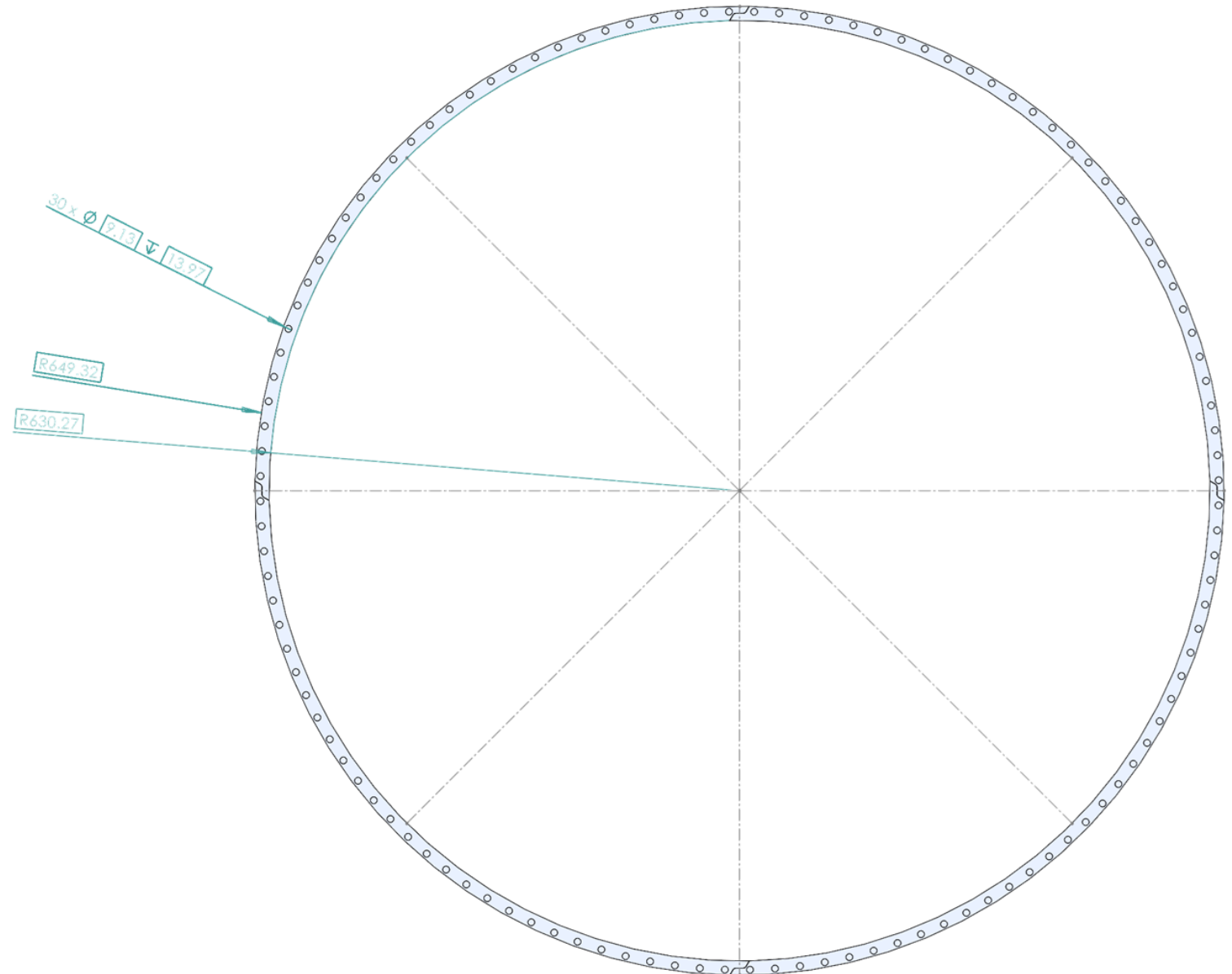


pfRICH Sensor Plate Prototype

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14 Oct 2024

- ⬢ There are 120 holes of diameter 9.13 mm (Drill size U – **DOUBLE check this**)
- ⬢ The depth of the holes is 14 mm from the top face of the PART. (* end point – nothing not even the tip of the drill goes below this)
- ⬢ Inner radius of the ring is R630.27 mm
- ⬢ Outer radius of the ring is R649.32 mm
- ⬢ The final thickness of the ring is 25.4 mm (1 inch thick)
- ⬢ The CAD model shows modified scarf-lap joint from the old version of the end ring (End Ring 1 & 2)
- ⬢ The End Ring 3 (which is going to be machined Sept 2024 – Archie/Simon) has a simple scarf joint. This is minor detail doesn't need to be changed from the CAD.

