SAS Platform Testing Update

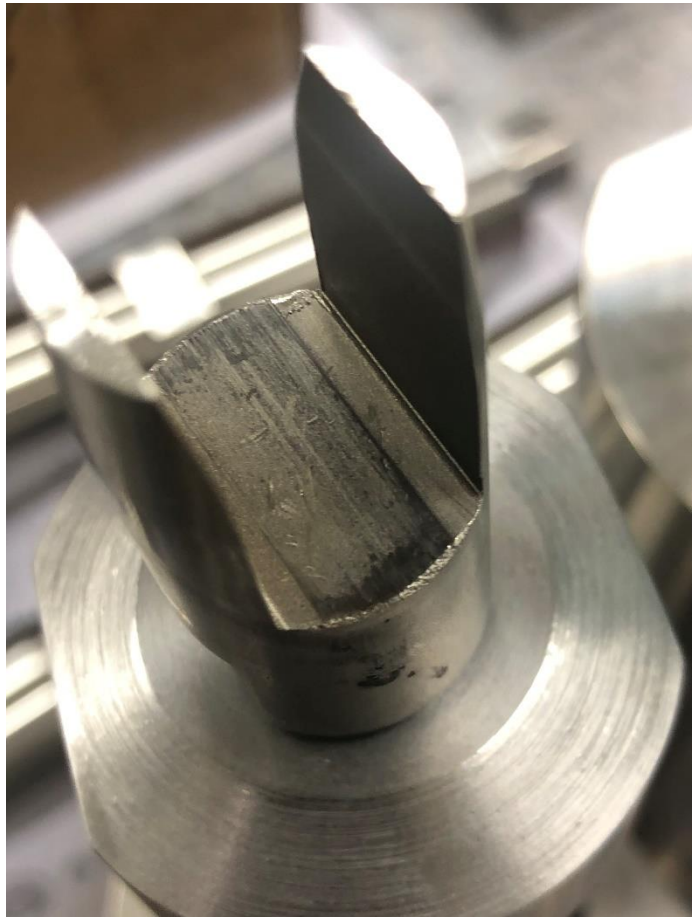
26-10-2022

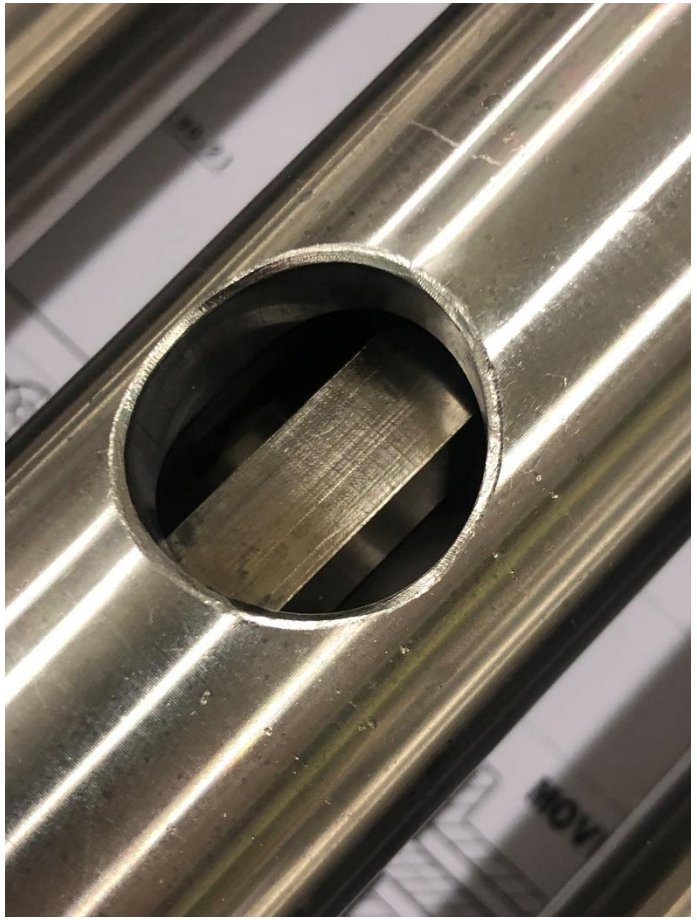
SAS Platform V4

Wedge and Fork – V1

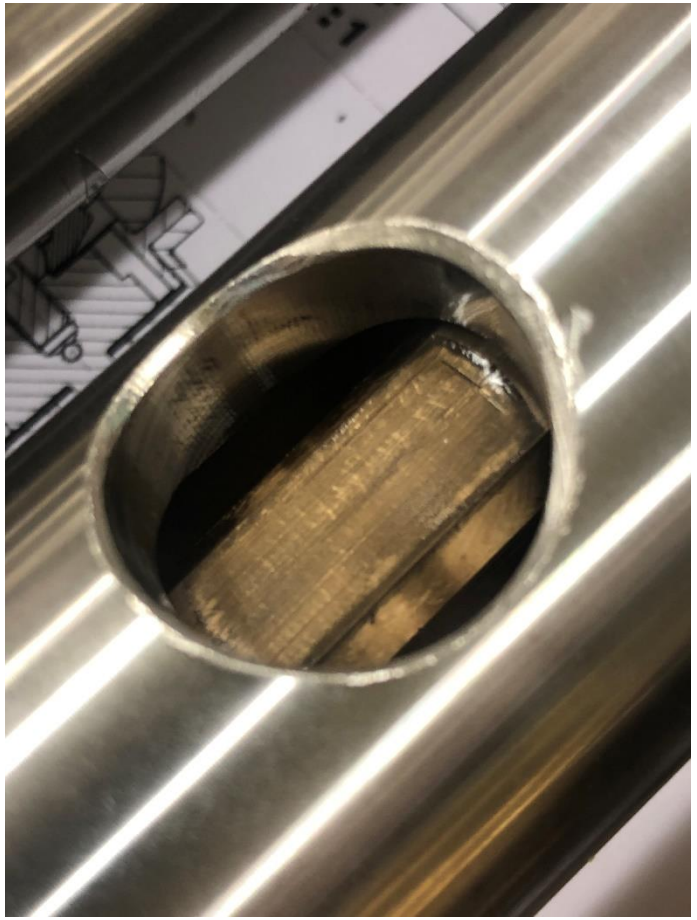
Wedge and Fork – V1

Wedge and Fork – V2





Wedge and Fork – V3



Wedge and Fork – Longituinal

Repeated Test Results

Matthew's First Test Results:

Axis	Axis Type	Measured Rate [µm]	Design Rate [µm]	Backlash [µm]	Backlash [turns]
Vertical 1	Wedge	31.147	30	22.544	0.724
Vertical 2	Wedge	31.162	30	19.830	0.636
Vertical 3	Wedge	29.370	30	8.099	0.276
Lateral 1	Differential Thread	36.052	40	23.863	0.662
