Platform support

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Cryostat Design Meeting

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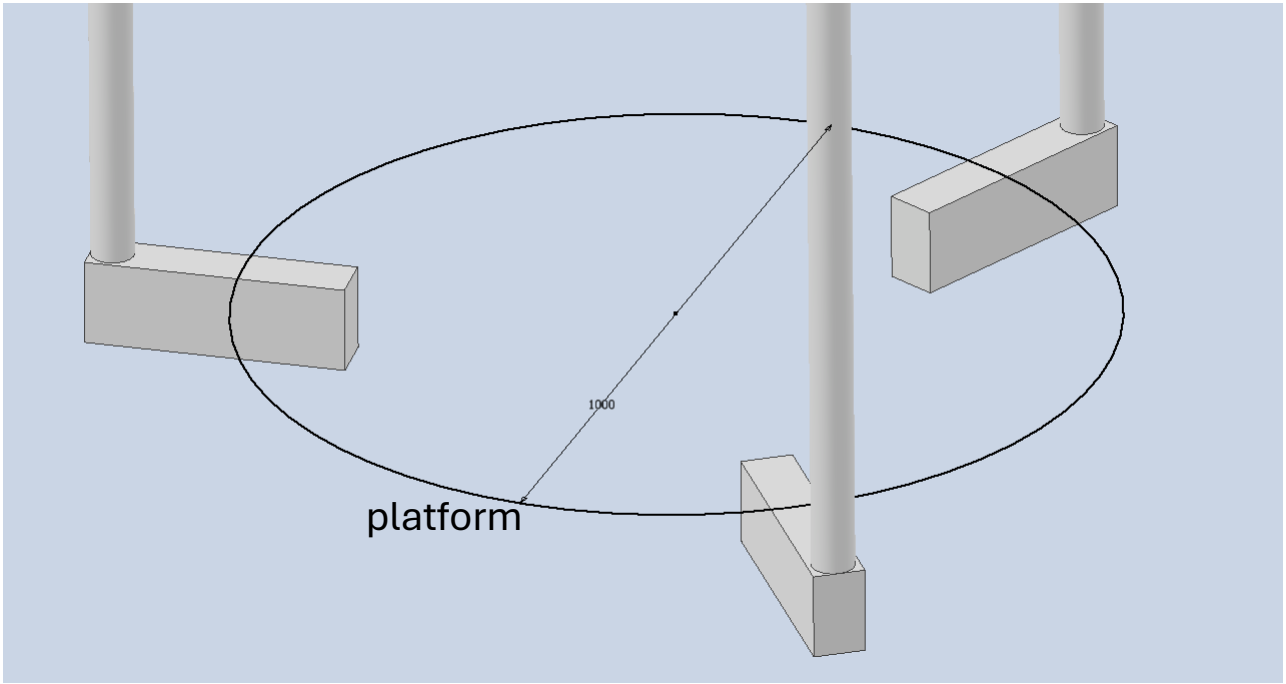
Platform support

- A support that holds the platform during payload operation
- This is going to stay in the cryostat during the interferometer running

- Assembly reason
  - Helping during the payload assembly
    - Keep the platform until everything is suspended
  - Coarse reference of payload angular position

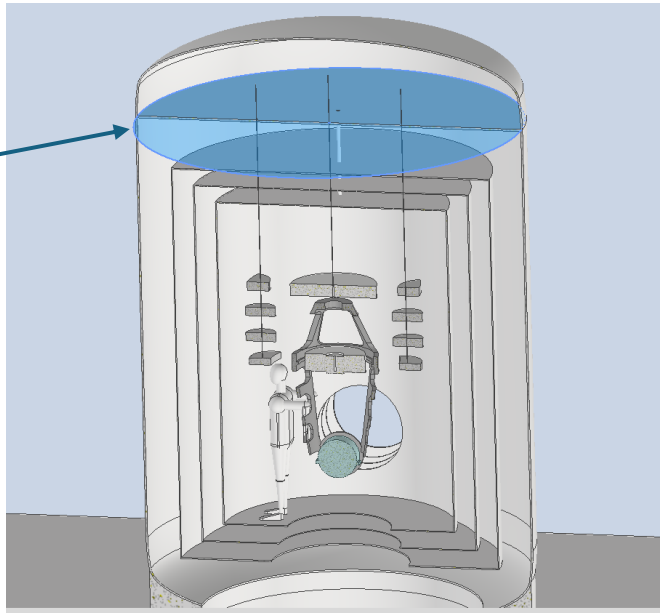
- Safety reason
  - If the wire connecting the platform brakes, it avoid that all the payload will fall down

