

pfRICH End Ring updates

Sushrut Karmarkar, Andy Jung

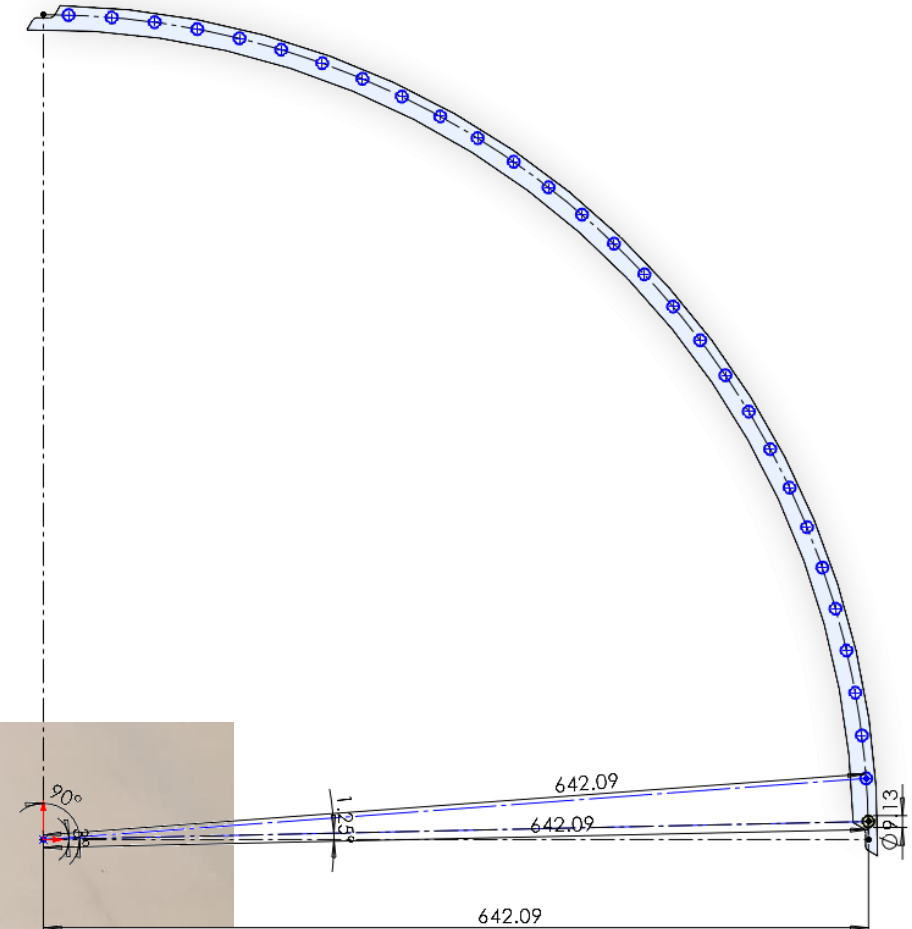
02 May 2024

Change in the radius for location of the circular bolt holes.

The location of the center of the holes for the end ring that hold the sensor plane is requested to change from **R643.0912** to **R642.0912 mm**

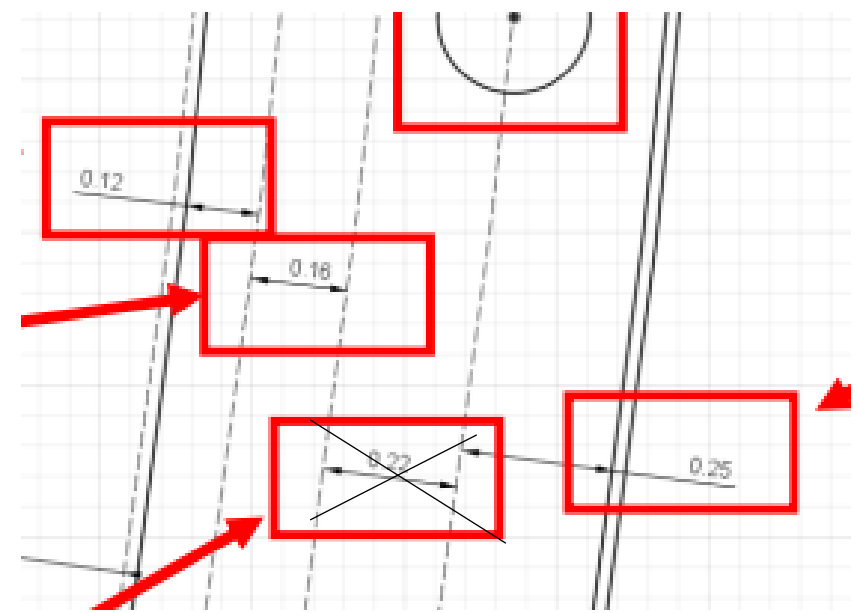
This change does not affect the sealing ring or any other components outside the end ring and sensor plane.