Lateral 2	Differential Thread	35.591	40	27.722	0.779
Longitudinal	Wedge	32.409	30	17.578	0.542

Josh's First Test Results:

Axis	Axis Type	Measured Rate [µm]	Design Rate [µm]	Backlash [µm]	Backlash [turns]
Vertical 1	Wedge	30.539	30	9.719	0.318
Vertical 2	Wedge	28.395	30	25.366	0.893
Vertical 3	Wedge	31.308	30	11.139	0.356
Lateral 1	Differential Thread	37.394	40	22.447	0.600
Lateral 2	Differential Thread	36.497	40	18.612	0.510
Longitudinal	Wedge	29.762	30	25.889	0.870

Relatively close agreement between our test results.

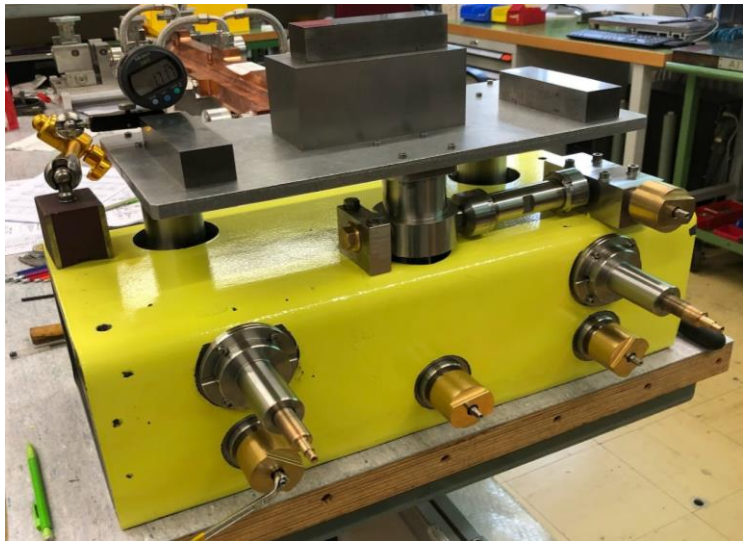
We increased the weight on the structure plate between the two tests.