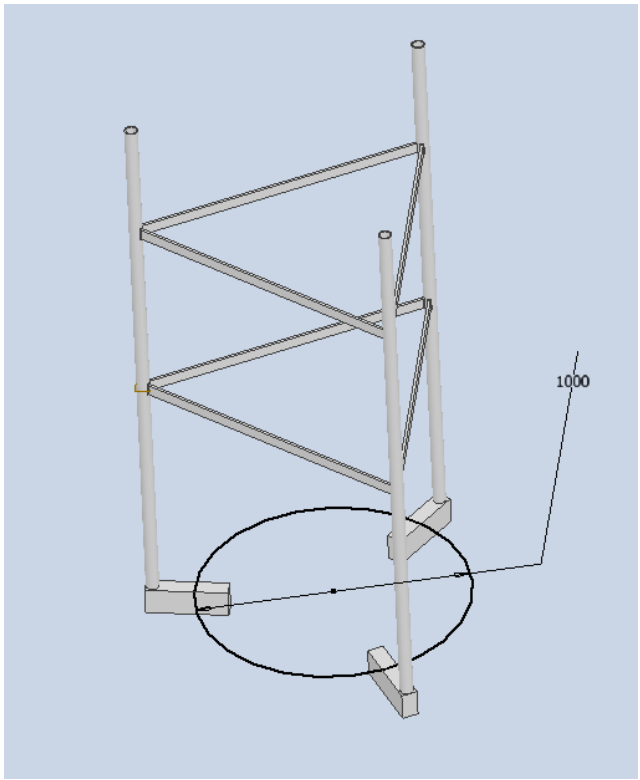


Main design idea

- Attach this support at the separating roof (blue flange)