This is because the inserts were too close to the edge and could cause potential thin wall break out.

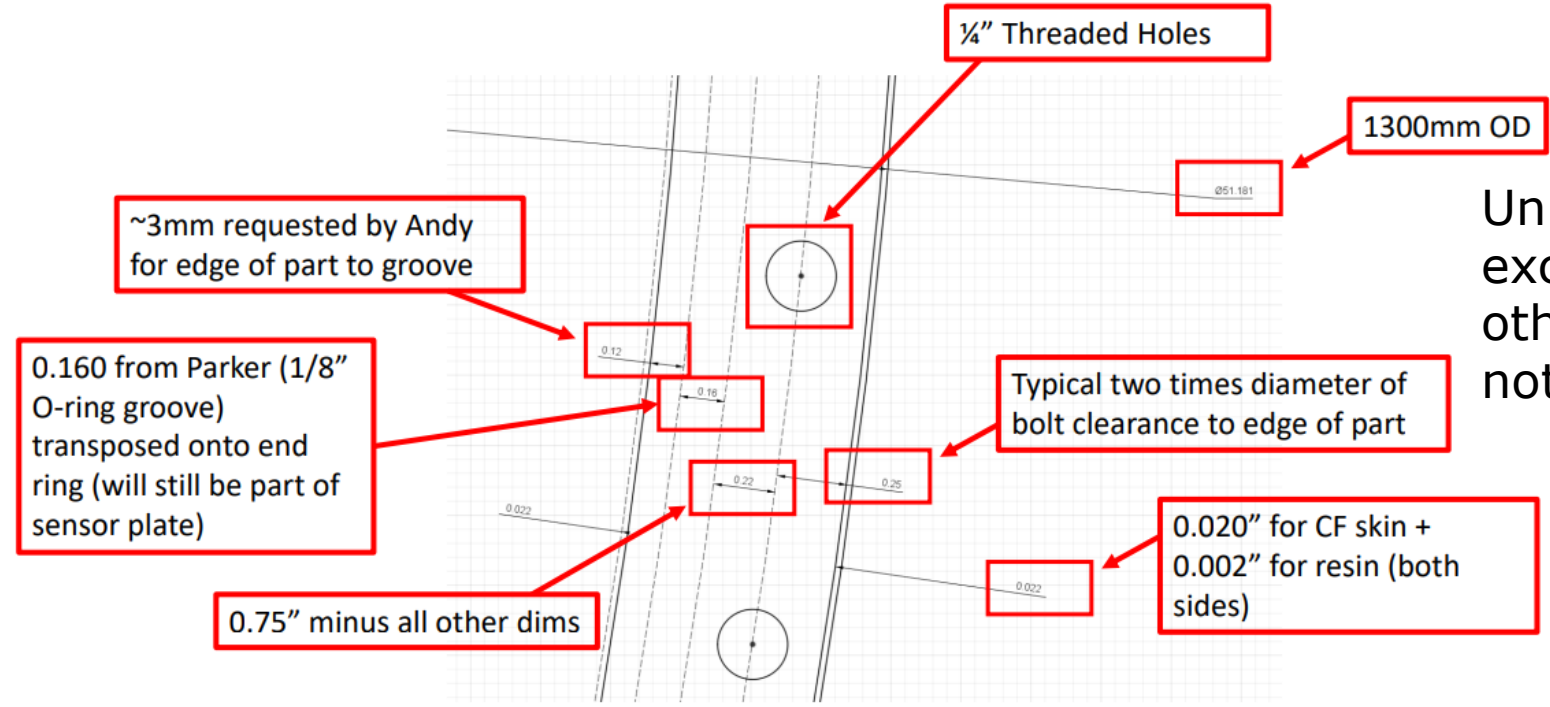


◊ <https://indico.bnl.gov/event/21463/contributions/84265/attachments/51388/87873/End%20Ring%20Design%20Update.pdf> – Slide 4 from the 4th Dec 2023 meeting

◊ This needs to be propagated to the sensor plane as well – no other systems or sub-components are affected by this design change – preliminary check with Alex



End Ring (Sketch View)



Units are inch except otherwise noted

This clearance of 0.22 inch goes down to 0.1806 inch when we shrink the radius of the bolt holes by 1mm (~0.004 inch)

