connections	Passive Components	Passive Component Connections	Connectors	Connector Connections	Opportunities
Main Electronics	Main Board	1	16	1	4	0	0	2	4	8	8	44
	<b>System Totals</b>	<b>1</b>	<b>16</b>	<b>1</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>4</b>	<b>8</b>	<b>8</b>	<b>44</b>

*NOTE: Occasional inconsistencies in totals may be present due to rounding error.*

IC Metrics											
General Area	Assembly Name	IC Die Count	IC Package Count	Number of Package Connections	Die Area (sq.mm)	Substrate Tiling Density (die area / substrate area)	Package Area (sq.mm)	Die Area/Package Area Ratio	Package Connections per sq.cm of Package Area	Volatile Memory (KBytes)	Non-Volatile Memory (KBytes)
Main Electronics	Main Board	1	1	16	10.8	0.03	76.0	0.14	21.1	0	0
	<b>System Totals</b>	<b>1</b>	<b>1</b>	<b>16</b>	<b>10.8</b>		<b>76.0</b>	<b>0.14</b>	<b>21.1</b>	<b>0</b>	<b>0</b>

*NOTE: Occasional inconsistencies in totals may be present due to rounding error.*

Subsystem	Part ID No.	Qty	Description	Fabrication Process	Material	Dimensions (mm)	Weight (grams)	Est'd Cost Each	Est'd Extended Cost
Enclosure	1	1	Housing 1	Molded + Engraved	PP + GF50	84.62 x 50.06 x 14.13	11.70	1.490	1.490
	2	1	Housing 2	Molded + Pulls	PP + GF50	84.62 x 50.49 x 18.38	14.70	1.950	1.950
	3	1	Gear 1	Molded	PP + GF50	22.7 x 22.7 x 15.11	2.70	0.330	0.330
	4	1	Gear 2	Molded	PP + GF50	22.73 x 22.73 x 11.59	1.80	0.220	0.220
	5	1	Gear 3 (Blk)	Molded	PP + GF50	18.57 x 18.57 x 11.06	1.10	0.130	0.130
	6	2	Gear Shafts	Extruded	Metal	13.97 x 1.45 x 13.97	0.40	0.010	0.020
	7	1	Worm Gear	Molded	PP + GF50	12.89 x 6.97 x 6.97	0.30	0.050	0.050
<b>Total</b>		<b>8</b>						<b>Estimated Cost</b>	<b>\$4.19</b>

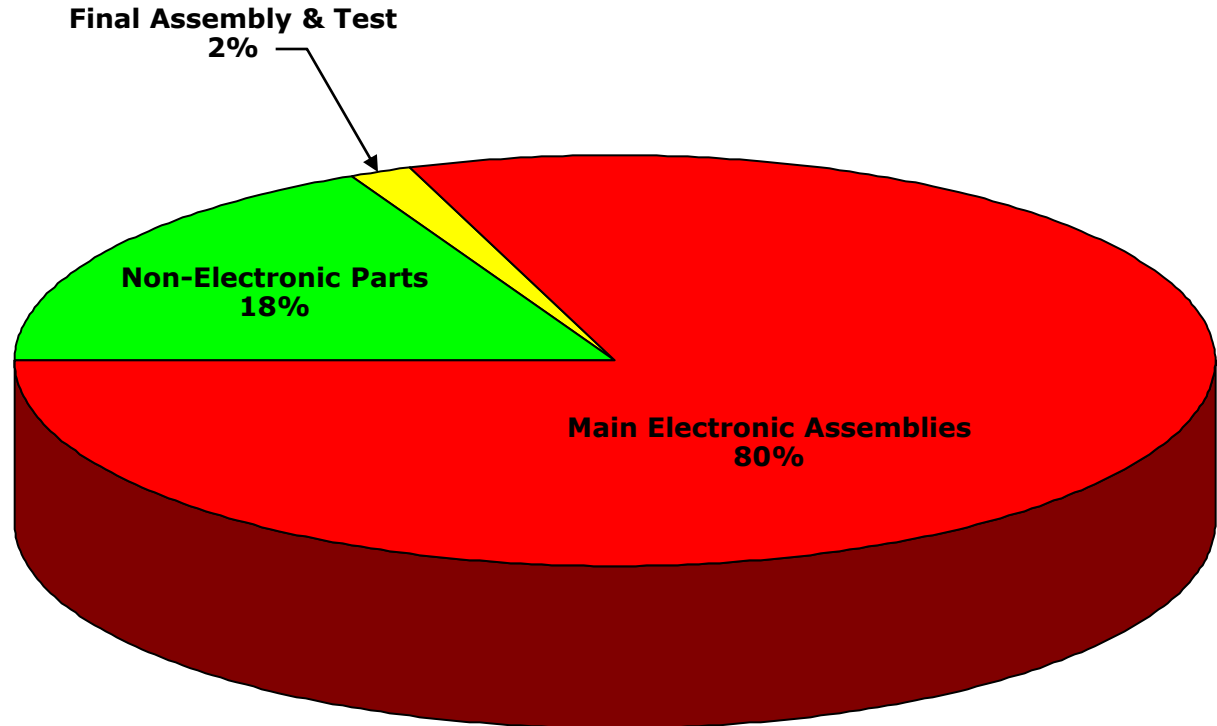
# Final Ass'y Labor & Test Cost Estimate

<b>Final Assembly &amp; Test</b>	
Made in	China
Number of parts	19
Est'd number of steps	65
Est'd time (seconds)	220
<b>Est'd final assembly cost</b>	<b>\$ 0.19</b>
<b>Est'd final test cost</b>	<b>\$ 0.20</b>



Estimated Cost Totals	
Main Electronic Assemblies	\$ 18.94
Non-Electronic Parts	\$ 4.19
Final Assembly & Test	\$ 0.39
<b>Total</b>	<b>\$ 23.52</b>

Cost Total Notes:
Estimated final assembly cost includes labor only.
Total cost does not include Non-recurring, R&D, G&A, IP licensing fees/royalties, software, sales & marketing, distribution.
Assumes fully scaled production.



# Cost Estimation Process

## (Overview & Discussion)

Cost modeling is tricky business. Multiple variables affect the actual production costs a manufacturer will experience, including development expenses, unit volumes, supply-and-demand in component markets, die yield-curve maturity, OEM purchasing power, and even variations in accounting practices. Different cost modeling methods employ different assumptions about how to handle these and other variables, but we can identify two basic approaches: that which seeks to track short-term variations in the inputs to the production process, and that which strives to maintain comparability of the output of the model across product families and over time.

TechInsights' philosophy in cost modeling is to emphasize consistency across products and comparability over time, rather than to track short-term fluctuations. During the past eight years, we have developed an estimation process that, while necessarily lacking an insider's knowledge of the cost factors that impact any one manufacturer, is reasonably accurate in its prediction of unit costs in high-volume production environments. We do not claim that the model will produce the "right" answer for your firm's environment. However, TechInsights does give customers a key analytical tool with a complete set of data in our Bill of Materials (BOM). The BOM allows readers to 1) scrutinize the assumptions behind our cost model and 2) modify the results based on substitution of their own component cost estimates where they have better information based on inside knowledge.

Our estimation process decomposes overall system cost into three major categories: Electronics, Mechanical, and Final Assembly. We begin by creating a complete electronics bill-of-materials (BOM). Each component from the largest ASIC to the smallest discrete resistor is entered into a BOM table with identifying attributes such as size, pitch, I/O count, package type, manufacturer, part number, estimated placement cost, and die size (if the component is an IC). Integrated circuit costs are calculated from measured die area. Using assumptions for wafer size, process type, number of die per wafer, defect density, and profit margin in combination with die area, an estimate of semiconductor cost is derived. Costs for discrete components and interconnect are derived from assumption tables which relate BOM line items to specific cost estimates by component type and estimates for part placement costs are included. For LCD display costs, we employ a model which tabulates expected cost from measurements of glass area, LCD type, and total pixel resolution. When market costs are available from alternative sources, LCD panel costs are taken from and referenced to these sources.

Costs of non-electronic components such as molded plastic enclosures and metallic components are measured in terms of weight, size, thickness, type of material, and complexity to arrive at their estimated cost. Other system items such as optics, antennae, batteries and displays are costed from a set of assumption tables derived from a combination of industry data, average high volume costs, and external sources. For final assembly, we re-build the torn-down product, tabulating stepwise assembly times as the reconstruction proceeds, to reach a total assembly time. Using a labor rate assumption for the country of origin, we then calculate final assembly cost.

The three major categories for system cost contributors can be broken down into the subcategories of ICs, other electronics parts, displays, batteries (as appropriate), camera modules, electronics assembly, non-electronic elements, and final assembly. By adding the cost estimates for each of these subcategories, an overall estimated cost is derived for the system under evaluation. Product packaging and accessories (CDs, cables, etc.) are also documented and estimated for their contribution to total cost as appropriate.

We believe our cost estimates generally fall within 15 percent of the "right answer," which itself can vary depending on the market and OEM-specific factors mentioned earlier. While the TechInsights cost model is imperfect, it yields important insights into technology and business dynamics along with good first-order contributions to system cost by component type. Additionally, the consistency of approach and gradual modification to assumptions (smoothing out frequently-shifting pricing factors) hopefully yields a credible, but user-modifiable, view of OEM high volume cost-to-produce.

Please feel free to contact us at [support@techinsights.com](mailto:support@techinsights.com) with any comments, questions, or proposed corrections with respect to our cost estimates. We welcome your input.

In our product teardowns, we gather a series of metrics for product profiling and comparison. Some metrics focus on system characteristics such as total silicon area, total system semiconductor storage capacity, and total connection count. Other metrics reflect more subtle aspects of electronics assembly such as connection density, average component I/O count, and silicon tiling density. Taken as a whole, the metrics allow deeper comparison and benchmarking across multiple disciplines and multiple products. Key metrics we gather on products are described below along with their definitions and what they tend to say about the system under study. Most metrics can be used both in comparing similar products for benchmarking purposes or for quantifying differences in levels of complexity between dissimilar product types. Data fall into two categories; either “raw” measured data or ratios of these measured data sets.

**Total Silicon Area** : This metric describes the total area of silicon as measured from X-ray or direct measurement of ICs. The area is an expression of the enclosed bare die area and excludes packaging area. The aggregate silicon area is a good benchmark to show how integrated a design might be when making comparisons to similar systems. Total silicon area also reflects the major cost driver for most systems we examine.

**Silicon Tiling Density** : Ratio of Total Silicon Area to total printed circuit board “projected” area (i.e. the simple board area and not the cumulative surface area of both sides of the board). This metric directly reflects the level of efficiency and aggressiveness in integrated circuit packing and placement. Single digit Silicon Tiling Density is typical but silicon coverage of 10% - 20% has been seen in some of the most advanced products we have examined. Higher Tiling Densities often correspond with the use of chip scale packaging (CSPs) or other small form-factor IC packaging technologies. High density circuit boards are also often a supporting technology.

**Number of Parts** : Total component count including ICs, passives, modules, connectors, etc., each separated out in our reporting.

**Number of Connections** : The total number of connections corresponds to the total number of interconnects introduced by the aggregate component set and reflects any electrical connection observed (solder joints, adhesive interconnect, or connector terminal interfaces).

**Opportunity Count** : Opportunity Count is the total number of parts plus the total number of connections; the name reflects that each of these constituent elements represents an opportunity for failure. A high opportunity count means more complex and riskier electronics assembly.

**Average Pin Count (APC)** : Ratio of total number of component terminals to total number of parts, at the system level. This metric reflects the ‘average’ terminal complexity of the components and often provide a signature of integration level and/or “digital-ness” of the overall product. Low APCs reflect a high number of discrettes or other low-pincount devices often characteristic of analog circuitry. Conversely, high APCs are characteristic of highly integrated, high-pincount assemblies, often those composed largely of digital integrated circuits.

**Connection Density** : This metric is a ratio of the total Number of Connections to total printed circuit board assembly area, in units of connections per sq. inch. The metric provides data related to the Silicon Tiling Density above, but with an emphasis on complexity of I/O interconnect. For example, with a fixed Connection Density, high tiling density of low-pincount memory chips is more readily achieved than comparable silicon tiling of high pincount logic.

**Part Density** : This metric is a ratio of the total Number of Parts to total printed circuit board assembly area, in units of components per sq. inch. The metric provides data related to the Silicon Tiling Density and Connection Density as described above, but with an emphasis on density and complexity of component packing efficiency. For example, low Part Density of high-pincount devices can pose an equal challenge in Connection Density to high Part Density of low-pincount devices. High Part Density does reflect challenges in surface mount assembly in terms of (typically) precision of placement, number of placements, and engineering of part clearances.

**Routing Density (heuristic estimate)** =  $3 * (\text{Average Pin Count}) * \sqrt{\text{Part Density}}$ . The Routing Density metric is an empirically derived relationship that characterizes the wiring density of the interconnect used to support the interconnection of components in a planar electronic assembly (i.e. the circuit board). Architectural issues such as bussing or other factors affecting the regularity of wiring impact the actual Routing Density needed to support a given application, but the metric provides a ready measure of wiring complexity.

***[Click Here to Return to  
Cost Analysis Page 1010](#)***

***[Click Here to Return to  
Cost Analysis Page 1038](#)***

# Deep Dive Report

## BMW i3 Blower Controller, HVAC

8040

Report #15900-150224-RRb



### Product Description

The Denso-sourced Blower Controller, HVAC LIN2.0 module regulates the air-flow speed of the fan blower in the 2014 BMW i3. It features a Renesas # $\mu$ PD79F0143 8-bit single-chip microcontroller with LIN connectivity.

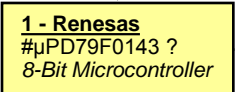
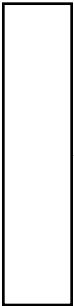
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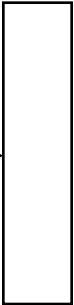
Product Description		Integrated Circuit Metrics		
Product Type	Automotive	IC Die Count	4	
Brand	BMW / Denso	IC Package Count	4	
Product Name & Model #	i3 Blower Controller	<b>Cost Metrics</b>		
Official Release Date	5/2/2014			
Weight (grams)	142.5 (Measured)	Retail Price		
Product Dimensions (mm)	137.1 x 53.84 x 37.43 (Measured at Longest/Widest/Thickest Points)	Total Manufacturing Cost	\$14.69	
<b>Product Features</b>		Electronics Cost	\$8.99	
		<b>Manufacturing Cost Breakdown</b>		
Processor	Renesas #μPD79F0143 8-Bit Single-Chip Microcontroller	Integrated Circuits	\$2.55	17.4%
Communications	NXP #TJA1028T LIN Transceiver	Modules, Discretes & Connectors	\$5.04	34.3%
		Substrates	\$0.58	3.9%
		Component Insertion	\$0.53	3.6%
		Card Test	\$0.29	2.0%
		Non-Electronic Parts	\$4.89	33.3%
		Final Assembly & Test	\$0.81	5.5%
		<b>Total</b>	<b>\$14.69</b>	<b>100.0%</b>

# Block Diagram

Input Power/Settings  
Connection



Blower Interface  
Connection



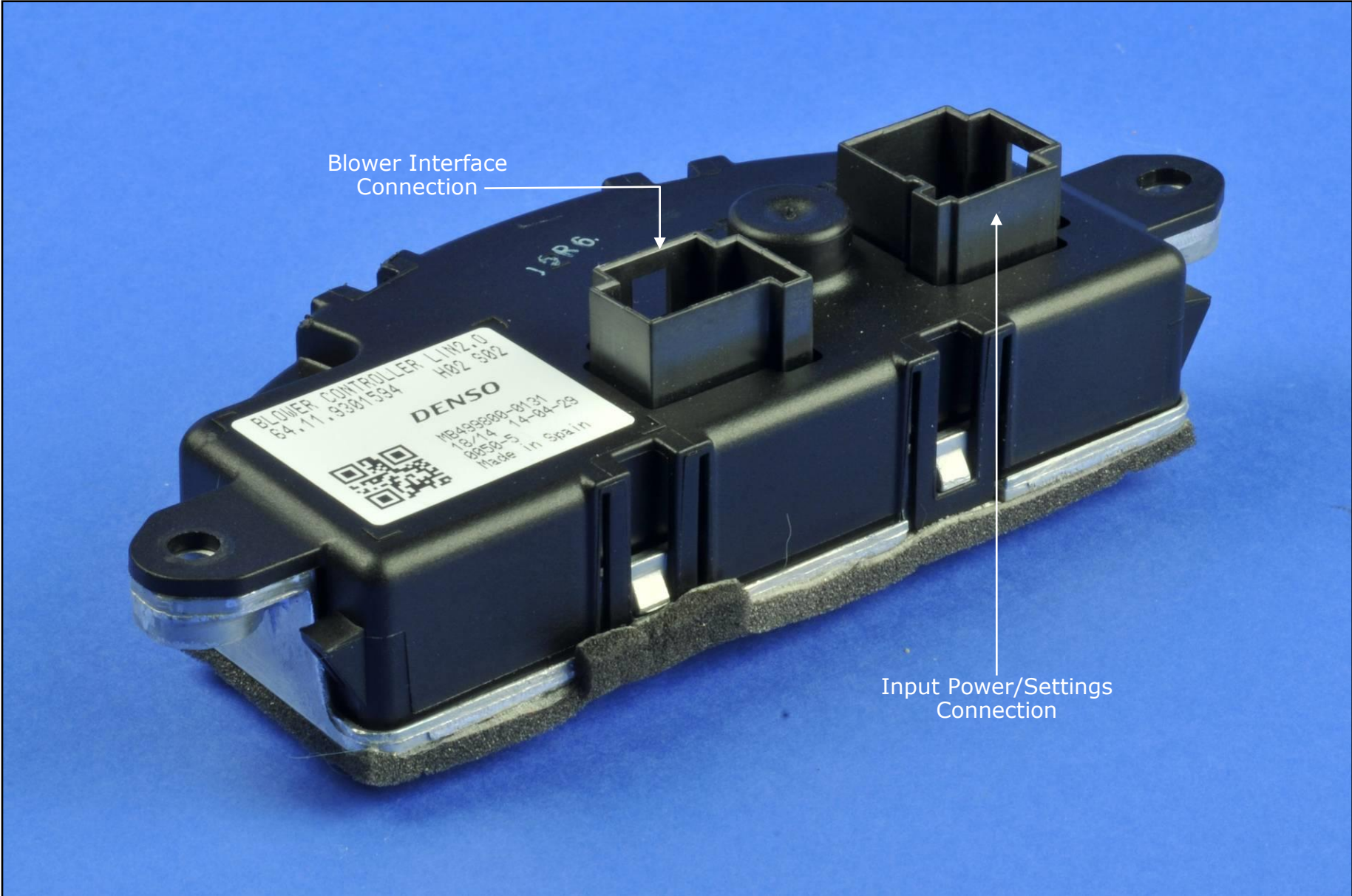
BLOWER CONTROLLER LIN2.0  
64.11.9301594 H02 S02