- 3 tubes connected each other
  - Connection between tubes to increase rigidity



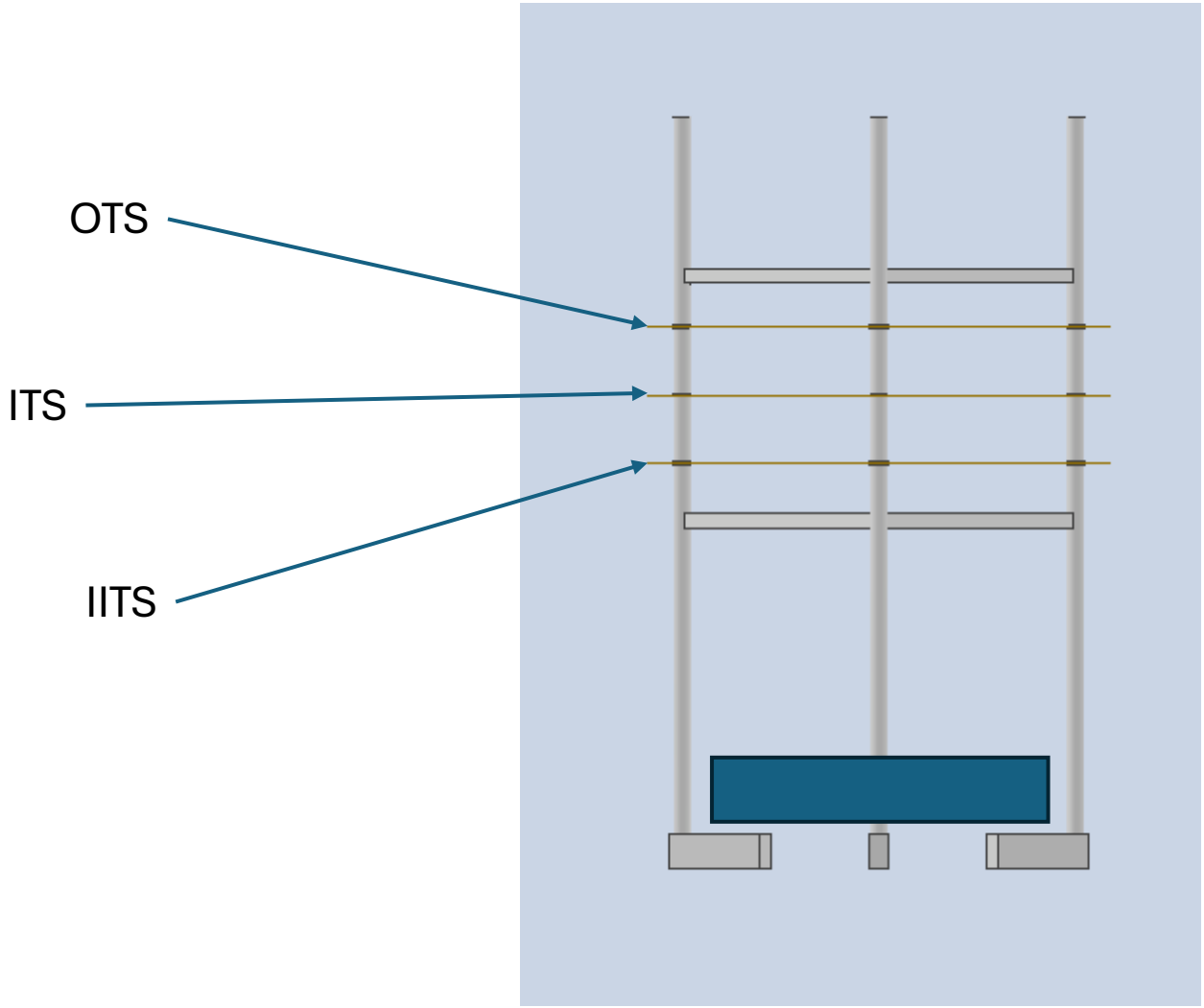


Requirements

- Support the 900kg load on one leg
  - In case of falling payload it is going to hit one leg first
- Need to be thermalized…?
- Normal frequency
- …?

Platform support

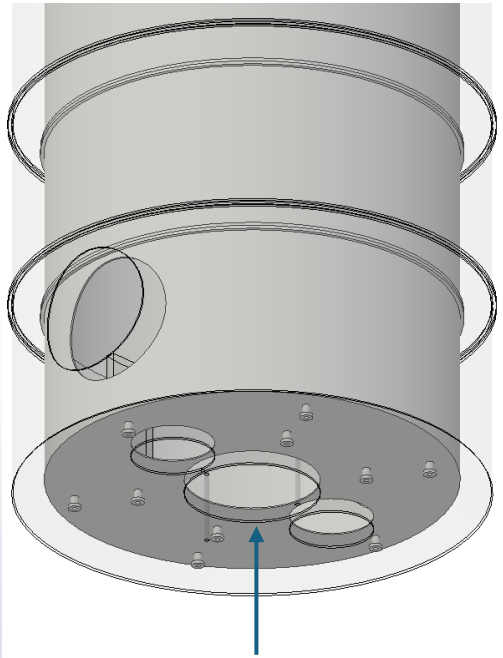
- Position of the support into the cryostat
- 2 stiffners: one over OTS, the other below IITS



