

## END USE PARTS – SURFACE COIL



### How Did FDM Compare to Traditional Methods for MR Instruments?

Method	Time	Cost
CNC machined, painted and assembled	7 days	\$850
FDM Production, painted and assembled	5 days	\$320
<b>SAVINGS</b>	<b>2 days (29%)</b>	<b>\$530 (62%)</b>

### Abstract:

MR Instruments designs and develops advanced Radiofrequency (RF) coils used in MRI scanning to visualize internal structures of the body. In addition to functional prototyping, MR Instruments was able to significantly reduce their production per part cost for their surface coil from around \$850 to \$320 by utilizing FDM for end use part production. In addition to the cost reduction, they were able to reduce the lead time from 7 to 5 days.

Since FDM materials have passed the tests for use in high-strength magnetic resonance imaging (MRI) systems. With a few coats of paint, they now have the aesthetic appeal required for production. For each surface coil produced FDM shaved 29% from the lead time and cut cost by 62%. With a custom order of less than 10 this solution was a perfect fit for this low volume job. MR Instruments uses an FDM system to produce parts that are for low volume and configure to order sold directly to their customer.

# END USE PARTS

Build Details		
<b>System:</b>	Fortus 400mc	
<b>Application:</b>	Insight 8.1, Build version: 4255	
<b>Material:</b>	PC	
<b>Slice/Tip:</b>	0.010 inch (0.254 mm) / T16	
<b>Part:</b>	Bottom Housing	Top Housing
<b>Color:</b>	White	White
<b>Build Time:</b>	1:43 (hrs/mins)	2:39 (hrs/ mins)
<b>Material Amount Used:</b>	5.75 in <sup>3</sup>	5.82 in <sup>3</sup>
<b>Support Material Amount Used:</b>	4.46 in <sup>3</sup>	0.39 in <sup>3</sup>
<b>Size:</b>	X: 4.66 in. (11.84 mm) Y: 7.99 in. (20.29 mm) Z: 0.50 in. (1.27 mm)	X: 4.66 in. (11.84 mm) Y: 7.99 in. (20.29 mm) Z: 0.81 in. (2.06 mm)
<b>Orientation:</b>	Flat	Flat
<b>Part interior style:</b>	Solid	Solid
<b>Visible surface style:</b>	Enhanced	Enhanced
<b>Support style:</b>	SMART	SMART

Property Requirements	
PROPERTIES	DETAILS
<b>Mechanical</b>	Drill and tapped mounting holes
<b>Thermal</b>	Up to (90 °F, 32°C)
<b>Electrical</b>	RF dielectric strength >1100 RMS
<b>Other</b>	No chemical exposure, HB Flame rating, sealed with paint

## **PROCEDURES:**

### **Design components for the custom order surface coil.**

- FDM design considerations for mounting boss diameters
- Integrated electrical mounting features on internal surface
- Non-clinical so no need for ISO grade PC material

### **Process and build coil components**

- See above for build details

### **Remove support material**

- Manually remove soluble support from fixture (simple geometry)
- WW tank for surrogate (yoke) component due to complex geometry

### **Finish/Paint**

- Coat with MRI acceptable filler (see painting best practice for additional information)
- Sand smooth
- Spray with MRI acceptable paint

### **Drill and Tap mounting bosses**

### **Assemble additional components**

- Strain relief
- Label (use FDM label alignment fixture to ensure placement of label)
- Nylon screws

### **Ready for delivery to customer**

- Package and ship

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