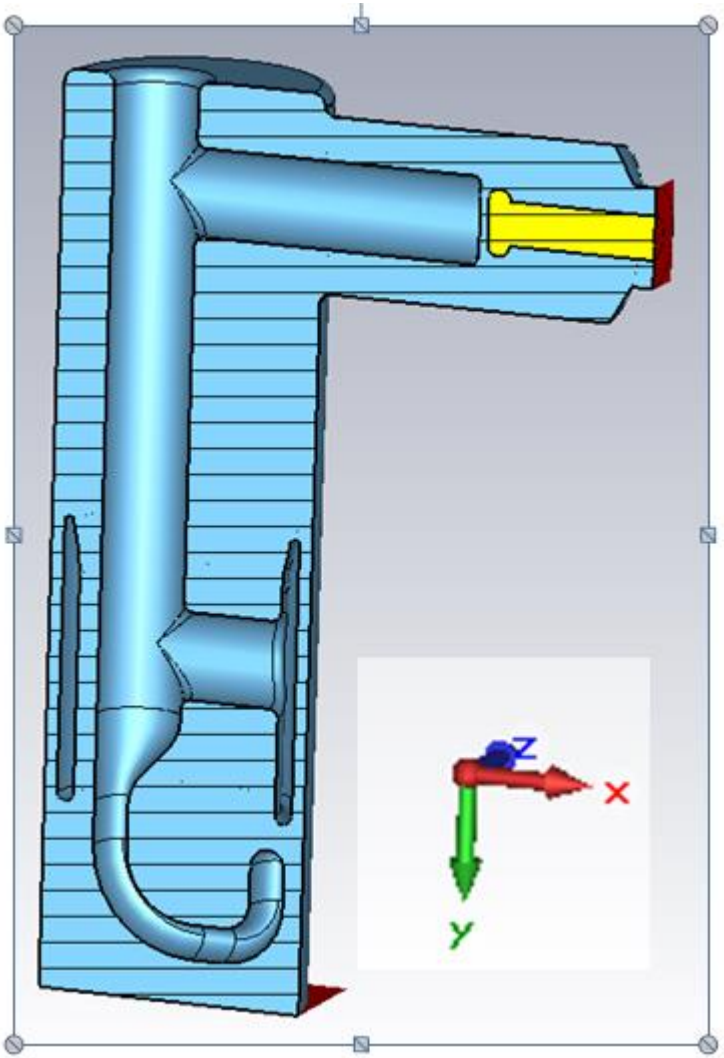
DQW HOM changes

Ben Hall

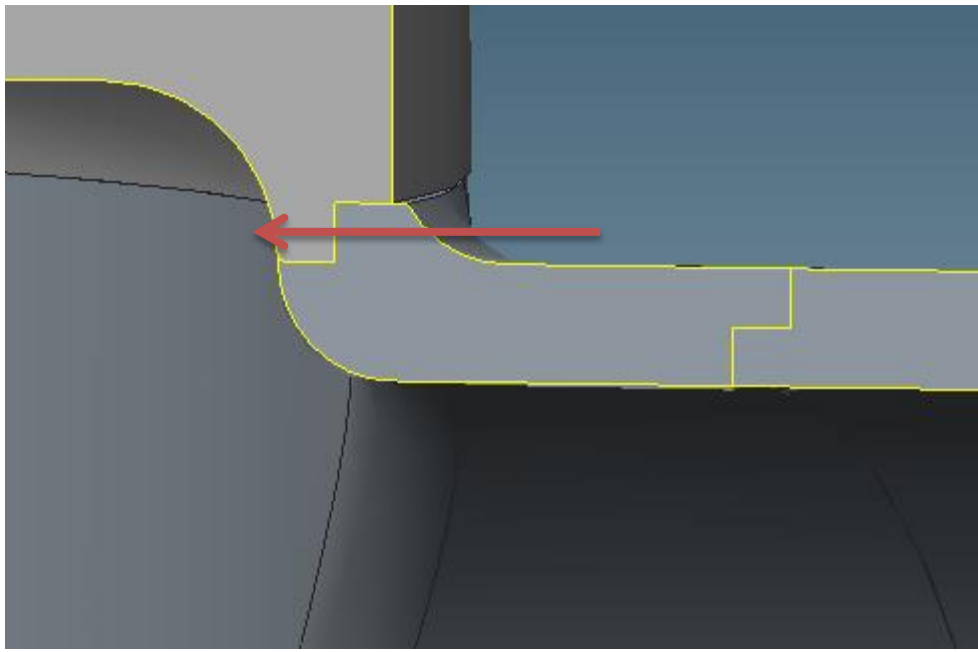
Current idea

- Looking at feasibility of manufacturing changes
- Top plate raised by 5mm to allow E-beam welding



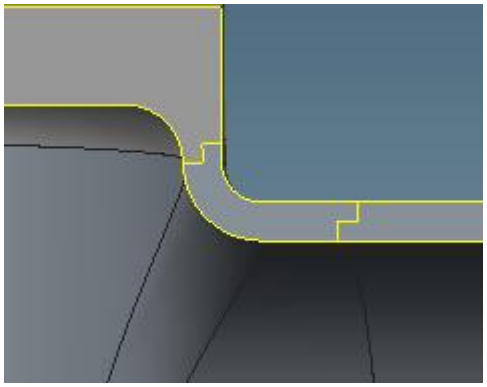
- With 3mm rounding on the top plate, and 2mm on the pull out the E-beam weld would be very close to the pull out if not parallel

