End Ring Design Update

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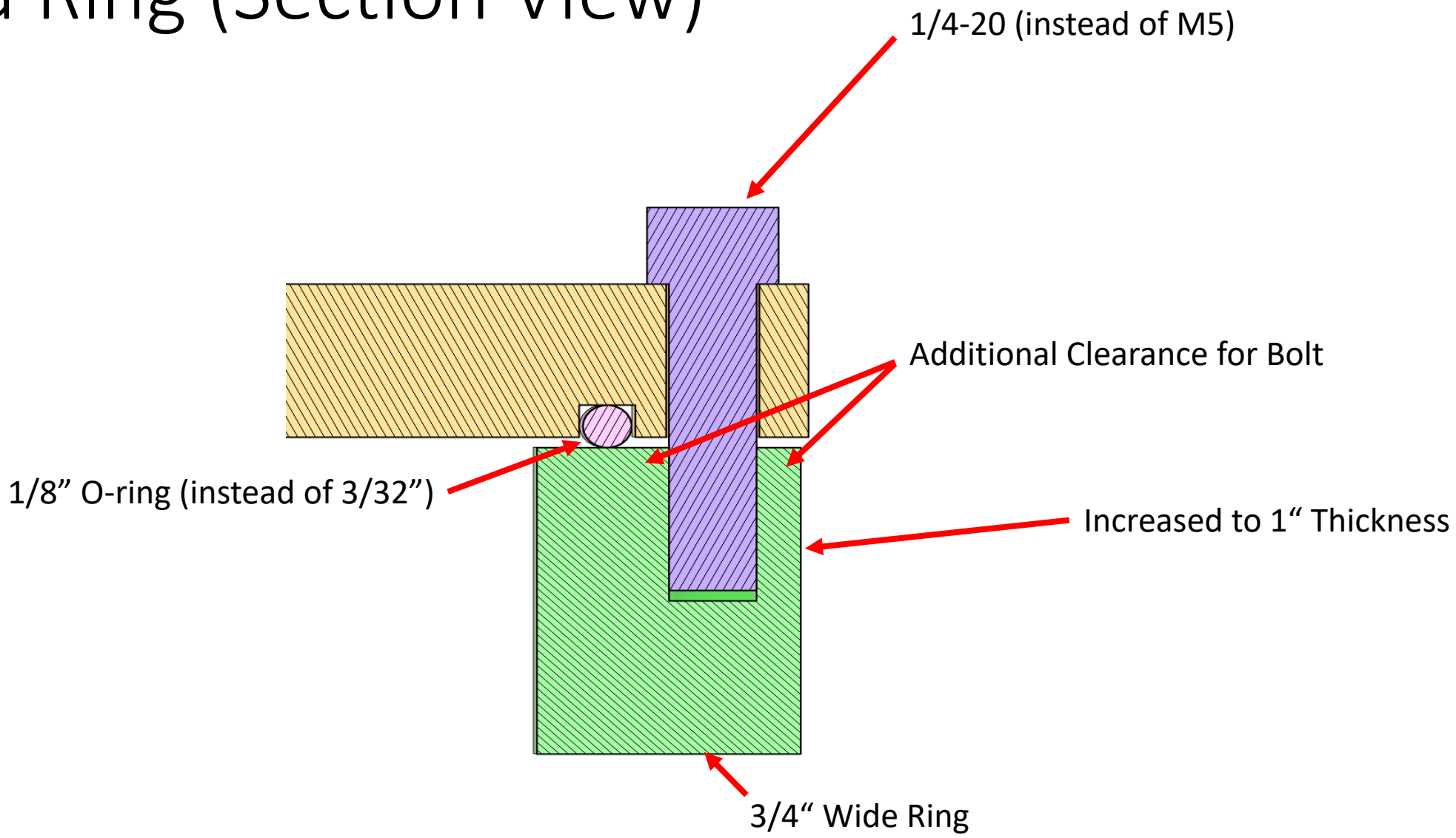
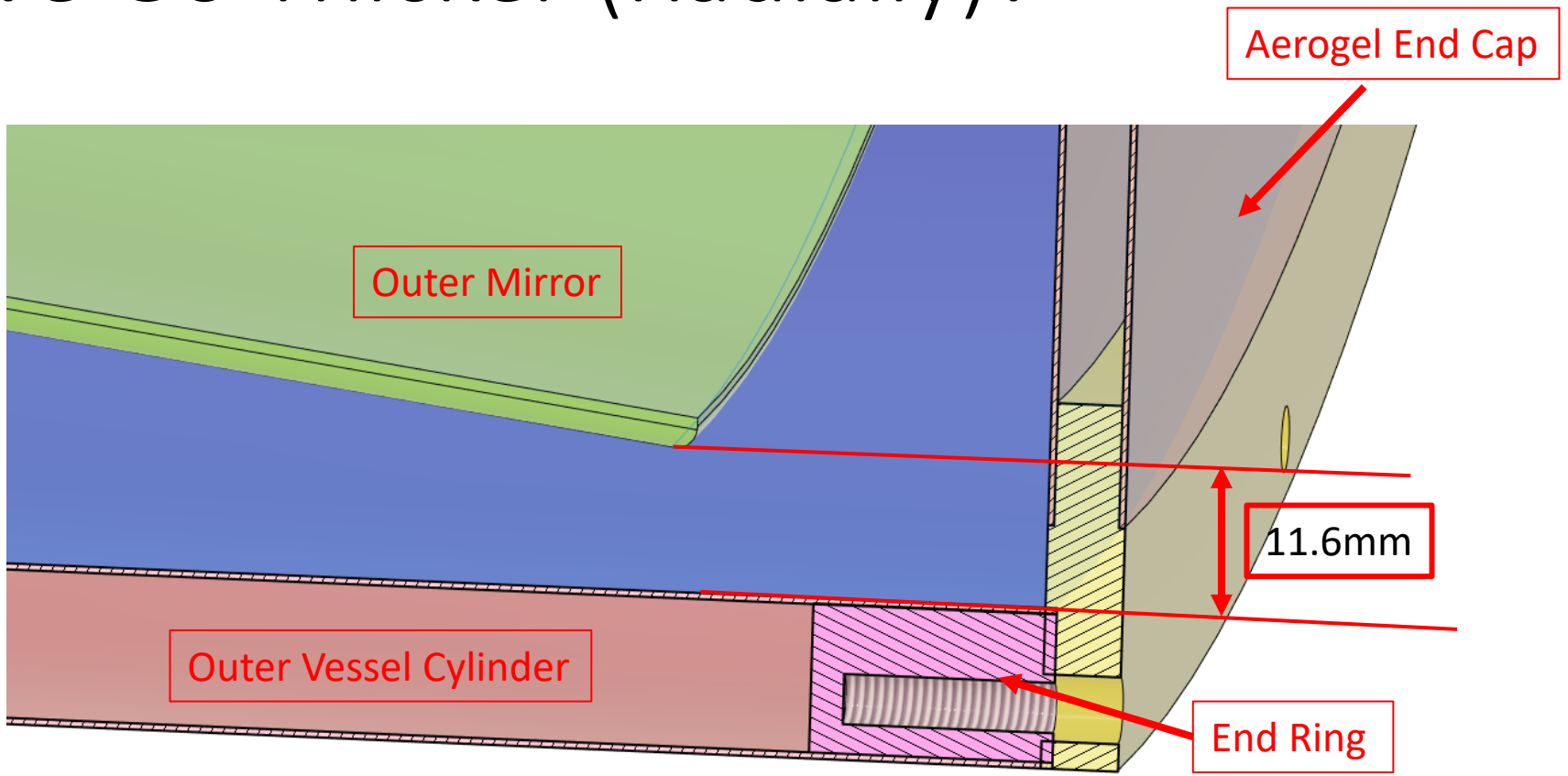
12/4/23