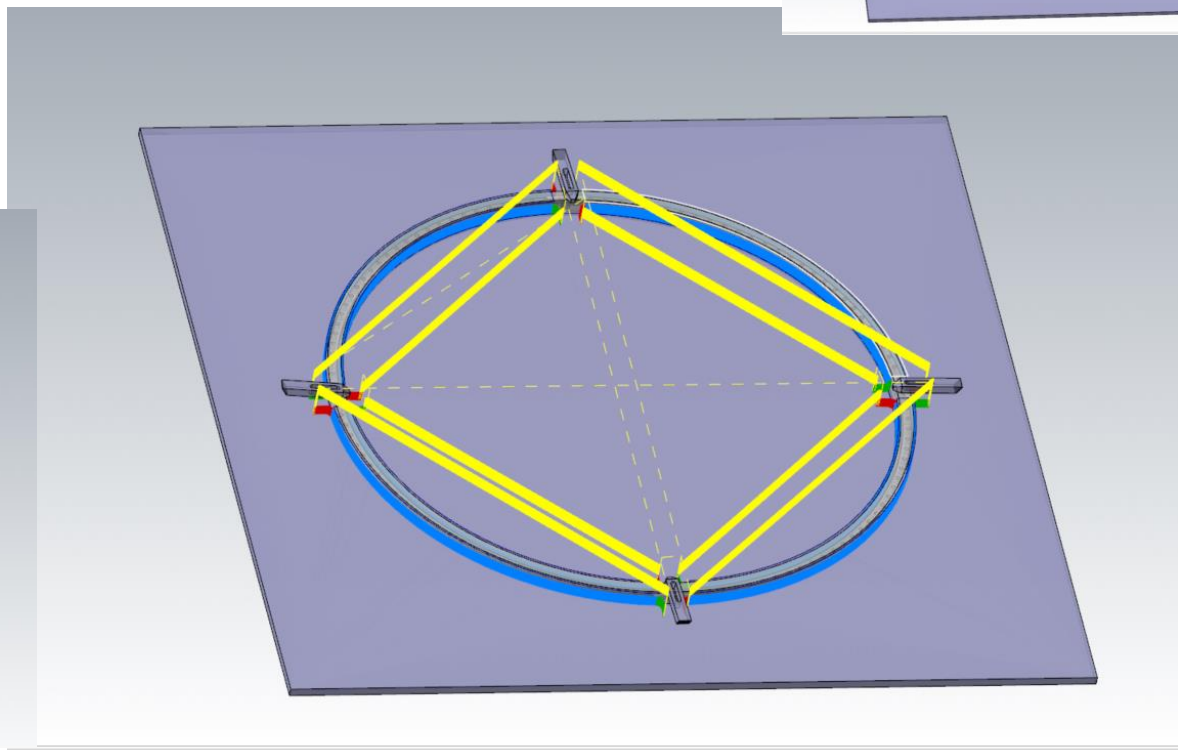
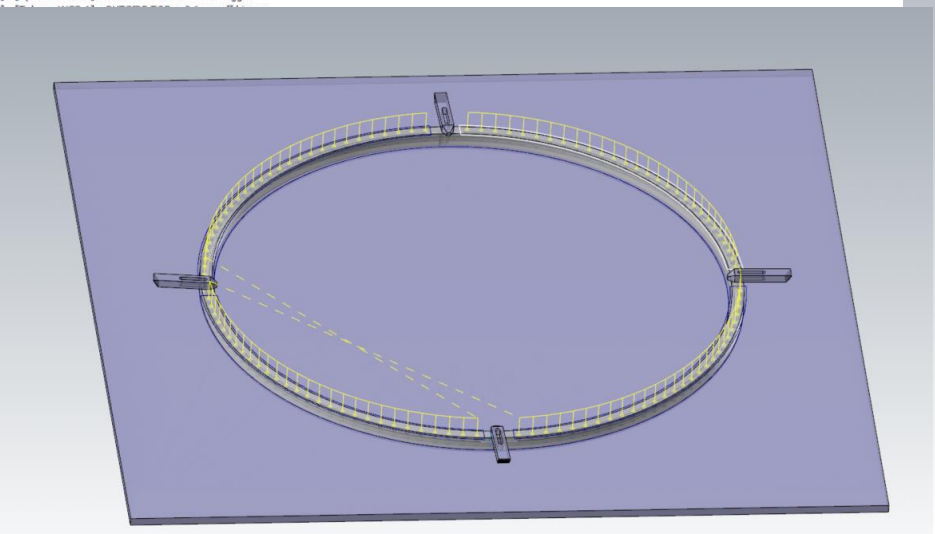
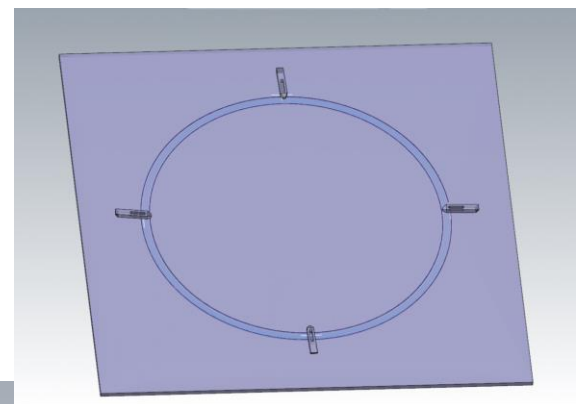


1. Use a sacrificial MDF board that is bolted to the LSAT table.
2. Face the top surface of the board using the largest end mill to get a flat reference surface on which the stock will be mounted.
3. Use engraving tool or a really thin end mill (maybe 1/8") to trace out the inner and outer radius (final part dimensions) on the MDF board. This will mark the limits of the part. – Simon has seen/done this for the previous end rings – so if in doubt ask Simon
4. Place the stock as centered and concentric on these scribe lines as possible – we traced the outline of the stock with sharpie on the MDF to get a sense of how to adjust.
5. Once this position has been established – we use double sided tape to have first (shearing) degree of freedom restricted. Just use double sided tape to bond the bottom of the stock to the MDF.