Payload integration

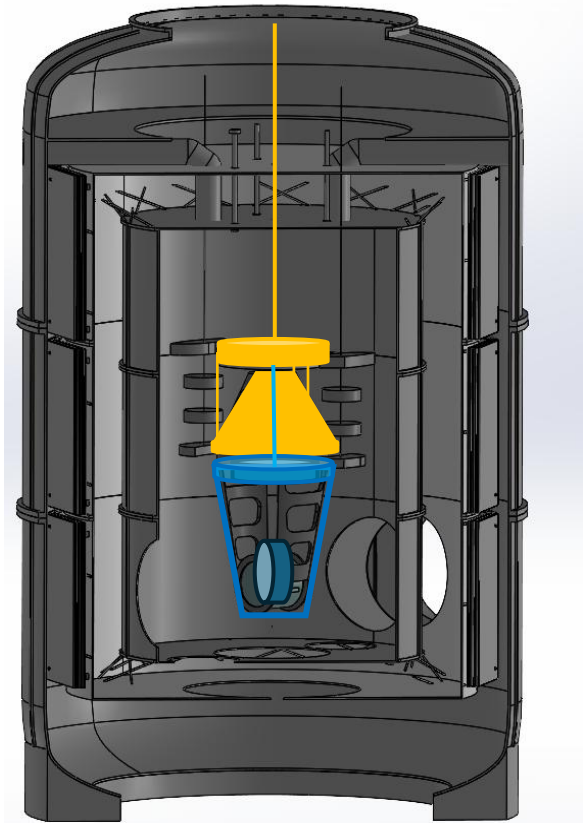
Payload will enter in the cryostat from the bottom:

- Need adjustment to match the marionette suspension wire (crystal) and the flange to bolt the actuation cage to a suspended circular flange
  - Both the horizontal directions
  - Vertical rotation



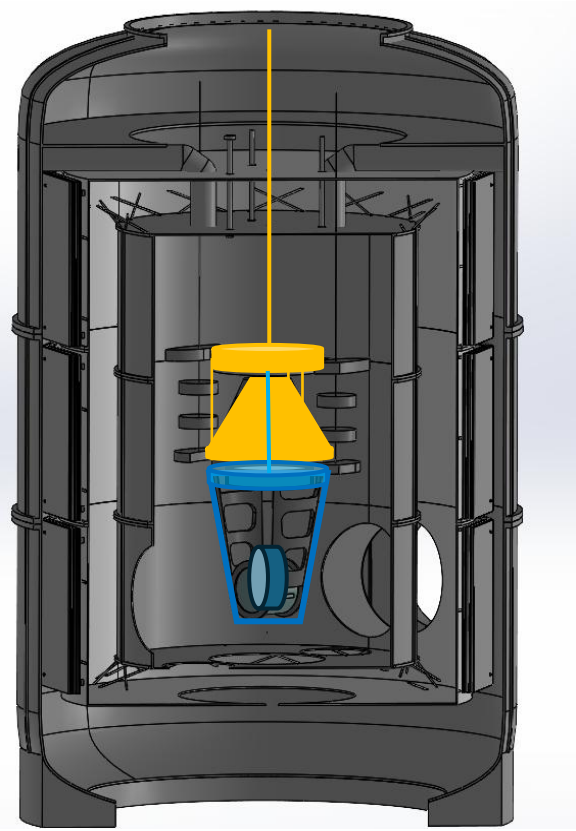
A possible scenario

- Paylaod can’t enter all assebled
- Payload’s orange part will enter first
  - Attach heat link from HLVIS to the actuation cage
  - Bring the platform to the support



Payload integration

- Platform will be hung by the support in these slides
- Blue payload subpart is on his frame
  - The Marionette and the mirror are blocked
- Get the blue payload subpart frame out
- Free the mirror
  - possible screws with a PEEK end to block the mirror movement
- Free the marionette from the actuation cage
  - «Arrows» fixing blocks
- Suspend the platform
  - Before suspend the platform connect the suspending wire



Platform support seed design

Support seed design idea

- 3 pipes connected
  - Material: stainless steel
  - Other options: titanium, …?
- First iteration design parameter

