Discussion for EEEMCal and pfRICH and PST mount on GST

Initial concepts and progress

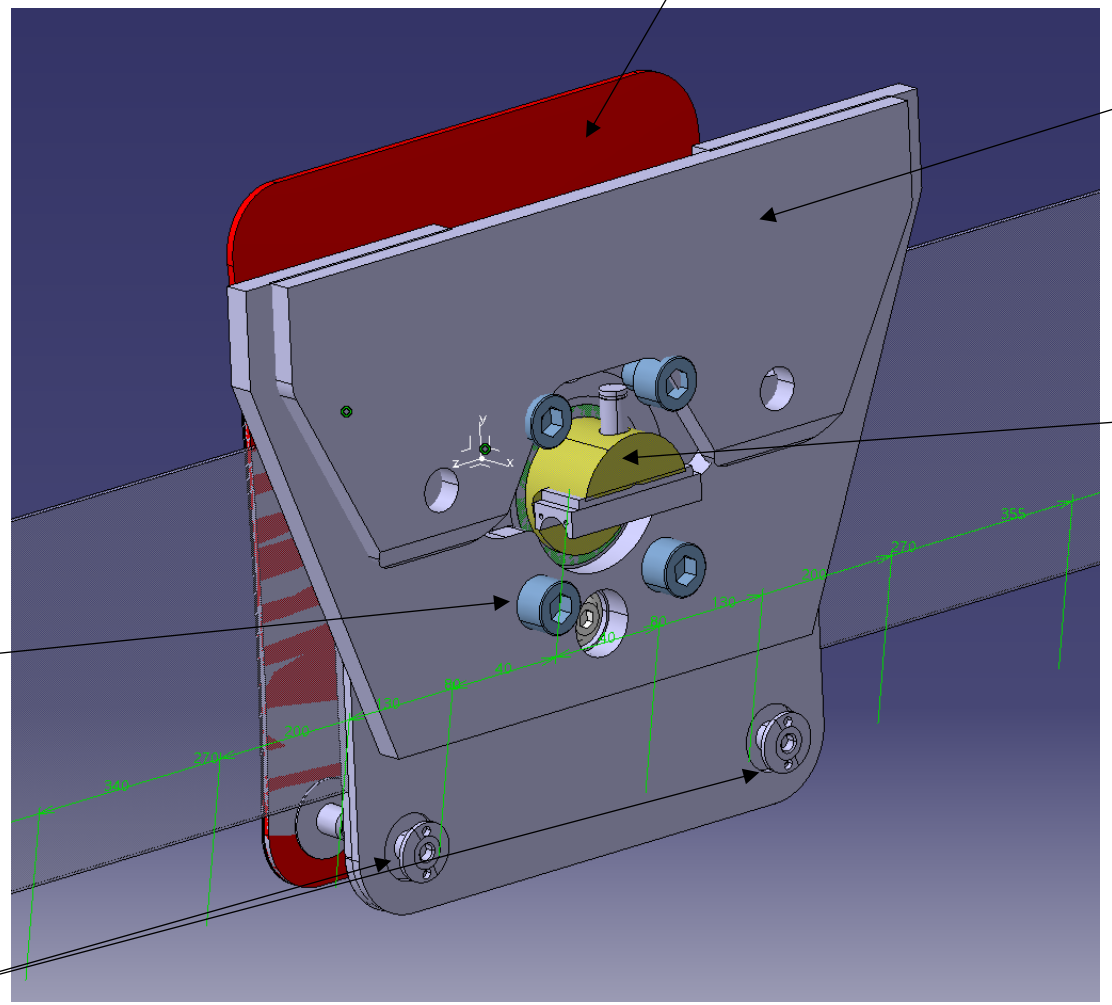
02 March 2026

Version 3 of the slider foot concept

- Comments received on this version –

1. Need it to be a “rolling” foot instead of a sliding foot
2. The adjustment for EEEMCal is just to get it “in the volume”
3. Adjustment for PST package needs to be more accurate since that has the beam pipe