End Ring (Section View)

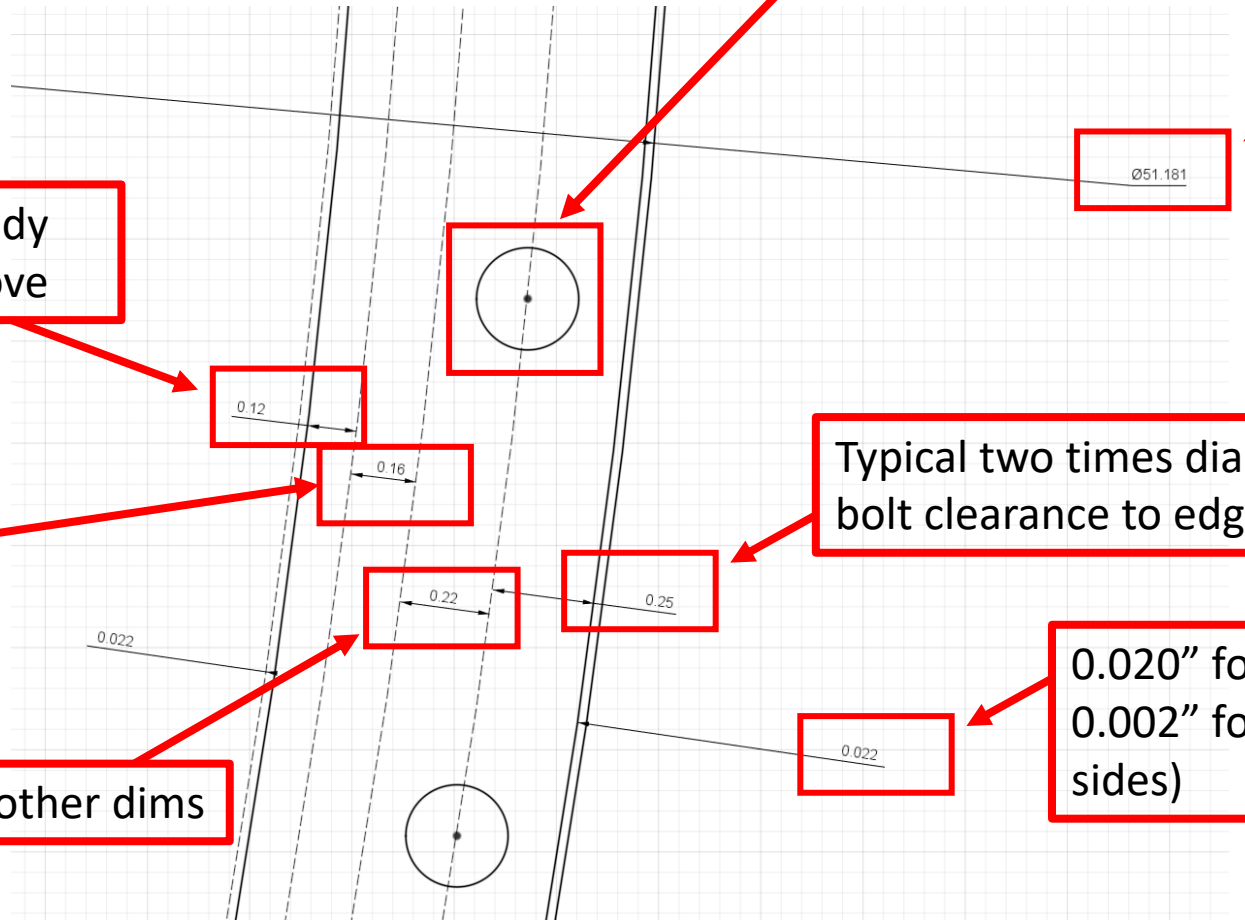


Can We Go Thicker (Radially)?



The current design (with a 3mm thick mirror) has about 11.6mm of clearance between the mirror and the inner CF wall. Moving from ½" to ¾" thickness radially will take 6.35mm away from that, leaving us with 5.25mm of clearance on each side for installation.