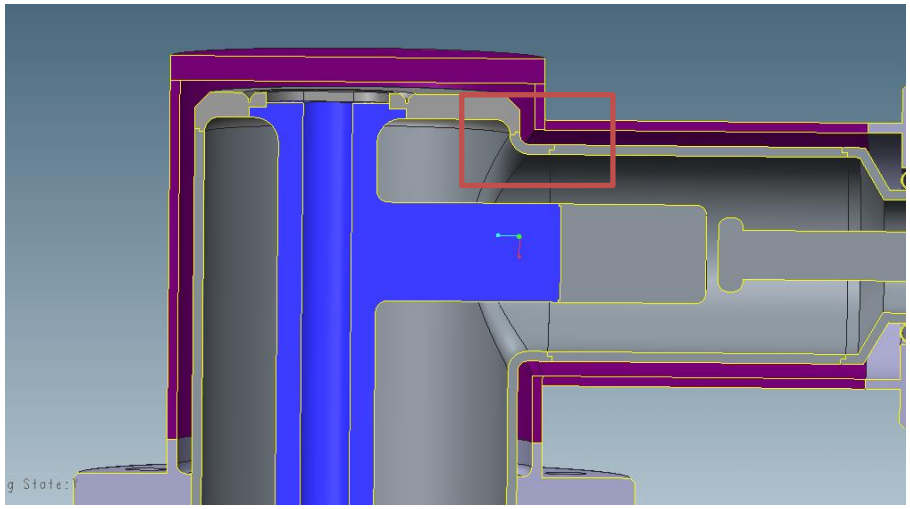
- The pull-out looks unrealistic as a non uniform thickness is created
- 4mm round for “blending2” suggested



Suggestion

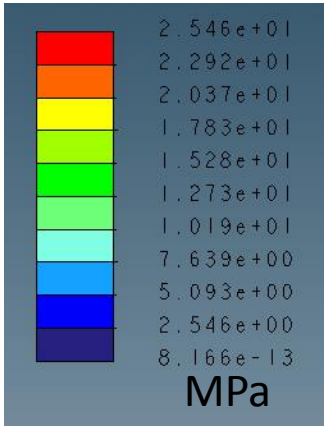
- With 4mm round the pull out is more realistic
- The weld not be parallel to the surface
- This increases the height by 7mm from the original
- I am unsure what RF effect this will have