Changes in machining process –

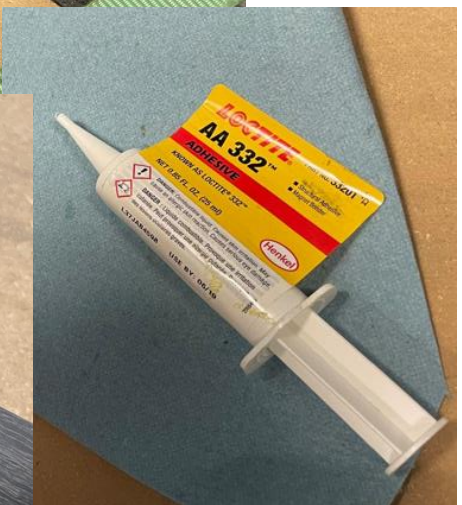
1. The brass inserts need to be set into place before doing the perimeter trim
2. This adds 1 day per quarter to the machining process since the adhesive needs to cure
3. We had insert pull outs when tried to machine without letting the adhesive cure



4. Effect on timeline -

| | | |
|-----------------------------|-------------------|--------|
| 1. End Ring Manufacturing | 30 April | |
| • CNC machining in progress | 4 days | 8 days |
| • Insert for 120 bolts | 2 days | |
| • Bonding and metrology | 2 days | |
| | 10 May | |