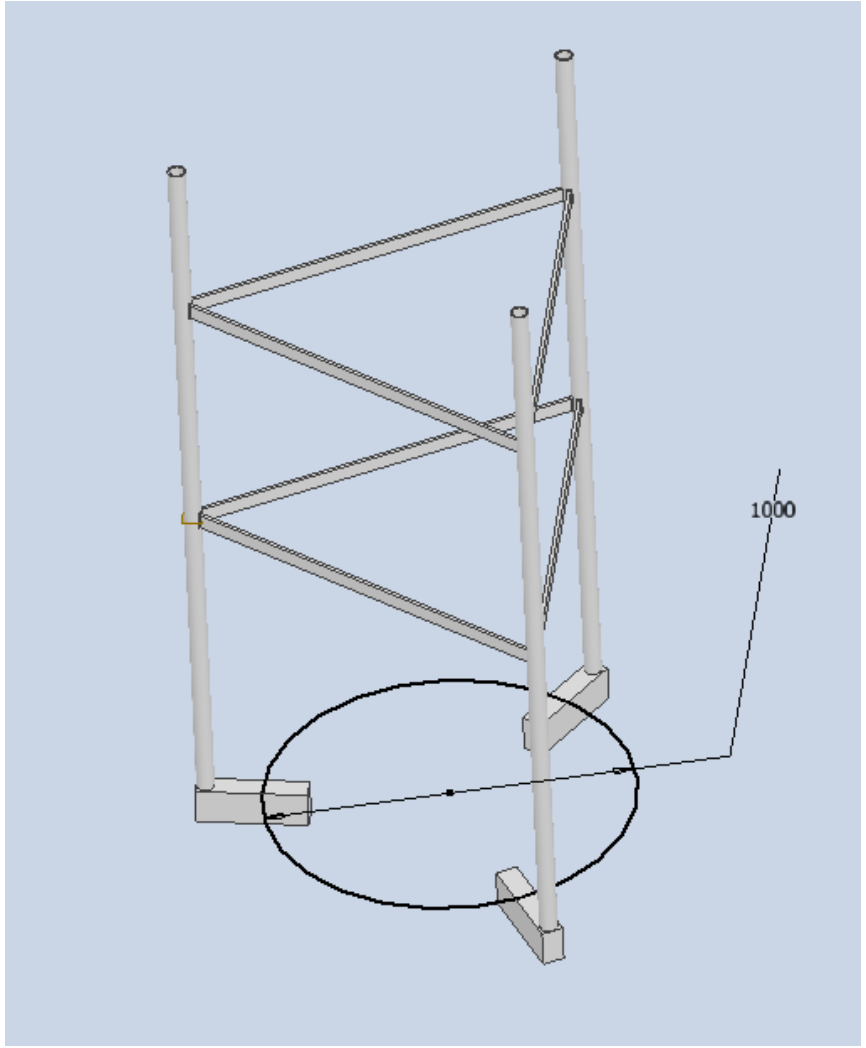
$mass := 900\ kg$ mass of the payload

$sf := 20$ safety factor

$De := 50\ mm$ outer diameter of the beam support