6. The ring needs to have a really really good holding down force. On DMS we used combination of toe clamps as well as ratchet straps to the bed. – Archie has to decide this for LSAT –
7. You cannot machine the whole tube surface in a single go – you have to do it in sectors while moving the clamps around to make sure the ring does not move when you are machining between sectors

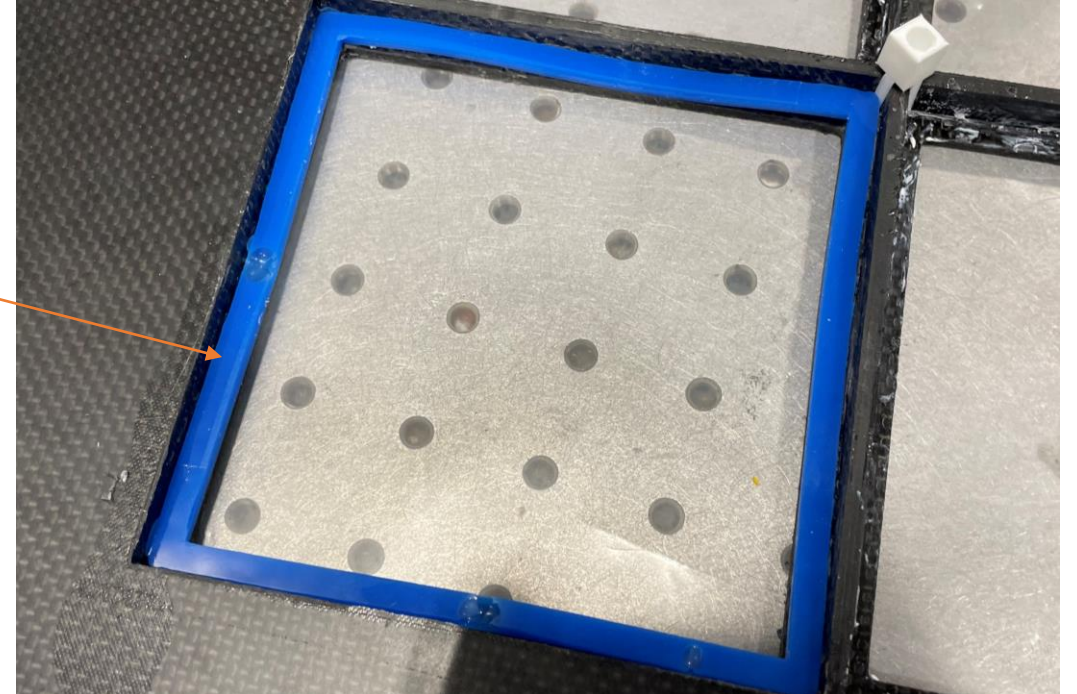
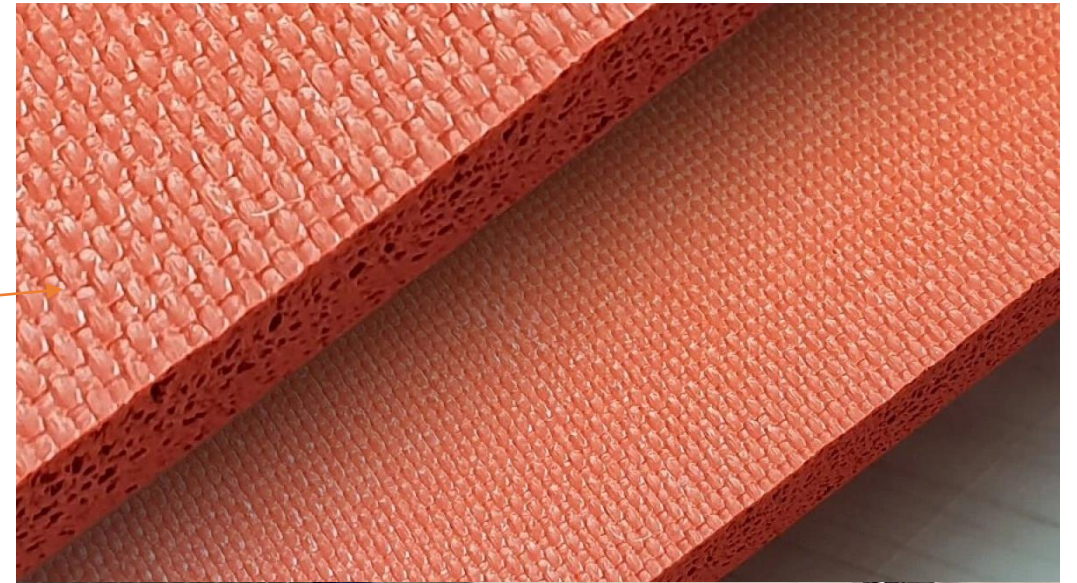
8. Once the ring is fixed you start with planning the top face.
9. The stock is about 35mm thick. Final thickness is 25.4 mm.
10. In the first step
 - Machine the top face to thickness of 27 mm (keep some extra)
 - Machine all holes to the final dept – 14 mm down from the “final” part face.