The red plate attaches to the EEEMcal structure

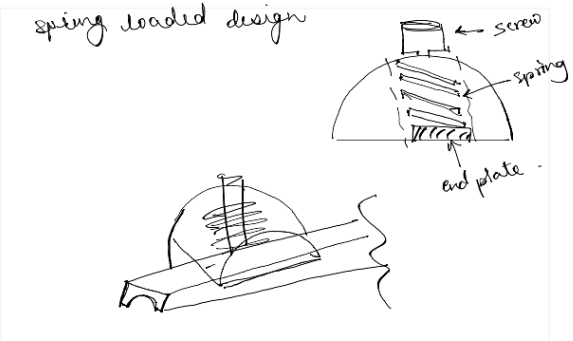


Ignore this plate… just realized I forgot to hide this when taking a screenshot

Spring loaded mechanism to ensure that the sliding mechanism is always in contact with the Rails and does not “jump” while sliding along Z

These 4 bolts allow for movement in the X-axis

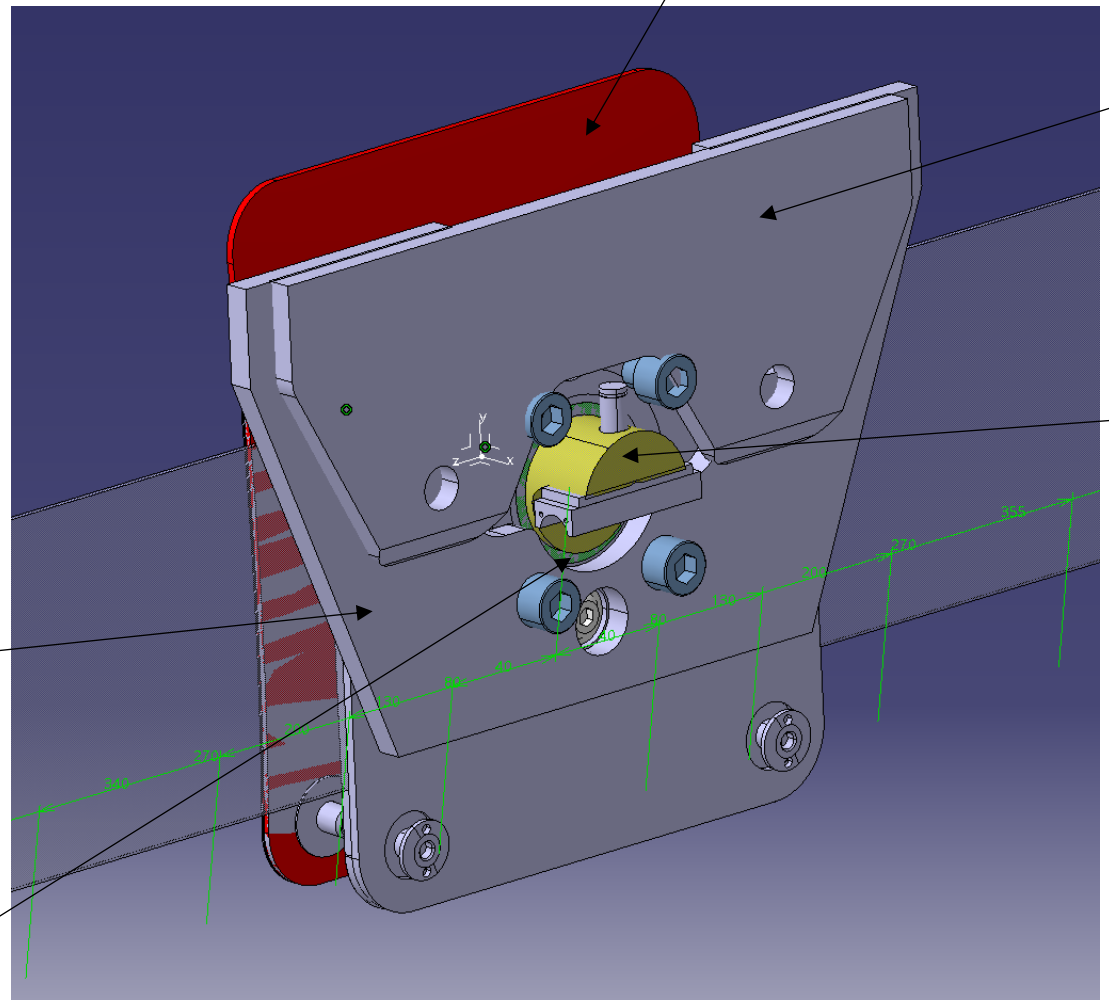
These two bolts allow for rotation about **local** the “z” axis