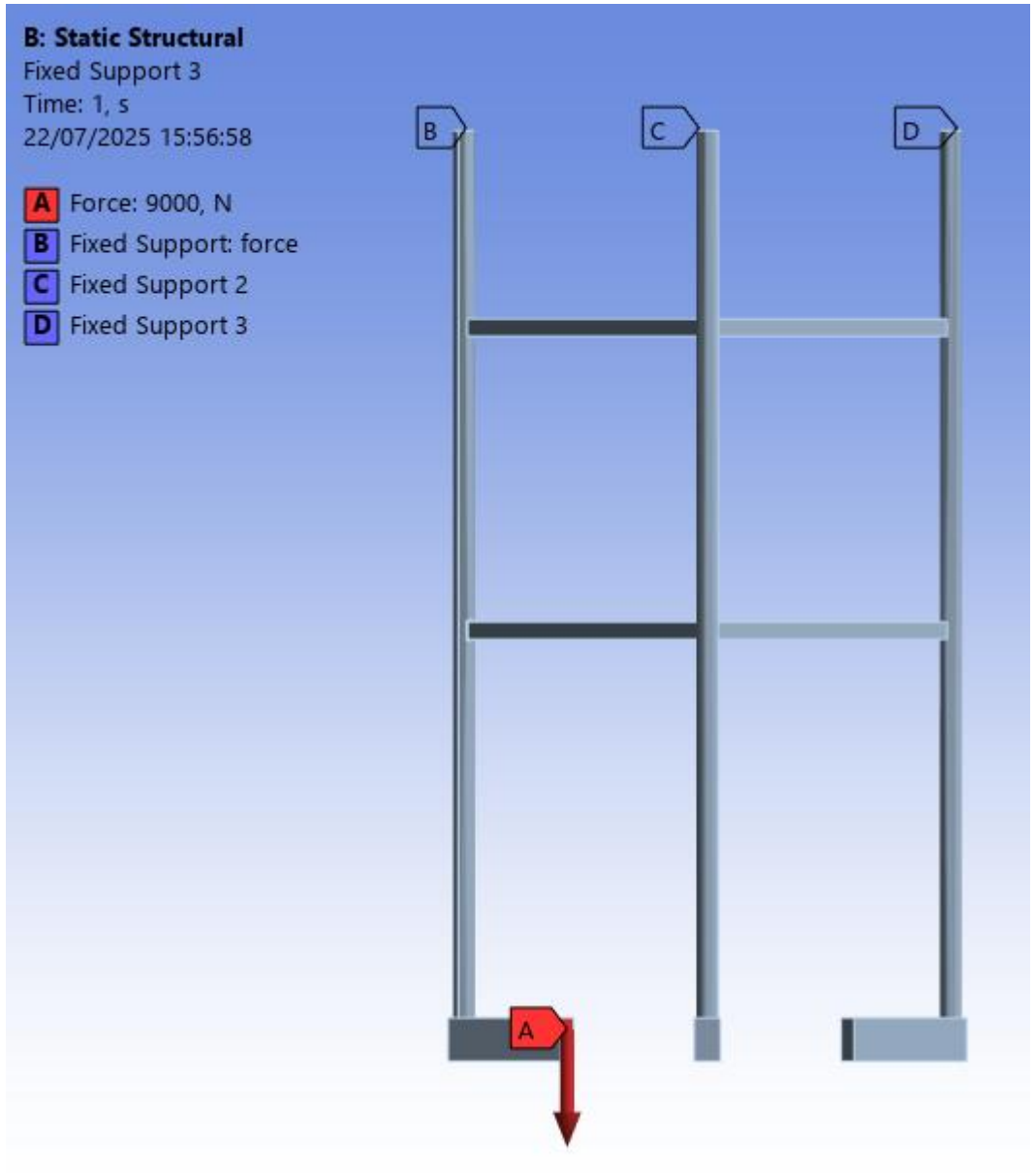
$\sigma_y := 200\ MPa$ Yeld strength stainless steel

$$Di := \sqrt{De^2 - \frac{4 \cdot mass \cdot g}{\pi \cdot \frac{\sigma_y}{sf}}} = 37.098\ mm$$