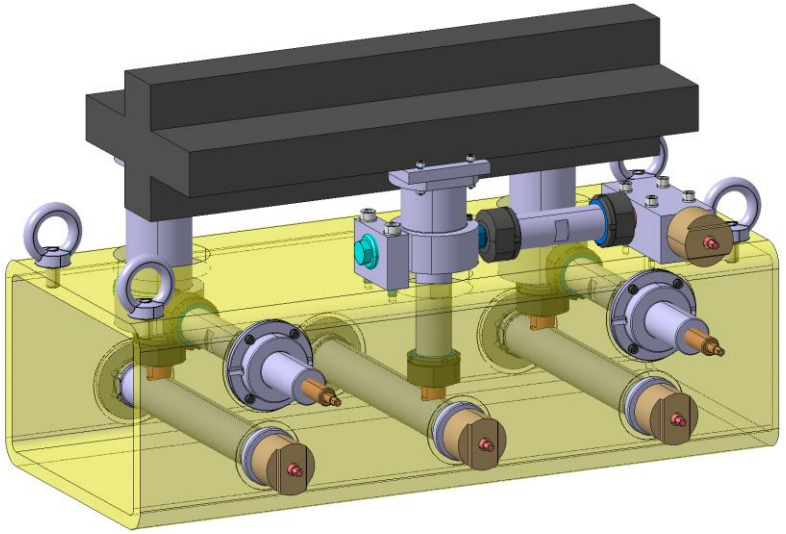
This increased the load and therefore friction within the other joints.

Required an increase in the spring force to prevent the fork losing contact with the wedge.

Further Testing

- Vivien Rude has agreed to perform some testing on the new platform using a laser tracker.
  - In exchange for letting them borrow the V3 prototype to display/demonstrate at a conference at CERN next week (IWAA).
  - They were not keen on letting us borrow a laser tracker.
- I need to make some accommodations for the testing:
  - Fixing a dummy structure mass.
  - Mounting the girder on a stable platform, such as the drive beam girder