Version 3 of the slider foot concept

- The track groove is changed from a round CFRP tube/rod into conical shape per BNL engineering request

The red plate attaches to the EEEMcal structure

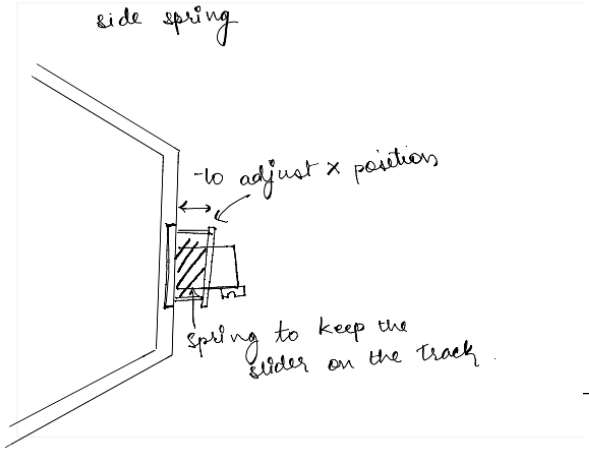


Ignore this plate… just realized I forgot to hide this when taking a screenshot

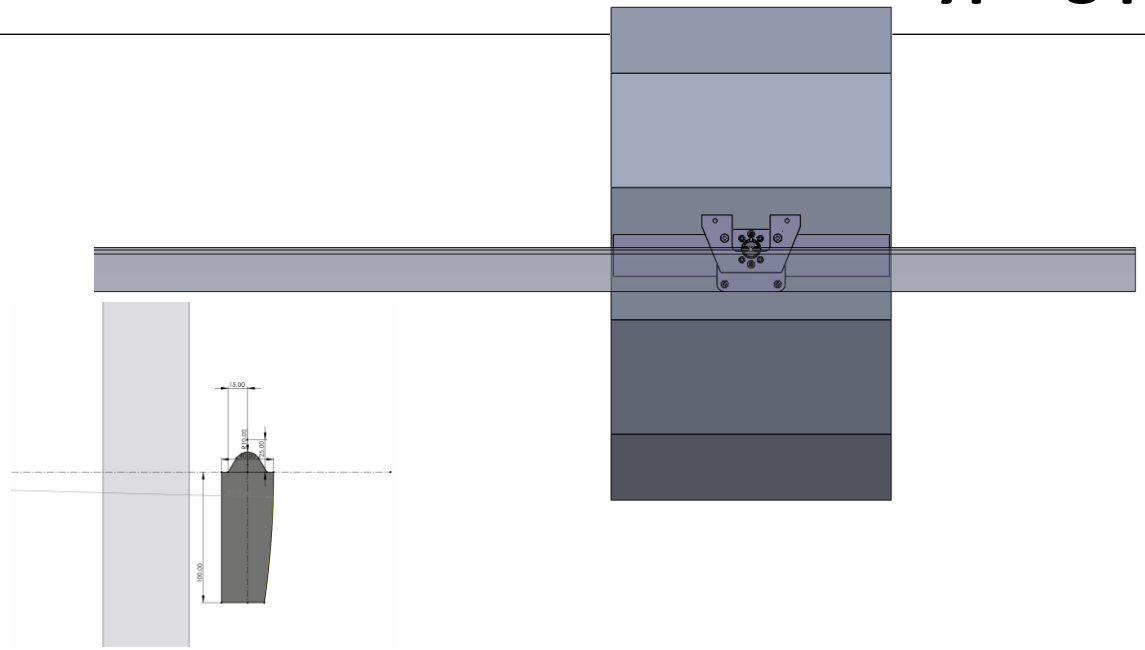
Spring loaded mechanism to ensure that the sliding mechanism is always in contact with the Rails and does not "jump" while sliding along Z