End Ring (Sketch View)



¼” Threaded Holes

1300mm OD

~3mm requested by Andy for edge of part to groove

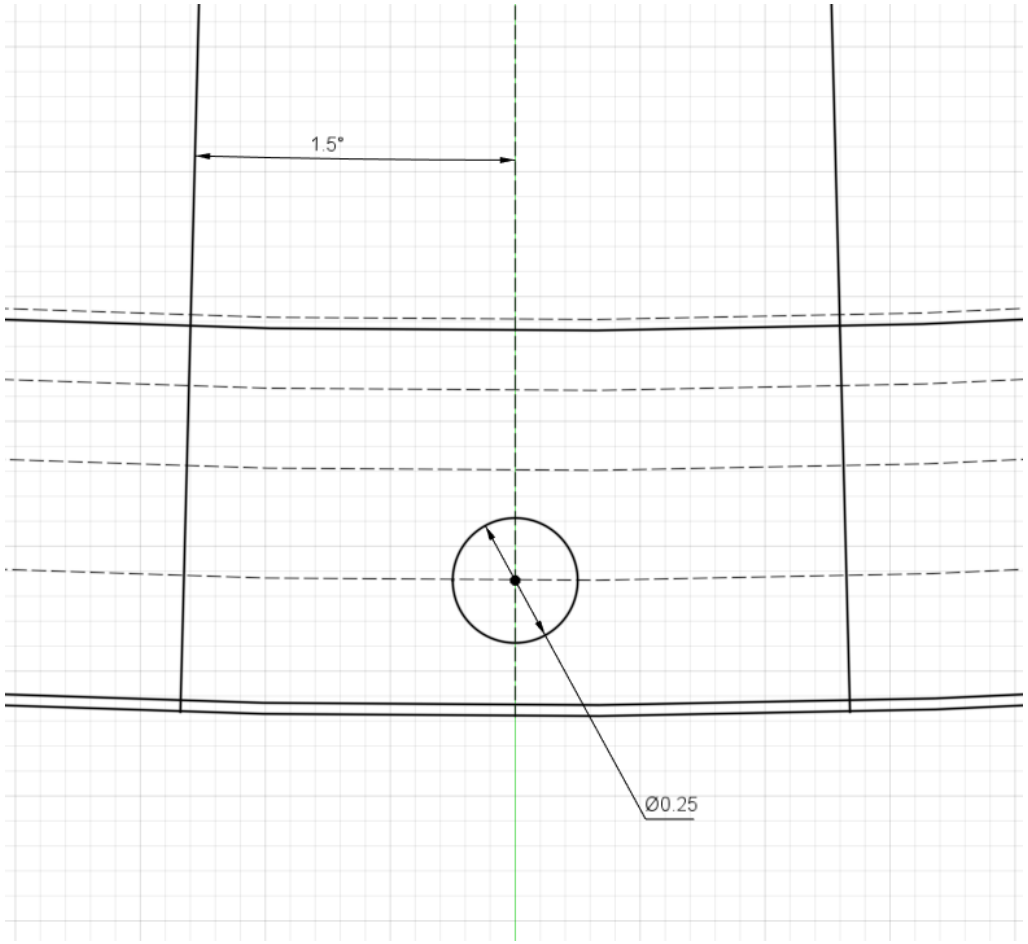
0.160 from Parker (1/8” O-ring groove) transposed onto end ring (will still be part of sensor plate)

Typical two times diameter of bolt clearance to edge of part

0.020” for CF skin + 0.002” for resin (both sides)

0.75” minus all other dims

Bolt Spacing



In full-gasketed joints uniformity of pressure on the gasket is important. To maintain adequate uniformity of pressure adjacent bolts should not be placed more than six nominal diameters apart on the bolt circle. To maintain wrench clearance, bolts should be placed at least three diameters apart. A rough rule for bolt spacing around a bolt circle is

$$3 \le \frac{\pi D_b}{N d} \le 6 \qquad (8\text{–}34)$$

where D_b is the diameter of the bolt circle and N is the number of bolts.

Based on the rule of thumb above, bolt spacing should be between 1.7 and 3.4 degrees. An initial guess would be 3 degrees (giving us 120 bolts) to be verified using FEA.