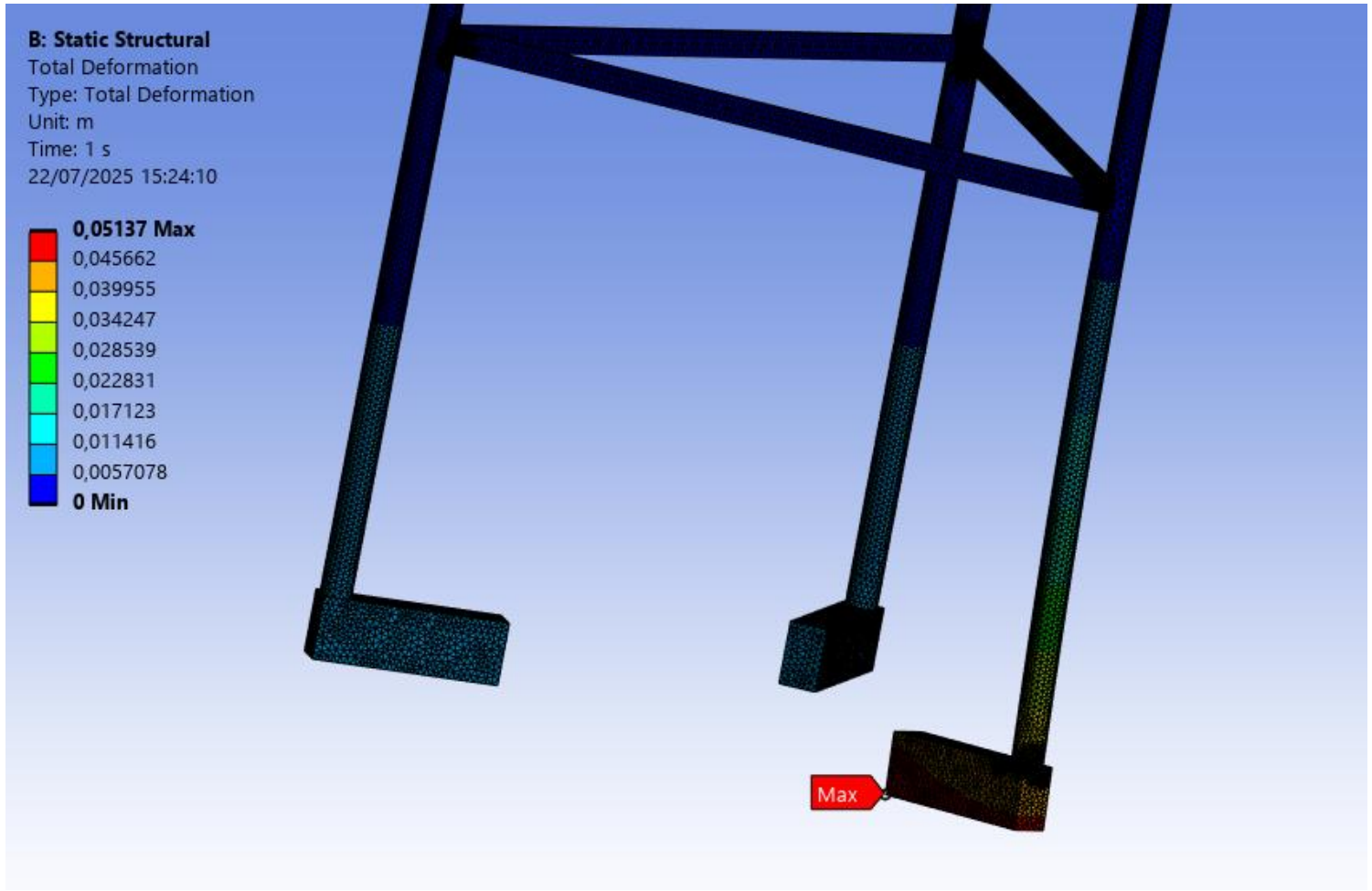
Load and constraint

- 900kg on one leg: if the payload falls hits one leg
- Fixed support on the upper leg end