***DENSO***

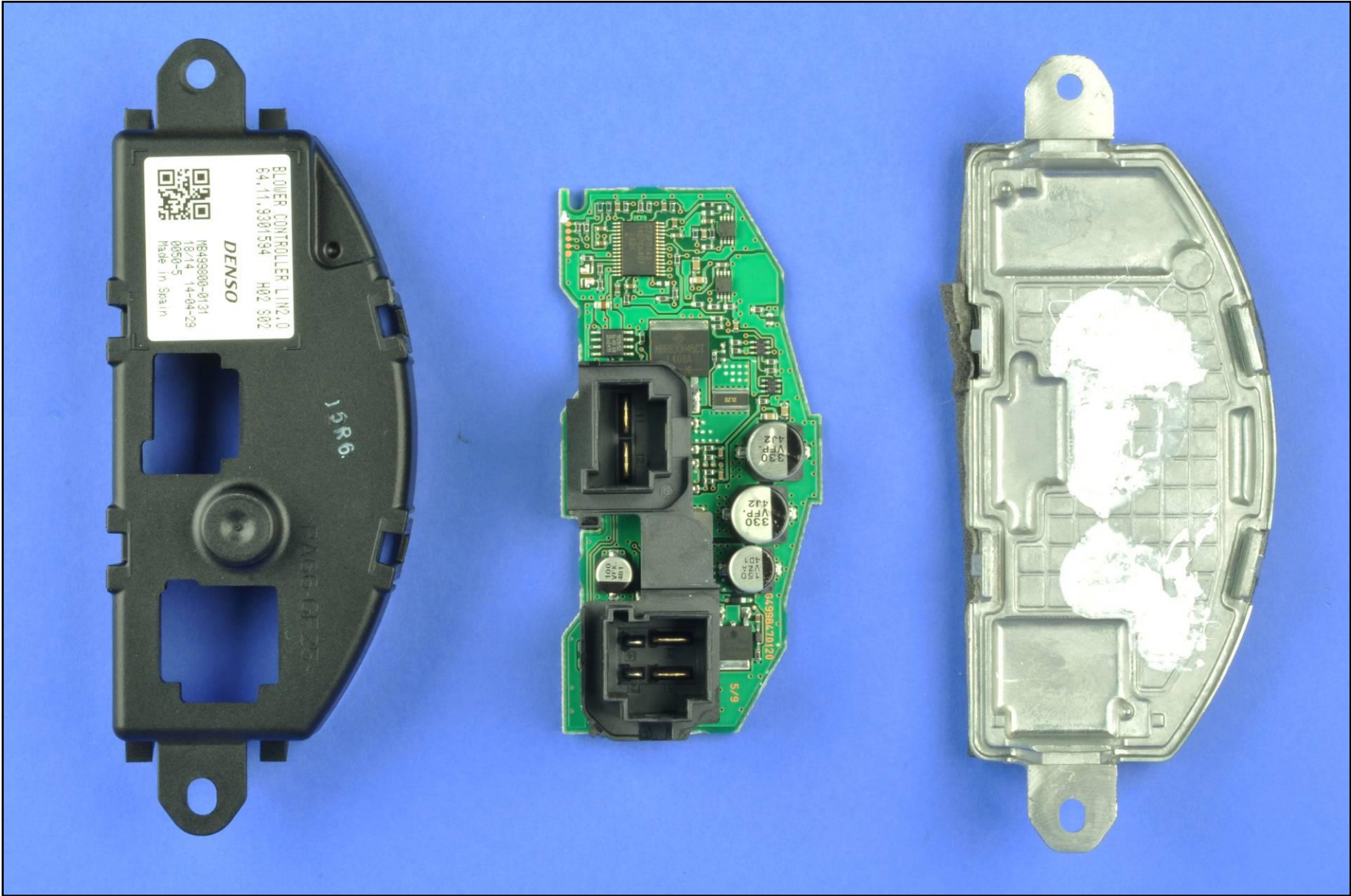


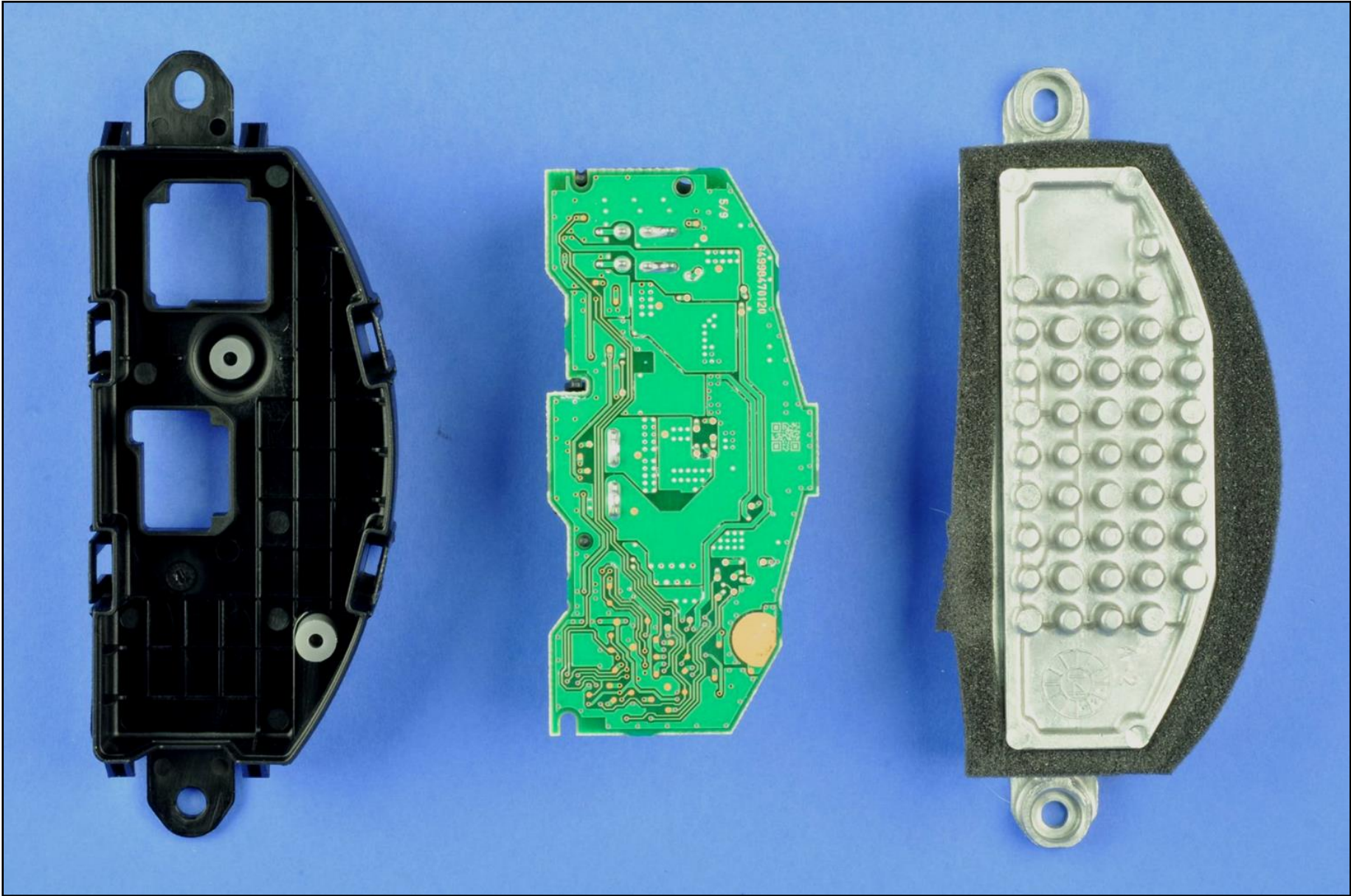
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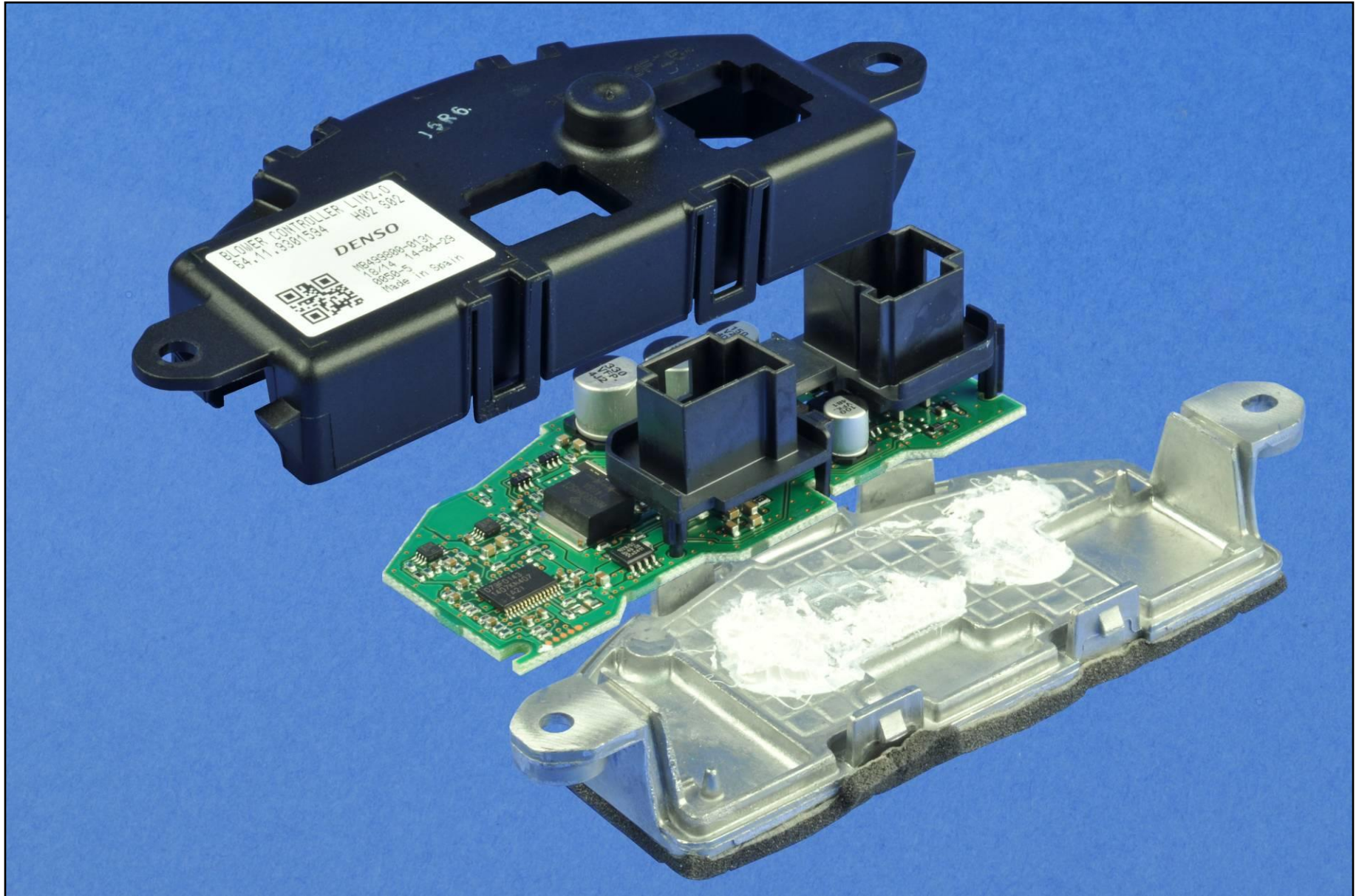


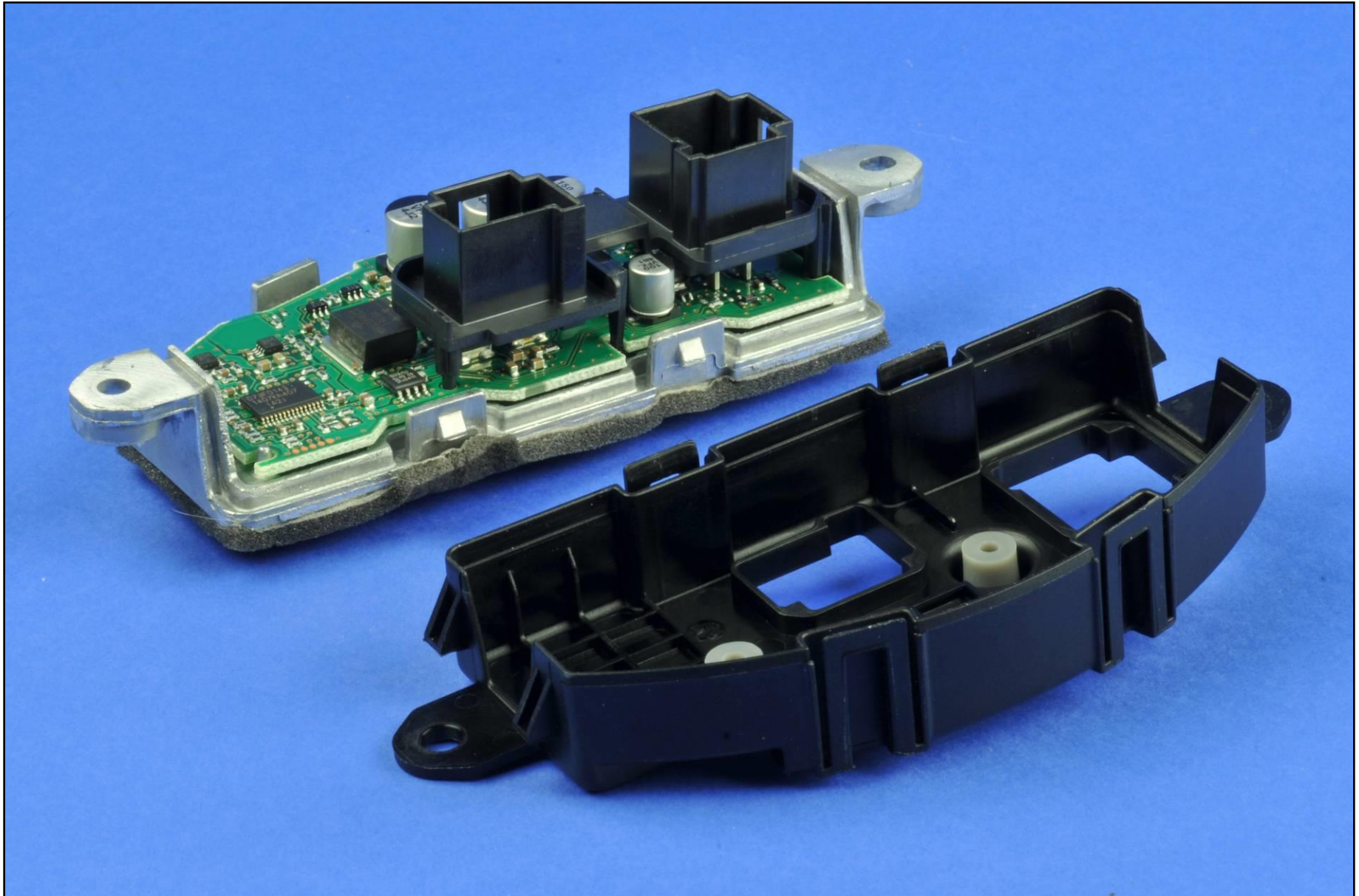


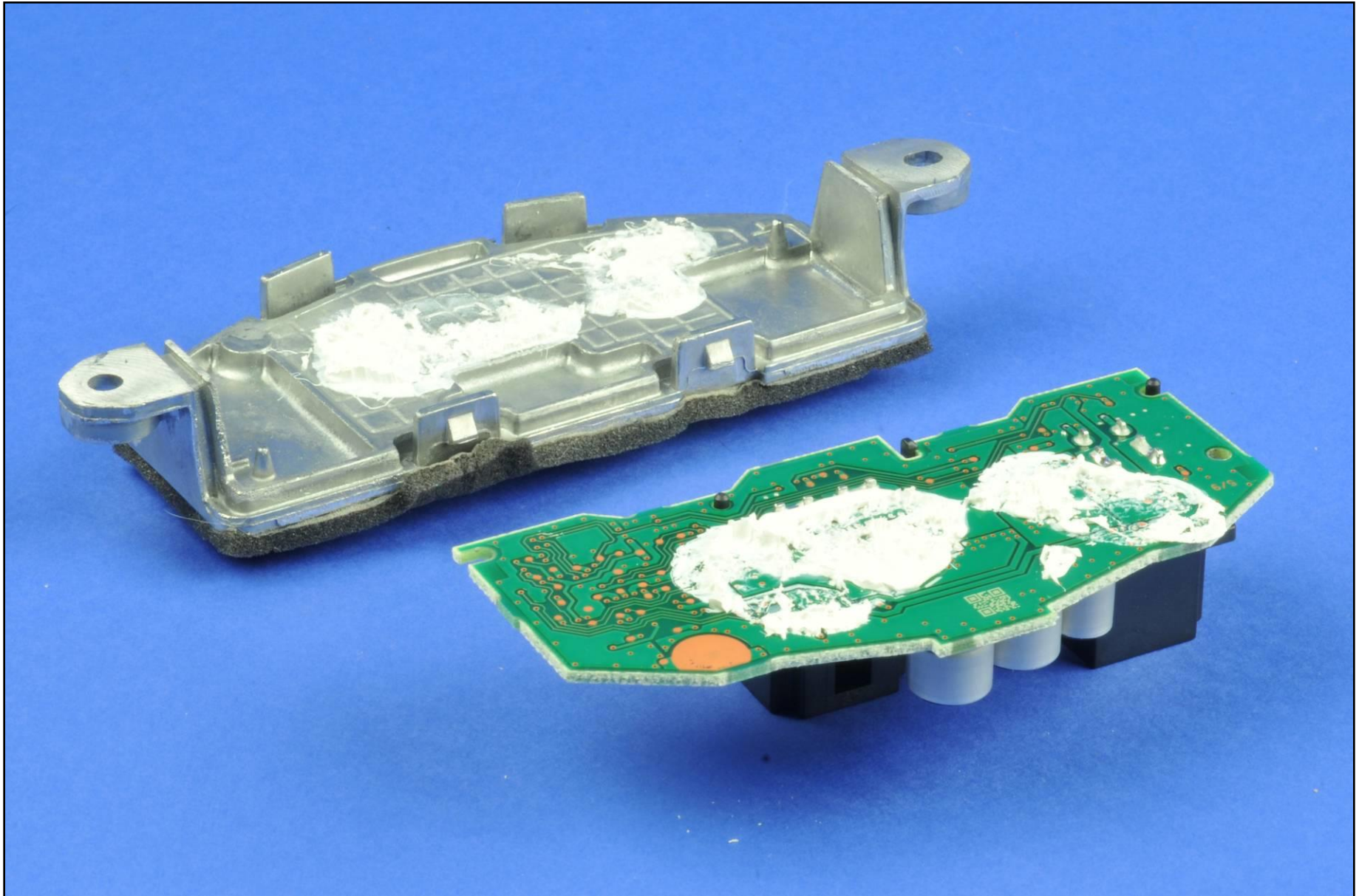






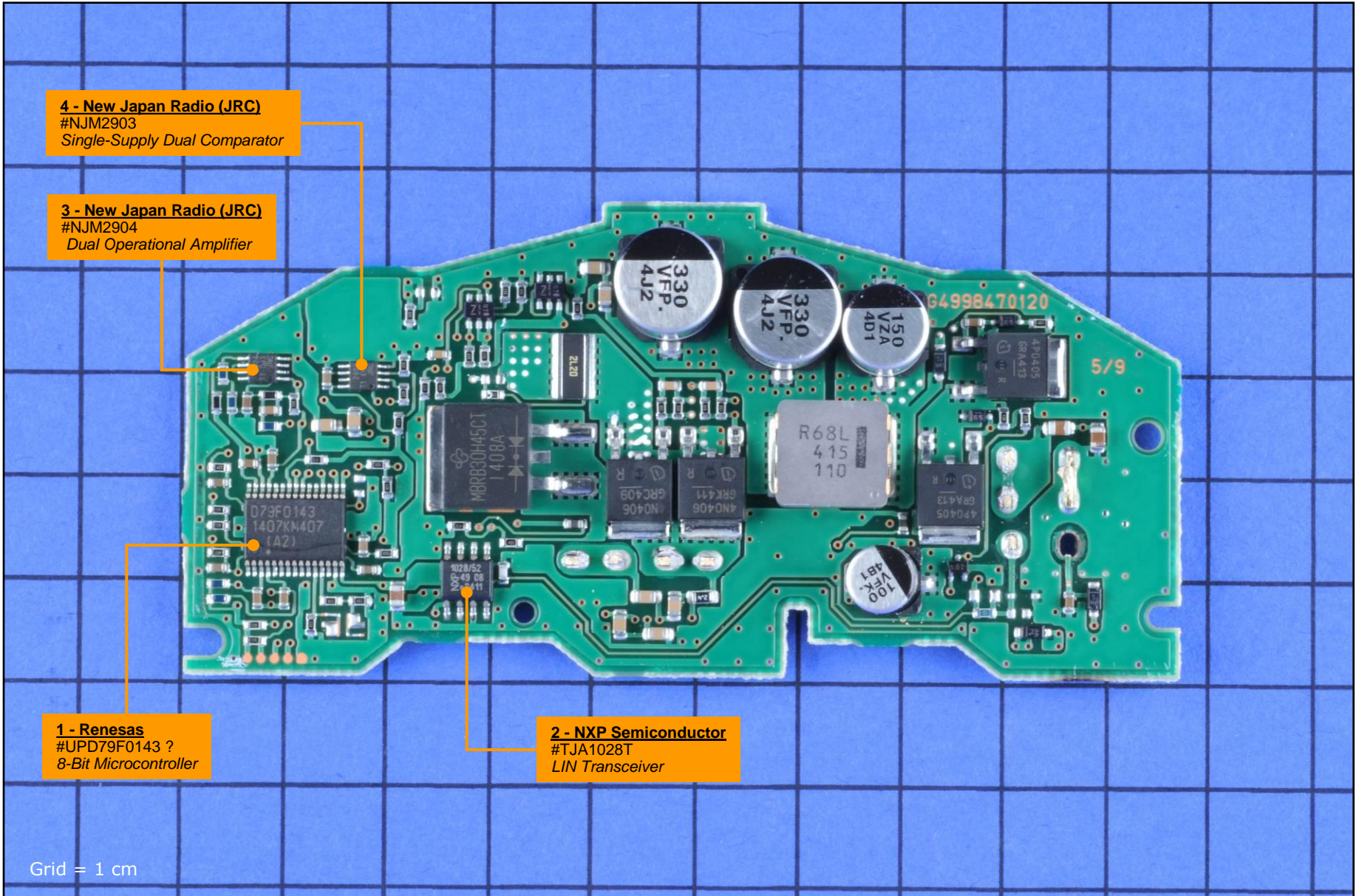












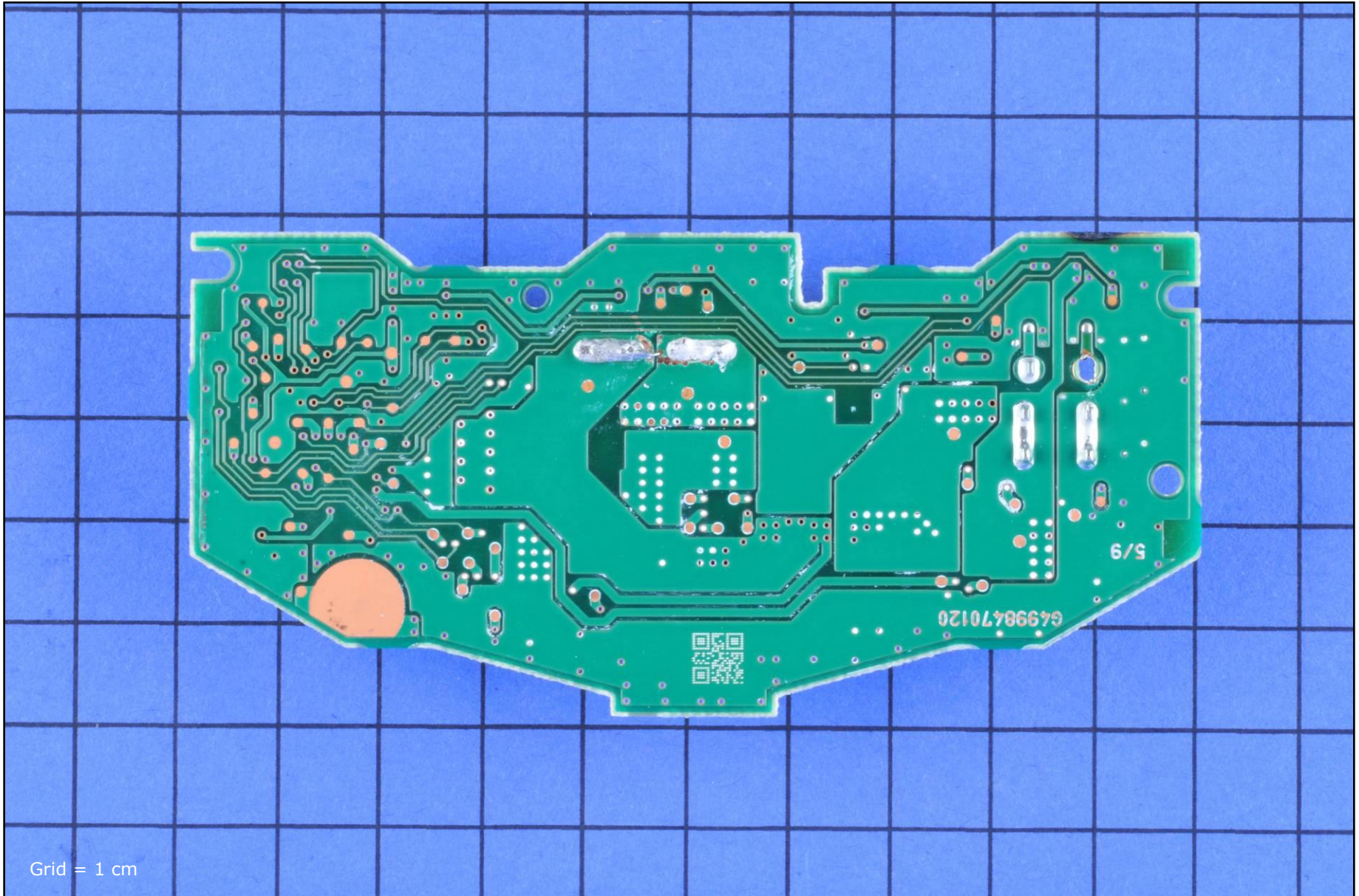
**4 - New Japan Radio (JRC)**  
#NJM2903  
Single-Supply Dual Comparator

**3 - New Japan Radio (JRC)**  
#NJM2904  
Dual Operational Amplifier

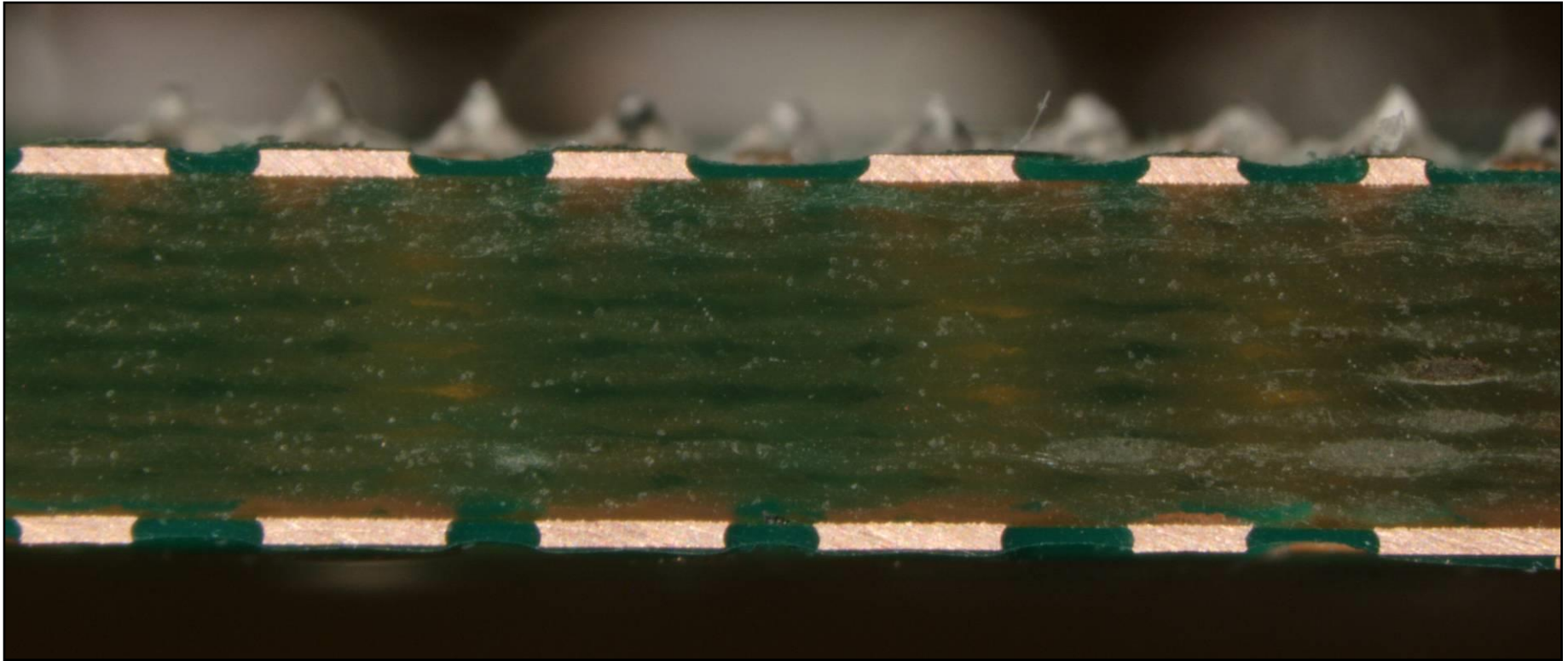
**1 - Renesas**  
#UPD79F0143 ?  
8-Bit Microcontroller

**2 - NXP Semiconductor**  
#TJA1028T  
LIN Transceiver

Grid = 1 cm



Grid = 1 cm



Substrates														
Assembly Name	Manufacturer	Core Material	Mfg. Technology	Layers	Area (cm <sup>2</sup> )	Min. Trace Pitch (mm)	Min. Trace Width (mm)	ThruVia Land Dia (mm)	ThruVia Hole Dia (mm)	BlindVia Land Dia (mm)	BlindVia Hole Dia (mm)	Thickness (mm)	Routing Density	Estimated Costs
Main Board	Unknown	FR4	2 Layer Conventional FR4 / HF	2	38.4	0.60	0.20	0.80	0.40			1.6	12.7	\$ 0.58

Location	Package Info									Die Info							Estimated Costs		
	Pkg Ref. #	Pkg Qty	Brand Name	Part Number	Pkg Description	Form	Pin Count	Length (mm)	Width (mm)	Height (mm)	Die Ref #	Die Qty	Brand Name	Part Number	Description	Length (mm)	Width (mm)	Each	Total
Main Board, Side 1	1	1	Renesas	UPD79F0143 ?	8-Bit Microcontroller	SOP	30	9.84	5.92	1.21	1.1	1	Renesas / NEC	1820	8-Bit Microcontroller	2.84	2.69	\$ 2.098	\$ 2.098
	2	1	NXP Semiconductor	TJA1028T	LIN Transceiver	SOP	8	4.94	3.83	1.45	2.1	1	NXP Semiconductor	CF1433A ?	LIN Transceiver	2.25	1.59	\$ 0.219	\$ 0.219
	3	1	New Japan Radio (JRC)	NJM2904	Dual Operational Amplifier	SOP	8	2.95	2.76	1.19	3.1	1	New Japan Radio (JRC)	2904 740	Dual Operational Amplifier	1.33	1.21	\$ 0.127	\$ 0.127
	4	1	New Japan Radio (JRC)	NJM2903	Single-Supply Dual Compara	SOP	8	2.94	2.71	1.13	4.1	1	New Japan Radio (JRC)	2903 206	Single-Supply Dual Comparat	1.19	1.06	\$ 0.110	\$ 0.110
<b>Totals</b>		<b>4</b>					<b>54</b>					<b>4</b>					<b>\$2.55</b>		

Note: Supplemental information, such as IC package & die markings, is included in the Excel Bill of Materials (BOM) spreadsheet.