This is pressure plate for spring to restrict and adjust motion in X

Spring and roller system to allow for breathing in X direction



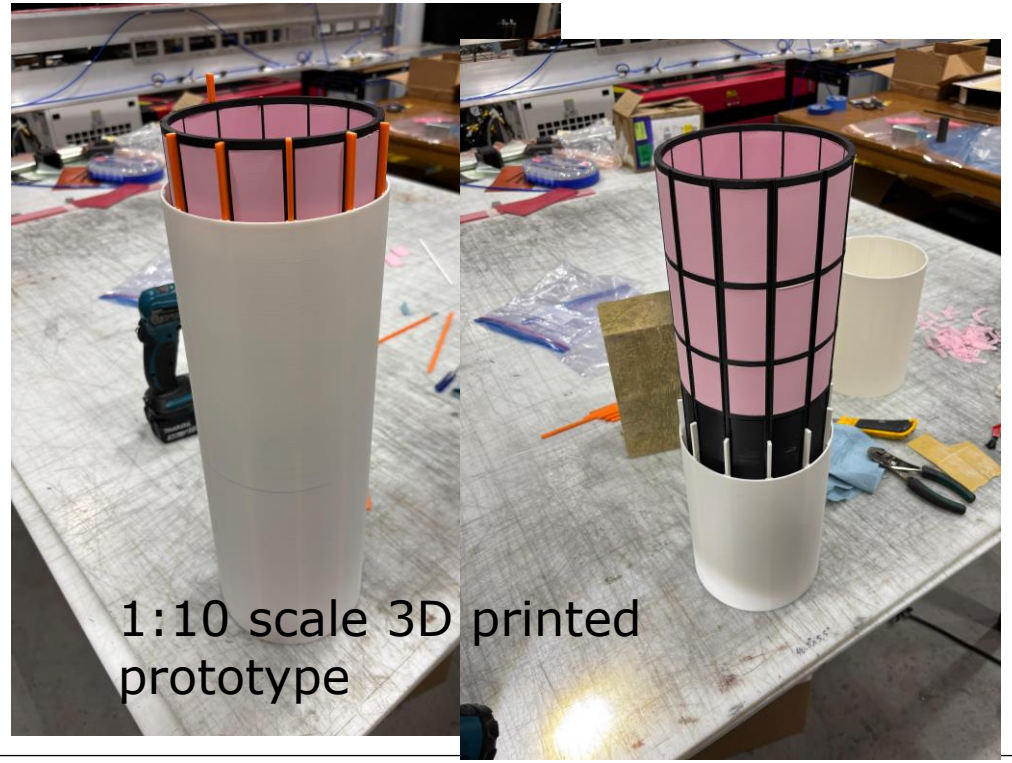
Prototyping progress at Purdue



- This is what the design in the EEEMCal geometry looks like.
- You can have 1 foot per side – or 2 foot per side – being decided by the FEA and prototypes currently in progress at Purdue

On-going work –

1. FEA of the new conical rails for GST
2. Prototyping of the mounting mechanism in 1:10 scale including rails and adjustment mechanism of the GST
3. Refinement of the mounting mechanism for the EEEMCal and other inner detectors