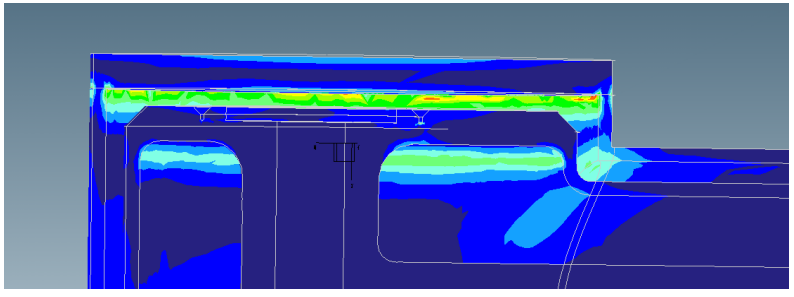


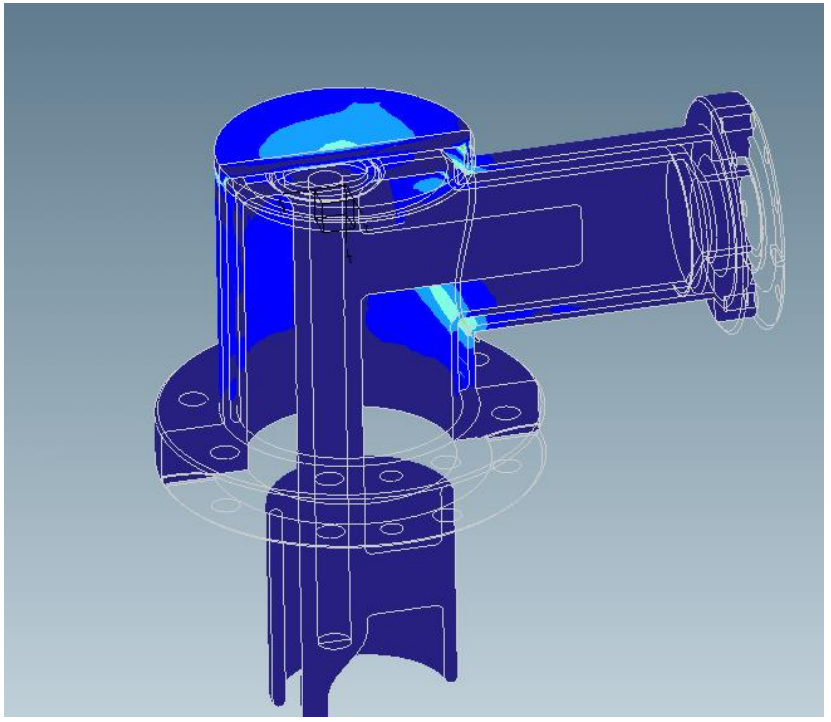


Initial analysis of top plate: Stress

- 5mm thick top niobium plate
- 1.8 bar applied to internal surfaces,
- Main couplers parts niobium, for the outer can steel was used.
- Most of the stress on the steel part
- Max on niobium, 12Mpa
- Thinning top plate is an option