Location	Qty	Functional Description	Package					Estimated Costs	
			Form	Top Marking	Pin Count	Length (mm)	Width (mm)	Each	Total
Main Board, Side 1	1	Small Active	Diode, Schottky	General Semiconductor Logo MBRB30H45CT 1408A	3	10.08	8.25	\$0.730	\$0.730
	2	Small Active	MOSFET	Infineon Logo 4N0406 GRK411 R, Logo 4N0406 GR409 R	3	6.22	6.06	\$0.300	\$0.600
	2	Small Active	MOSFET	Infineon Logo 4P0405 GRA413 R	3	6.45	6.28	\$0.450	\$0.900
	1	Small Active	Transistor, Small	t 02	3	2.04	1.29	\$0.030	\$0.030
	4	Small Active	Diode, SMT	65, SJ M41	2	2.06	1.32	\$0.015	\$0.060
	2	Small Active	Transistor, Small	ZI 07	6	2.90	1.50	\$0.030	\$0.060
<b>TOTALS</b>	<b>12</b>				<b>38</b>				<b>\$2.38</b>

Location	Qty	Functional Description	Package		Estimated Costs	
			Form	Pin Count	Each	Total
Main Board, Side 1	1	Capacitor	Electrolytic, Small	2	\$0.109	\$0.109
	1	Capacitor	Electrolytic, Medium	2	\$0.226	\$0.226
	2	Capacitor	Electrolytic, Large	2	\$0.228	\$0.456
	1	Coil	SMT, Large	2	\$0.280	\$0.280
	17	Small Passive	Cap, Res, Ferrite	2	\$0.004	\$0.068
	6	Small Passive	Cap, Res, Ferrite	2	\$0.004	\$0.024
	15	Small Passive	Cap, Res, Ferrite	2	\$0.004	\$0.060
	38	Small Passive	Cap, Res, Ferrite	2	\$0.004	\$0.152
<b>TOTALS</b>	<b>81</b>			<b>162</b>		<b>\$1.38</b>

Location	Qty	Form	Package			Estimated Costs	
			Pin Count	Length (mm)	Width (mm)	Each	Total
Main Board, Side 1	1	Connector: Vehicle Wiring	6	66.34	26.00	\$1.290	\$1.290
<b>TOTALS</b>	<b>1</b>		<b>6</b>				<b>\$1.29</b>



Electronic Assembly Metrics by Assembly											
General Area	Assembly Name	Substrate Area (sq.cm)	Metal Layers	Circuit Area (sq.cm)	Routing Density (cm of routing per sq.cm of substrate)	Number of Components	Number of Connections	Component Density (Components/sq.cm)	Connection Density (Connections/sq.cm)	Avg. Pin Count	Assembly Weight (grams)
Main Electronics	Main Board	38.4	2	76.8	12.7	98	260	2.6	6.8	2.7	40.60
	<b>System Totals</b>	<b>38.4</b>	<b>2</b>	<b>76.8</b>		<b>98</b>	<b>260</b>	<b>2.6</b>	<b>6.8</b>	<b>2.7</b>	<b>40.60</b>

*NOTE: Occasional inconsistencies in totals may be present due to rounding error.*

Electronics Costs by Assembly										
General Area	Assembly Name	Total	Integrated Circuits	Modular & Odd Form Components	Small Active Components	Passive Components	Connector Components	Substrates	Insertion	Card Test
Main Electronics	Main Board	\$ 8.99	\$ 2.55	\$ -	\$ 2.38	\$ 1.38	\$ 1.29	\$ 0.58	\$ 0.53	\$ 0.29
	<b>System Totals</b>	<b>\$ 8.99</b>	<b>\$ 2.55</b>	<b>\$ -</b>	<b>\$ 2.38</b>	<b>\$ 1.38</b>	<b>\$ 1.29</b>	<b>\$ 0.58</b>	<b>\$ 0.53</b>	<b>\$ 0.29</b>

*NOTE: Occasional inconsistencies in totals may be present due to rounding error.*

Counts by Assembly												
General Area	Assembly Name	IC Package Count	IC Connections	Modular/Odd Form Components	Modular/Odd Form Component Connections	Small Active Components	Small Active Component Connections	Passive Components	Passive Component Connections	Connectors	Connector Connections	Opportunities
Main Electronics	Main Board	4	54	0	0	12	38	81	162	1	6	358
	<b>System Totals</b>	<b>4</b>	<b>54</b>	<b>0</b>	<b>0</b>	<b>12</b>	<b>38</b>	<b>81</b>	<b>162</b>	<b>1</b>	<b>6</b>	<b>358</b>

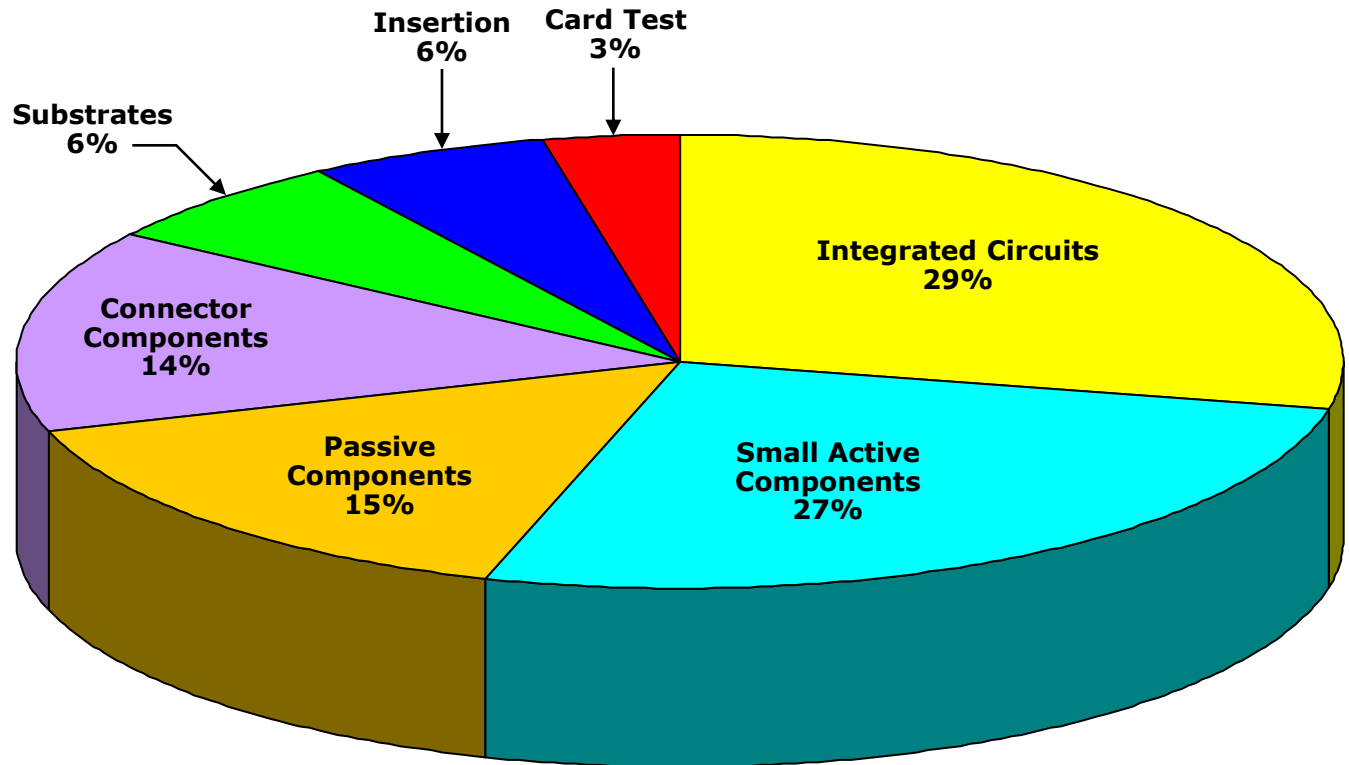
*NOTE: Occasional inconsistencies in totals may be present due to rounding error.*

IC Metrics											
General Area	Assembly Name	IC Die Count	IC Package Count	Number of Package Connections	Die Area (sq,mm)	Substrate Tiling Density (die area / substrate area)	Package Area (sq,mm)	Die Area/Package Area Ratio	Package Connections per sq,cm of Package Area	Volatile Memory (KBytes)	Non-Volatile Memory (KBytes)
Main Electronics	Main Board	4	4	54	14.1	0	93.3	0.15	57.9	0	0
	<b>System Totals</b>	<b>4</b>	<b>4</b>	<b>54</b>	<b>14.1</b>		<b>93.3</b>	<b>0.15</b>	<b>57.9</b>	<b>0</b>	<b>0</b>

NOTE: Occasional inconsistencies in totals may be present due to rounding error.

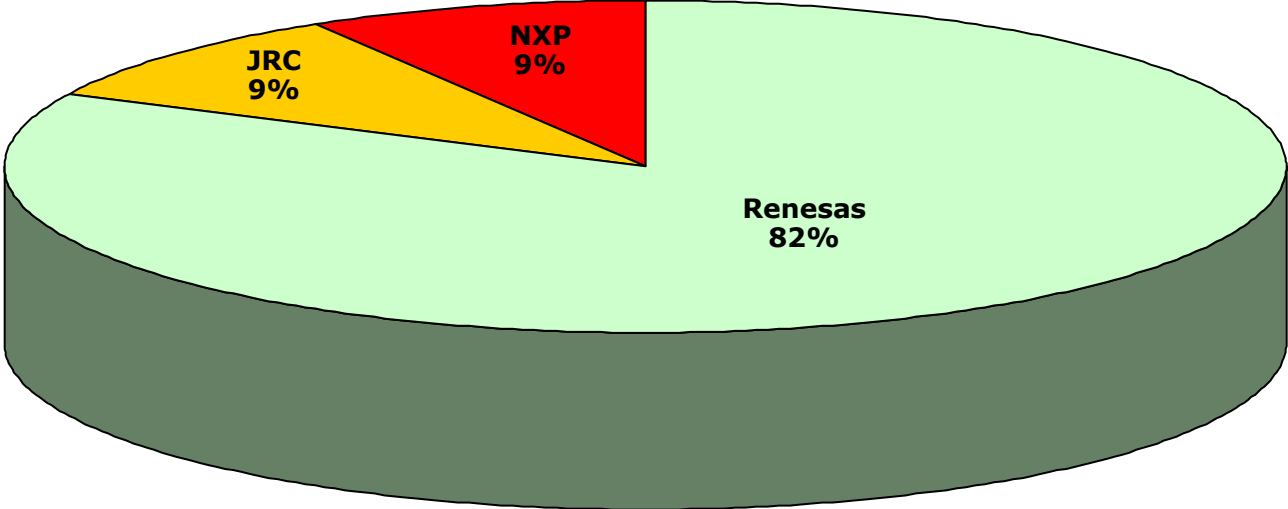
**Estimated Cost  
of Electronics**

**\$8.99**



NOTE: Occasional inconsistencies in totals may be present due to rounding error.

Pkg. Brand	Cost
Renesas	\$2.10
New Japan Radio (JRC)	\$0.24
NXP Semiconductor	\$0.22



NOTE: Occasional inconsistencies in totals may be present due to rounding error.

Subsystem	Part ID No.	Qty	Description	Fabrication Process	Material	Dimensions (mm)	Weight (grams)	Est'd Cost Each	Est'd Extended Cost
Enclosure	1	1	Cover Housing	Molded	PA66-GF25	137.1 x 51.6 x 27.37	19.90	1.680	1.680
	2	1	Heat Sink	Cast + Anodized + Machined	Aluminum	136.43 x 53.89 x 25.02	80.50	3.030	3.030
	3	2	Bumpers	Extruded	Rubber	8.9 x 6.78 x 8.9	0.80	0.020	0.040
	4	1	Label	Die-Cut + Printed	Plastic	31.39 x 24.94 x 0.06	0.05	0.060	0.060
	5	1	Foam Gasket	Die-Cut	Foam + Adhesive	107.83 x 53.59 x 2.66	0.60	0.080	0.080
<b>Total</b>		<b>6</b>						<b>Estimated Cost</b>	<b>\$4.89</b>

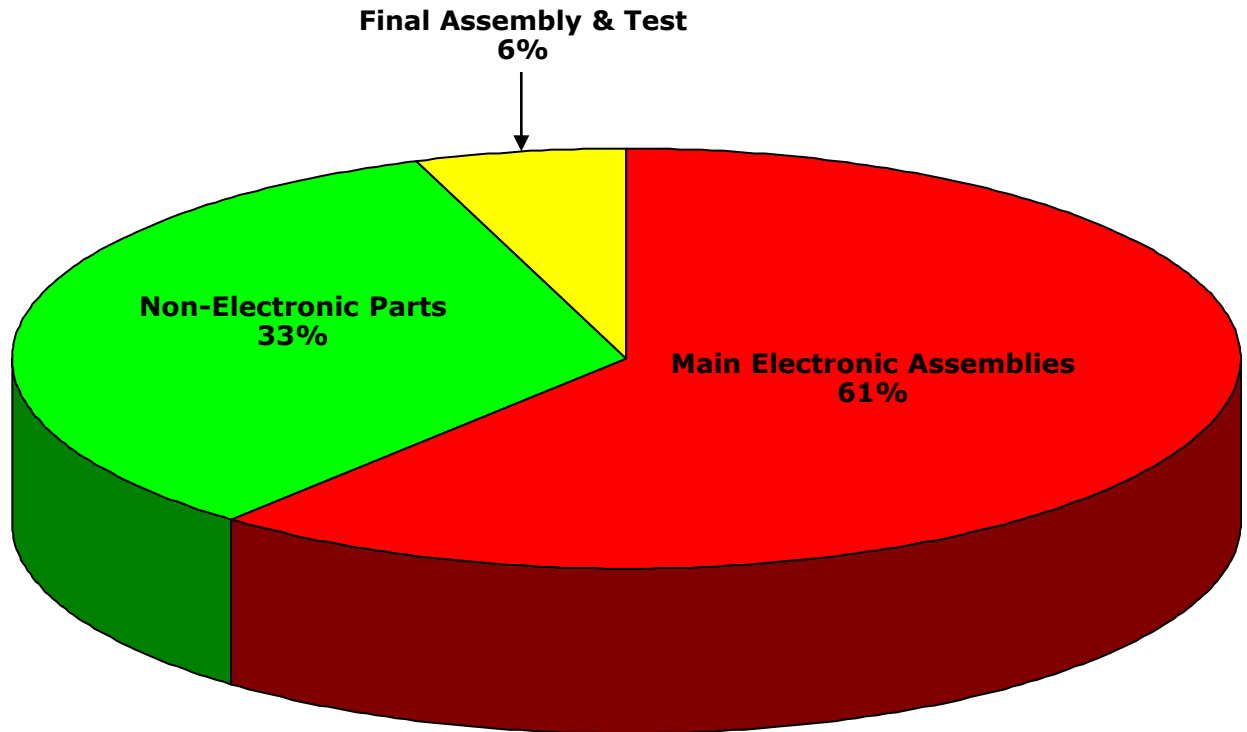
# Final Ass'y Labor & Test Cost Estimate

<b>Final Assembly &amp; Test</b>	
Made in	Spain
Number of parts	8
Est'd number of steps	26
Est'd time (seconds)	82
Est'd final assembly cost	\$ 0.61
Est'd final test cost	\$ 0.20



Estimated Cost Totals	
Main Electronic Assemblies	\$ 8.99
Non-Electronic Parts	\$ 4.89
Final Assembly & Test	\$ 0.81
<b>Total</b>	<b>\$ 14.69</b>

Cost Total Notes:
Estimated final assembly cost includes labor only.
Total cost does not include Non-recurring, R&D, G&A, IP licensing fees/royalties, software, sales & marketing, distribution.
Assumes fully scaled production.



# Cost Estimation Process

## (Overview & Discussion)

Cost modeling is tricky business. Multiple variables affect the actual production costs a manufacturer will experience, including development expenses, unit volumes, supply-and-demand in component markets, die yield-curve maturity, OEM purchasing power, and even variations in accounting practices. Different cost modeling methods employ different assumptions about how to handle these and other variables, but we can identify two basic approaches: that which seeks to track short-term variations in the inputs to the production process, and that which strives to maintain comparability of the output of the model across product families and over time.

TechInsights' philosophy in cost modeling is to emphasize consistency across products and comparability over time, rather than to track short-term fluctuations. During the past eight years, we have developed an estimation process that, while necessarily lacking an insider's knowledge of the cost factors that impact any one manufacturer, is reasonably accurate in its prediction of unit costs in high-volume production environments. We do not claim that the model will produce the "right" answer for your firm's environment. However, TechInsights does give customers a key analytical tool with a complete set of data in our Bill of Materials (BOM). The BOM allows readers to 1) scrutinize the assumptions behind our cost model and 2) modify the results based on substitution of their own component cost estimates where they have better information based on inside knowledge.

Our estimation process decomposes overall system cost into three major categories: Electronics, Mechanical, and Final Assembly. We begin by creating a complete electronics bill-of-materials (BOM). Each component from the largest ASIC to the smallest discrete resistor is entered into a BOM table with identifying attributes such as size, pitch, I/O count, package type, manufacturer, part number, estimated placement cost, and die size (if the component is an IC). Integrated circuit costs are calculated from measured die area. Using assumptions for wafer size, process type, number of die per wafer, defect density, and profit margin in combination with die area, an estimate of semiconductor cost is derived. Costs for discrete components and interconnect are derived from assumption tables which relate BOM line items to specific cost estimates by component type and estimates for part placement costs are included. For LCD display costs, we employ a model which tabulates expected cost from measurements of glass area, LCD type, and total pixel resolution. When market costs are available from alternative sources, LCD panel costs are taken from and referenced to these sources.

Costs of non-electronic components such as molded plastic enclosures and metallic components are measured in terms of weight, size, thickness, type of material, and complexity to arrive at their estimated cost. Other system items such as optics, antennae, batteries and displays are costed from a set of assumption tables derived from a combination of industry data, average high volume costs, and external sources. For final assembly, we re-build the torn-down product, tabulating stepwise assembly times as the reconstruction proceeds, to reach a total assembly time. Using a labor rate assumption for the country of origin, we then calculate final assembly cost.

The three major categories for system cost contributors can be broken down into the subcategories of ICs, other electronics parts, displays, batteries (as appropriate), camera modules, electronics assembly, non-electronic elements, and final assembly. By adding the cost estimates for each of these subcategories, an overall estimated cost is derived for the system under evaluation. Product packaging and accessories (CDs, cables, etc.) are also documented and estimated for their contribution to total cost as appropriate.

We believe our cost estimates generally fall within 15 percent of the "right answer," which itself can vary depending on the market and OEM-specific factors mentioned earlier. While the TechInsights cost model is imperfect, it yields important insights into technology and business dynamics along with good first-order contributions to system cost by component type. Additionally, the consistency of approach and gradual modification to assumptions (smoothing out frequently-shifting pricing factors) hopefully yields a credible, but user-modifiable, view of OEM high volume cost-to-produce.

Please feel free to contact us at [support@techinsights.com](mailto:support@techinsights.com) with any comments, questions, or proposed corrections with respect to our cost estimates. We welcome your input.

In our product teardowns, we gather a series of metrics for product profiling and comparison. Some metrics focus on system characteristics such as total silicon area, total system semiconductor storage capacity, and total connection count. Other metrics reflect more subtle aspects of electronics assembly such as connection density, average component I/O count, and silicon tiling density. Taken as a whole, the metrics allow deeper comparison and benchmarking across multiple disciplines and multiple products. Key metrics we gather on products are described below along with their definitions and what they tend to say about the system under study. Most metrics can be used both in comparing similar products for benchmarking purposes or for quantifying differences in levels of complexity between dissimilar product types. Data fall into two categories; either “raw” measured data or ratios of these measured data sets.

**Total Silicon Area** : This metric describes the total area of silicon as measured from X-ray or direct measurement of ICs. The area is an expression of the enclosed bare die area and excludes packaging area. The aggregate silicon area is a good benchmark to show how integrated a design might be when making comparisons to similar systems. Total silicon area also reflects the major cost driver for most systems we examine.

**Silicon Tiling Density** : Ratio of Total Silicon Area to total printed circuit board “projected” area (i.e. the simple board area and not the cumulative surface area of both sides of the board). This metric directly reflects the level of efficiency and aggressiveness in integrated circuit packing and placement. Single digit Silicon Tiling Density is typical but silicon coverage of 10% - 20% has been seen in some of the most advanced products we have examined. Higher Tiling Densities often correspond with the use of chip scale packaging (CSPs) or other small form-factor IC packaging technologies. High density circuit boards are also often a supporting technology.

**Number of Parts** : Total component count including ICs, passives, modules, connectors, etc., each separated out in our reporting.

**Number of Connections** : The total number of connections corresponds to the total number of interconnects introduced by the aggregate component set and reflects any electrical connection observed (solder joints, adhesive interconnect, or connector terminal interfaces).

**Opportunity Count** : Opportunity Count is the total number of parts plus the total number of connections; the name reflects that each of these constituent elements represents an opportunity for failure. A high opportunity count means more complex and riskier electronics assembly.

**Average Pin Count (APC)** : Ratio of total number of component terminals to total number of parts, at the system level. This metric reflects the ‘average’ terminal complexity of the components and often provide a signature of integration level and/or “digital-ness” of the overall product. Low APCs reflect a high number of discretely or other low-pincount devices often characteristic of analog circuitry. Conversely, high APCs are characteristic of highly integrated, high-pincount assemblies, often those composed largely of digital integrated circuits.