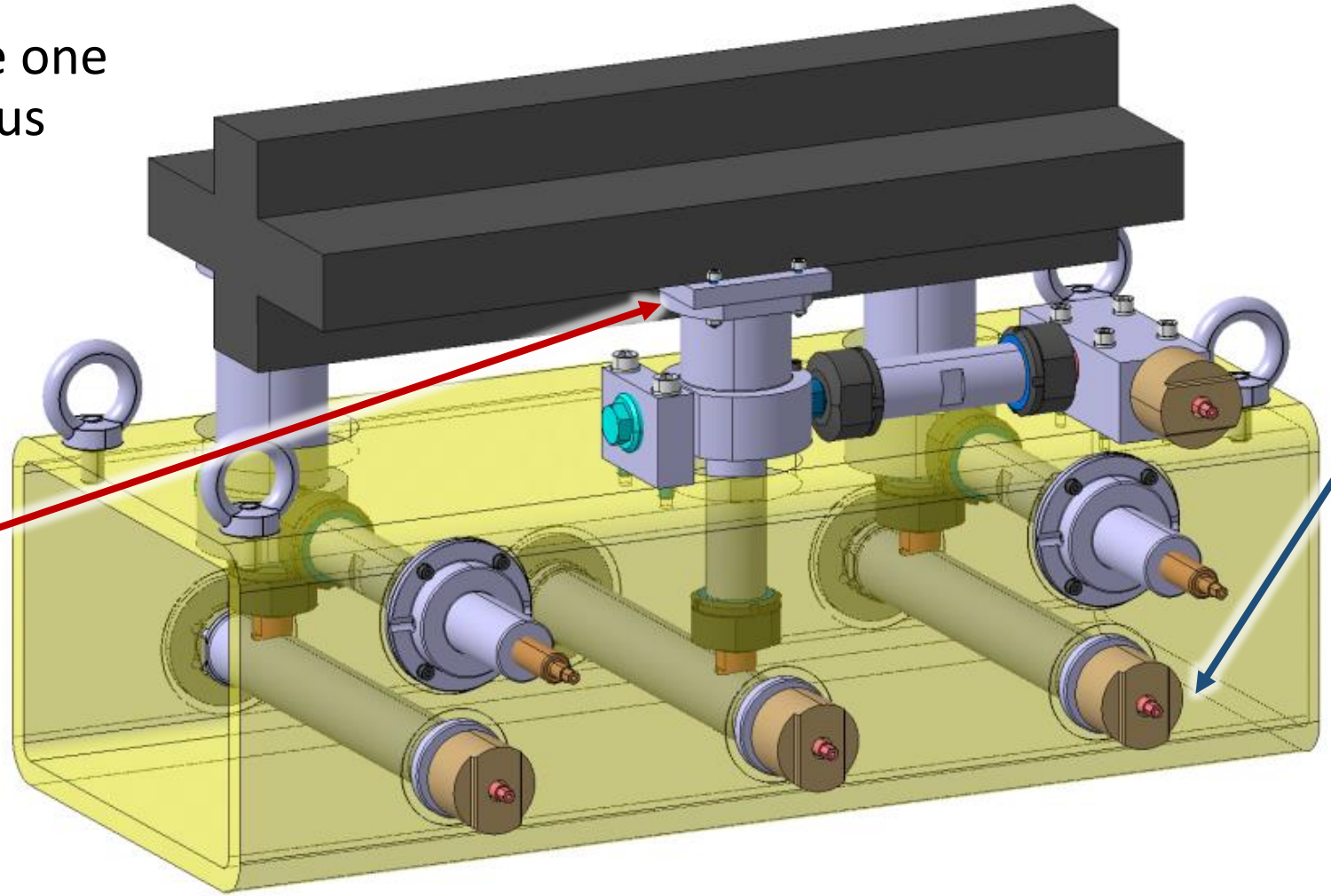




Allowing Further Testing

We could use one of the previous dummy structures

Requires new adaptor plates