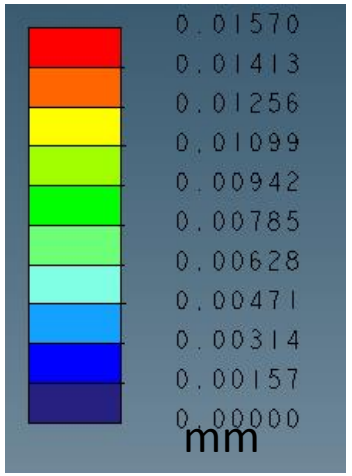




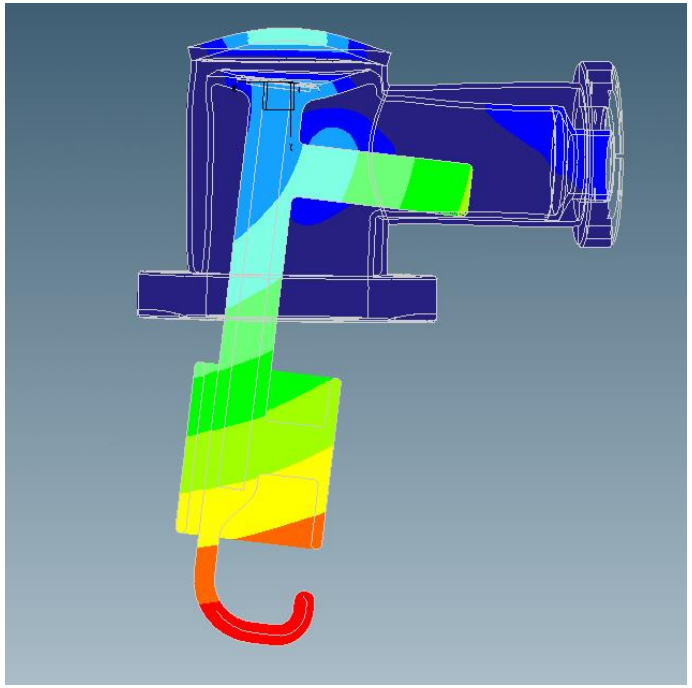


Deformation

- Max deformation is 15microns, at 1.8Bar
- ~1nm per mBar for he variation

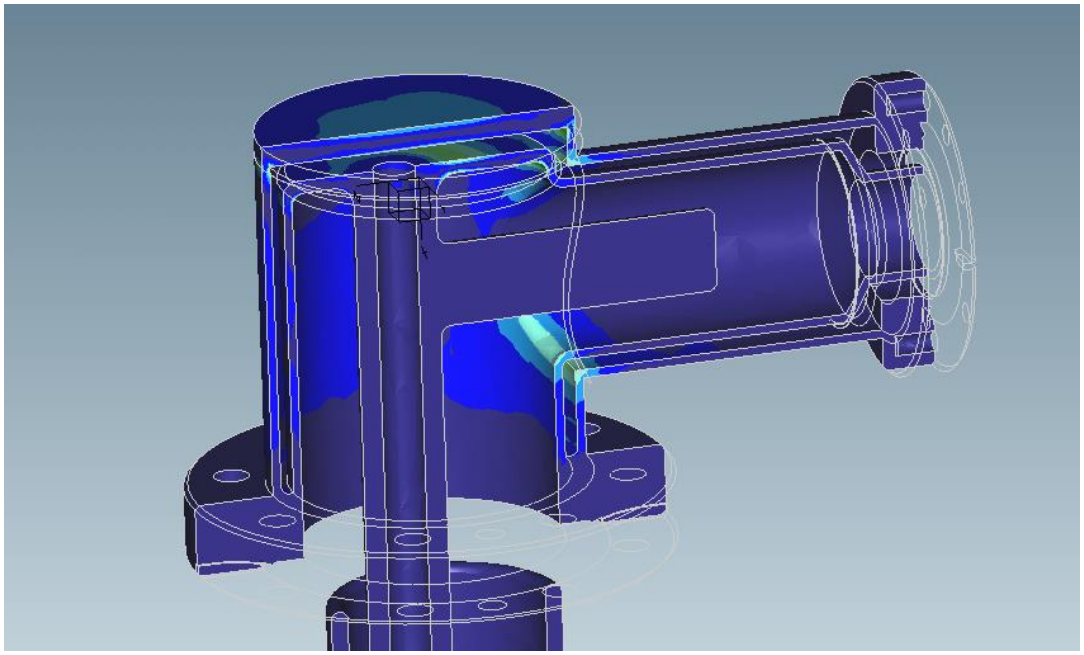


