Waveguide flex and beam interconnection

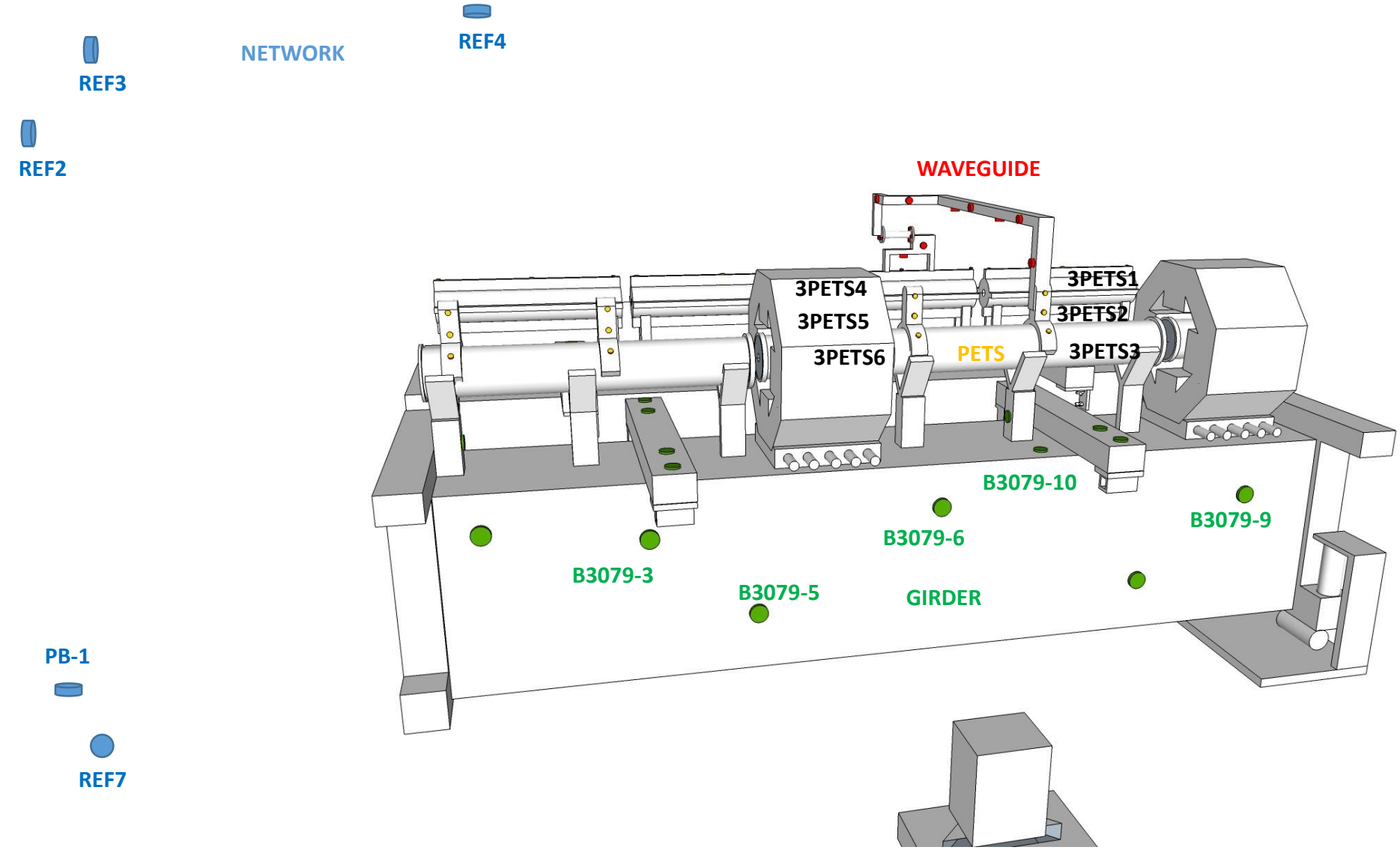
4/10/17

Summary

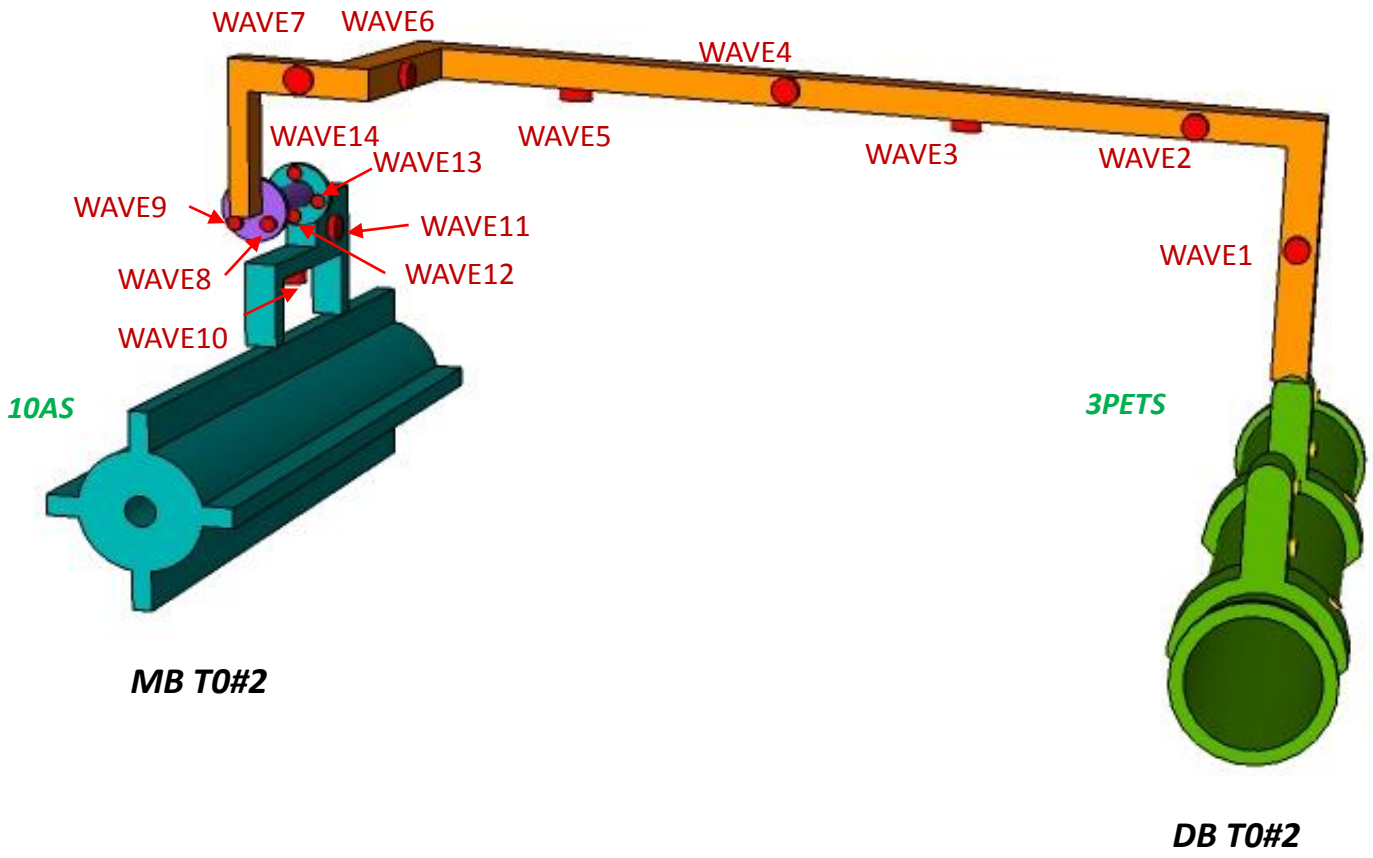
- Moving around MB girder
- Measure impact on DB girder
- Measure flex of WG

- Many thanks to A. Zemanek for the measurements
  - Detailed results: https://indico.cern.ch/event/667279/