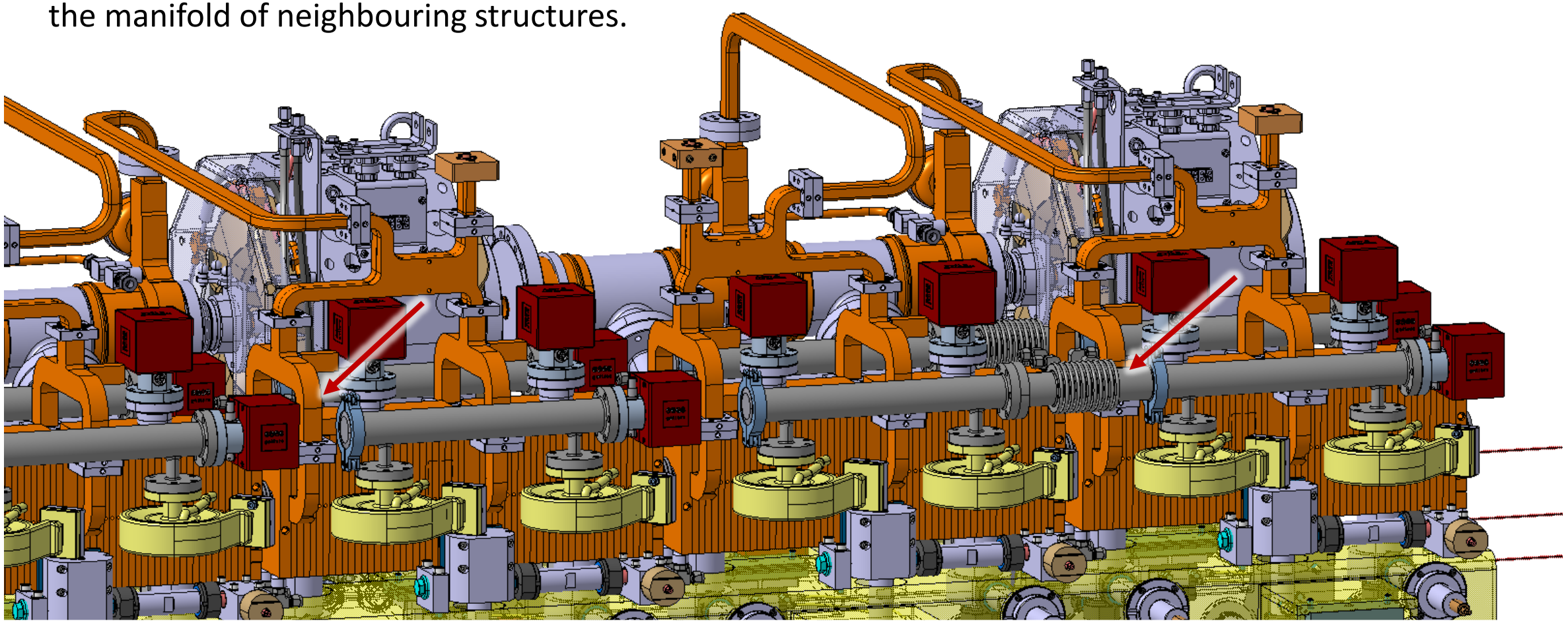


Addition of mounting holes to allow installation on the lab drive beam girder.