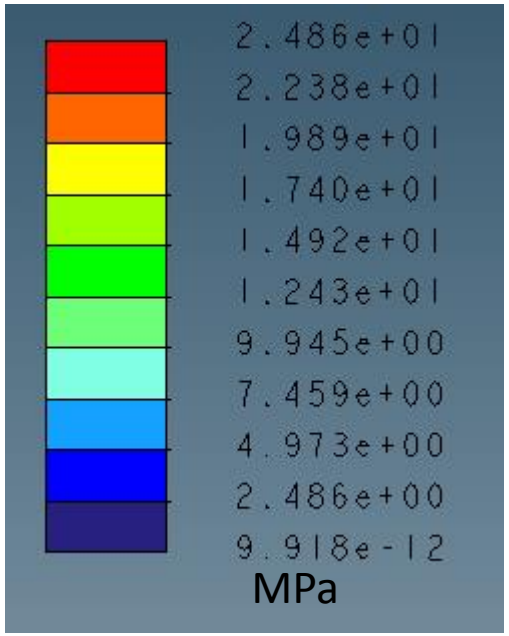
- displacement is magnified significantly



Thinned top plate

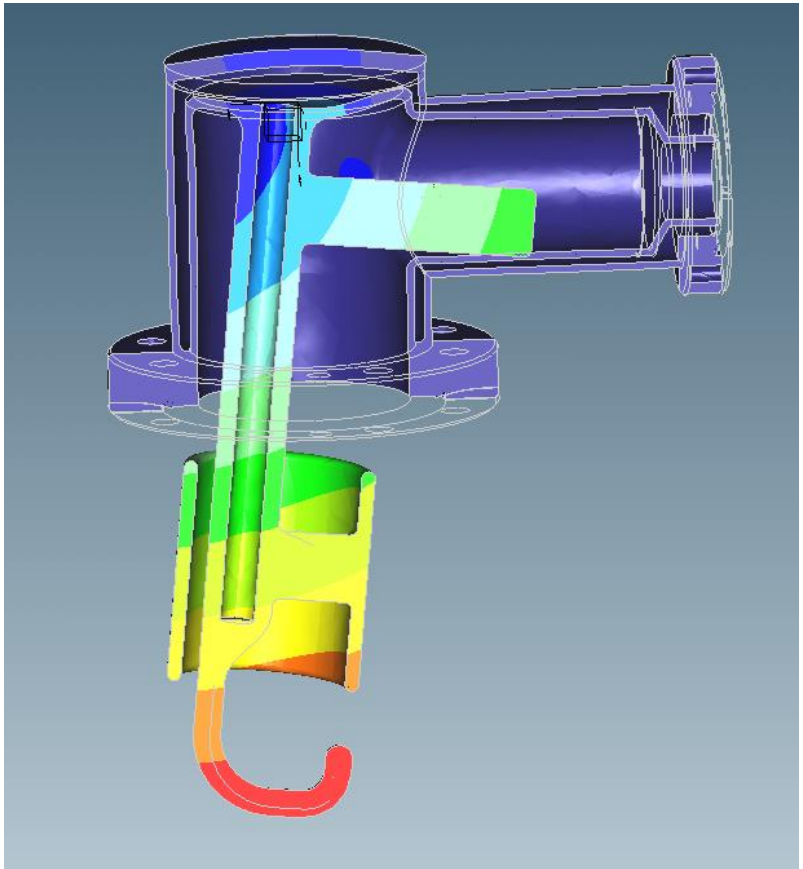
- Thinned to 3mm thick
- Removes need for weld grove and reduces space
- Top plate ~12MPa