 - STOP
11. At this point – Simon will come in and bond in the inserts for all the 120 holes
12. Once these have been bonded wait for 24 hours for adhesive to cure
13. The next step for machining is to machine the face again to the final depth.
14. Then do the outer diameter
15. And finally inner diameter.
16. For all these steps you have to keep changing the position of the clamps and do it in sectors
17. So when you plan the machining path be careful with that.

- PFRich End Ring with sections
 - 13 - Pocket (Standard) - [WCS: WCS-1] - [Tplane: WCS-1] - PLANE BR
 - 14 - Pocket (Standard) - [WCS: WCS-1] - [Tplane: WCS-1] - PLANE TR
 - 15 - Pocket (Standard) - [WCS: WCS-1] - [Tplane: WCS-1] - PLANE TL
 - 16 - Pocket (Standard) - [WCS: WCS-1] - [Tplane: WCS-1] - PLANE BL
 - 17 - Peck drill - full retract - [WCS: WCS-1] - [Tplane: WCS-1] - DRILL BR
 - 18 - Peck drill - full retract - [WCS: WCS-1] - [Tplane: WCS-1] - DRILL TR
 - 19 - Peck drill - full retract - [WCS: WCS-1] - [Tplane: WCS-1] - DRILL TL
 - 20 - Peck drill - full retract - [WCS: WCS-1] - [Tplane: WCS-1] - DRILL BL
 - 21 - Pocket (Standard) - [WCS: WCS-1] - [Tplane: WCS-1] - FINAL PLANE BR
 - 22 - Pocket (Standard) - [WCS: WCS-1] - [Tplane: WCS-1] - FINAL PLANE TR
 - 23 - Pocket (Standard) - [WCS: WCS-1] - [Tplane: WCS-1] - FINAL PLANE TL
 - 24 - Pocket (Standard) - [WCS: WCS-1] - [Tplane: WCS-1] - FINAL PLANE BL
 - 25 - Contour (2D) - [WCS: WCS-1] - [Tplane: WCS-1] - INSIDE BR
 - 26 - Contour (2D) - [WCS: WCS-1] - [Tplane: WCS-1] - INSIDE TR
 - 27 - Contour (2D) - [WCS: WCS-1] - [Tplane: WCS-1] - INSIDE TL
 - 28 - Contour (2D) - [WCS: WCS-1] - [Tplane: WCS-1] - INSIDE BL