**Connection Density** : This metric is a ratio of the total Number of Connections to total printed circuit board assembly area, in units of connections per sq. inch. The metric provides data related to the Silicon Tiling Density above, but with an emphasis on complexity of I/O interconnect. For example, with a fixed Connection Density, high tiling density of low-pincount memory chips is more readily achieved than comparable silicon tiling of high pincount logic.

**Part Density** : This metric is a ratio of the total Number of Parts to total printed circuit board assembly area, in units of components per sq. inch. The metric provides data related to the Silicon Tiling Density and Connection Density as described above, but with an emphasis on density and complexity of component packing efficiency. For example, low Part Density of high-pincount devices can pose an equal challenge in Connection Density to high Part Density of low-pincount devices. High Part Density does reflect challenges in surface mount assembly in terms of (typically) precision of placement, number of placements, and engineering of part clearances.

**Routing Density (heuristic estimate)** =  $3 * (\text{Average Pin Count}) * \sqrt{\text{Part Density}}$ . The Routing Density metric is an empirically derived relationship that characterizes the wiring density of the interconnect used to support the interconnection of components in a planar electronic assembly (i.e. the circuit board). Architectural issues such as bussing or other factors affecting the regularity of wiring impact the actual Routing Density needed to support a given application, but the metric provides a ready measure of wiring complexity.

***Click Here to Return to***  
***Cost Analysis Page***  
***1059***

# Deep Dive Report

## BMW i3 ECU HVAC Assembly

Part #8024

Report # 15900-150217-SBb



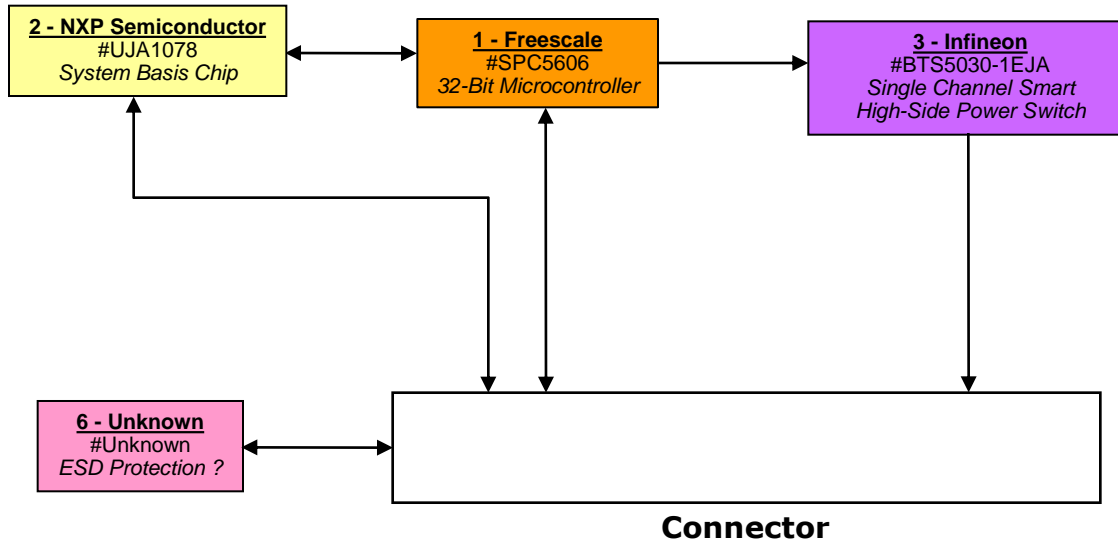
### Product Description

The Valeo-sourced Electronic Control Unit (ECU) assembly controls the HVAC portion of the 2014 BMW i3. This device consists of a single printed circuit board (PCB) protected by top and bottom glass-filled polycarbonate enclosures. It also has two connectors on one side. It is controlled by a Freescale 32-bit microcontroller.

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Product Description		Integrated Circuit Metrics		
Product Type	Automotive	IC Die Count	3	
Brand	Valeo	IC Package Count	3	
Product Name & Model #	ECU HVAC Assembly	<b>Cost Metrics</b>		
Official Release Date	5/2/2014			
Weight (grams)	83.6	Retail Price		
Product Dimensions (mm)	108.21 x 80.66 x 38.27	Total Manufacturing Cost	\$21.21	
<b>Product Features</b>		Electronics Cost	\$17.42	
		<b>Manufacturing Cost Breakdown</b>		
Microcontroller	Freescale 32-Bit Microcontroller	Integrated Circuits	\$8.19	38.6%
Communications	N/A	Modules, Discretes & Connectors	\$6.63	31.3%
Connectivity	N/A	Substrates	\$1.12	5.3%
		Component Insertion	\$0.92	4.3%
Interface	N/A	Card Test	\$0.56	2.6%
		Non-Electronic Parts	\$3.55	16.7%
		Final Assembly & Test	\$0.24	1.1%
		<b>Total</b>	<b>\$21.21</b>	<b>100.0%</b>



? = Unconfirmed

Estimated block diagram based on observation of this specific product implementation, manufacturer's data sheets where available, and best engineering judgment. Certain details of the interface circuitry are not reflected in this block diagram. Partitioning and connectivity are speculative.