Module Design/Analysis

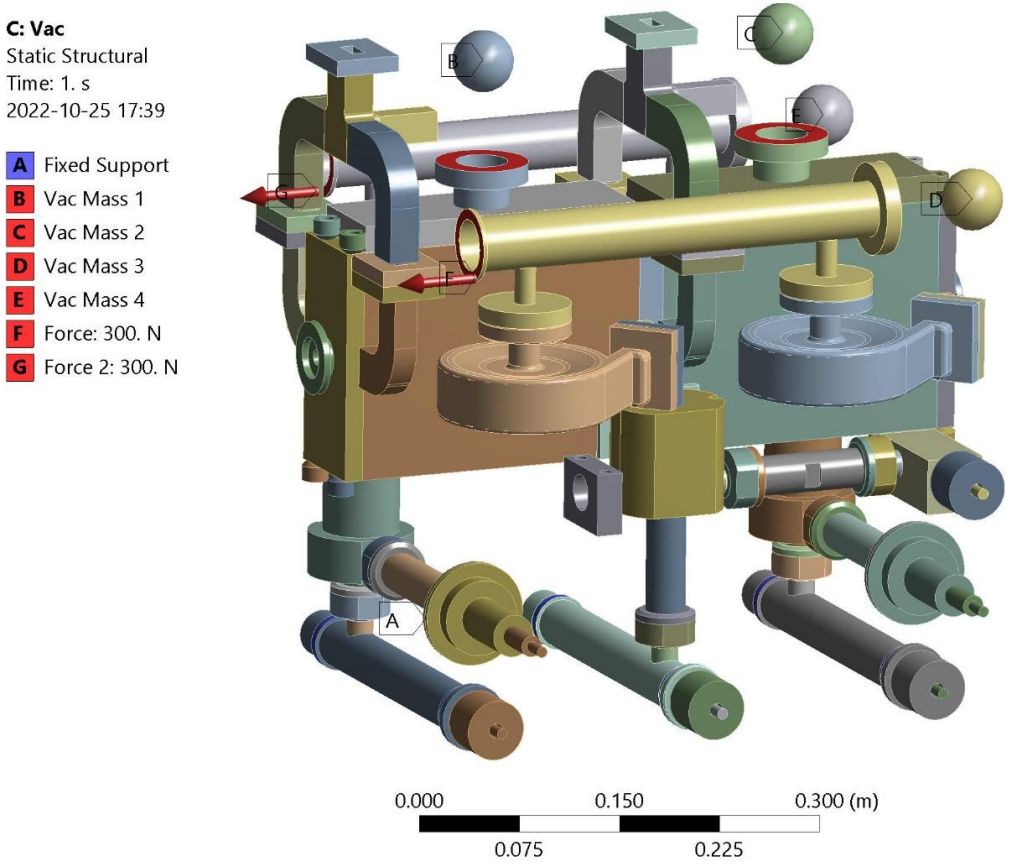
RF Load Vacuum Manifold

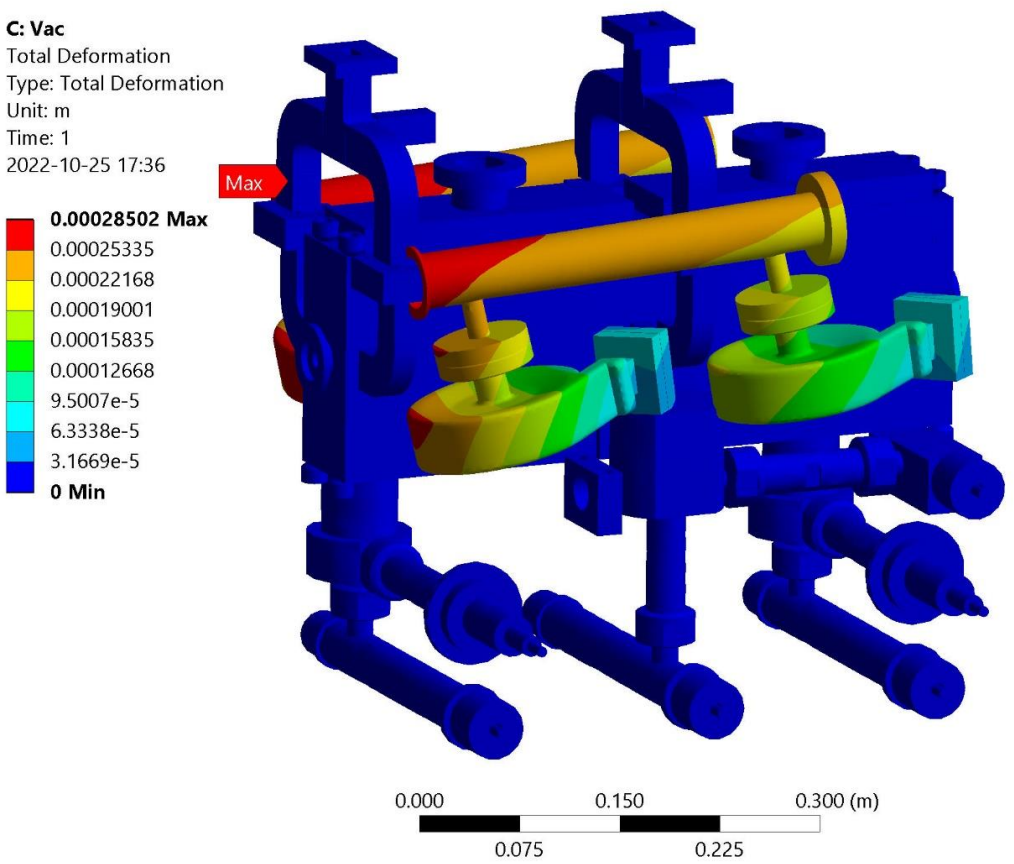
Considering the impact of the vacuum manifold for the RF loads, and whether it is possible to combine the manifold of neighbouring structures.



FEA of Vacuum Load

Assuming a common manifold would provide a vacuum load pulling two neighbouring structures together.