Need +1 week delay on this

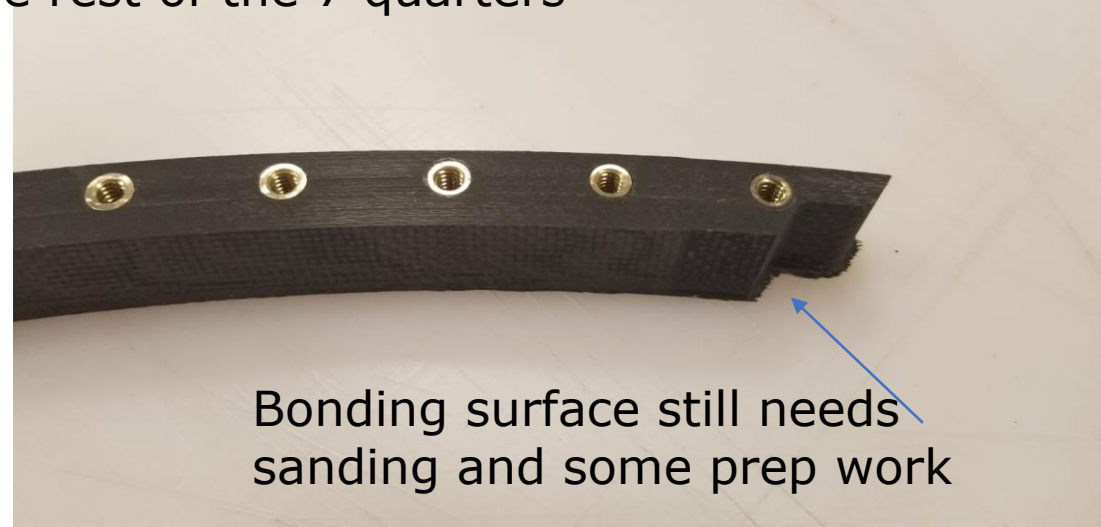
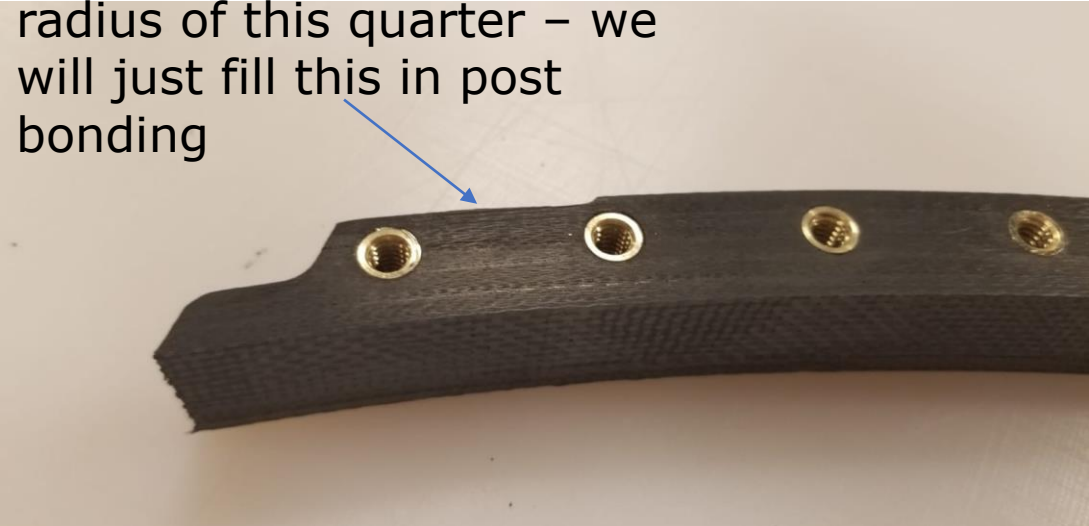


Link for machining pictures –(this is a link) → [pfRICH End Ring Machining](#)



Machining code has been corrected for this – won't happen to the rest of the 7 quarters

Small damage on the outer radius of this quarter – we will just fill this in post bonding



Bonding surface still needs sanding and some prep work



Simon Snydersmith
UG Research Intern at CMSC

1. End Ring Manufacturing
 - CNC machining in progress
 - Insert for 120 bolts
 - Bonding and metrology
 - ~~Sealing tests (?)~~ – exploring options to shift to SBU (?)

2. Sensor plane
 - T-beam prototyping
 - 2 x 2 sensor plane prototype
 - Sealing design work – Alex in-person meeting on 28th May at Purdue – finalize design
 - Sensor plane support-beam manufacturing
 - Sensor plane assembly and CNC finishing operations
 - Sensor plane assembly and metrology