Location of the measured points

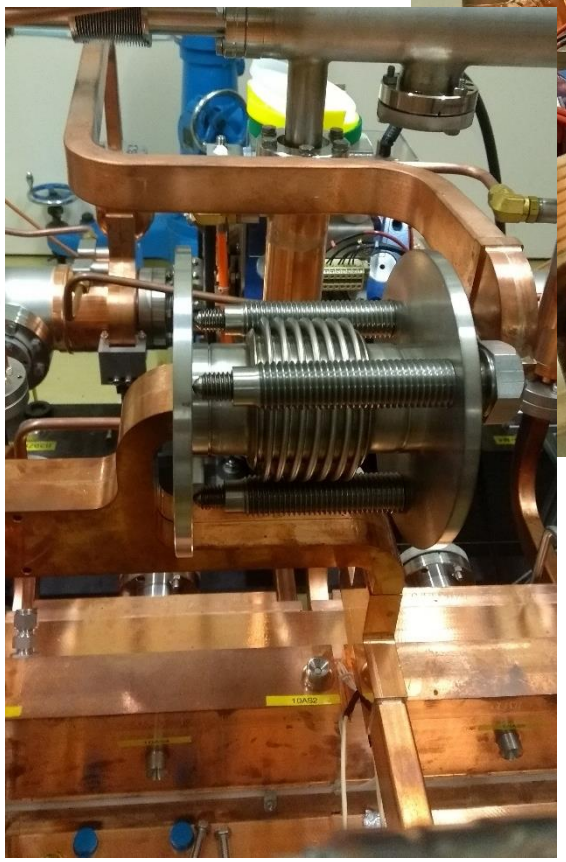


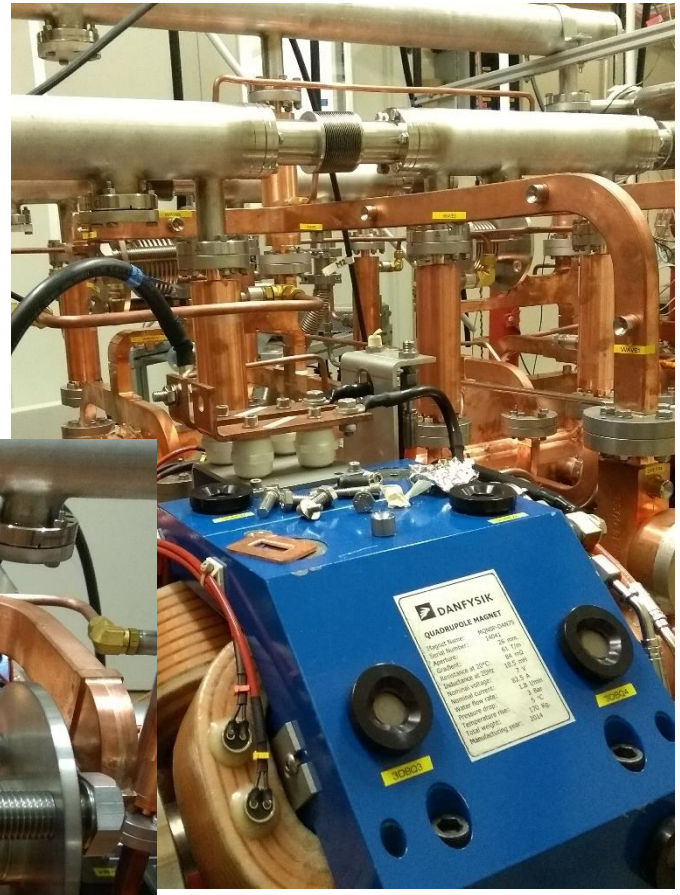
Location of the measured points



MB T0#2

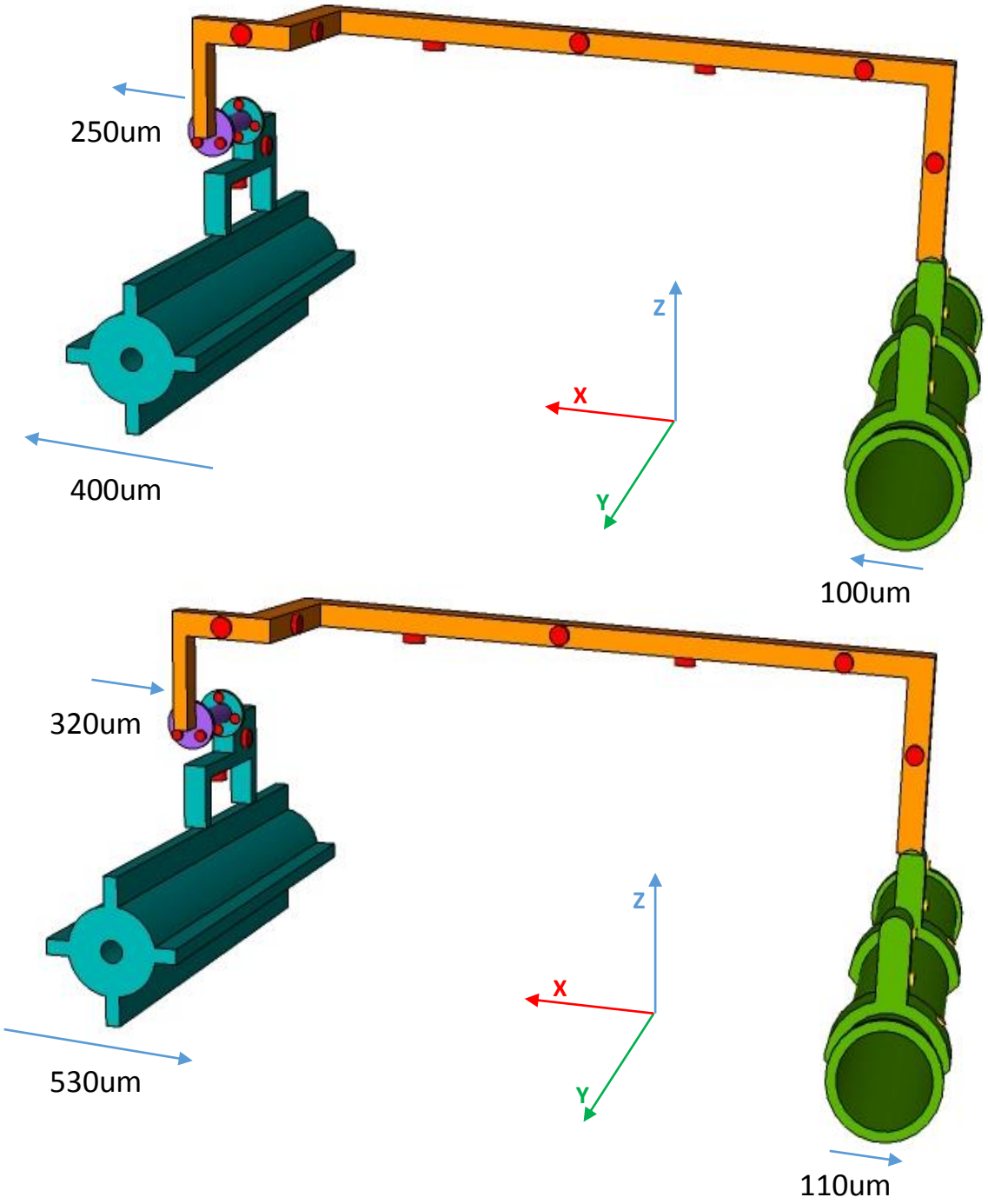
DB T0#2





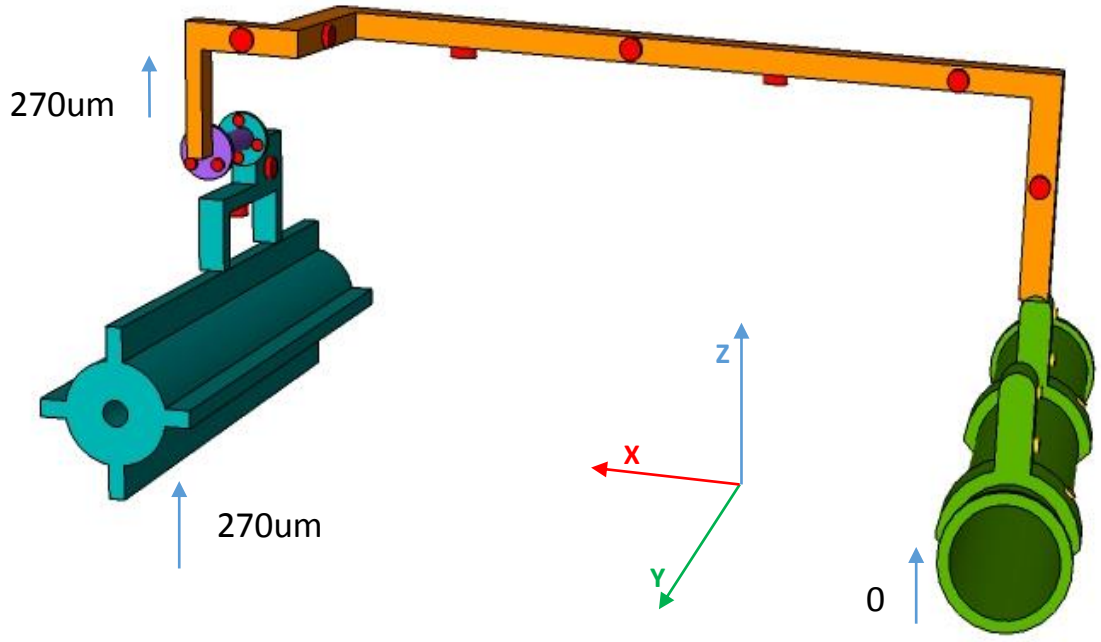
Transversal movement

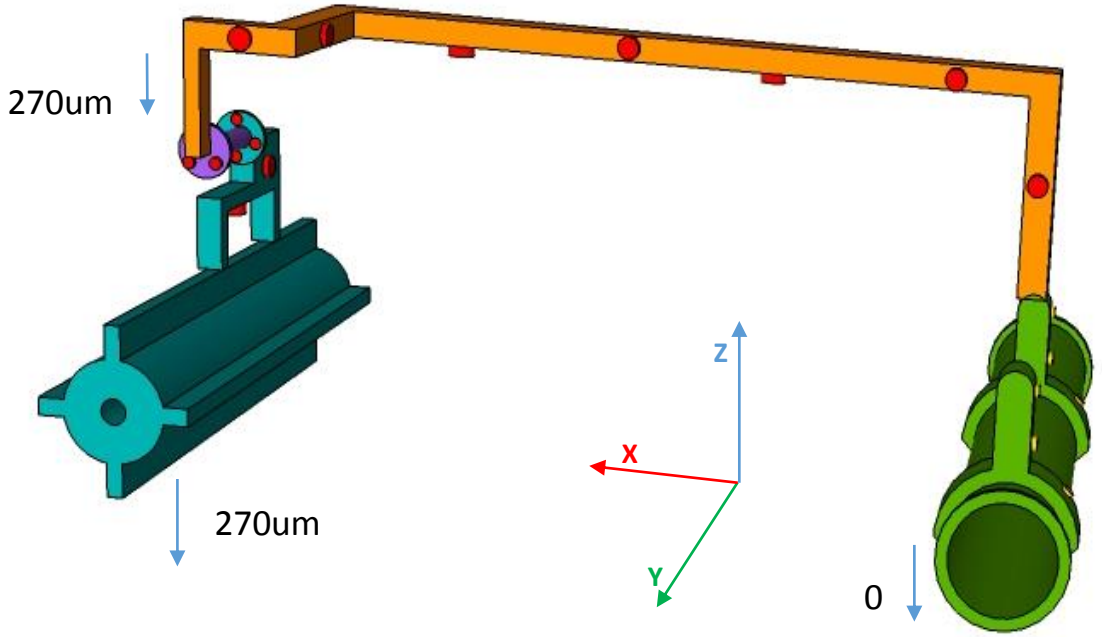
- For 400um of MB movement:
  - Bellow moves 250um
  - WG deforms 150um
  - DB is moved 100um
- For -530um of MB movement:
  - Bellow moves 320um
  - WG deforms 200um
  - DB is moved 110um
- Movement of DB is elastic, i.e. it returns to original position



Vertical movement

- For 270um of MB movement:
  - Bellow moves 0
  - WG deforms 270um
  - DB is moved 0
- For -280um of MB movement:
  - Bellow moves 0
  - WG deforms 280um
  - DB is moved 0





Simulation

- Transversal:
  - equal rigidity between WG and bellow
  - Good fit with experiment
- Vertical:
  - WG factor of 3 more flexible
  - Experiment shows a factor of ~10
- Difficult to compare
  - not exactly the same conditions