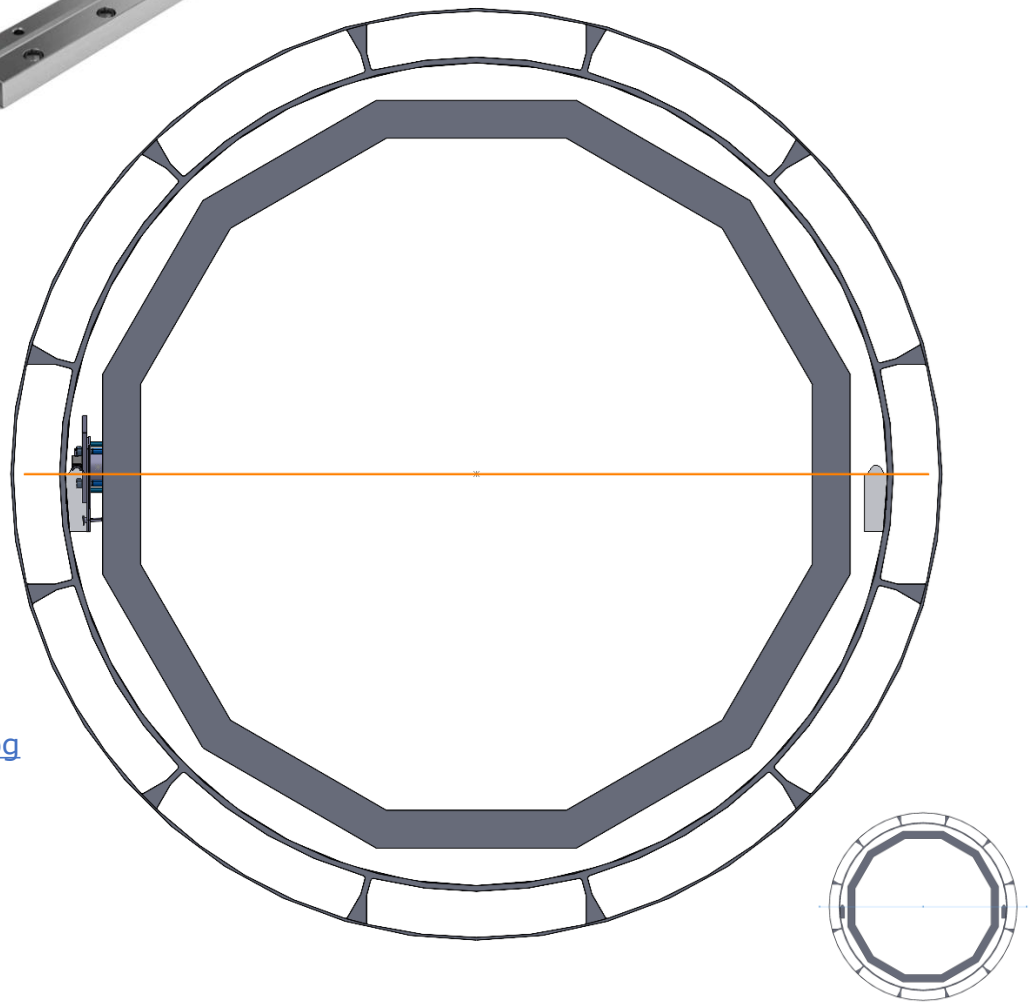
1:10 scale 3D printed prototype

Updated rails to use needle linear bearings

This is the best available for the application

Can take upto 5000 kg
But no off the shelf part available for this

Working with 2 companies for the quotes and possibilities of custom designed linear bearings
NRB bearings is willing to come up with custom solutions for GST – trying to set up a meeting with them in early march