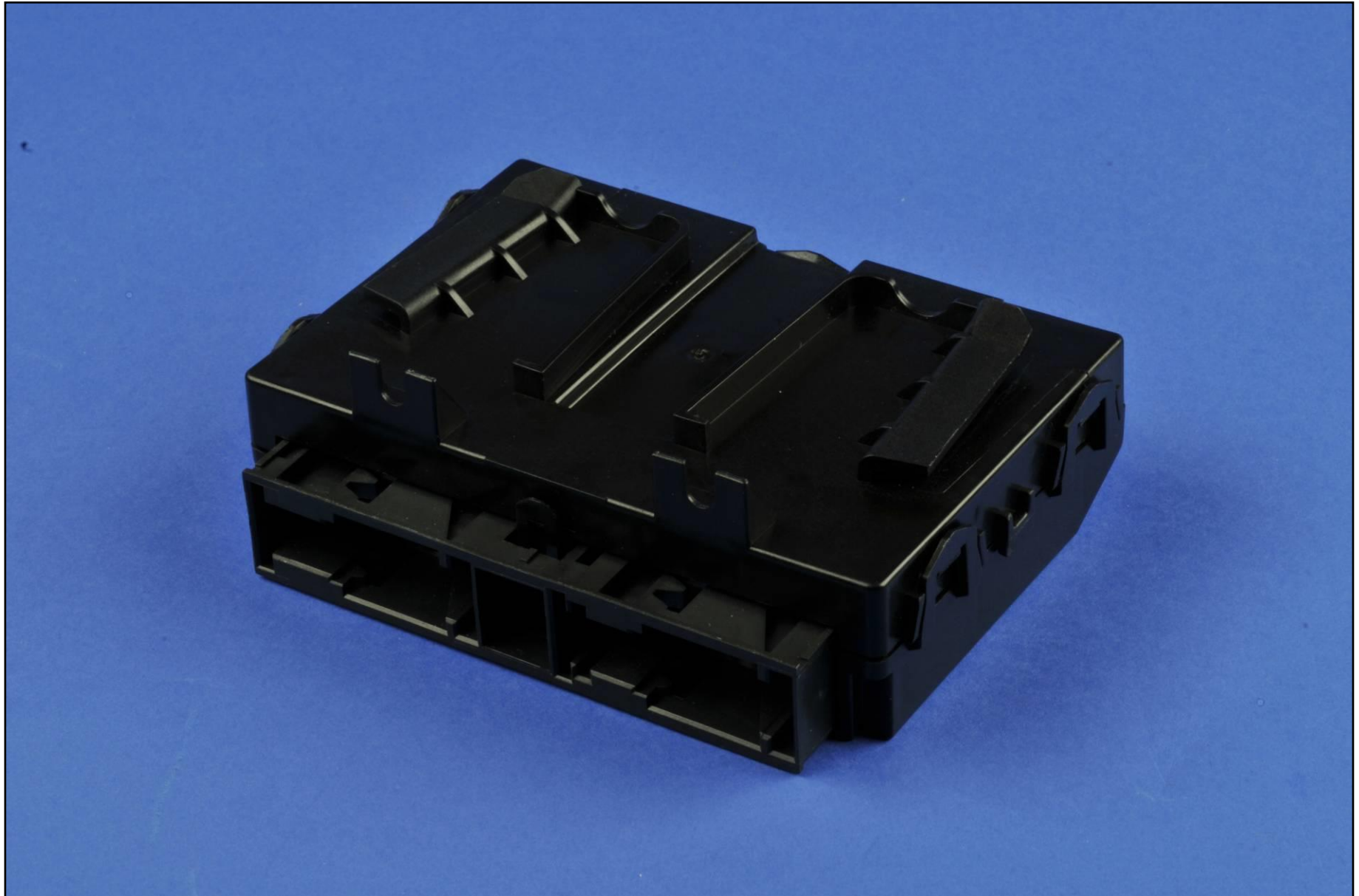


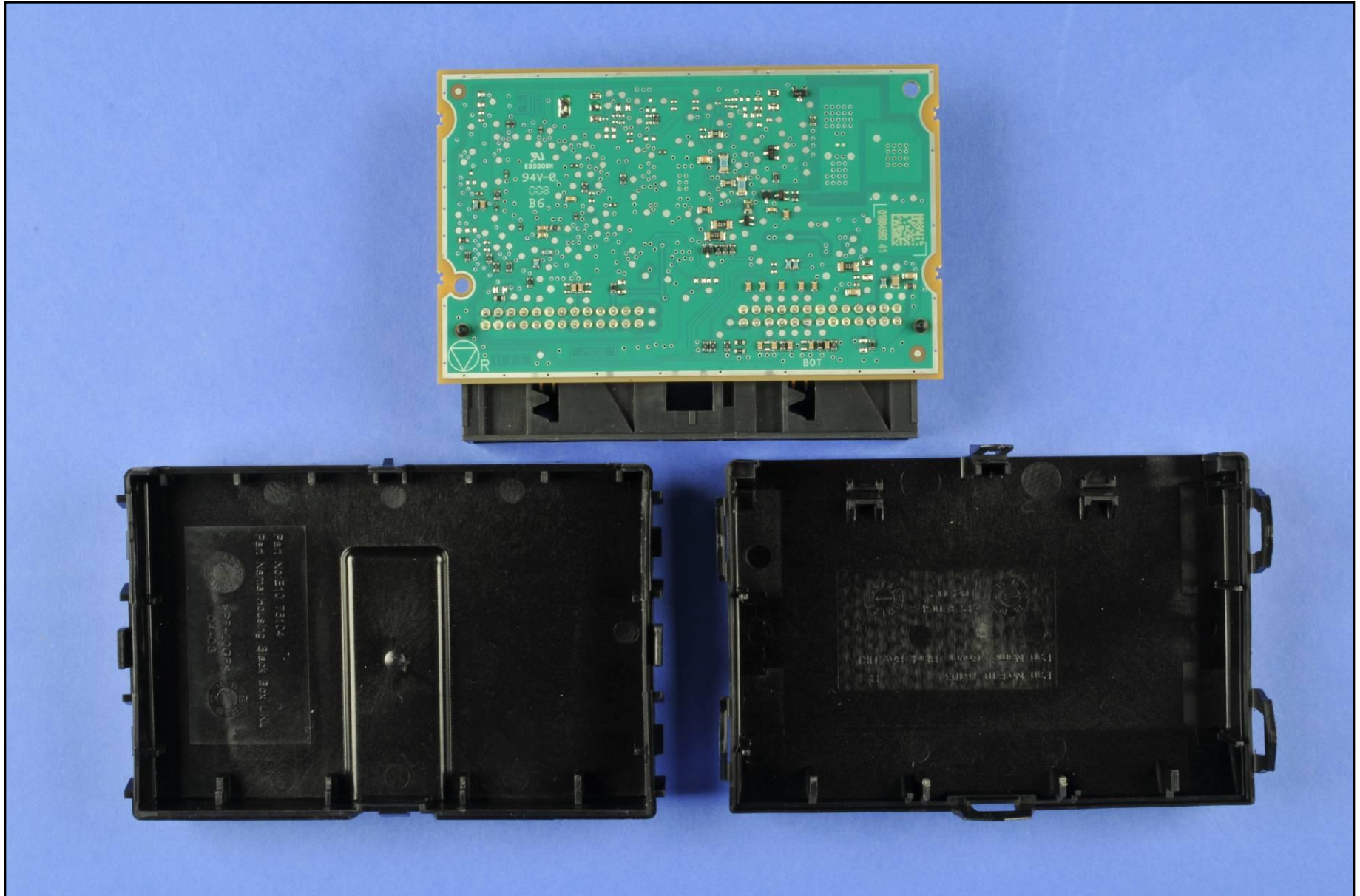




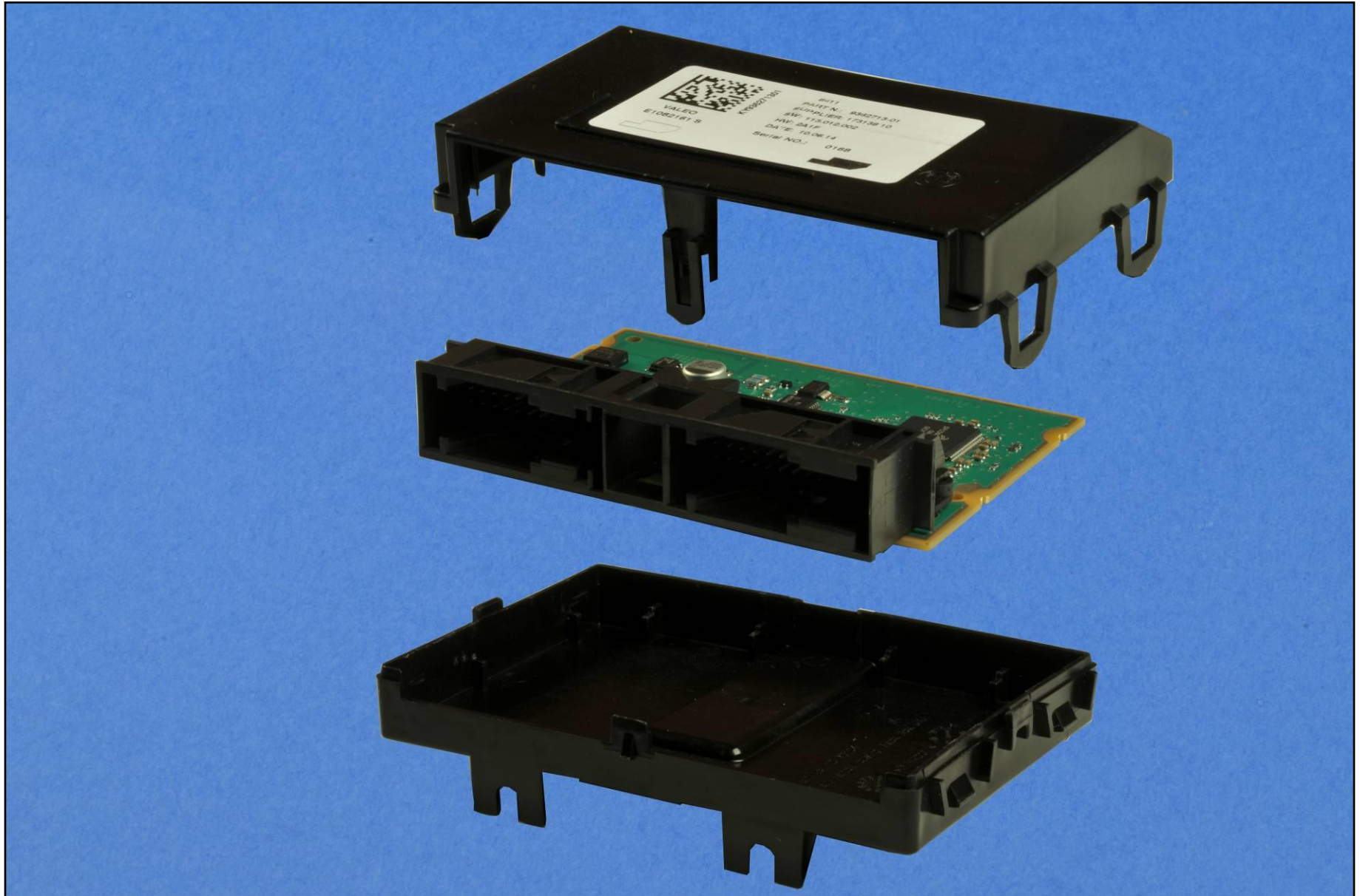






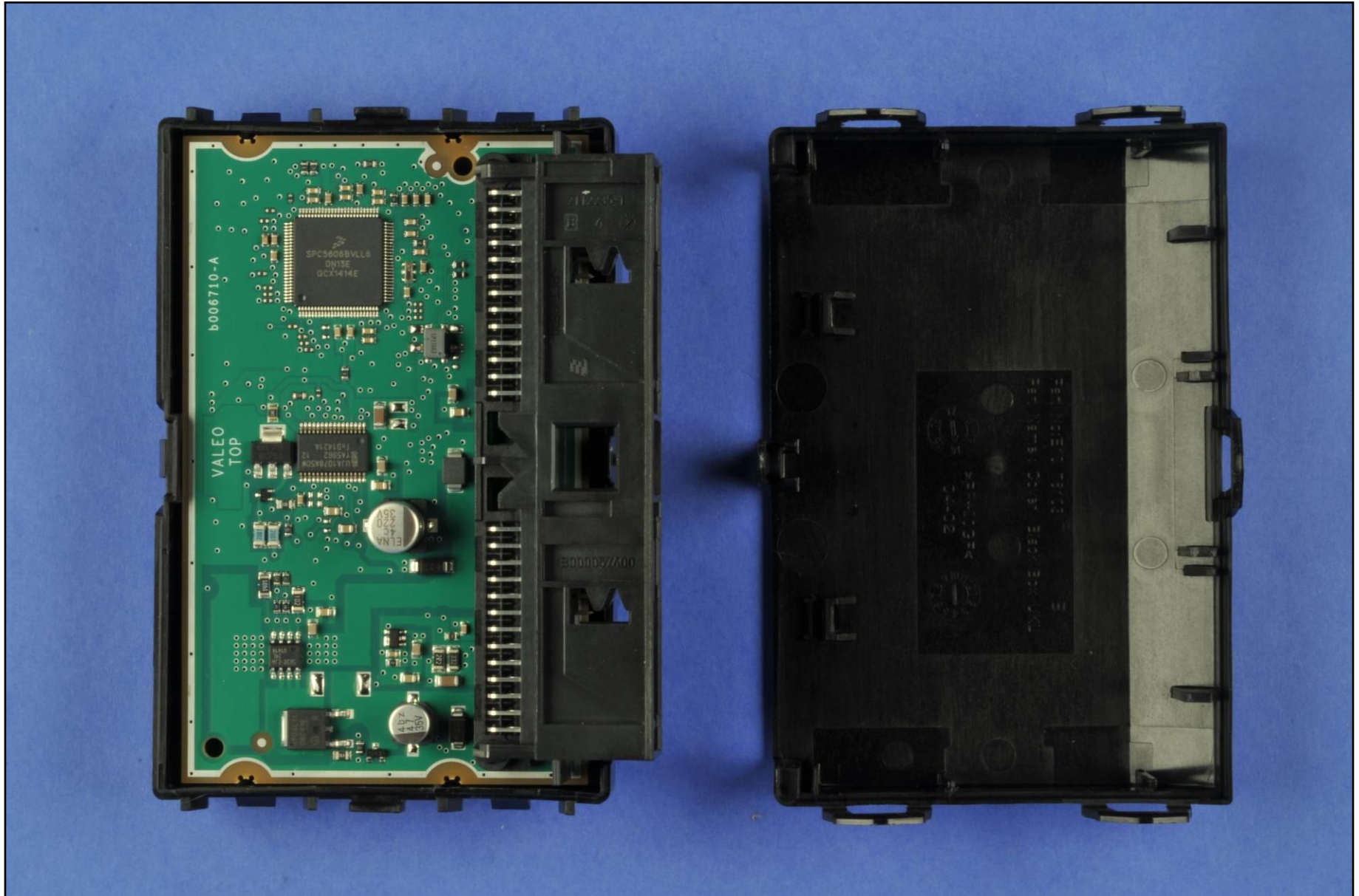


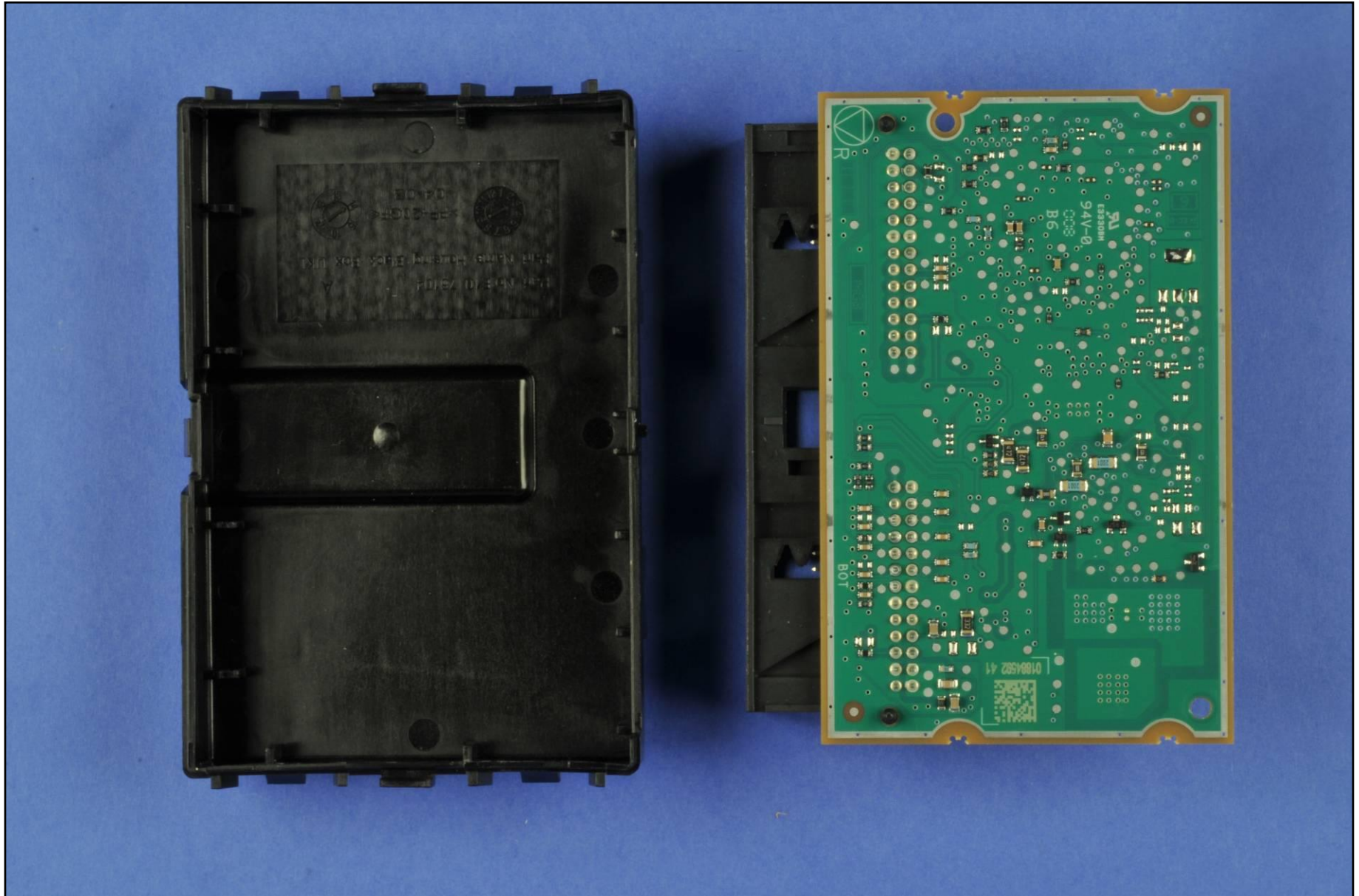


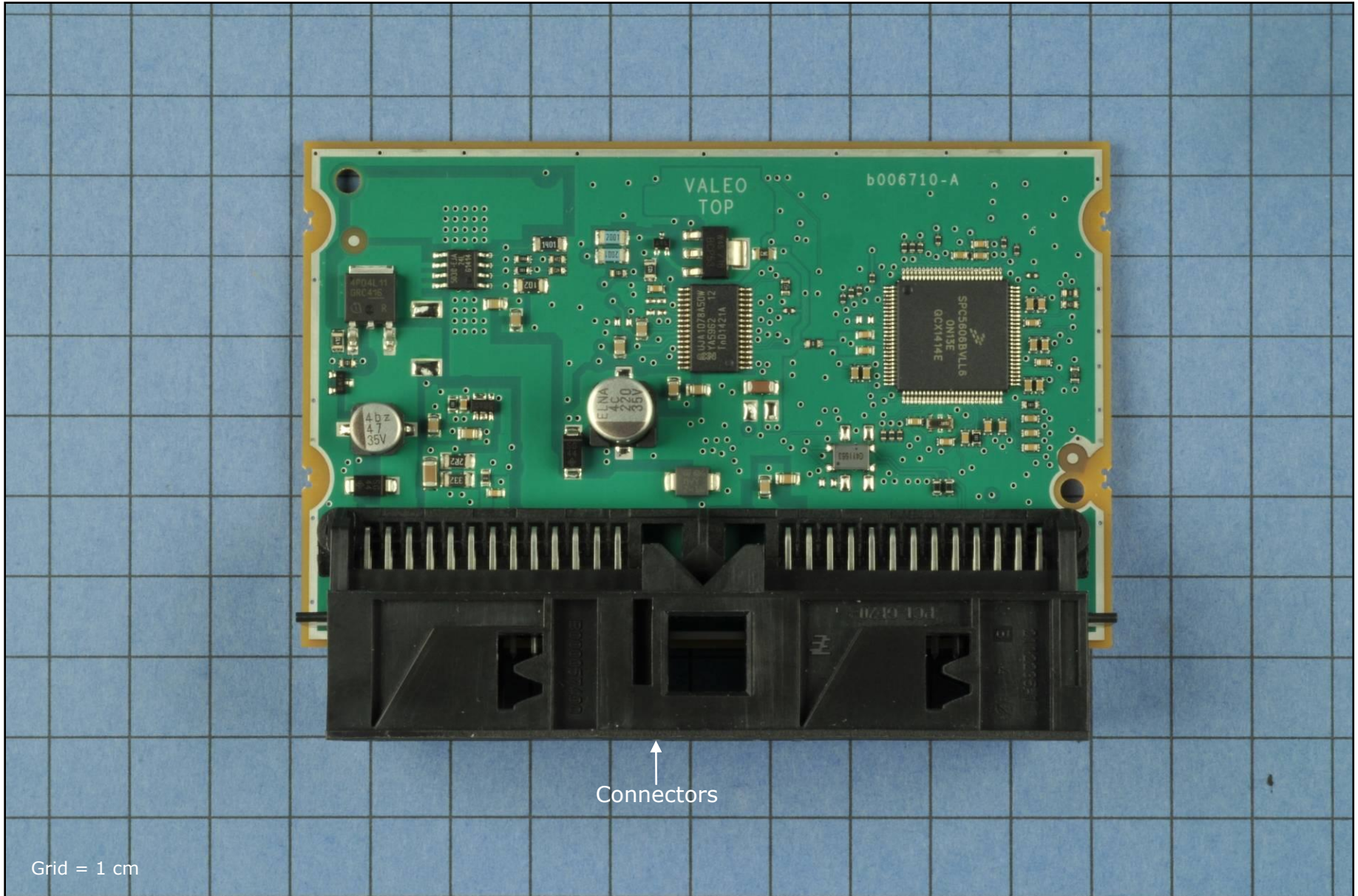






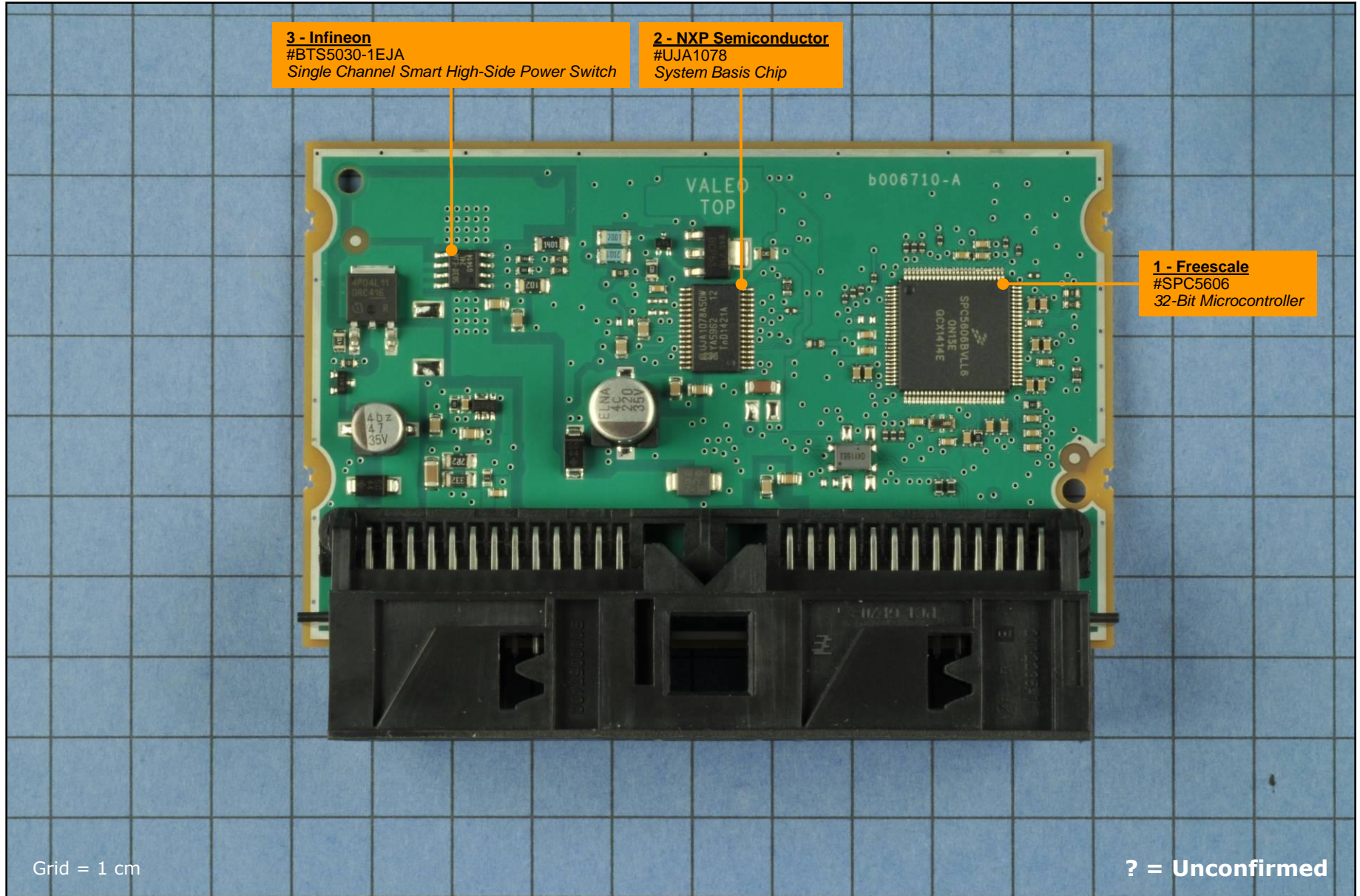






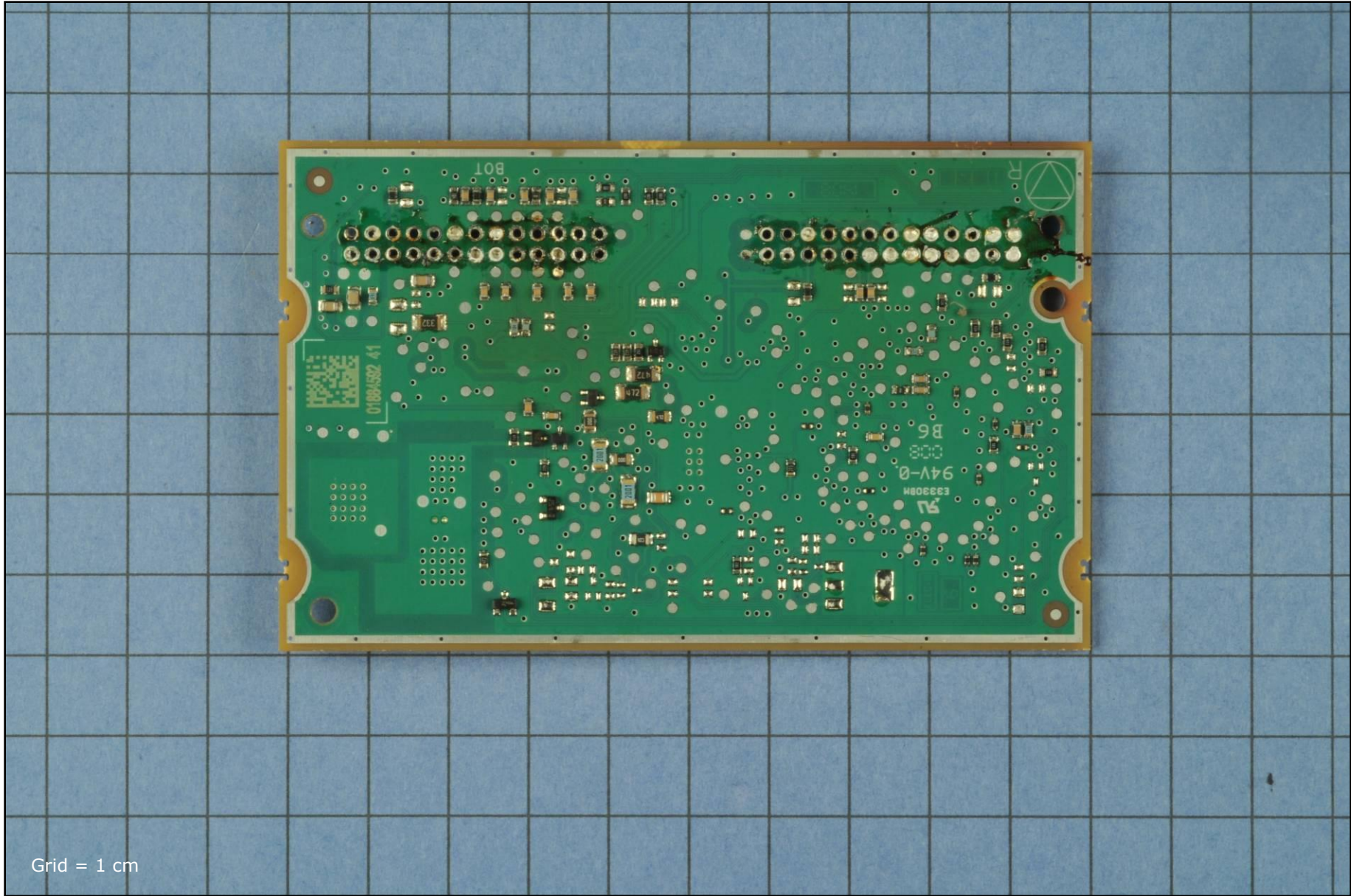
↑  
Connectors

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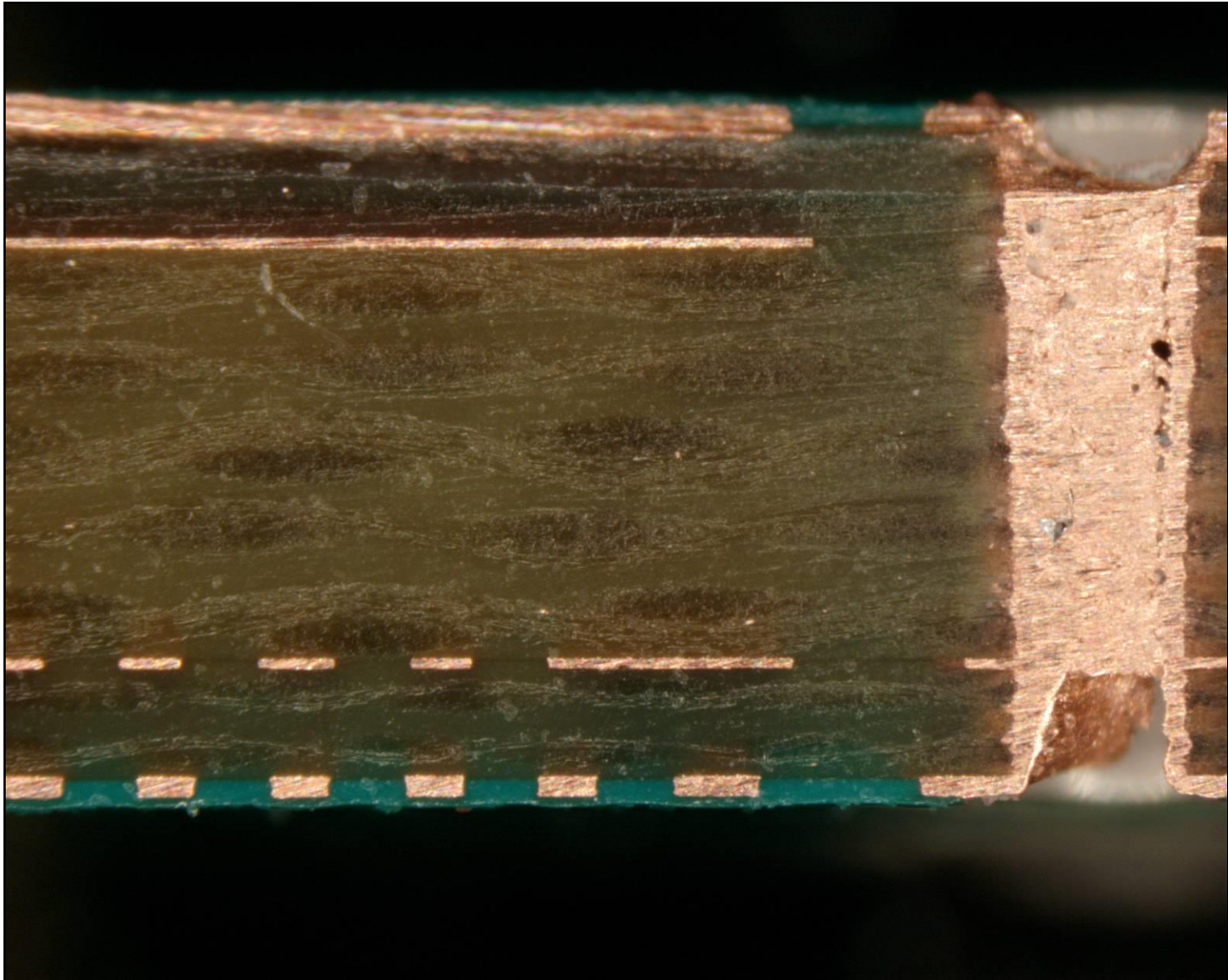


Grid = 1 cm

? = Unconfirmed



Grid = 1 cm



Substrates														
Assembly Name	Manufacturer	Core Material	Mfg. Technology	Layers	Area (cm <sup>2</sup> )	Min. Trace Pitch (mm)	Min. Trace Width (mm)	ThruVia Land Dia (mm)	ThruVia Hole Dia (mm)	BlindVia Land Dia (mm)	BlindVia Hole Dia (mm)	Thickness (mm)	Routing Density	Estimated Costs
Main Board	ELEC & ELTEK MULTILAYER PCB LTD	FR4	4 Layer Conventional FR4 / HF	4	63.0	0.51	0.20	1.10	0.44			1.5	15.8	\$ 1.12

Location	Package Info										Die Info						Estimated Costs		
	Pkg Ref. #	Pkg Qty	Brand Name	Part Number	Pkg Description	Form	Pin Count	Length (mm)	Width (mm)	Height (mm)	Die Ref #	Die Qty	Brand Name	Part Number	Description	Length (mm)	Width (mm)	Each	Total
Main Board, Side 1	1	1	Freescale	SPC5606	32-Bit Microcontroller	QFP	100	13.77	13.77	1.68	1.1	1	Freescale	N13E	32-Bit Microcontroller	4.79	4.67	\$ 5.385	\$ 5.385
	2	1	NXP Semiconductor	UJA1078	System Basis Chip	SOP	32	10.97	6.10	1.04	2.1	1	NXP Semiconductor	CF1501A	System Basis Chip	4.25	3.22	\$ 2.559	\$ 2.559
	3	1	Infineon	BTS5030-1EJA	Single Channel Smart High-Sid	SOP	8	5.04	3.74	1.59	3.1	1	Infineon	8306B11	Single Channel Smart High-	2.36	1.79	\$ 0.249	\$ 0.249
<b>Totals</b>		<b>3</b>					<b>140</b>					<b>3</b>					<b>\$8.19</b>		

Note: Supplemental information, such as IC package & die markings, is included in the Excel Bill of Materials (BOM) spreadsheet.



Location	Qty	Brand Name	Part Number	Description	Package			Estimated Costs	
					Pin Count	Length (mm)	Width (mm)	Each	Total
Main Board, Side 1	1	Unknown	Unknown	Crystal: Ceramic	4	3.00	1.26	\$ 0.200	\$ 0.200
<b>TOTALS</b>	<b>1</b>				<b>4</b>				<b>\$0.20</b>

Location	Qty	Functional Description	Package					Estimated Costs	
			Form	Top Marking	Pin Count	Length (mm)	Width (mm)	Each	Total
Main Board, Side 1	1	Small Active	Diode, ESD	50S 43	5	2.92	1.54	\$0.100	\$0.100
	1	Small Active	MOSFET	Infineon Logo 4P04L11 GRC416 R	3	6.48	6.12	\$0.250	\$0.250
	1	Small Active	MOSFET	W45/16 BCP53	4	6.24	3.38	\$0.090	\$0.090
	1	Small Active	Transistor, Small	A4T	3	2.15	1.16	\$0.030	\$0.030
	2	Small Active	Diode, SMT	SG 44	2	4.18	2.57	\$0.060	\$0.120
	1	Small Active	Diode, SMT	NT G MVY Z416	2	4.17	3.70	\$0.060	\$0.060
	1	Small Active	Transistor, Small	Y2W44	3	2.92	1.23	\$0.030	\$0.030
Main Board, Side 2	1	Small Active	Transistor, Small	Z4F	3	2.93	1.23	\$0.030	\$0.030
	1	Small Active	Transistor, Small	JST 44	3	2.78	1.25	\$0.030	\$0.030
	1	Small Active	Transistor, Small	5CT	3	2.11	1.10	\$0.030	\$0.030
	2	Small Active	Transistor, Small	44/GS	3	2.00	1.14	\$0.030	\$0.060
	1	Small Active	Transistor, Small	6CT	3	2.15	1.12	\$0.030	\$0.030
<b>TOTALS</b>	<b>14</b>				<b>42</b>				<b>\$0.86</b>

Location	Qty	Functional Description	Package		Estimated Costs	
			Form	Pin Count	Each	Total
Main Board, Side 1	1	Capacitor	Electrolytic, Small	2	\$0.040	\$0.040
	1	Capacitor	Electrolytic, Medium	2	\$0.110	\$0.110
	79	Small Passive	Cap, Res, Ferrite	2	\$0.004	\$0.316
	1	Coil	SMT, CMC	4	\$0.150	\$0.150
Main Board, Side 2	76	Small Passive	Cap, Res, Ferrite	2	\$0.004	\$0.304
<b>TOTALS</b>	<b>158</b>			<b>318</b>		<b>\$0.92</b>

Location	Qty	Form	Package			Estimated Costs	
			Pin Count	Length (mm)	Width (mm)	Each	Total
Main Board, Side 1	1	Bd to Bd: Male or Female	52	98.20	28.44	\$4.650	\$4.650
<b>TOTALS</b>	<b>1</b>		<b>52</b>				<b>\$4.65</b>

Electronic Assembly Metrics by Assembly											
General Area	Assembly Name	Substrate Area (sq.cm)	Metal Layers	Circuit Area (sq.cm)	Routing Density (cm of routing per sq.cm of substrate)	Number of Components	Number of Connections	Component Density (Components/sq.cm)	Connection Density (Connections/sq.cm)	Avg. Pin Count	Assembly Weight (grams)
Main Electronics	Main Board	63.0	4	252.0	15.8	177	556	2.8	8.8	3.1	45.30
	<b>System Totals</b>	<b>63.0</b>	<b>4</b>	<b>252</b>		<b>177</b>	<b>556</b>	<b>2.8</b>	<b>8.8</b>	<b>3.1</b>	<b>45.30</b>

*NOTE: Occasional inconsistencies in totals may be present due to rounding error.*

Electronics Costs by Assembly										
General Area	Assembly Name	Total	Integrated Circuits	Modular & Odd Form Components	Small Active Components	Passive Components	Connector Components	Substrates	Insertion	Card Test
Main Electronics	Main Board	\$ 17.42	\$ 8.19	\$ 0.20	\$ 0.86	\$ 0.92	\$ 4.65	\$ 1.12	\$ 0.92	\$ 0.56
	<b>System Totals</b>	<b>\$ 17.42</b>	<b>\$ 8.19</b>	<b>\$ 0.20</b>	<b>\$ 0.86</b>	<b>\$ 0.92</b>	<b>\$ 4.65</b>	<b>\$ 1.12</b>	<b>\$ 0.92</b>	<b>\$ 0.56</b>

NOTE: Occasional inconsistencies in totals may be present due to rounding error.