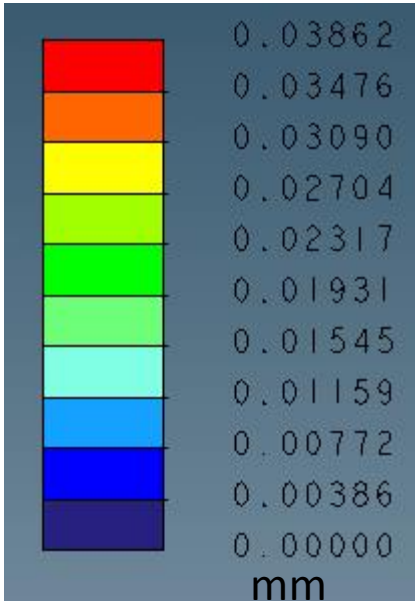




Deformation 3mm

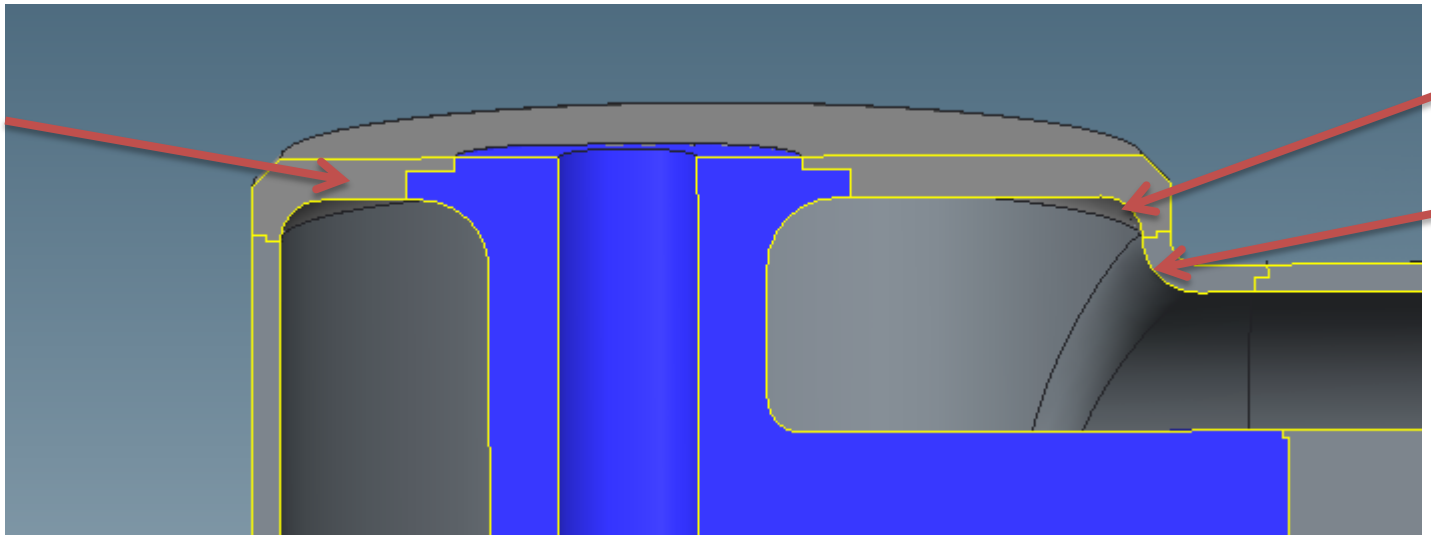
- 1.8Bar applied to internal surface
- ~2nm per mBar displacement