- S. Uimonen

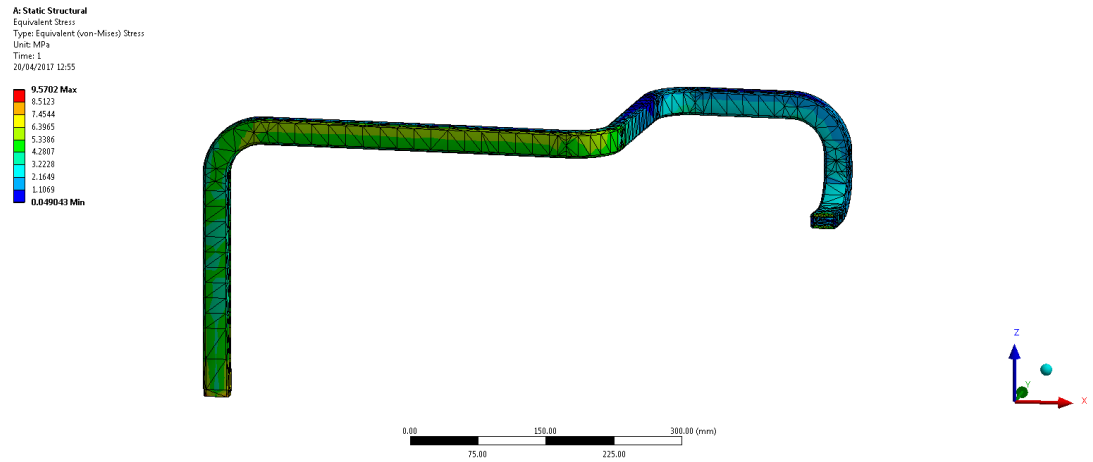


Figure 3.1. Equivalent stress under 1 mm displacement along X-axis.

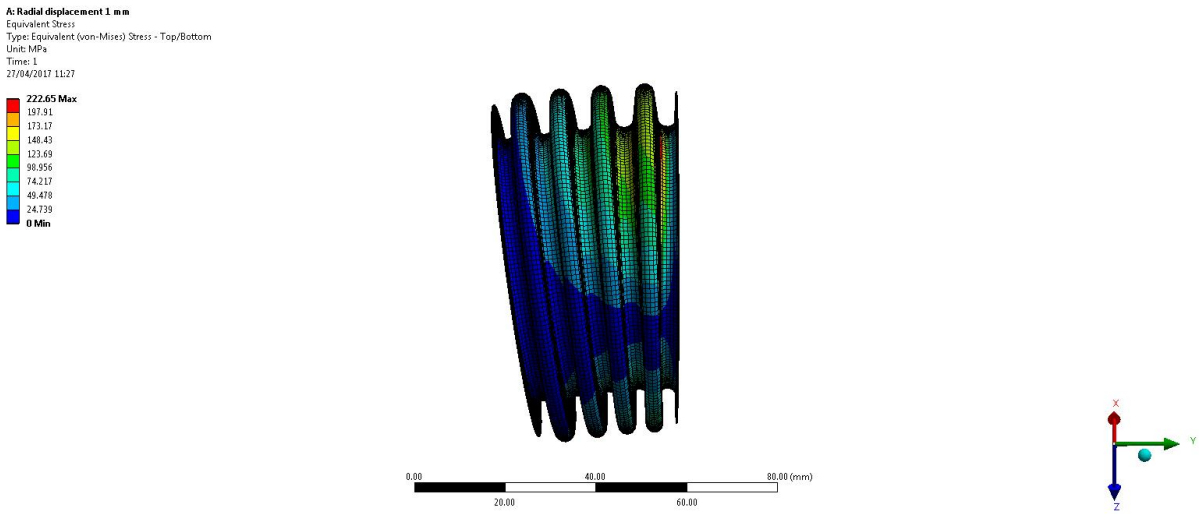


Figure 3.3. Equivalent stress and deformation plot for radial displacement 1 mm.

Conclusions

- Vacuum has no significant effect on the components
- Transversally:
  - MB movement induces DB movement (1:5 ratio)
  - WG flex is similar to bellow
- Vertically:
  - No link between beams found
  - WG is much more flexible than bellow, it accommodates fully the movement
- The shape of the WG can be adjusted to accommodate for displacements
- Micro-controlle support system is more rigid than Boostec
- PETS attached to the girder rigidly
- SAS show small roll movement