Counts by Assembly												
General Area	Assembly Name	IC Package Count	IC Connections	Modular/Odd Form Components	Modular/Odd Form Component Connections	Small Active Components	Small Active Component Connections	Passive Components	Passive Component Connections	Connectors	Connector Connections	Opportunities
Main Electronics	Main Board	3	140	1	4	14	42	158	318	1	52	733
	<b>System Totals</b>	<b>3</b>	<b>140</b>	<b>1</b>	<b>4</b>	<b>14</b>	<b>42</b>	<b>158</b>	<b>318</b>	<b>1</b>	<b>52</b>	<b>733</b>

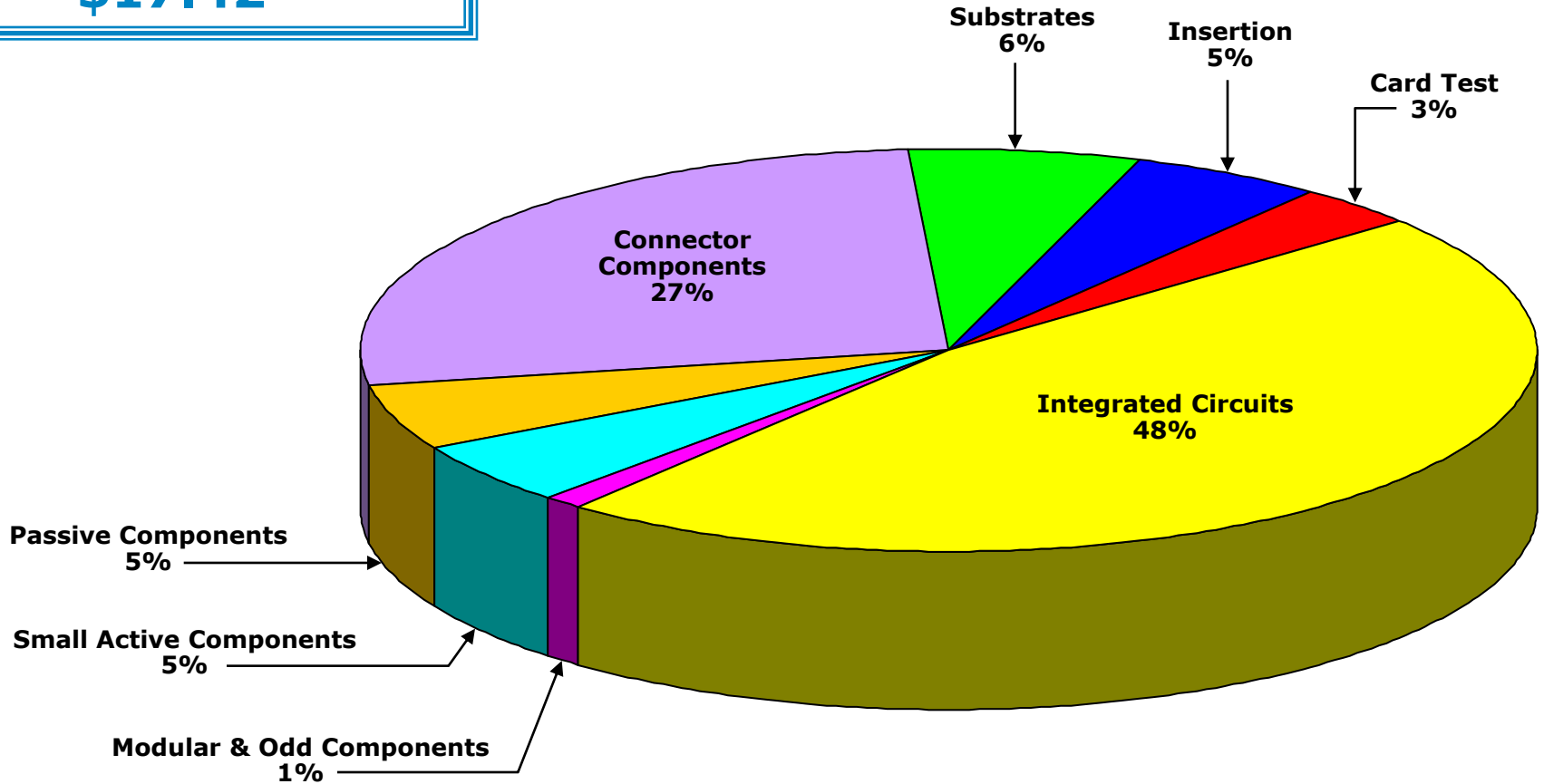
*NOTE: Occasional inconsistencies in totals may be present due to rounding error.*

IC Metrics											
General Area	Assembly Name	IC Die Count	IC Package Count	Number of Package Connections	Die Area (sq.mm)	Substrate Tiling Density (die area / substrate area)	Package Area (sq.mm)	Die Area/Package Area Ratio	Package Connections per sq.cm of Package Area	Volatile Memory (KBytes)	Non-Volatile Memory (KBytes)
Main Electronics	Main Board	3	3	140	40.3	0.01	275.4	0.15	50.8	0	0
	<b>System Totals</b>	<b>3</b>	<b>3</b>	<b>140</b>	<b>40.3</b>		<b>275.4</b>	<b>0.15</b>	<b>50.8</b>	<b>0</b>	<b>0</b>

*NOTE: Occasional inconsistencies in totals may be present due to rounding error.*



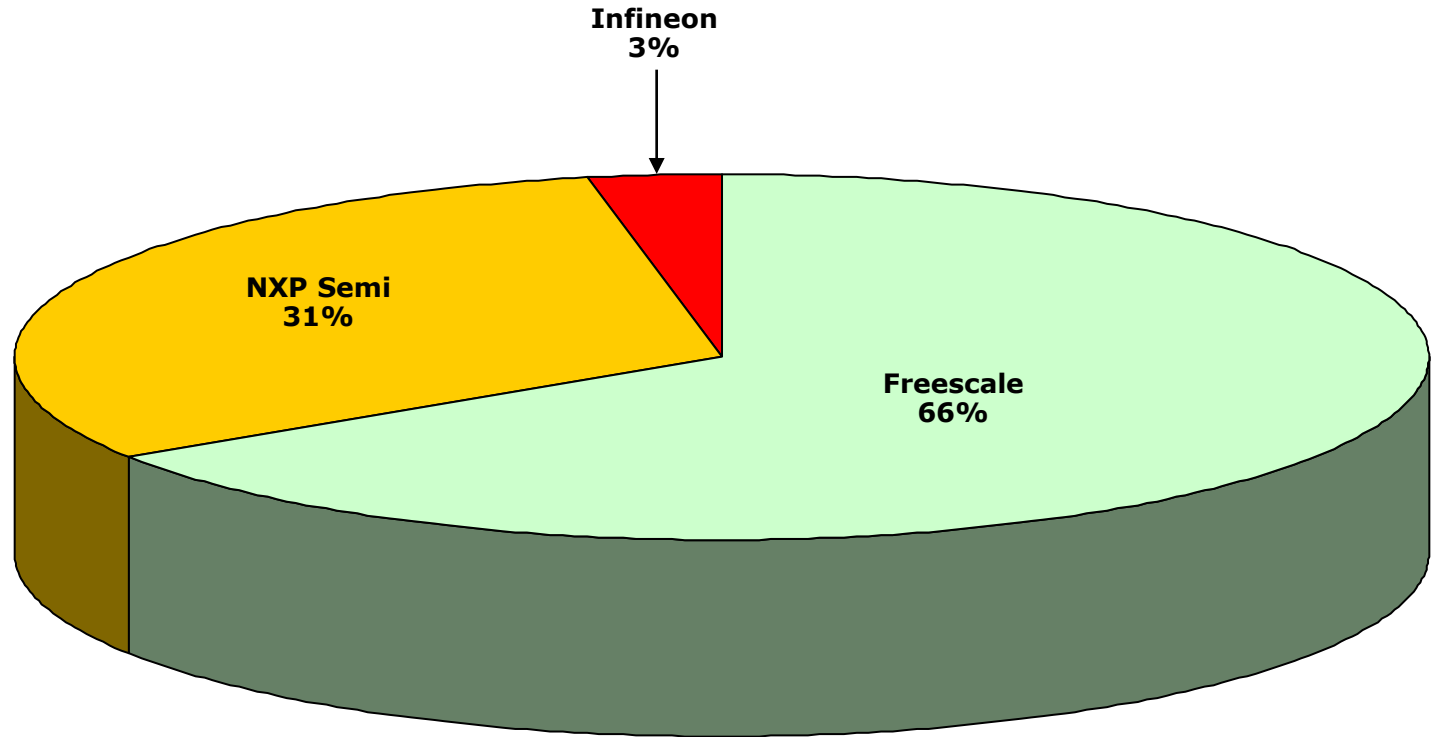
**Estimated Cost of Electronics**  
(Includes Subsystem Electronics)  
**\$17.42**



NOTE: Occasional inconsistencies in totals may be present due to rounding error.

Pkg. Brand	Cost
Freescale	\$5.39
NXP Semiconductor	\$2.56
Infineon	\$0.25

\* Includes Subsystem Vendors & Associated Costs



NOTE: Occasional inconsistencies in totals may be present due to rounding error.

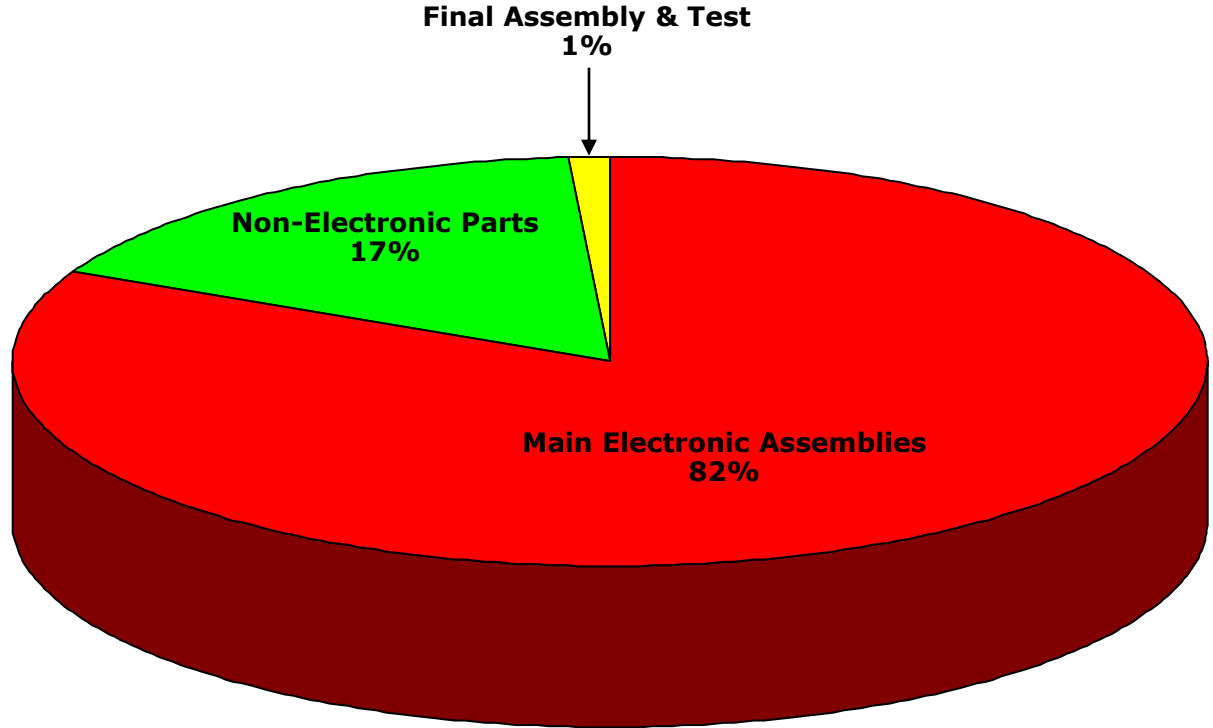
Subsystem	Part ID No.	Qty	Description	Fabrication Process	Material	Dimensions (mm)	Weight (grams)	Est'd Cost Each	Est'd Extended Cost	
Enclosures	2	1	Top Enclosure	Molded	PP + GF20	108.35 x 73.84 x 24.61	17.30	1.460	1.460	
	3	1	Bottom Enclosure	Molded + Pulls	PP + GF20	108.43 x 72.28 x 21.94	20.50	2.030	2.030	
Miscellaneous	1	1	Label	Die-Cut	Plastic + Adhesive	59.73 x 31.95 x 0.09	0.20	0.060	0.060	
<b>Total</b>		<b>3</b>						<b>Estimated Cost</b>		<b>\$3.55</b>

# Final Ass'y Labor & Test Cost Estimate

<b>Final Assembly &amp; Test</b>	
Made in	China
Number of parts	5
Est'd number of steps	15
Est'd time (seconds)	45
<b>Est'd final assembly cost</b>	<b>\$ 0.04</b>
<b>Est'd final test cost</b>	<b>\$ 0.20</b>

Estimated Cost Totals	
Main Electronic Assemblies	\$ 17.42
Non-Electronic Parts	\$ 3.55
Final Assembly & Test	\$ 0.24
<b>Total</b>	<b>\$ 21.21</b>

Cost Total Notes:
Estimated final assembly cost includes labor only.
Total cost does not include Non-recurring, R&D, G&A, IP licensing fees/royalties, software, sales & marketing, distribution.
Assumes fully scaled production.



# Cost Estimation Process

## (Overview & Discussion)

Cost modeling is tricky business. Multiple variables affect the actual production costs a manufacturer will experience, including development expenses, unit volumes, supply-and-demand in component markets, die yield-curve maturity, OEM purchasing power, and even variations in accounting practices. Different cost modeling methods employ different assumptions about how to handle these and other variables, but we can identify two basic approaches: that which seeks to track short-term variations in the inputs to the production process, and that which strives to maintain comparability of the output of the model across product families and over time.

TechInsights' philosophy in cost modeling is to emphasize consistency across products and comparability over time, rather than to track short-term fluctuations. During the past eight years, we have developed an estimation process that, while necessarily lacking an insider's knowledge of the cost factors that impact any one manufacturer, is reasonably accurate in its prediction of unit costs in high-volume production environments. We do not claim that the model will produce the "right" answer for your firm's environment. However, TechInsights does give customers a key analytical tool with a complete set of data in our Bill of Materials (BOM). The BOM allows readers to 1) scrutinize the assumptions behind our cost model and 2) modify the results based on substitution of their own component cost estimates where they have better information based on inside knowledge.

Our estimation process decomposes overall system cost into three major categories: Electronics, Mechanical, and Final Assembly. We begin by creating a complete electronics bill-of-materials (BOM). Each component from the largest ASIC to the smallest discrete resistor is entered into a BOM table with identifying attributes such as size, pitch, I/O count, package type, manufacturer, part number, estimated placement cost, and die size (if the component is an IC). Integrated circuit costs are calculated from measured die area. Using assumptions for wafer size, process type, number of die per wafer, defect density, and profit margin in combination with die area, an estimate of semiconductor cost is derived. Costs for discrete components and interconnect are derived from assumption tables which relate BOM line items to specific cost estimates by component type and estimates for part placement costs are included. For LCD display costs, we employ a model which tabulates expected cost from measurements of glass area, LCD type, and total pixel resolution. When market costs are available from alternative sources, LCD panel costs are taken from and referenced to these sources.

Costs of non-electronic components such as molded plastic enclosures and metallic components are measured in terms of weight, size, thickness, type of material, and complexity to arrive at their estimated cost. Other system items such as optics, antennae, batteries and displays are costed from a set of assumption tables derived from a combination of industry data, average high volume costs, and external sources. For final assembly, we re-build the torn-down product, tabulating stepwise assembly times as the reconstruction proceeds, to reach a total assembly time. Using a labor rate assumption for the country of origin, we then calculate final assembly cost.

The three major categories for system cost contributors can be broken down into the subcategories of ICs, other electronics parts, displays, batteries (as appropriate), camera modules, electronics assembly, non-electronic elements, and final assembly. By adding the cost estimates for each of these subcategories, an overall estimated cost is derived for the system under evaluation. Product packaging and accessories (CDs, cables, etc.) are also documented and estimated for their contribution to total cost as appropriate.

We believe our cost estimates generally fall within 15 percent of the "right answer," which itself can vary depending on the market and OEM-specific factors mentioned earlier. While the TechInsights cost model is imperfect, it yields important insights into technology and business dynamics along with good first-order contributions to system cost by component type. Additionally, the consistency of approach and gradual modification to assumptions (smoothing out frequently-shifting pricing factors) hopefully yields a credible, but user-modifiable, view of OEM high volume cost-to-produce.

Please feel free to contact us at [support@techinsights.com](mailto:support@techinsights.com) with any comments, questions, or proposed corrections with respect to our cost estimates. We welcome your input.

In our product teardowns, we gather a series of metrics for product profiling and comparison. Some metrics focus on system characteristics such as total silicon area, total system semiconductor storage capacity, and total connection count. Other metrics reflect more subtle aspects of electronics assembly such as connection density, average component I/O count, and silicon tiling density. Taken as a whole, the metrics allow deeper comparison and benchmarking across multiple disciplines and multiple products. Key metrics we gather on products are described below along with their definitions and what they tend to say about the system under study. Most metrics can be used both in comparing similar products for benchmarking purposes or for quantifying differences in levels of complexity between dissimilar product types. Data fall into two categories; either “raw” measured data or ratios of these measured data sets.

**Total Silicon Area** : This metric describes the total area of silicon as measured from X-ray or direct measurement of ICs. The area is an expression of the enclosed bare die area and excludes packaging area. The aggregate silicon area is a good benchmark to show how integrated a design might be when making comparisons to similar systems. Total silicon area also reflects the major cost driver for most systems we examine.

**Silicon Tiling Density** : Ratio of Total Silicon Area to total printed circuit board “projected” area (i.e. the simple board area and not the cumulative surface area of both sides of the board). This metric directly reflects the level of efficiency and aggressiveness in integrated circuit packing and placement. Single digit Silicon Tiling Density is typical but silicon coverage of 10% - 20% has been seen in some of the most advanced products we have examined. Higher Tiling Densities often correspond with the use of chip scale packaging (CSPs) or other small form-factor IC packaging technologies. High density circuit boards are also often a supporting technology.

**Number of Parts** : Total component count including ICs, passives, modules, connectors, etc., each separated out in our reporting.

**Number of Connections** : The total number of connections corresponds to the total number of interconnects introduced by the aggregate component set and reflects any electrical connection observed (solder joints, adhesive interconnect, or connector terminal interfaces).

**Opportunity Count** : Opportunity Count is the total number of parts plus the total number of connections; the name reflects that each of these constituent elements represents an opportunity for failure. A high opportunity count means more complex and riskier electronics assembly.

**Average Pin Count (APC)** : Ratio of total number of component terminals to total number of parts, at the system level. This metric reflects the ‘average’ terminal complexity of the components and often provide a signature of integration level and/or “digital-ness” of the overall product. Low APCs reflect a high number of discretely or other low-pincount devices often characteristic of analog circuitry. Conversely, high APCs are characteristic of highly integrated, high-pincount assemblies, often those composed largely of digital integrated circuits.

**Connection Density** : This metric is a ratio of the total Number of Connections to total printed circuit board assembly area, in units of connections per sq. inch. The metric provides data related to the Silicon Tiling Density above, but with an emphasis on complexity of I/O interconnect. For example, with a fixed Connection Density, high tiling density of low-pincount memory chips is more readily achieved than comparable silicon tiling of high pincount logic.

**Part Density** : This metric is a ratio of the total Number of Parts to total printed circuit board assembly area, in units of components per sq. inch. The metric provides data related to the Silicon Tiling Density and Connection Density as described above, but with an emphasis on density and complexity of component packing efficiency. For example, low Part Density of high-pincount devices can pose an equal challenge in Connection Density to high Part Density of low-pincount devices. High Part Density does reflect challenges in surface mount assembly in terms of (typically) precision of placement, number of placements, and engineering of part clearances.

**Routing Density (heuristic estimate)** =  $3 * (\text{Average Pin Count}) * \sqrt{\text{Part Density}}$ . The Routing Density metric is an empirically derived relationship that characterizes the wiring density of the interconnect used to support the interconnection of components in a planar electronic assembly (i.e. the circuit board). Architectural issues such as bussing or other factors affecting the regularity of wiring impact the actual Routing Density needed to support a given application, but the metric provides a ready measure of wiring complexity.

***Click Here to Return to***  
***Cost Analysis Page***  
***1172***



# *Munro & Associates Wire Harness Reports*

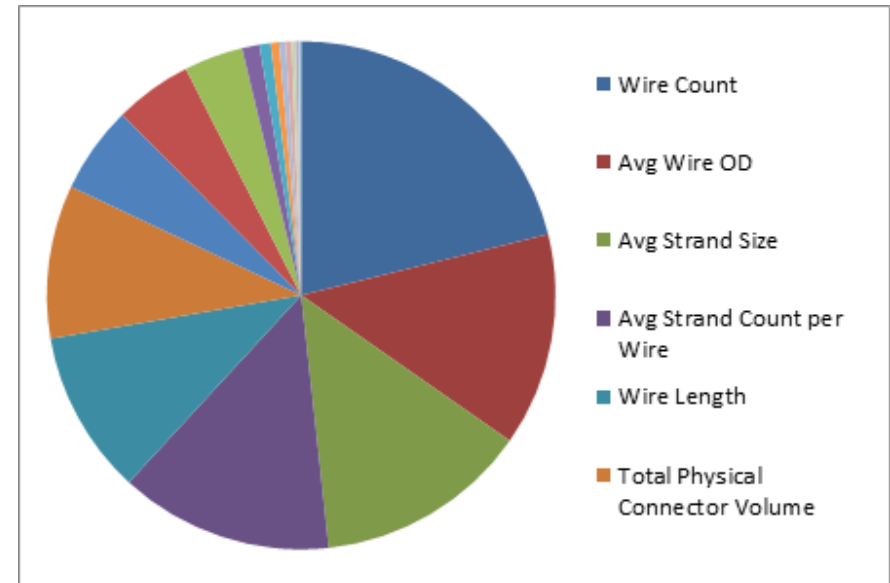
# *Wire Harness Cost Analysis*

## *HVAC Wire Harness*

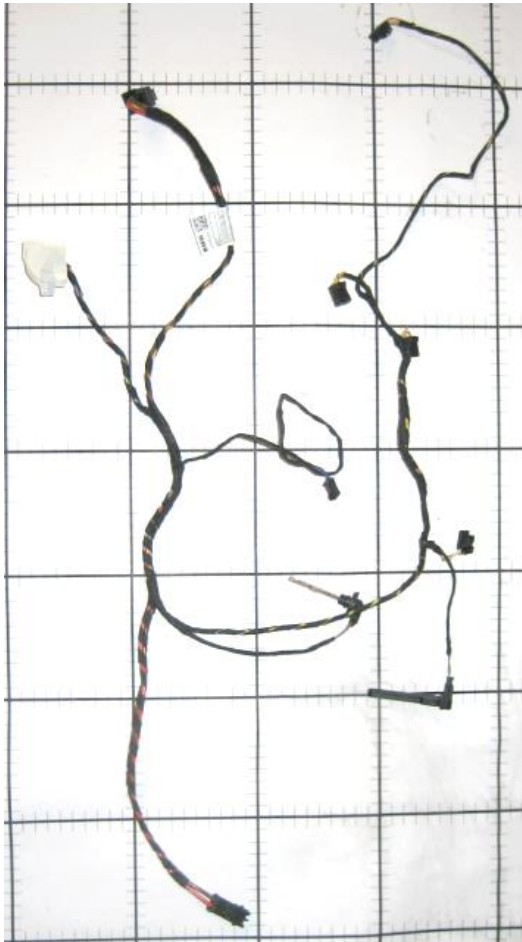
- The Design Profit<sup>®</sup> based Wire Harness Coster generates cost estimates of various components and assembly processes for the majority of wire harnesses found in today's manufactured products. The Wire Harness Coster rolls up these costs to deliver an estimate of the total manufactured cost.
- Costs are based on several factors including: commodity items, components, burdened machine rates, processing speeds, burdened labor rates, and cost of poor quality drivers.
- The Wire Harness Coster consistently generates a cost estimate for a given wire harness without the need to completely disassemble or destroy the wire harness. Minimal disassembly may be required to capture various attributes and identify overall circuit routing. Inputs to the coster include: connector data (size, cavity count, locking mechanisms and sealing attributes), wire data (sizes quantities and lengths), coverings (type, size and length), fasteners, brackets, troughs, etc.
- The Wire Harness Coster separates the parts and processes to more easily delineate Bill of Material (BOM) costs and build processing costs.

## Factors Influencing Cost:

1. Wire count is the primary factor driving cost as it affects the amount of wire, the size of connectors, and the number of assembly processes.
2. Wire selection (wire OD, strand size, strand count / wire) is significant as it directly relates to conductor cross section, and therefore the amount of copper or aluminum used in the harness.
3. Wire length is another major cost factor as it both relates to material cost and to assembly time, as longer lengths require more handling.
4. The total physical connector size is a major cost factor as connectors are a large portion of harness part costs. Total physical connector size also tends to drive assembly costs.