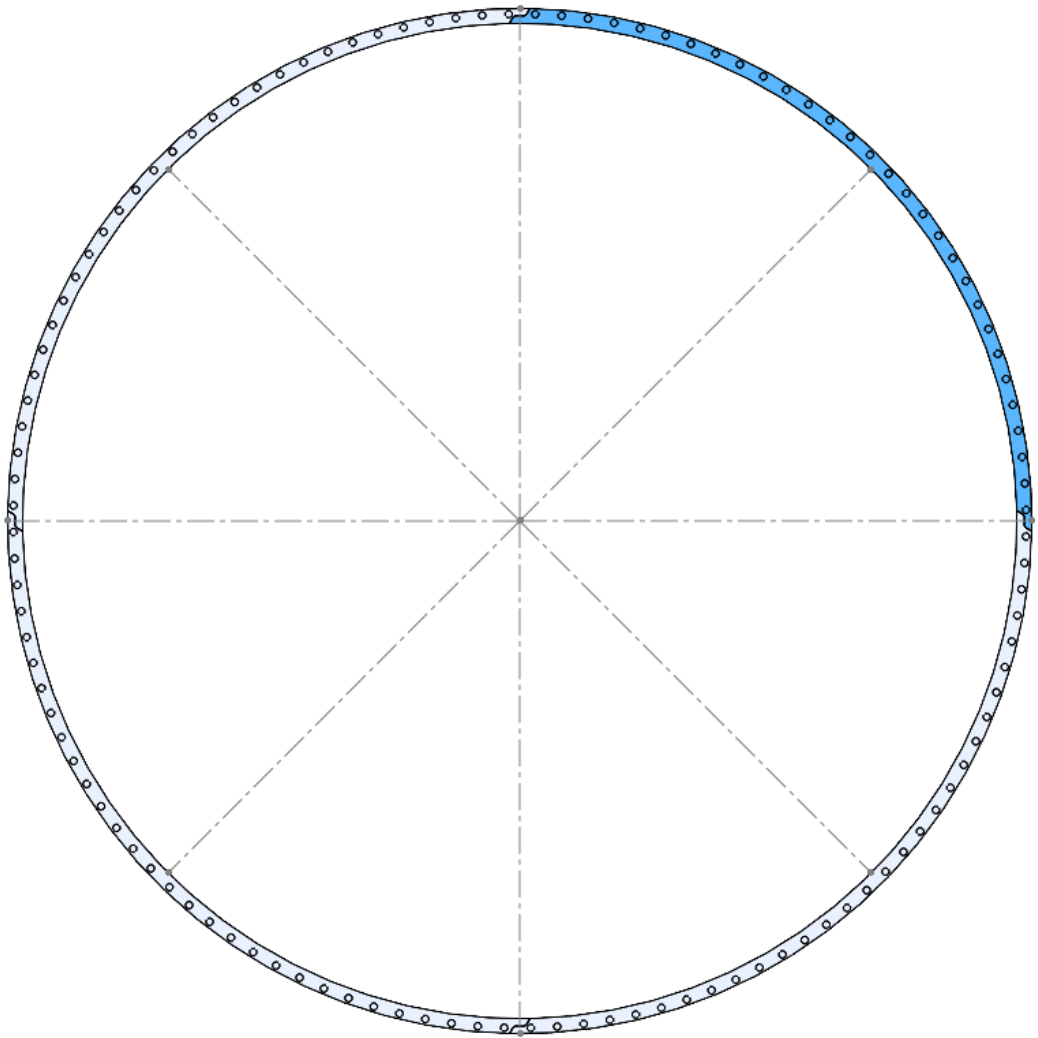
~~30 April~~
8 days
 2 days
 2 days
~~10 May~~
17 May
 + ~~2 weeks~~

1 week
 1 week
 - 20 May
 ~1 week + 1 week for FEA
 - 10 June
 ~3 weeks
 ~2 weeks
 ~1 week
 - 30 July