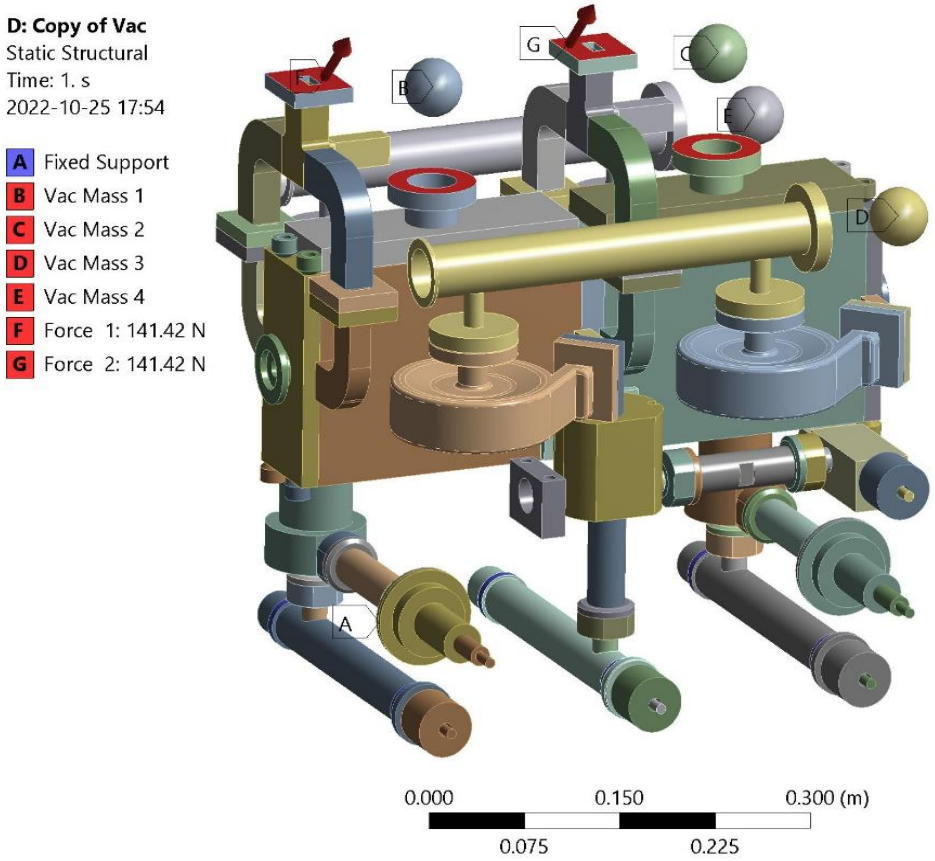
FEA of Vacuum Load

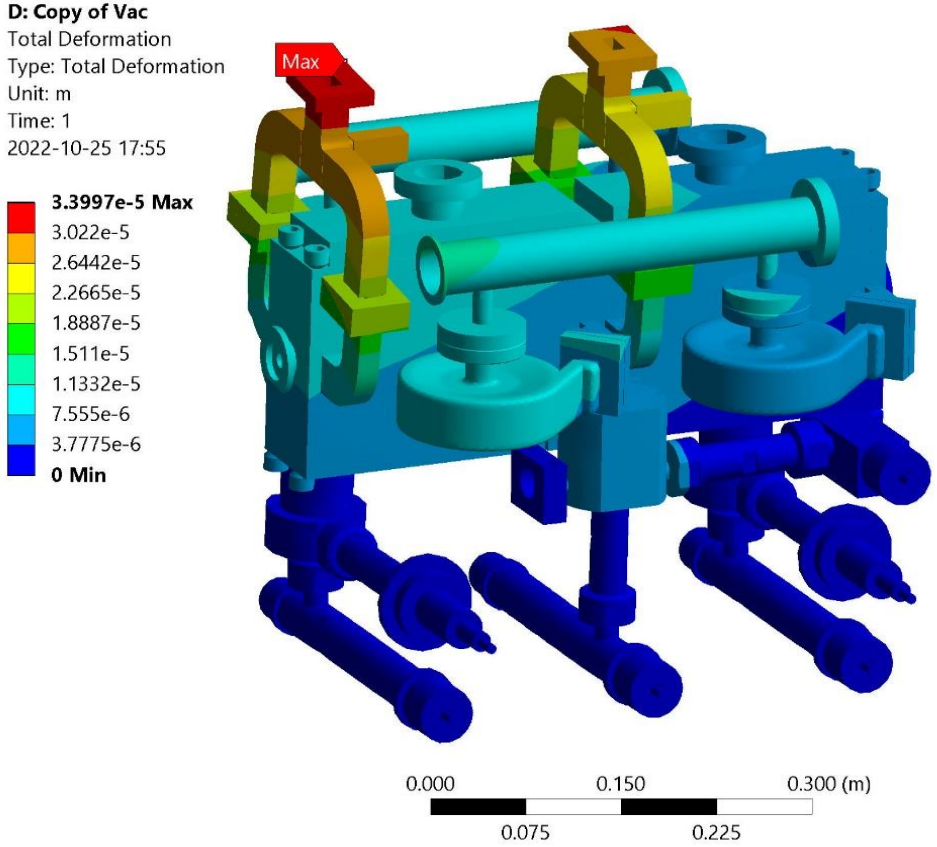
- Resulting displacement of the structure measured at the noses of the structure disks:
  - x_{MAX} (lateral) = 8.5µm
  - y_{MAX} (longitudinal) = 8.8µm
  - z_{MAX} (vertical) = 4.7µm

- Therefore the vacuum manifolds should remain separate.