 - 29 - Contour (2D) - [WCS: WCS-1] - [Tplane: WCS-1] - OUTSIDE BR w 0.1mm off bigger
 - 30 - Contour (2D) - [WCS: WCS-1] - [Tplane: WCS-1] - OUTSIDE TR w 0.1mm off bigger
 - 31 - Contour (2D) - [WCS: WCS-1] - [Tplane: WCS-1] - OUTSIDE TL w 0.1mm off bigger
 - 32 - Contour (2D) - [WCS: WCS-1] - [Tplane: WCS-1] - OUTSIDE BL w 0.1mm off bigger
- PFRich End Ring (under clamps)
 - 33 - Pocket (Standard) - [WCS: WCS-1] - [Tplane: WCS-1] - PLANE BOT
 - 34 - Pocket (Standard) - [WCS: WCS-1] - [Tplane: WCS-1] - PLANE R
 - 35 - Pocket (Standard) - [WCS: WCS-1] - [Tplane: WCS-1] - PLANE TOP
 - 36 - Pocket (Standard) - [WCS: WCS-1] - [Tplane: WCS-1] - PLANE L
 - 37 - Peck drill - full retract - [WCS: WCS-1] - [Tplane: WCS-1] - DRILL BOT
 - 38 - Peck drill - full retract - [WCS: WCS-1] - [Tplane: WCS-1] - DRILL R
 - 39 - Peck drill - full retract - [WCS: WCS-1] - [Tplane: WCS-1] - DRILL TOP
 - 40 - Peck drill - full retract - [WCS: WCS-1] - [Tplane: WCS-1] - DRILL L
 - 41 - Pocket (Standard) - [WCS: WCS-1] - [Tplane: WCS-1] - FINAL PLANE BOT
 - 42 - Pocket (Standard) - [WCS: WCS-1] - [Tplane: WCS-1] - FINAL PLANE R
 - 43 - Pocket (Standard) - [WCS: WCS-1] - [Tplane: WCS-1] - FINAL PLANE TOP
 - 44 - Pocket (Standard) - [WCS: WCS-1] - [Tplane: WCS-1] - FINAL PLANE L
 - 45 - Contour (2D) - [WCS: WCS-1] - [Tplane: WCS-1] - INSIDE BOT
 - 46 - Contour (2D) - [WCS: WCS-1] - [Tplane: WCS-1] - INSIDE R
 - 47 - Contour (2D) - [WCS: WCS-1] - [Tplane: WCS-1] - INSIDE TOP
 - 48 - Contour (2D) - [WCS: WCS-1] - [Tplane: WCS-1] - INSIDE L
 - 49 - Contour (2D) - [WCS: WCS-1] - [Tplane: WCS-1] - OUTSIDE BOT w 0.1mm off bigger
 - 50 - Contour (2D) - [WCS: WCS-1] - [Tplane: WCS-1] - OUTSIDE R w 0.1mm off bigger