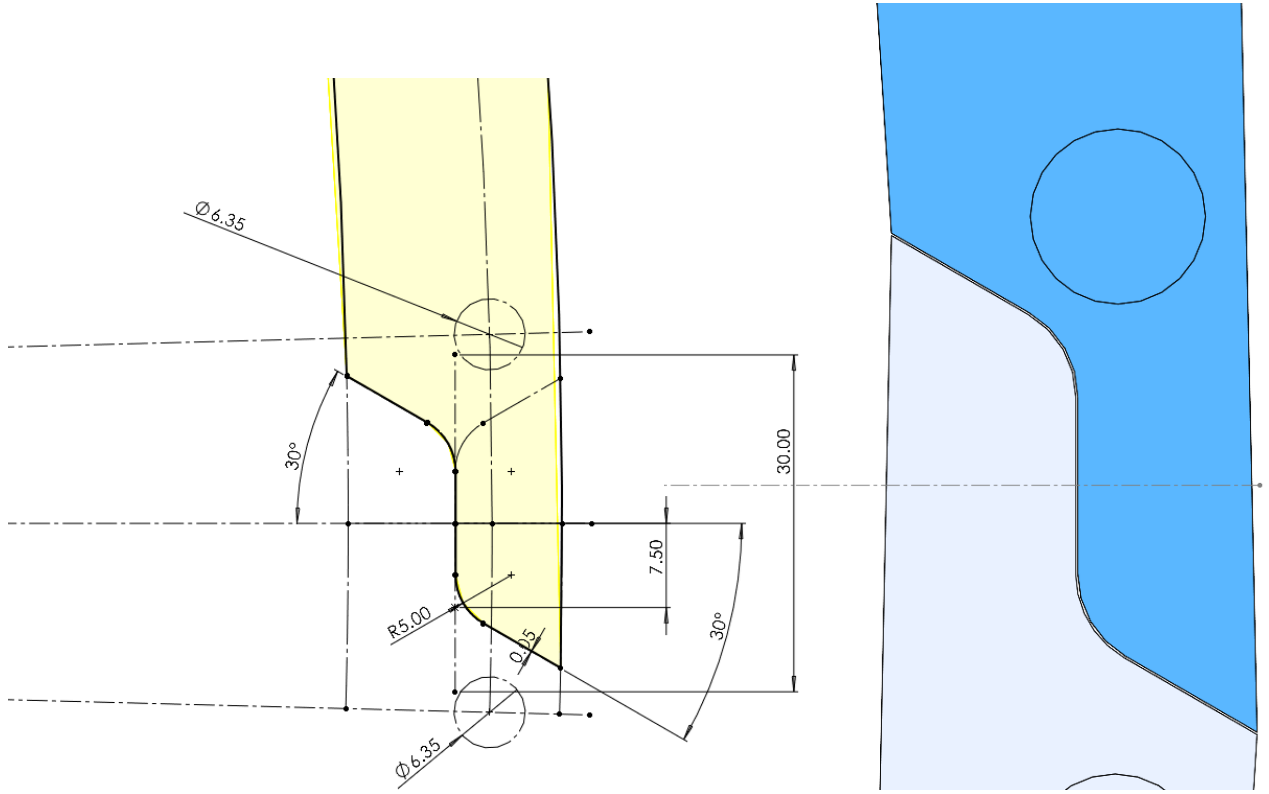
3. Mirror substrate manufacturing
 - Conical lexan co-bonding tests
 - Samples sent to SBU
 - Finalize design and start tool manufacturing simulations for outer mirror
 - Tool machining for outer mirror
 - Outer mirror prototyping
 - Co-bonding for outer mirror
 - Inner mirror (repeat – can be in parallel with 2 week offset/delay start from outer mirror work)

Starting on
6th May
 2 weeks
 1 week
 3 weeks for FEA (in parallel)
 - 10 June
 ~2 weeks
 ~1 week
 ~1 week
 - 7 July
 outer mirrors
 - 21 July
 inner mirrors

| | |
|--|---------|
| 4. Aerogel plane manufacturing | ??? |
| • Design | 1 week |
| • Tool manufacturing | 1 week |
| • Part manufacturing + CNC | 1 week |
| • Bonding and metrology | 1 weeks |
| 5. Global integration design with Alex and prototyping | |
| • CAD concept – summer 2024 | |
| • Prototyping if needed late Fall 2024 | |



- ⬠ The bond will be a combination of step and scarf joint.
- ⬠ Bonding jig is being designed and 3D printed in parallel.



- ⬠ Machining process for end ring quarters completely figured out.
 - ⬠ All 8 quarters are cured and ready for machining
 - ⬠ 1st quarter machined on 1st May
 - ⬠ 2nd quarter is being machined today – 2nd May
 - ⬠ Bonding jig design and 3D printing on-going
 - ⬠ 1st quarter machined part metrology on-going
- ⬠ Other news –
 1. Sealing test brought up in Monday Engineering meeting
 - Exploring and finalizing options for the same
 2. Conical mirror co-bond testing will start in the week of 6th May once UG workforce is back to the lab after their finals