Bolt Holes

1 Pitch = .05”
for 1/4-20 Bolts

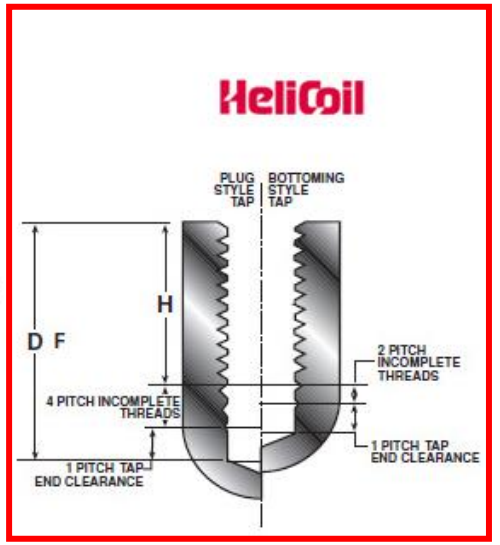
Helicoil Tapping Chart

The minimum tapping depths shown below (Dimension H) are the **MINIMUM** for countersunk holes and insert set-down of 1-1/2 pitch maximum. The calculation for Dimension “H” is:

H is equal to insert nominal length +1 Pitch.

The tapped hole must be held within the stated pitch diameter limits for the required class of fit for the installed Heli-Coil insert.

When anodize, Iridite or other finishes are used, all tapped hole dimensions must be met after the finishes are applied.



D = .550” + (4*.05”) + .05”
D = 0.8”

Since we don’t want through holes to avoid another leak point, we should move to the next size up that makes sense. Therefore, the ring thickness should be 1”

TABLE VII – INCH TAPPED HOLE DIMENSIONS

Nominal Thread Size	Countersink “M” Diameter (120° ±5° included angle)		Pitch Diameter			“H” MINIMUM TAPPING DEPTH					Minor Diameter (after tapping)		Tap Major Dia. Max.	Thread Pitch “P”
						INSERT LENGTH								
	Min.	Max.	Min.	3B Max.	2B Max.	1D	1-1/2D	2 D	1-1/2D	3D	Min.	Max.		
UNIFIED COARSE THREAD (UNC)														
1 (.073)-64	.085	.10	.0832	.0843	.0850	.090	.125	.160	.200	.235	.0764	.0823	.0958	.01563
2 (.086)-56	.09	.11	.0976	.0989	.0996	.100	.150	.190	.230	.280	.0899	.0961	.1117	.01786
3 (.099)-48	.11	.14	.1126	.1140	.1148	.120	.170	.220	.270	.320	.1036	.1104	.1289	.02083
4 (.112)-40	.14	.17	.1283	.1299	.1308	.140	.190	.250	.310	.360	.1175	.1252	.1473	.02500
5 (.125)-40	.16	.19	.1413	.1430	.1438	.150	.210	.280	.340	.400	.1305	.1373	.1603	.02500
6 (.138)-32	.18	.21	.1583	.1601	.1611	.170	.240	.310	.380	.450	.1448	.1527	.1817	.03125
8 (.164)-32	.20	.23	.1843	.1862	.1872	.200	.280	.360	.440	.520	.1708	.1781	.2077	.03125
10 (.190)-24	.24	.27	.2170	.2192	.2203	.230	.330	.420	.520	.610	.1990	.2080	.2475	.04167
12 (.216)-24	.26	.29	.2430	.2453	.2464	.260	.370	.470	.580	.690	.2250	.2340	.2735	.04167
1/4 (.2500)-20	.31	.34	.2825	.2851	.2864	.300	.430	.550	.680	.800	.2608	.2704	.3187	.05000

https://www.noblefix.com/helicoil/HeliCoil-Tapping-Chart.html

Summary

- Assumptions:
  - The sensor plane will have the machined O-ring groove (possibly a dovetail)
  - 5mm on each side is enough clearance for installation
  - Helicoils will be used in the CF end ring
- Based on the above, final design drawings can be made for the end rings, provided there are no oversights that may be missing. The only thing left to confirm is that the bolt hole spacing provides uniform sealing across the face seal of the O-ring
- Unless someone has a reason otherwise, SBU can order the honeycomb in a 3/4“ thickness ASAP to start the lead time on that order