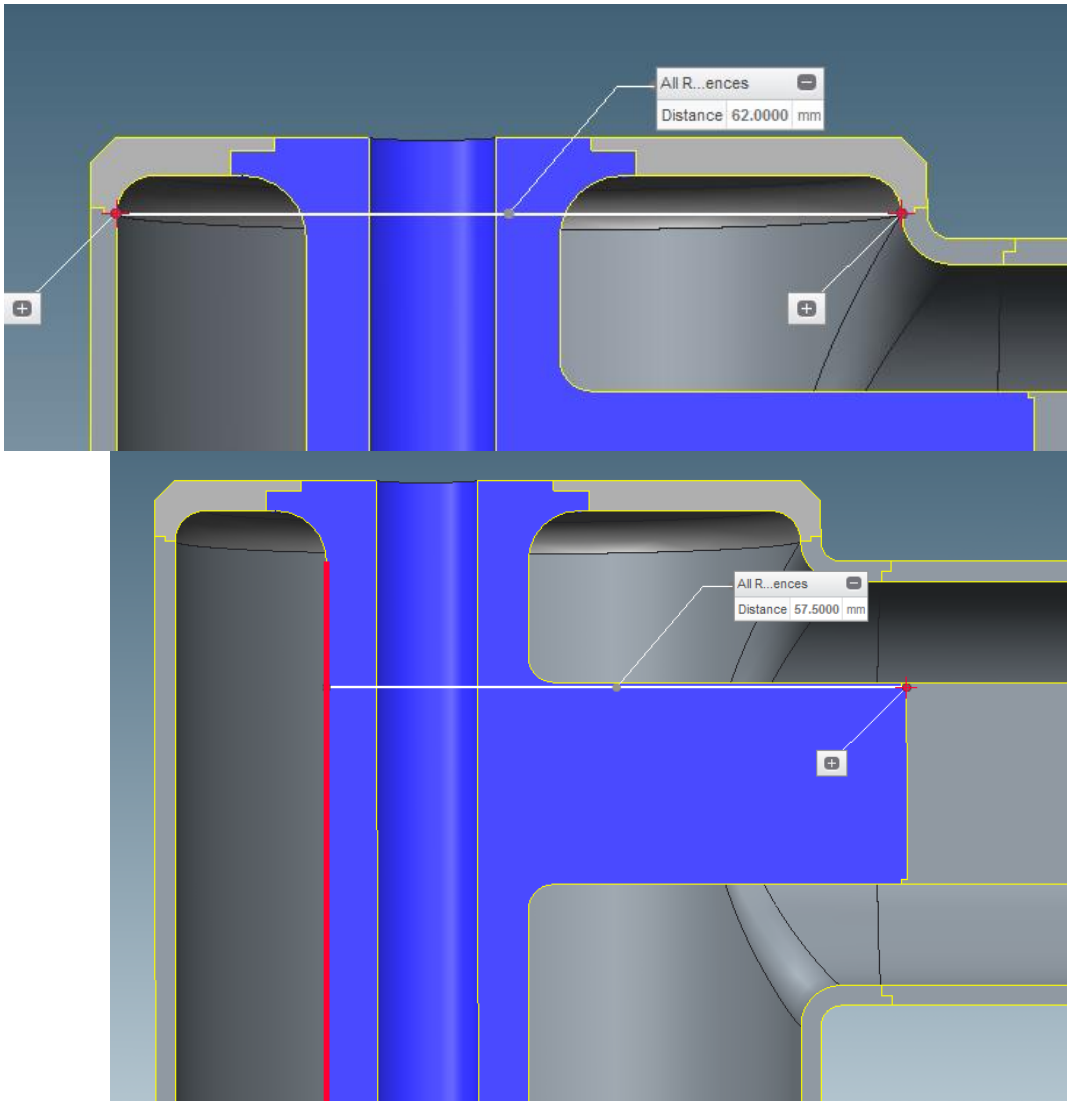
Top suggestions

- Top plate thinned to 3mm
- Rounding increased to 4mm on pull out
- Able to withstand 1.8bar test pressure



Weld positioned to allow assembly

- The arm of the coupler need to be split to fit inside the can of the coupler
- Enough room has been ensured to allow for construction and E-beam welding or the rest of the coupler arm
- Arm can be made a few mm longer if needed but this will reduce the room for assembly



Current MP sims

- The multipacting in the cylinder is seen in the case of wet treated niobium [Comparatively high SEE]
- No Mp has been seen yet with Ar-cleaned [Comparatively low SEE]
- Current sweep is up to 1.8MV transverse, MP starts ~1.4MV