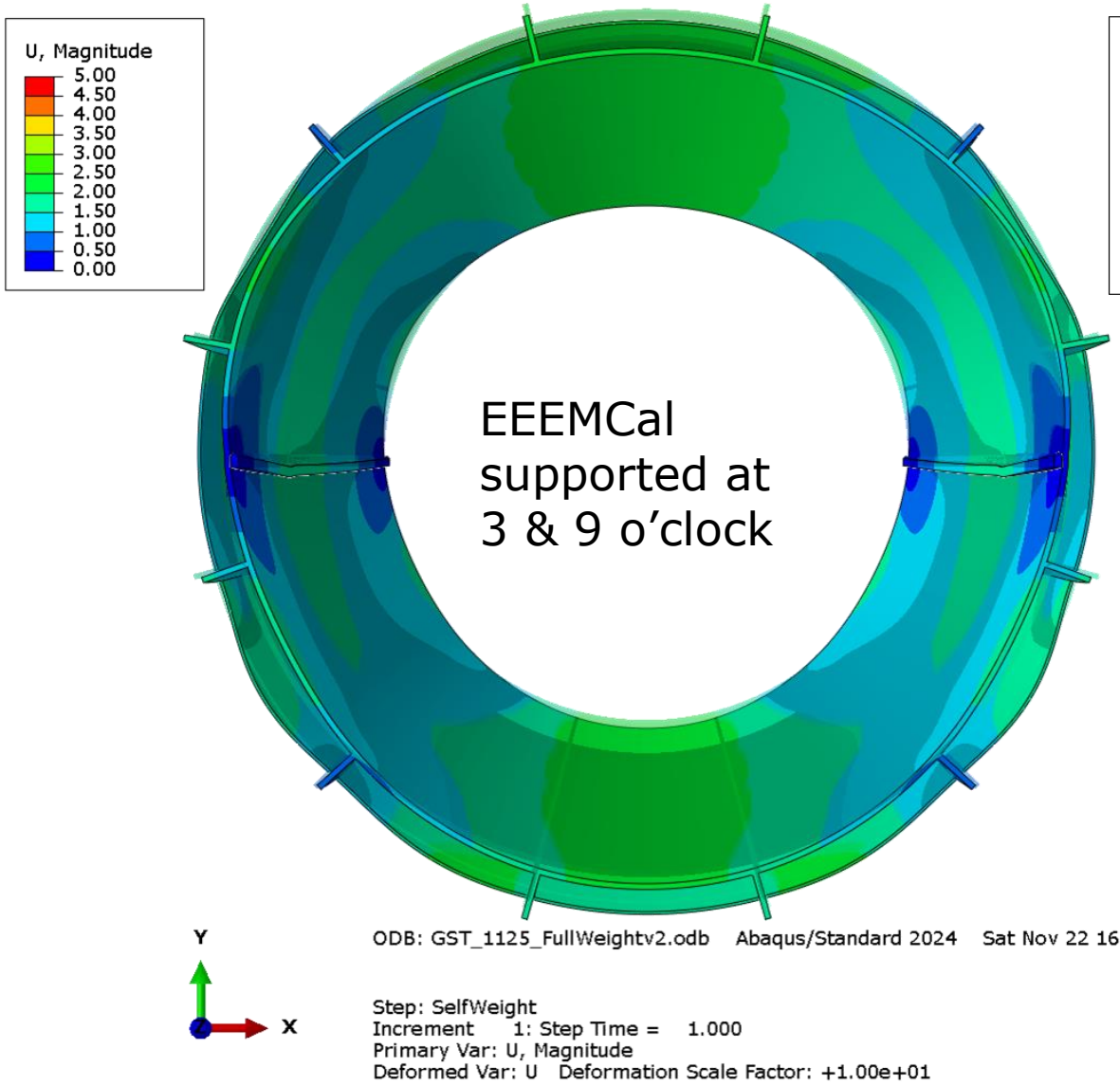


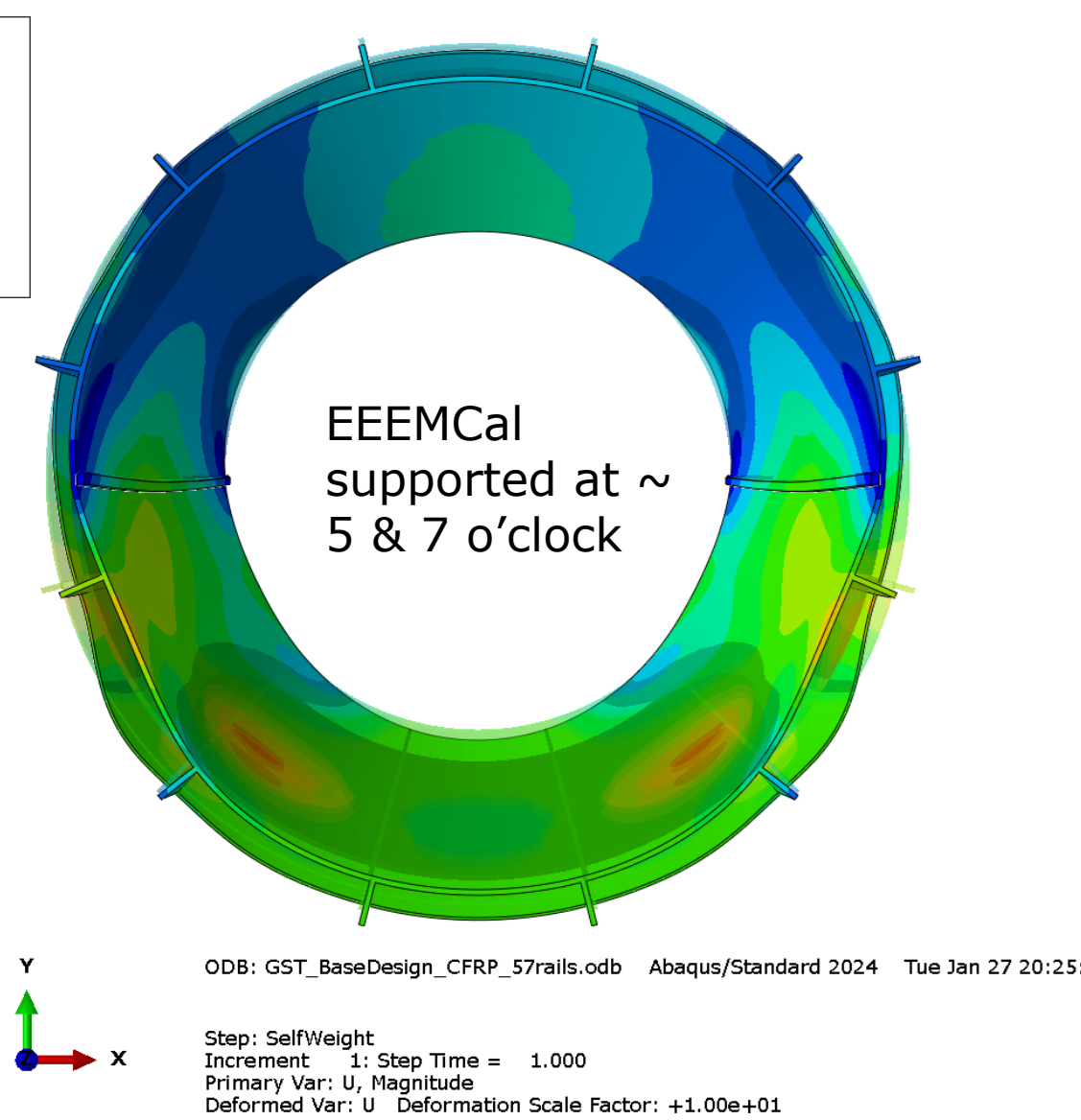
https://www.nrbbearings.com/index.htm

https://www.schneeberger.com/fileadmin/documents/downloadcenter/01_product_catalogues_company_brochures/01_Linear-_and_profiled_guideways/03_Linear_bearings_and_recirculating_units/Linearbearings_-_Product_catalogue_EN.pdf

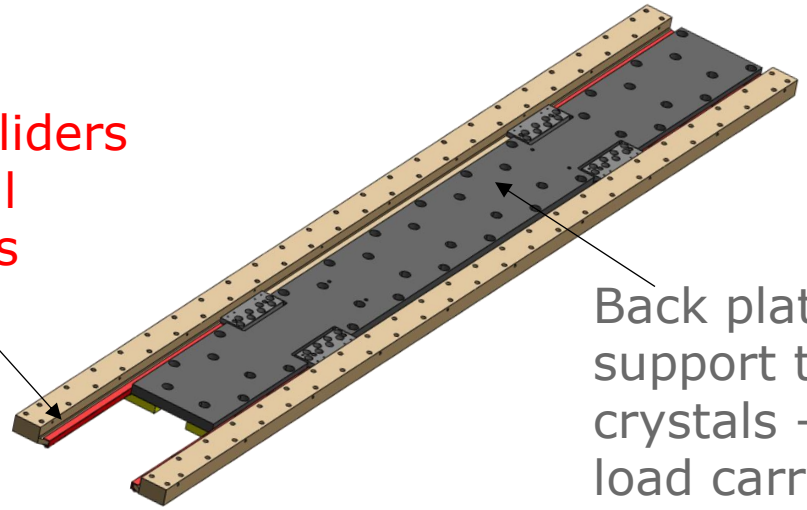
https://www.linearmotiontips.com/what-are-needle-roller-linear-bearings/

Simulation results for GST





Mounting mechanism design – preliminary for quartz HPDIRC crystals into GST

