# Ending Design Answers

SBU:

- What kind of tolerances are needed for the end ring for the mandrel?
- How does the tolerance of the end ring stack up to the overall diameter? What's a reasonable estimate for the cylindricity of the final part?
- Maintaining alignment between the end rings… clocking the rings to the same positions?

# TPC End Ring Blueprint

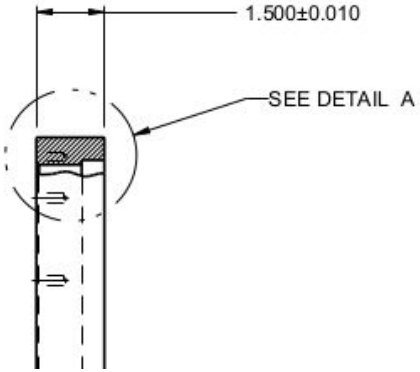
NOTES:

1. MATERIAL: 6061-T651 ALUMINUM PER ASTM B209. NO WELDING PERMITTED. MATERIAL CERTIFICATION REQUIRED.

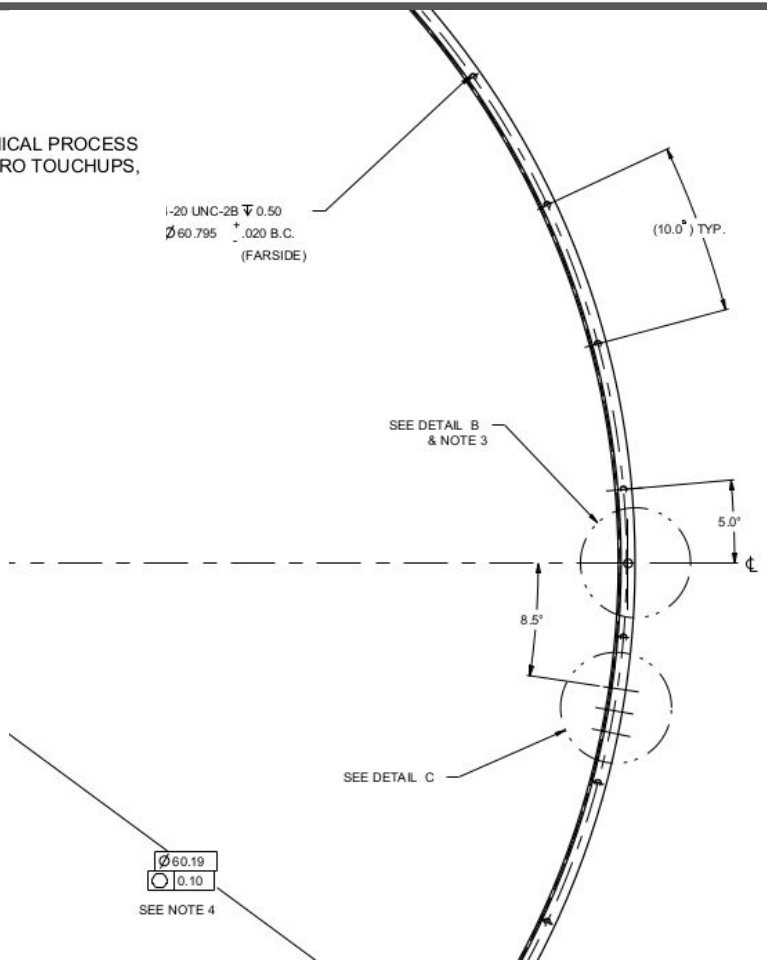
2. ALL SURFACES TO BE TREATED WITH HENKEL CORP, ALUMIPREP 33 FOLLOWED BY ALODINE 1201 PER MFR'S TECHNICAL PROCESS BULLETIN NO'S 234449 AND 235110 RESPECTIVELY, AND IN ACCORDANCE WITH MIL-C-5541. SUGGESTED SOURCE: AERO TOUCHUPS, ALUMINUM PREP KIT #AT117, OR INDIVIDUALLY, ALUMIPREP 33-QT, 1201-QT.

3. THIS FEATURE IS INCLUDED IN THE "-01" DWG. IT IS OMITTED IN THE"-02" DWG.

4. THE INNER CIRCUMFERENCE SHALL BE WITHIN THE RANGE OF 189.09 +/- .06 INCH.




Ring thickness



# Ending Design Answers

SBU:

- What kind of tolerances are needed for the end ring for the mandrel?
  +- 0.06 inches (Same with the TPC endring, despite smaller radius)

- How does the tolerance of the end ring stack up to the overall diameter? What's a reasonable estimate for the cylindricity of the final part?
  The only constraint should be on the inner circumference.
  There will be a play to the ring, which we can fix the ring for smooth installation.
  Therefore cylindricity is not the most critical measure. (Circularity 0.1)

- Maintaining alignment between the end rings… clocking the rings to the same positions?
  Two rings should be made identical. Alignment to precession better than 50 micron.
  See alignment procedure next page

# Endring alignment Procedure

**- The mandrel has the capability to have a variety of instruments attached to the computer-controlled stage. These include:**

- speed-controller motor for machining the foam.
- microscope for alignment.
- Felt pen for making precise marks on the mandrel surface.

**- The end ring placement uses the microscope attachment:**

- The precision of the translational stage is 1 micron.
- The accuracy of the stage is a few mils over two meters (TPC length)
- The rotation of the mandrel has a precision of $(21E6)^{\wedge -1}$ revolution or about 3 microradians (accuracy not well understood
- Magnification makes the scale of the image have a "tic mark (small tics)" every 50 microns (2 mils)
- Some unique identifiable feature visible to the microscope (looks radially inward) is DESIRED!
- TPC: We used a precision pin in a hole on the outside edge of the end ring
- pfRICH: A marking on the outer face (scratch, groove, ...) would be even better as part of the design for the pfRICH.

Alignment video: https://photos.app.goo.gl/coB5AvSfVy3CrYHk9