**Relative influence of factors on harness costs**  
(Data based on L32 two-level Taguchi analysis  
of the Wire Harness Coster)



- The HVAC Wire Harness consists of 25 wires joining 10 connectors. Sixteen of the wires are 1.3 mm OD and two are 3.4 mm OD. All wires are copper stranded. There are no twisted pairs. There are four ultrasonically welded splices.
- The overall weight of the harness is 0.15 kg.
- All of the connectors are unsealed.
- There are two temperature sensors included in the harness analysis and cost estimate.
- The largest connector has 26 cavities populated with 7 terminals and has a lever lock to ensure full engagement.
- The harness covering consists cloth tape.
- There are no attached fasteners or clips.
- All major components are analyzed in detail, while prices are applied to commodity items (i.e. clips, terminals).
- *Estimates are based on actual parts.*
- *Photos: Background on 100mm grid paper.*

**Design Profit<sup>®</sup>**

## EXECUTIVE SUMMARY Harness Overview

	8025 - HVAC Wire Harness Asm
<b>Parts</b>	<b>55</b>
<b>Steps</b>	<b>323</b>
<b>Assembly Time (min)</b>	<b>16.68</b>
<b>Total Weight (kg)</b>	<b>0.1500</b>
<b>Purchased Part Cost</b>	<b>\$4.90</b>
<b>Supplier Asm. Cost</b>	<b>\$4.81</b>
<b>Q Burden</b>	<b>\$0.41</b>
<b>Total Cost</b>	<b>\$10.13</b>

**Design Profit<sup>®</sup>**

## EXECUTIVE SUMMARY Wire, Cable & Splices

	8025 - HVAC Wire Harness Asm
Wire & Cable Count	25
Splice Count	4
Wire Length Total (cm)	1082.2
Harness Total Weight	0.1500 kg
Cu Conductor Mass	0.1042 kg
Cu to Harness Mass (%)	69.47 %
Al Conductor Mass	0.0000 kg
Al to Harness Mass (%)	0.00 %
Wire Cost	\$1.52

**Design Profit<sup>®</sup>**

## EXECUTIVE SUMMARY Connectors & Terminals

	8025 - HVAC Wire Harness Asm
<b>Connector Assemblies</b>	<b>10</b>
<b>Sealed Connectors</b>	<b>0</b>
<b>Terminal Cavities</b>	<b>56</b>
<b>Unpopulated Cavities</b>	<b>23</b>
<b>Connector Body Cost</b>	<b>\$0.61</b>
<b>Coax Connectors</b>	<b>0</b>
<b>Coax Connector Cost</b>	<b>\$0.00</b>
<b>Pin &amp; Blade Terminals</b>	<b>33</b>
<b>Ring Terminals</b>	<b>0</b>
<b>Battery Terminals</b>	<b>0</b>
<b>Terminal Strips</b>	<b>0</b>
<b>Total Terminal Count</b>	<b>33</b>
<b>Terminal Cost</b>	<b>\$0.42</b>



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## EXECUTIVE SUMMARY Labels, Clips, Tape & Coverings

	8025 - HVAC Wire Harness Asm
Label Count	1
Label Area cm2	20.5
Label Cost	\$0.06
Clip Count	0
Clip Cost	\$0.00
Tape Tacks	0
Taped Length cm	243.5
Tape Actual Length cm	355.6
Tape Cost	\$0.17
Tube & Wrap Count	0
Heat Shrink Count	0
Covering Count Total	0
Covering Length cm	0.0
Covering Cost	\$0.00

# Miscellaneous Parts Sub-Totals



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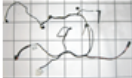

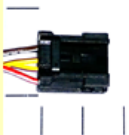



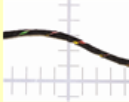


## EXECUTIVE SUMMARY Miscellaneous Parts

	8025 - HVAC Wire Harness Asm
<b>Bracket Count</b>	0
<b>Bracket Cost</b>	\$0.00
<b>Trough Count</b>	0
<b>Trough Cost</b>	\$0.00
<b>Fuse Count</b>	0
<b>Fuse Cost</b>	\$0.00
<b>Grommet Count</b>	0
<b>Grommet Cost</b>	\$0.00
<b>Misc Part Count</b>	2
<b>Misc Part Cost</b>	\$2.12

# Wire Harness Costed Bill of Materials








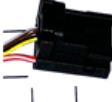




## Harness CBOM

### 8025 - HVAC Wire Harness Asm

	Name	Purchased Part Cost	Item Qty	Measure	Unit of Measure	Purchased Part Cost (Total)
	Main Harness	\$4.9010	1	1	Each	\$4.9010
<b>Media:</b>						
						
	C01	\$0.1100	1	1	Each	\$0.1100
<b>Media:</b>						
						
	C02	\$0.1100	1	1	Each	\$0.1100
<b>Media:</b>						
						
	Tape, Fabric - C01	\$0.0189	1	38.5	cm	\$0.0189
<b>Media:</b>						
						
	Tape, Fabric - C02	\$0.0029	1	5.9	cm	\$0.0029
<b>Media:</b>						
						


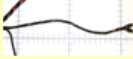



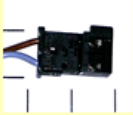






# Wire Harness Costed Bill of Materials

## 8025 - HVAC Wire Harness Asm

Name	Purchased Part Cost	Item Qty	Measure	Unit of Measure	Purchased Part Cost (Total)
 Tape, Fabric - B01-02 Media: 	\$0.0047	1	9.6	cm	\$0.0047
 C03 Media: 	\$0.1100	1	1	Each	\$0.1100
 Tape, Fabric - B01-03 Media: 	\$0.0168	1	34.2	cm	\$0.0168
 C04 Media: 	\$0.1000	1	1	Each	\$0.1000
 C05 Media: 	\$0.0500	1	1	Each	\$0.0500
 Tape, Fabric - C05 Media: 	\$0.0103	1	21.0	cm	\$0.0103

# Wire Harness Costed Bill of Materials

## 8025 - HVAC Wire Harness Asm

Name	Purchased Part Cost	Item Qty	Measure	Unit of Measure	Purchased Part Cost (Total)
 Tape, Fabric-B01-05 Media: 	\$0.0121	1	246	cm	\$0.0121
 Sensor, Temp, AC Airflow Media: 	\$1.1700	1	1	Each	\$1.1700
 C06 Media: 	\$0.0500	1	1	Each	\$0.0500
 Tape, Fabric-C06 Media: 	\$0.0099	1	20.1	cm	\$0.0099
 Tape, Fabric-B01-06 Media: 	\$0.0027	1	5.6	cm	\$0.0027
 Sensor, Temp, AC Evaporator Media: 	\$0.9500	1	1	Each	\$0.9500












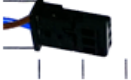
# Wire Harness Costed Bill of Materials

## 8025 - HVAC Wire Harness Asm

Name	Purchased Part Cost	Item Qty	Measure	Unit of Measure	Purchased Part Cost (Total)
 C07 Media: 	\$0.0900	1	1	Each	\$0.0900
 Tape, Fabric-C07 Media: 	\$0.0166	1	33.8	cm	\$0.0166
 Tape, Fabric-B01-07 Media: 	\$0.0080	1	16.2	cm	\$0.0080
 C09 Media: 	\$0.1300	1	1	Each	\$0.1300
 C10 Media: 	\$0.2100	1	1	Each	\$0.2100
 Tape, Fabric-C09 Full Media: 	\$0.0106	1	21.6	cm	\$0.0106







# Wire Harness Costed Bill of Materials

## 8025 - HVAC Wire Harness Asm

Name	Purchased Part Cost	Item Qty	Measure	Unit of Measure	Purchased Part Cost (Total)
 Tape, Fabric - C09 Media: 	\$0.0157	1	31.8	cm	\$0.0157
 Tape, Fabric - C10 Media: 	\$0.0093	1	19.0	cm	\$0.0093
 Tape, Fabric - Splice Media: 	\$0.0033	1	6.7	cm	\$0.0033
 Tape, Fabric - B08-10 Media: 	\$0.0026	1	5.2	cm	\$0.0026
 Label Media: 	\$0.0600	1	1	Each	\$0.0600
 C08 Media: 	\$0.0500	1	1	Each	\$0.0500

# Wire Harness Costed Bill of Materials

## 8025 - HVAC Wire Harness Asm

	Name	Purchased Part Cost	Item Qty	Measure	Unit of Measure	Purchased Part Cost (Total)
	Tape, Fabric - C08	\$0.0271	1	55.0	cm	\$0.0271
<b>Media:</b>						
	Tape, Fabric - Splice	\$0.0033	1	6.7	cm	\$0.0033
<b>Media:</b>						
	Wire 1.3 OD/ 7- 0.25 OD Strands	\$0.0222	23	40	cm	\$0.5117
	Wire 3.4 OD/ 56- 0.30 OD Strands	\$0.5020	2	79	cm	\$1.0040



# Wire Harness Costed Bill of Process



## Assembly Process

### 8025 - HVAC Wire Harness Asm

Symbol Name	Assembly Time	Q Burden	Assembly Cost	Qty	Q Burden (Total)	Assembly Cost (Total)
Wire Operations	0.0000 sec	\$0.00	\$0.00	1	\$0.00	\$0.00
Wire Cut & Strip Machine, Automatic	0.0000 sec	\$0.00	\$0.00	1	\$0.00	\$0.00
Wire	4.0000 sec	\$0.00	\$0.02	25	\$0.04	\$0.48
Cut & Strip Wire	1.0000 sec	\$0.00	\$0.00	25	\$0.04	\$0.12
Wire Crimp Machine, Automatic	0.0000 sec	\$0.00	\$0.00	1	\$0.00	\$0.00
Insert Wire Ends	2.0000 sec	\$0.00	\$0.01	33	\$0.05	\$0.32
Terminal, Contact	2.0000 sec	\$0.00	\$0.01	33	\$0.05	\$0.32
Crimp Terminal	1.0000 sec	\$0.00	\$0.00	33	\$0.05	\$0.16
Splice Machine, Automatic	0.0000 sec	\$0.00	\$0.00	1	\$0.00	\$0.00
Place wire ends	3.0000 sec	\$0.00	\$0.01	17	\$0.02	\$0.25
Ultrasonic Splice	3.0000 sec	\$0.00	\$0.01	4	\$0.01	\$0.06
Wiring Board	0.0000 sec	\$0.00	\$0.00	1	\$0.00	\$0.00
Route Wire (avg length)	2.4000 sec	\$0.00	\$0.01	23	\$0.03	\$0.27
Route Wire (avg length)	4.7400 sec	\$0.00	\$0.02	2	\$0.00	\$0.06
Connedor	4.0000 sec	\$0.00	\$0.02	10	\$0.01	\$0.19
Insert Wire Contact (qty/connedor)	4.0000 sec	\$0.00	\$0.02	33	\$0.05	\$0.64
Snap (qty/connedor)	1.0000 sec	\$0.00	\$0.00	1	\$0.00	\$0.00
Sensor, Temp, AC Evaporator	5.0000 sec	\$0.00	\$0.02	1	\$0.00	\$0.02
Snap (qty/connedor)	1.0000 sec	\$0.00	\$0.00	1	\$0.00	\$0.00
Sensor, Temp, AC Airflow	5.0000 sec	\$0.00	\$0.02	1	\$0.00	\$0.02
Snap (qty/connedor)	1.0000 sec	\$0.00	\$0.00	1	\$0.00	\$0.00
Test, Wire Harness	0.0000 sec	\$0.00	\$0.00	1	\$0.00	\$0.00
Electrical Test Equipment	0.0000 sec	\$0.00	\$0.00	1	\$0.00	\$0.00
Grasp & Position Connedor	3.0000 sec	\$0.00	\$0.01	10	\$0.01	\$0.14
Mate Connectors to test equip	2.0000 sec	\$0.00	\$0.01	10	\$0.00	\$0.10
Test Harness	2.0000 sec	\$0.00	\$0.01	25	\$0.01	\$0.24
Coverings & Tape Winding	0.0000 sec	\$0.00	\$0.00	1	\$0.00	\$0.00
Label	8.0000 sec	\$0.00	\$0.04	1	\$0.00	\$0.04
Apply Label	5.1200 sec	\$0.01	\$0.02	1	\$0.01	\$0.02
Tape Winder	0.0000 sec	\$0.00	\$0.00	1	\$0.00	\$0.00
Tape Wind C01	36.0000 sec	\$0.00	\$0.17	1	\$0.00	\$0.17
Tape Wind C02	5.0000 sec	\$0.00	\$0.02	1	\$0.00	\$0.02
Tape Wind B01-02	4.5000 sec	\$0.00	\$0.02	1	\$0.00	\$0.02
Tape Wind B01-03	17.0000 sec	\$0.00	\$0.08	1	\$0.00	\$0.08
Tape Wind C05	11.5000 sec	\$0.00	\$0.06	1	\$0.00	\$0.06
Tape Wind B01-05	22.0000 sec	\$0.00	\$0.11	1	\$0.00	\$0.11
Tape Wind C06	12.5000 sec	\$0.00	\$0.06	1	\$0.00	\$0.06
Tape Wind B01-06	3.0000 sec	\$0.00	\$0.01	1	\$0.00	\$0.01
Tape Wind C07	25.0000 sec	\$0.00	\$0.12	1	\$0.00	\$0.12
Tape Wind B01-07	12.5000 sec	\$0.00	\$0.06	1	\$0.00	\$0.06
Tape Wind C08	38.0000 sec	\$0.00	\$0.18	1	\$0.00	\$0.18

# Wire Harness Costed Bill of Process



8025 - HVAC Wire Harness Asm							
Symbol Name	Assembly Time	Q Burden	Assembly Cost	Qty	Q Burden (Total)	Assembly Cost (Total)	
Tape Wind C09-Ful	8.0000 sec	\$0.00	\$0.04	1	\$0.00	\$0.04	
Tape Wind C09	21.5000 sec	\$0.00	\$0.10	1	\$0.00	\$0.10	
Tape Wind C10	16.5000 sec	\$0.00	\$0.08	1	\$0.00	\$0.08	
Tape Wind Spike	4.0000 sec	\$0.00	\$0.02	2	\$0.00	\$0.04	
Tape Wind B08-10	4.0000 sec	\$0.00	\$0.02	1	\$0.00	\$0.02	
Route Branch thru wind head	4.0000 sec	\$0.00	\$0.02	10	\$0.01	\$0.19	
<b>Report Totals</b>	Count: 47						
				326	\$0.41	\$4.81	

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***Cost Analysis Page***  
***1176***

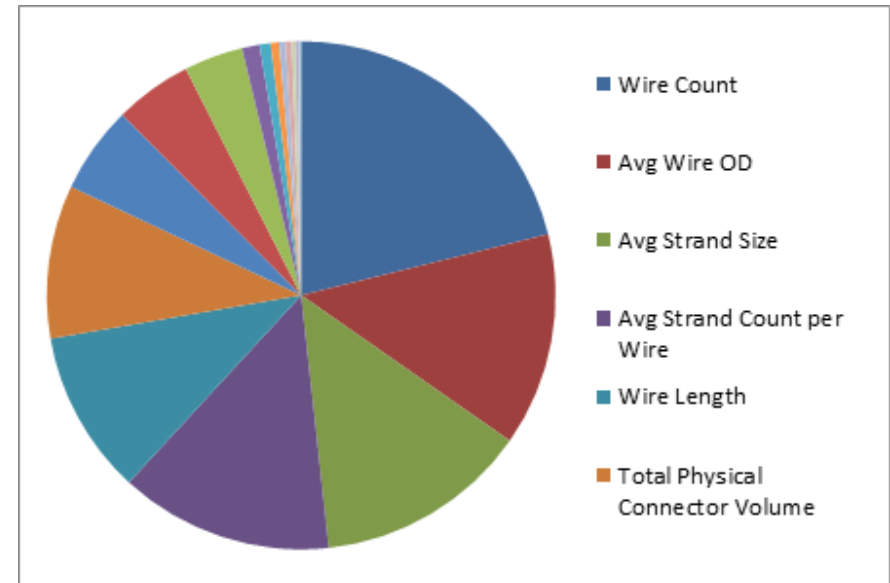
# *Wire Harness Cost Analysis*

## *Heat Exchanger Connector Wire Harness*

- The Design Profit<sup>®</sup> based Wire Harness Coster generates cost estimates of various components and assembly processes for the majority of wire harnesses found in today's manufactured products. The Wire Harness Coster rolls up these costs to deliver an estimate of the total manufactured cost.
- Costs are based on several factors including: commodity items, components, burdened machine rates, processing speeds, burdened labor rates, and cost of poor quality drivers.
- The Wire Harness Coster consistently generates a cost estimate for a given wire harness without the need to completely disassemble or destroy the wire harness. Minimal disassembly may be required to capture various attributes and identify overall circuit routing. Inputs to the coster include: connector data (size, cavity count, locking mechanisms and sealing attributes), wire data (sizes quantities and lengths), coverings (type, size and length), fasteners, brackets, troughs, etc.
- The Wire Harness Coster separates the parts and processes to more easily delineate Bill of Material (BOM) costs and build processing costs.

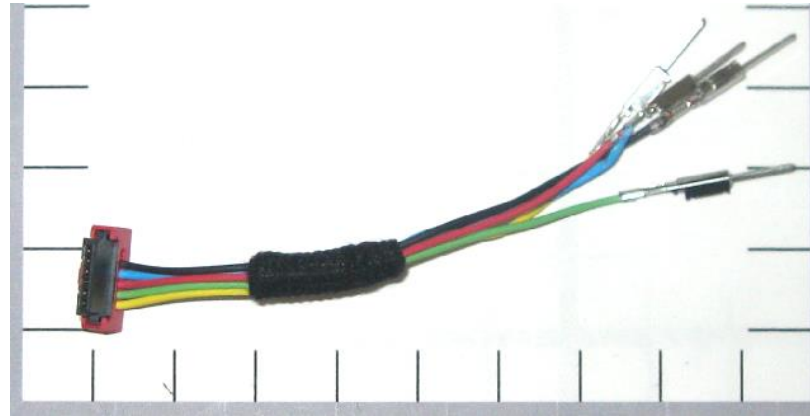
## Factors Influencing Cost:

1. Wire count is the primary factor driving cost as it affects the amount of wire, the size of connectors, and the number of assembly processes.
2. Wire selection (wire OD, strand size, strand count / wire) is significant as it directly relates to conductor cross section, and therefore the amount of copper or aluminum used in the harness.
3. Wire length is another major cost factor as it both relates to material cost and to assembly time, as longer lengths require more handling.
4. The total physical connector size is a major cost factor as connectors are a large portion of harness part costs. Total physical connector size also tends to drive assembly costs.



**Relative influence of factors on harness costs**  
(Data based on L32 two-level Taguchi analysis  
of the Wire Harness Coster)

# Heat Exchanger Connector Harness Overview



- The Heat Exchanger Connector Harness assembly consists of five 1.0 mm wires joining one black and red plastic connector to five pin terminals. All wires are copper stranded. There are no twisted pairs.
- The overall weight of the harness is 0.0019 kg.
- The connector is unsealed.
- One terminal cavity in the connector is unpopulated.
- The harness has no additional covering beyond wire Insulation.
- There is one tape tack on the connector.
- All major components are analyzed in detail, while prices are applied to commodity items (i.e. clips, terminals).
- *Estimates are based on actual parts.*
- *Photos: Background on 100mm grid paper.*

**Design Profit<sup>®</sup>**

## EXECUTIVE SUMMARY Harness Overview

	b5561 - Heat Exchanger Connector Harness
<b>Parts</b>	<b>12</b>
<b>Steps</b>	<b>64</b>
<b>Assembly Time (min)</b>	<b>2.57</b>
<b>Total Weight (kg)</b>	<b>0.0019</b>
<b>Purchased Part Cost</b>	<b>\$0.19</b>
<b>Supplier Asm. Cost</b>	<b>\$0.74</b>
<b>Q Burden</b>	<b>\$0.07</b>
<b>Total Cost</b>	<b>\$1.01</b>



**Design Profit<sup>®</sup>**

## EXECUTIVE SUMMARY Wire, Cable & Splices

	b5561 - Heat Exchanger Connector Harness
Wire & Cable Count	3
Splice Count	0
Wire Length Total (cm)	41.0
Harness Total Weight	0.0019 kg
Cu Conductor Mass	0.0008 kg
Cu to Harness Mass (%)	40.63 %
Al Conductor Mass	0.0000 kg
Al to Harness Mass (%)	0.00 %
Wire Cost	\$0.01

**Design Profit<sup>®</sup>**

## EXECUTIVE SUMMARY Connectors & Terminals

	b5561 - Heat Exchanger Connector Harness
<b>Connector Assemblies</b>	1
<b>Sealed Connectors</b>	0
<b>Terminal Cavities</b>	6
<b>Unpopulated Cavities</b>	1
<b>Connector Body Cost</b>	\$0.06
<b>Coax Connectors</b>	0
<b>Coax Connector Cost</b>	\$0.00
<b>Pin &amp; Blade Terminals</b>	10
<b>Ring Terminals</b>	0
<b>Battery Terminals</b>	0
<b>Terminal Strips</b>	0
<b>Total Terminal Count</b>	10
<b>Terminal Cost</b>	\$0.12

**Design Profit<sup>®</sup>**

## EXECUTIVE SUMMARY Labels, Clips, Tape & Coverings

	b5561 - Heat Exchanger Connector Harness
Label Count	0
Label Area cm2	0.0
Label Cost	\$0.00
Clip Count	0
Clip Cost	\$0.00
Tape Tacks	1
Taped Length cm	0.0
Tape Actual Length cm	5.4
Tape Cost	\$0.00
Tube & Wrap Count	0
Heat Shrink Count	0
Covering Count Total	0
Covering Length cm	0.0
Covering Cost	\$0.00

**Design Profit<sup>®</sup>**


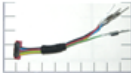



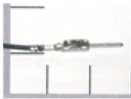



## EXECUTIVE SUMMARY Miscellaneous Parts

	b5561 - Heat Exchanger Connector Harness
<b>Bracket Count</b>	0
<b>Bracket Cost</b>	\$0.00
<b>Trough Count</b>	0
<b>Trough Cost</b>	\$0.00
<b>Fuse Count</b>	0
<b>Fuse Cost</b>	\$0.00
<b>Grommet Count</b>	0
<b>Grommet Cost</b>	\$0.00
<b>Misc Part Count</b>	0
<b>Misc Part Cost</b>	\$0.00

# Wire Harness Costed Bill of Materials

## Harness CBOM

### b5561 - Heat Exchanger Connector Harness

Name	Purchased Part Cost	Item Qty	Measure	Unit of Measure	Purchased Part Cost (Total)
 Main Harness Media: 	\$0.1903	1	1	Each	\$0.1903
 C01 Media: 	\$0.1200	1	1	Each	\$0.1200
 C02 Media: 	\$0.0100	5	1	Each	\$0.0500
 Tape, Tack Media: 	\$0.0027	1	5.4	cm	\$0.0027
 Wire 1.0OD/ 6-0.19OD Strands	\$0.0026	5	8.2	cm	\$0.0131

# Wire Harness Costed Bill of Process



## Assembly Process

### b5561 - Heat Exchanger Connector Harness

Symbol Name	Assembly Time	Q Burden	Assembly Cost	Qty	Q Burden (Total)	Assembly Cost (Total)
Wire Operations	0.0000 sec	\$0.00	\$0.00	1	\$0.00	\$0.00
Wire Cut & Strip Machine, Automatic	0.0000 sec	\$0.00	\$0.00	1	\$0.00	\$0.00
Wire	4.0000 sec	\$0.00	\$0.02	5	\$0.01	\$0.10
Cut & Strip Wire	1.0000 sec	\$0.00	\$0.00	5	\$0.01	\$0.02
Wire Crimp Machine, Automatic	0.0000 sec	\$0.00	\$0.00	1	\$0.00	\$0.00
Insert Wire Ends	2.0000 sec	\$0.00	\$0.01	5	\$0.01	\$0.05
Terminal, Contact	2.0000 sec	\$0.00	\$0.01	5	\$0.01	\$0.05
Crimp Terminal	1.0000 sec	\$0.00	\$0.00	5	\$0.01	\$0.02
Wiring Board	0.0000 sec	\$0.00	\$0.00	1	\$0.00	\$0.00
Grab Wire	4.0000 sec	\$0.00	\$0.02	5	\$0.01	\$0.10
Route Wire (avg length)	0.4920 sec	\$0.00	\$0.00	5	\$0.01	\$0.01
Connedor	4.0000 sec	\$0.00	\$0.02	1	\$0.00	\$0.02
Insert Wire Ends	6.0000 sec	\$0.00	\$0.03	5	\$0.01	\$0.14
Press Together	3.0000 sec	\$0.00	\$0.01	1	\$0.00	\$0.01
Test, Wire Harness	0.0000 sec	\$0.00	\$0.00	1	\$0.00	\$0.00
Electrical Test Equipment	0.0000 sec	\$0.00	\$0.00	1	\$0.00	\$0.00
Grasp & Position Connedor	3.0000 sec	\$0.00	\$0.01	6	\$0.01	\$0.09
Mate Connectors to test equip	2.0000 sec	\$0.00	\$0.01	6	\$0.00	\$0.06
Test Harness	2.0000 sec	\$0.00	\$0.01	5	\$0.00	\$0.05
Coverings & Tape Winding	0.0000 sec	\$0.00	\$0.00	1	\$0.00	\$0.00
Tape Tack	5.0000 sec	\$0.00	\$0.02	1	\$0.00	\$0.02
<b>Report Totals</b>				<b>67</b>	<b>\$0.07</b>	<b>\$0.74</b>

Count: 21

***Click Here to Return to***  
***Cost Analysis Page***  
***1334***

# *Wire Harness Cost Analysis*

## *Heat Exchanger Power Connector*

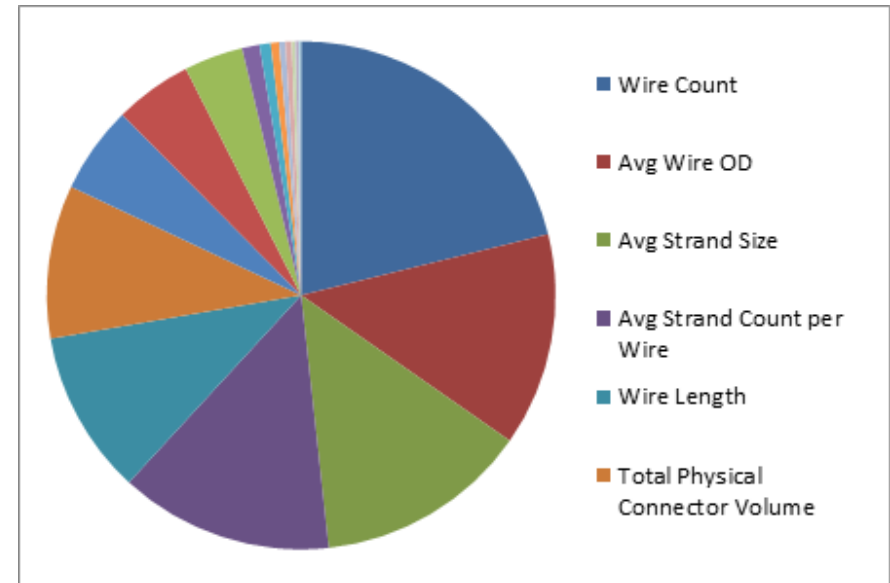
### *Wire Harness*



- The Design Profit<sup>®</sup> based Wire Harness Coster generates cost estimates of various components and assembly processes for the majority of wire harnesses found in today's manufactured products. The Wire Harness Coster rolls up these costs to deliver an estimate of the total manufactured cost.
- Costs are based on several factors including: commodity items, components, burdened machine rates, processing speeds, burdened labor rates, and cost of poor quality drivers.
- The Wire Harness Coster consistently generates a cost estimate for a given wire harness without the need to completely disassemble or destroy the wire harness. Minimal disassembly may be required to capture various attributes and identify overall circuit routing. Inputs to the coster include: connector data (size, cavity count, locking mechanisms and sealing attributes), wire data (sizes quantities and lengths), coverings (type, size and length), fasteners, brackets, troughs, etc.
- The Wire Harness Coster separates the parts and processes to more easily delineate Bill of Material (BOM) costs and build processing costs.