 - 51 - Contour (2D) - [WCS: WCS-1] - [Tplane: WCS-1] - OUTSIDE TOP w 0.1mm off bigger
 - 52 - Contour (2D) - [WCS: WCS-1] - [Tplane: WCS-1] - OUTSIDE L w 0.1mm off bigger
- TRIALS
- MDF outline machining
 - Properties - THM SAX
 - Outline
 - 71 - Pocket (Standard) - [WCS: WCS-1] - [Tplane: WCS-1] - PLANE BOT

- Archie (machinist at Purdue) has finally put pFRICH end ring on the machine and is his active working task starting Oct 10th
- He has finished the CAM process as of morning of 14th Oct. and was working on making a mounting jig for the machine



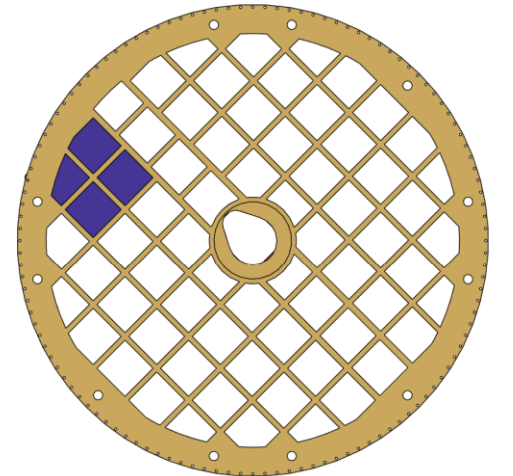
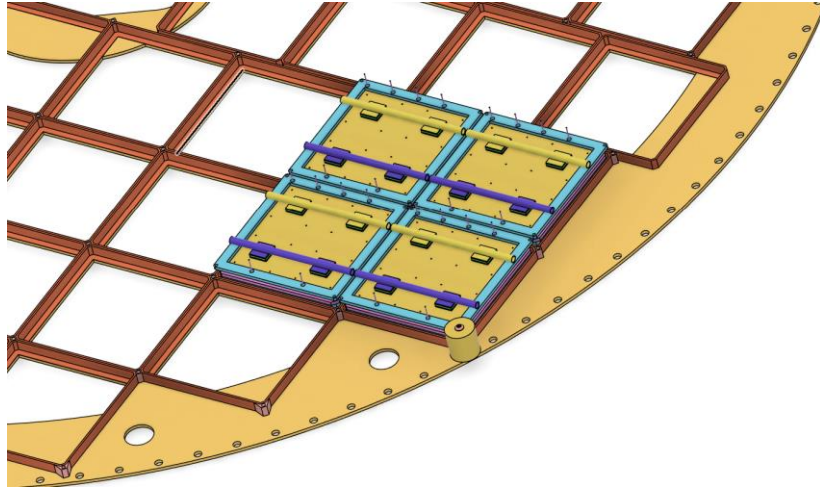
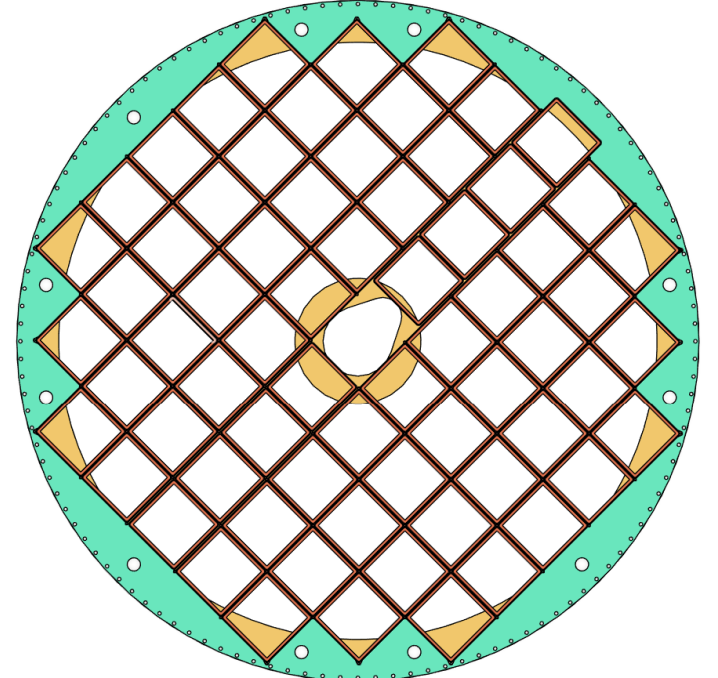
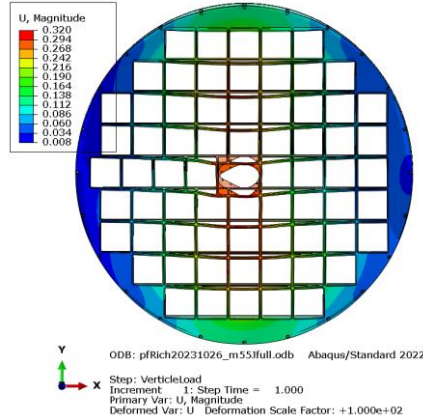
- ◊ Reprinted standoffs with thicker legs
- ◊ New gasket cut from silicone sponge
- ◊ Compression force expected to be about 5 times lower than previously used 30A hardness silicone



- ⬠ Standoff still broke off before intended 25% compression was reached
- ⬠ Adhesive bond in almost pure tension is not strong enough to achieve gasket seal with even extremely soft material
- ⬠ Reprinted with high-strength resin to give standoff design one more chance



- ⬡ FEA for updated sensor plane geometry has started
- ⬡ The old loading test FEAs (from Oct 2023) need to be updated before manufacturing starts
- ⬡ Aluminum plate mold for the full sensor and aerogel plane order and received at Purdue as of first week of Oct. 2024
- ⬡ Trial large plate layups planned this week onwards



- ◊ We can integrate grounding path in the aerogel or sensor plane CFRP layup if needed.
- ◊ This can be tapped at discrete locations to achieve reference/grounding contact for <xxxx>
- ◊