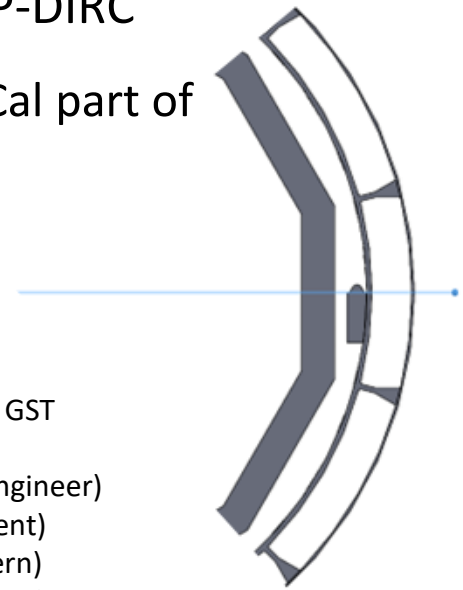


- Very preliminary adaptation from the HGCAL mounting mechanism for CMS.
- Still working out the details – stress analysis for crystals

Coming up next work –

1. Full scale 3 drawer prototype of GST with rails and inserts for HP-DIRC

   (well I guess not the EEEMCal part of this picture)



- Current team working on GST
1. Andy Jung
2. Sushrut Karmarkar (Engineer)
3. Anish Tilak (PhD student)
4. David Vasilev (UG intern)
5. Gavin Forrest (UG intern)

Simulation results for GST