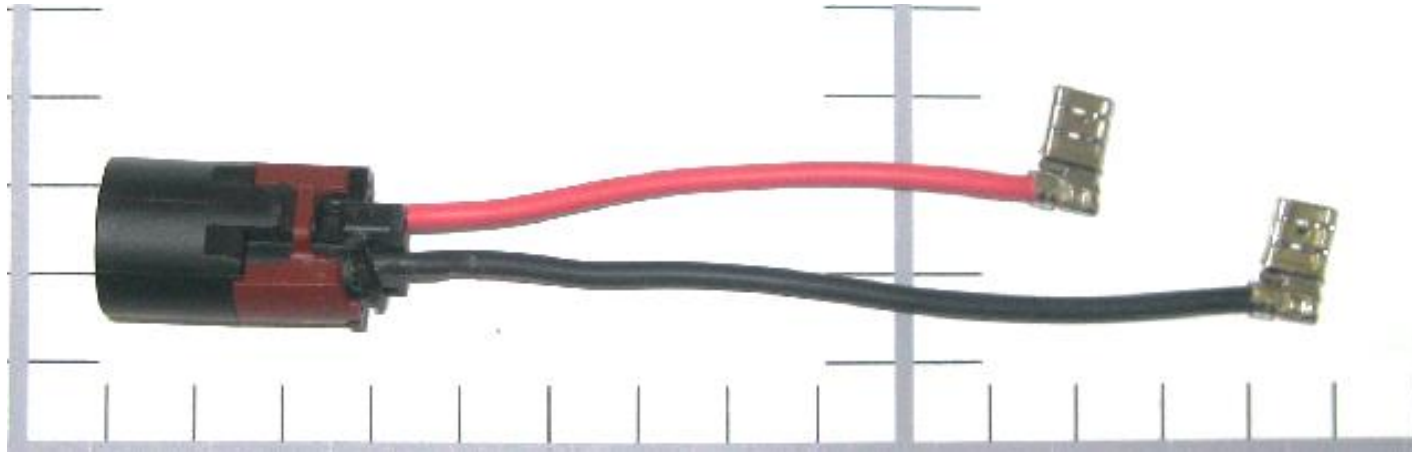
## Factors Influencing Cost:

1. Wire count is the primary factor driving cost as it affects the amount of wire, the size of connectors, and the number of assembly processes.
2. Wire selection (wire OD, strand size, strand count / wire) is significant as it directly relates to conductor cross section, and therefore the amount of copper or aluminum used in the harness.
3. Wire length is another major cost factor as it both relates to material cost and to assembly time, as longer lengths require more handling.
4. The total physical connector size is a major cost factor as connectors are a large portion of harness part costs. Total physical connector size also tends to drive assembly costs.



**Relative influence of factors on harness costs**  
(Data based on L32 two-level Taguchi analysis  
of the Wire Harness Coster)

# Heat Exchanger Power Connector Harness Overview



- The Heat Exchanger Power Connector Harness consists of two 2.9 mm wires joining one black plastic connector to two female spade terminals. Both wires are copper stranded. There are no twisted pairs.
- The overall weight of the harness is 0.0217 kg.
- The connector is unsealed.
- Two of four terminal cavities in the black plastic connector are unpopulated.
- The harness has no additional covering beyond wire insulation.
- There are no clips or labels.
- All major components are analyzed in detail, while prices are applied to commodity items (i.e. clips, terminals).
- *Estimates are based on actual parts.*
- *Photos: Background on 100mm grid paper.*

**Design Profit<sup>®</sup>**

## EXECUTIVE SUMMARY Harness Overview

b5564 - Heat Exchanger Power Connector Harness	
<b>Parts</b>	<b>5</b>
<b>Steps</b>	<b>34</b>
<b>Assembly Time (min)</b>	<b>1.06</b>
<b>Total Weight (kg)</b>	<b>0.0149</b>
<b>Purchased Part Cost</b>	<b>\$0.32</b>
<b>Supplier Asm. Cost</b>	<b>\$0.30</b>
<b>Q Burden</b>	<b>\$0.04</b>
<b>Total Cost</b>	<b>\$0.66</b>

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## EXECUTIVE SUMMARY Wire, Cable & Splices

	b5564 - Heat Exchanger Power Connector Harness
Wire & Cable Count	2
Splice Count	0
Wire Length Total (cm)	21.5
Harness Total Weight	0.0149 kg
Cu Conductor Mass	0.0054 kg
Cu to Harness Mass (%)	36.23 %
Al Conductor Mass	0.0000 kg
Al to Harness Mass (%)	0.00 %
Wire Cost	<b>\$0.07</b>

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## EXECUTIVE SUMMARY Connectors & Terminals

b5564 - Heat Exchanger Power Connector Harness	
Connector Assemblies	1
Sealed Connectors	0
Terminal Cavities	4
Unpopulated Cavities	2
Connector Body Cost	\$0.07
Coax Connectors	0
Coax Connector Cost	\$0.00
Pin & Blade Terminals	4
Ring Terminals	0
Battery Terminals	0
Terminal Strips	0
Total Terminal Count	4
Terminal Cost	\$0.17

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## EXECUTIVE SUMMARY Labels, Clips, Tape & Coverings

	b5564 - Heat Exchanger Power Connector Harness
Label Count	0
Label Area cm2	0.0
Label Cost	\$0.00
Clip Count	0
Clip Cost	\$0.00
Tape Tacks	0
Taped Length cm	0.0
Tape Actual Length cm	0.0
Tape Cost	\$0.00
Tube & Wrap Count	0
Heat Shrink Count	0
Covering Count Total	0
Covering Length cm	0.0
Covering Cost	\$0.00

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## EXECUTIVE SUMMARY Miscellaneous Parts


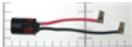







	b5564 - Heat Exchanger Power Connector Harness
<b>Bracket Count</b>	0
<b>Bracket Cost</b>	\$0.00
<b>Trough Count</b>	0
<b>Trough Cost</b>	\$0.00
<b>Fuse Count</b>	0
<b>Fuse Cost</b>	\$0.00
<b>Grommet Count</b>	0
<b>Grommet Cost</b>	\$0.00
<b>Misc Part Count</b>	0
<b>Misc Part Cost</b>	\$0.00



# Wire Harness Costed Bill of Materials

## Harness CBOM

### b5564 - Heat Exchanger Power Connector Harness

Name	Purchased Part Cost	Item Qty	Measure	Unit of Measure	Purchased Part Cost (Total)
 Main Harness	\$0.3162	1	1	Each	\$0.3162
<b>Media:</b>					
					
 C01	\$0.1200	1	1	Each	\$0.1200
<b>Media:</b>					
					
 C02	\$0.0600	1	1	Each	\$0.0600
<b>Media:</b>					
					
 C03	\$0.0600	1	1	Each	\$0.0600
<b>Media:</b>					
					
 Wire 2.9 OD/ 36-0.28 OD Strands	\$0.0369	2	11	cm	\$0.0738

# Wire Harness Costed Bill of Process



## Assembly Process

### b5564 - Heat Exchanger Power Connector Harness

Symbol Name	Assembly Time	Q Burden	Assembly Cost	Qty	Q Burden (Total)	Assembly Cost (Total)
Wire Operations	0.0000 sec	\$0.00	\$0.00	1	\$0.00	\$0.00
Wire Cut & Strip Machine, Automatic	0.0000 sec	\$0.00	\$0.00	1	\$0.00	\$0.00
Wire	4.0000 sec	\$0.00	\$0.02	2	\$0.00	\$0.04
Cut & Strip Wire	1.0000 sec	\$0.00	\$0.00	2	\$0.00	\$0.01
Wire Crimp Machine, Automatic	0.0000 sec	\$0.00	\$0.00	1	\$0.00	\$0.00
Insert Wire Ends	2.0000 sec	\$0.00	\$0.01	4	\$0.01	\$0.04
Terminal, Contact	2.0000 sec	\$0.00	\$0.01	4	\$0.01	\$0.04
Crimp Terminal	1.0000 sec	\$0.00	\$0.00	4	\$0.01	\$0.02
Wiring Board	0.0000 sec	\$0.00	\$0.00	1	\$0.00	\$0.00
Route Wire (avg length)	0.6600 sec	\$0.00	\$0.00	2	\$0.00	\$0.01
Connector	4.0000 sec	\$0.00	\$0.02	1	\$0.00	\$0.02
Insert Wire Contact (qty/connector)	4.0000 sec	\$0.00	\$0.02	2	\$0.00	\$0.04
Snap (qty/connector)	1.0000 sec	\$0.00	\$0.00	1	\$0.00	\$0.00
Test, Wire Harness	0.0000 sec	\$0.00	\$0.00	1	\$0.00	\$0.00
Electrical Test Equipment	0.0000 sec	\$0.00	\$0.00	1	\$0.00	\$0.00
Grasp & Position Connector	3.0000 sec	\$0.00	\$0.01	3	\$0.00	\$0.04
Mate Connector to test equip	2.0000 sec	\$0.00	\$0.01	3	\$0.00	\$0.03
Test Harness	2.0000 sec	\$0.00	\$0.01	2	\$0.00	\$0.02
<b>Report Totals</b>						
	Count: 18			36	\$0.04	\$0.30

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***Cost Analysis Page***  
***1345***

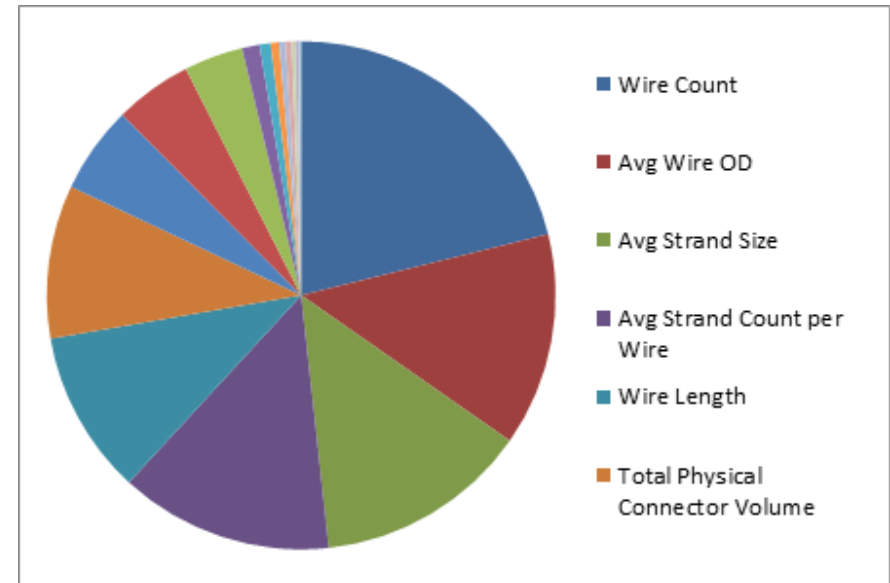
# *Wire Harness Cost Analysis*

## *Sensor Wire Harness*

- The Design Profit<sup>®</sup> based Wire Harness Coster generates cost estimates of various components and assembly processes for the majority of wire harnesses found in today's manufactured products. The Wire Harness Coster rolls up these costs to deliver an estimate of the total manufactured cost.
- Costs are based on several factors including: commodity items, components, burdened machine rates, processing speeds, burdened labor rates, and cost of poor quality drivers.
- The Wire Harness Coster consistently generates a cost estimate for a given wire harness without the need to completely disassemble or destroy the wire harness. Minimal disassembly may be required to capture various attributes and identify overall circuit routing. Inputs to the coster include: connector data (size, cavity count, locking mechanisms and sealing attributes), wire data (sizes quantities and lengths), coverings (type, size and length), fasteners, brackets, troughs, etc.
- The Wire Harness Coster separates the parts and processes to more easily delineate Bill of Material (BOM) costs and build processing costs.

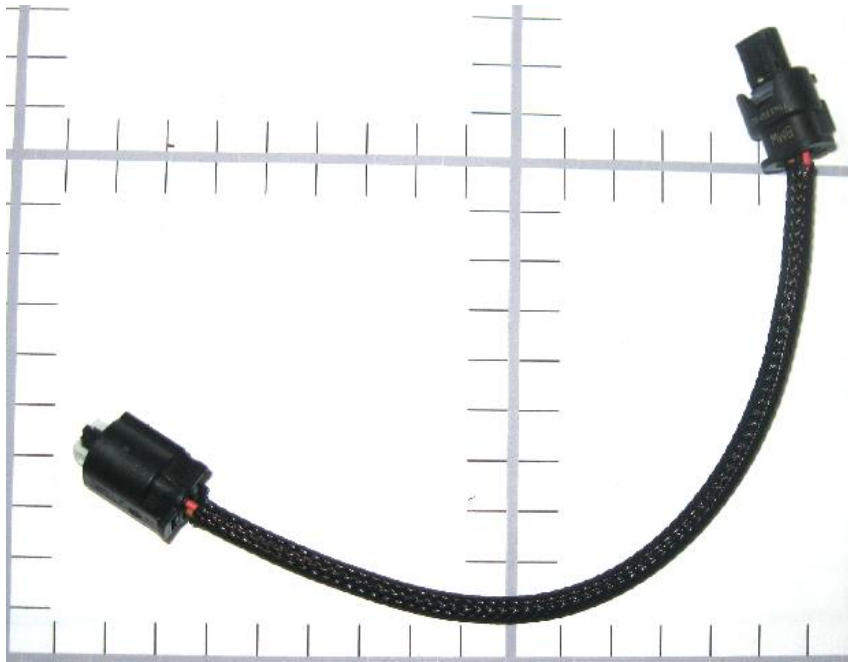
## Factors Influencing Cost:

1. Wire count is the primary factor driving cost as it affects the amount of wire, the size of connectors, and the number of assembly processes.
2. Wire selection (wire OD, strand size, strand count / wire) is significant as it directly relates to conductor cross section, and therefore the amount of copper or aluminum used in the harness.
3. Wire length is another major cost factor as it both relates to material cost and to assembly time, as longer lengths require more handling.
4. The total physical connector size is a major cost factor as connectors are a large portion of harness part costs. Total physical connector size also tends to drive assembly costs.



**Relative influence of factors on harness costs**  
(Data based on L32 two-level Taguchi analysis  
of the Wire Harness Coster)

# Sensor Wire Harness Overview



- The Sensor Wire Harness consists of 2 wires joining 2 connectors.
- All wires are 1.3 mm in diameter and are twisted copper strands. The overall weight of the harness is 0.0087 kg.
- All of the connectors are sealed connectors with multiple terminal cavities.
- The harness is fully covered in a braided sleeve
- All major components are analyzed in detail, while prices are applied to commodity items (i.e. clips, terminals).
- *Estimates are based on actual parts.*
- *Photos: Background on 100mm grid paper.*

**Design Profit<sup>®</sup>**

## EXECUTIVE SUMMARY Harness Overview

	b5534 - Sensor Wire Harness
<b>Parts</b>	<b>5</b>
<b>Steps</b>	<b>43</b>
<b>Assembly Time (min)</b>	<b>1.59</b>
<b>Total Weight (kg)</b>	<b>0.0087</b>
<b>Purchased Part Cost</b>	<b>\$0.40</b>
<b>Supplier Asm. Cost</b>	<b>\$0.46</b>
<b>Q Burden</b>	<b>\$0.04</b>
<b>Total Cost</b>	<b>\$0.90</b>



**Design Profit<sup>®</sup>**

## EXECUTIVE SUMMARY Wire, Cable & Splices

	b5534 - Sensor Wire Harness
Wire & Cable Count	2
Splice Count	0
Wire Length Total (cm)	42.0
Harness Total Weight	0.0087 kg
Cu Conductor Mass	0.0012 kg
Cu to Harness Mass (%)	14.22 %
Al Conductor Mass	0.0000 kg
Al to Harness Mass (%)	0.00 %
Wire Cost	\$0.02

**Design Profit®**

## EXECUTIVE SUMMARY Connectors & Terminals

	b5534 - Sensor Wire Harness
<b>Connector Assemblies</b>	<b>2</b>
<b>Sealed Connectors</b>	<b>2</b>
<b>Terminal Cavities</b>	<b>4</b>
<b>Unpopulated Cavities</b>	<b>0</b>
<b>Connector Body Cost</b>	<b>\$0.22</b>
<b>Coax Connectors</b>	<b>0</b>
<b>Coax Connector Cost</b>	<b>\$0.00</b>
<b>Pin &amp; Blade Terminals</b>	<b>4</b>
<b>Ring Terminals</b>	<b>0</b>
<b>Battery Terminals</b>	<b>0</b>
<b>Terminal Strips</b>	<b>0</b>
<b>Total Terminal Count</b>	<b>4</b>
<b>Terminal Cost</b>	<b>\$0.06</b>

**Design Profit<sup>®</sup>**

## EXECUTIVE SUMMARY Labels, Clips, Tape & Coverings

	b5534 - Sensor Wire Harness
Label Count	0
Label Area cm2	0.0
Label Cost	\$0.00
Clip Count	0
Clip Cost	\$0.00
Tape Tacks	0
Taped Length cm	0.0
Tape Actual Length cm	0.0
Tape Cost	\$0.00
Tube & Wrap Count	1
Heat Shrink Count	0
Covering Count Total	1
Covering Length cm	18.0
Covering Cost	\$0.09



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## EXECUTIVE SUMMARY Miscellaneous Parts

	b5534 - Sensor Wire Harness
<b>Bracket Count</b>	0
<b>Bracket Cost</b>	\$0.00
<b>Trough Count</b>	0
<b>Trough Cost</b>	\$0.00
<b>Fuse Count</b>	0
<b>Fuse Cost</b>	\$0.00
<b>Grommet Count</b>	0
<b>Grommet Cost</b>	\$0.00
<b>Misc Part Count</b>	0
<b>Misc Part Cost</b>	\$0.00

# Wire Harness Costed Bill of Materials

## Harness CBOM

### b5534 - Sensor Wire Harness

Name	Purchased Part Cost	Item Qty	Measure	Unit of Measure	Purchased Part Cost (Total)
<input type="checkbox"/> Main Harness Media: 	\$0.3967	1	1	Each	\$0.3967
<input type="checkbox"/> C01 Media: 	\$0.1600	1	1	Each	\$0.1600
<input type="checkbox"/> C02 Media: 	\$0.1300	1	1	Each	\$0.1300
<input type="checkbox"/> Braided Sleeve	\$0.0853	1	18	cm	\$0.0853
<input type="checkbox"/> Wire 1.3OD/ 7-0.22OD Strands	\$0.0095	2	21	cm	\$0.0189

# Wire Harness Costed Bill of Process



## Assembly Process

### b5534 - Sensor Wire Harness

Symbol Name	Assembly Time	Q Burden	Assembly Cost	Qty	Q Burden (Total)	Assembly Cost (Total)
Wire Operations	0.0000 sec	\$0.00	\$0.00	1	\$0.00	\$0.00
Wire Cut & Strip Machine, Automatic	0.0000 sec	\$0.00	\$0.00	1	\$0.00	\$0.00
Wire	4.0000 sec	\$0.00	\$0.02	2	\$0.00	\$0.04
Cut & Strip Wire	1.0000 sec	\$0.00	\$0.00	2	\$0.00	\$0.01
Wire Crimp Machine, Automatic	0.0000 sec	\$0.00	\$0.00	1	\$0.00	\$0.00
Insert Wire Ends	2.0000 sec	\$0.00	\$0.01	4	\$0.01	\$0.04
Terminal, Contact	2.0000 sec	\$0.00	\$0.01	4	\$0.01	\$0.04
Crimp Terminal	1.0000 sec	\$0.00	\$0.00	4	\$0.01	\$0.02
Wiring Board	0.0000 sec	\$0.00	\$0.00	1	\$0.00	\$0.00
Grab Wire	4.0000 sec	\$0.00	\$0.02	2	\$0.00	\$0.04
Route Wire (avg length)	1.2600 sec	\$0.00	\$0.01	2	\$0.00	\$0.01
Connedor	4.0000 sec	\$0.00	\$0.02	2	\$0.00	\$0.04
Insert Wire Contact (qty/connedor)	4.0000 sec	\$0.00	\$0.02	4	\$0.01	\$0.08
Snap (qty/connedor)	1.0000 sec	\$0.00	\$0.00	4	\$0.00	\$0.02
Test, Wire Harness	0.0000 sec	\$0.00	\$0.00	1	\$0.00	\$0.00
Electrical Test Equipment	0.0000 sec	\$0.00	\$0.00	1	\$0.00	\$0.00
Grasp & Position Connedor	3.0000 sec	\$0.00	\$0.01	2	\$0.00	\$0.03
Mate Connectors to test equip	2.0000 sec	\$0.00	\$0.01	2	\$0.00	\$0.02
Test Harness	2.0000 sec	\$0.00	\$0.01	2	\$0.00	\$0.02
Coverings & Tape Winding	0.0000 sec	\$0.00	\$0.00	1	\$0.00	\$0.00
Coverings	7.0000 sec	\$0.00	\$0.03	1	\$0.00	\$0.03
Part Manipulation	3.0000 sec	\$0.00	\$0.01	2	\$0.00	\$0.03

### Report Totals

Count: 22

46      \$0.04      \$0.46

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***Cost Analysis Page***  
***1433***

## ***BMW i3 Plant Assembly Line Videos:***

- <https://www.youtube.com/watch?v=gt1k3BLN7pw>
- <https://www.youtube.com/watch?v=1u7XiBnwPCw>
- <https://www.youtube.com/watch?v=htuVoxuMQFQ>
- <https://www.youtube.com/watch?v=kfISmVGCjxg>
- <https://www.youtube.com/watch?v=29VHdcOvnK8>
- [https://www.youtube.com/watch?v=x3brfAEs\\_RY](https://www.youtube.com/watch?v=x3brfAEs_RY)
- <https://www.youtube.com/watch?v=Zyf9JhfXu5k>

## ***Car & Driver Article Discussing BMW i3 with REx System:***

- <http://www.caranddriver.com/bmw/i3>

## ***SAE Article Discussing BMW i3:***

- <http://articles.sae.org/12056/>