FEA of Waveguide Reaction Force

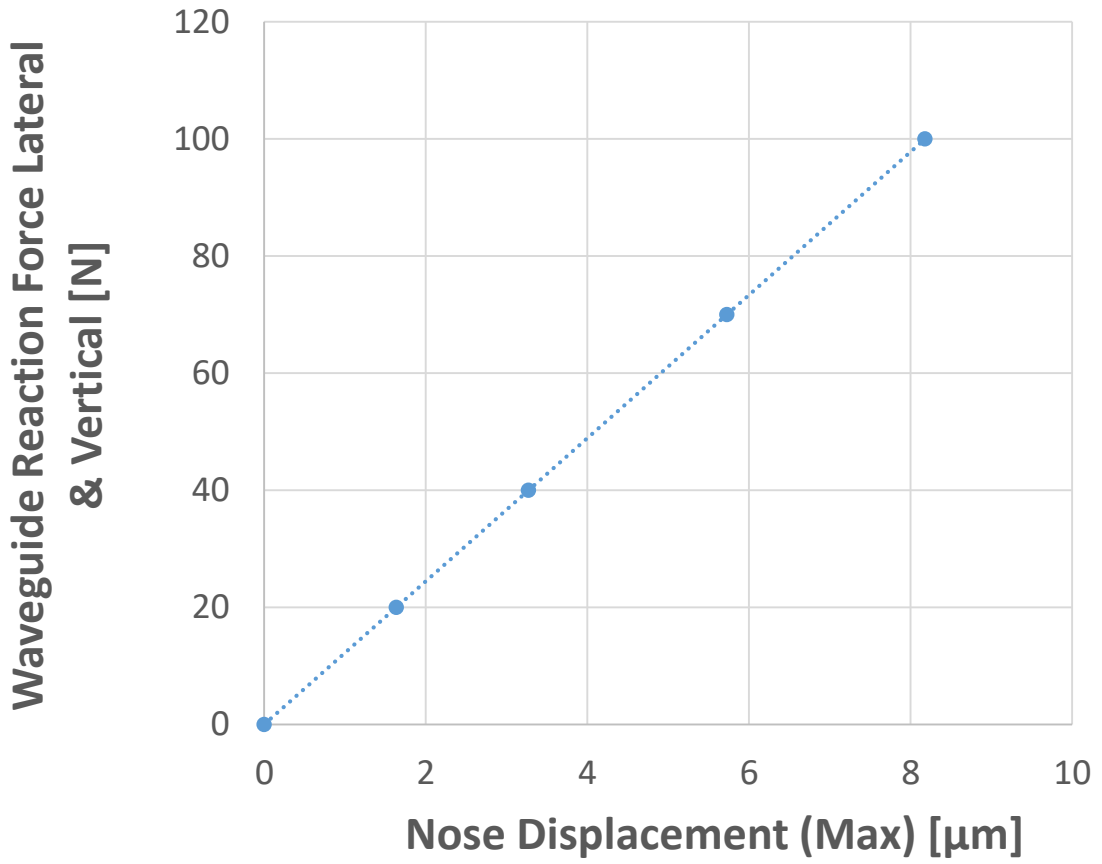
Using the same model to determine the impact of the waveguide reaction forces on structure position.





FEA of Waveguide Reaction Force

- Graph shows the resulting displacement of the structure disks when a reaction force is applied to the waveguide flanges both vertically and laterally
  - Therefore likely an oversimplification
  - 100N was chosen arbitrarily to show the relationship between the two
  - Will allow comparison with the waveguide optimisation



Considering Other Module Configurations

Considering Combining Steel DB & MB