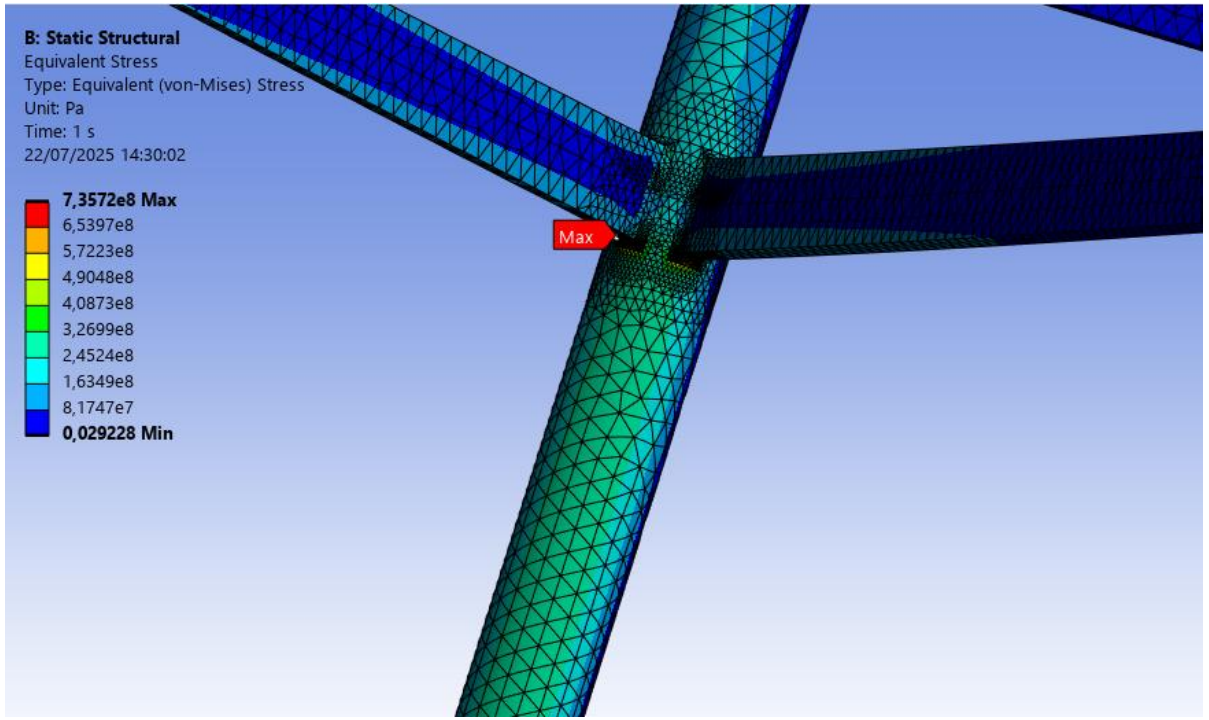
Results

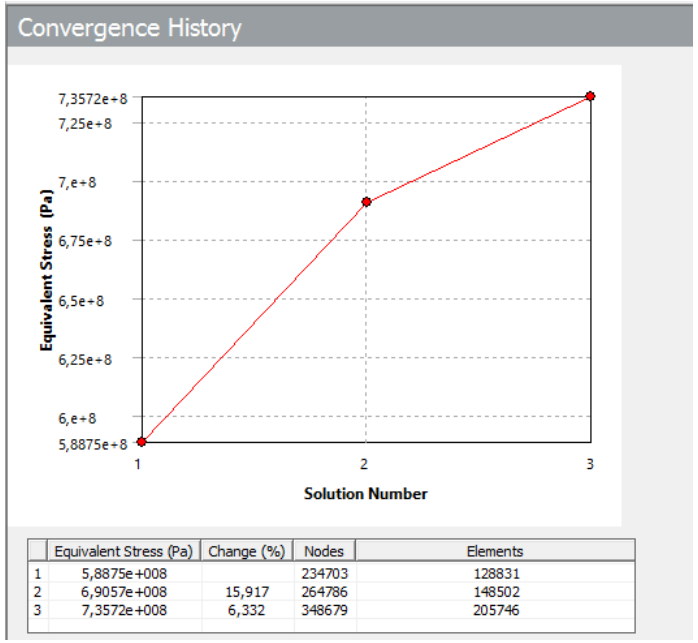
Max displacement: 51mm



Results

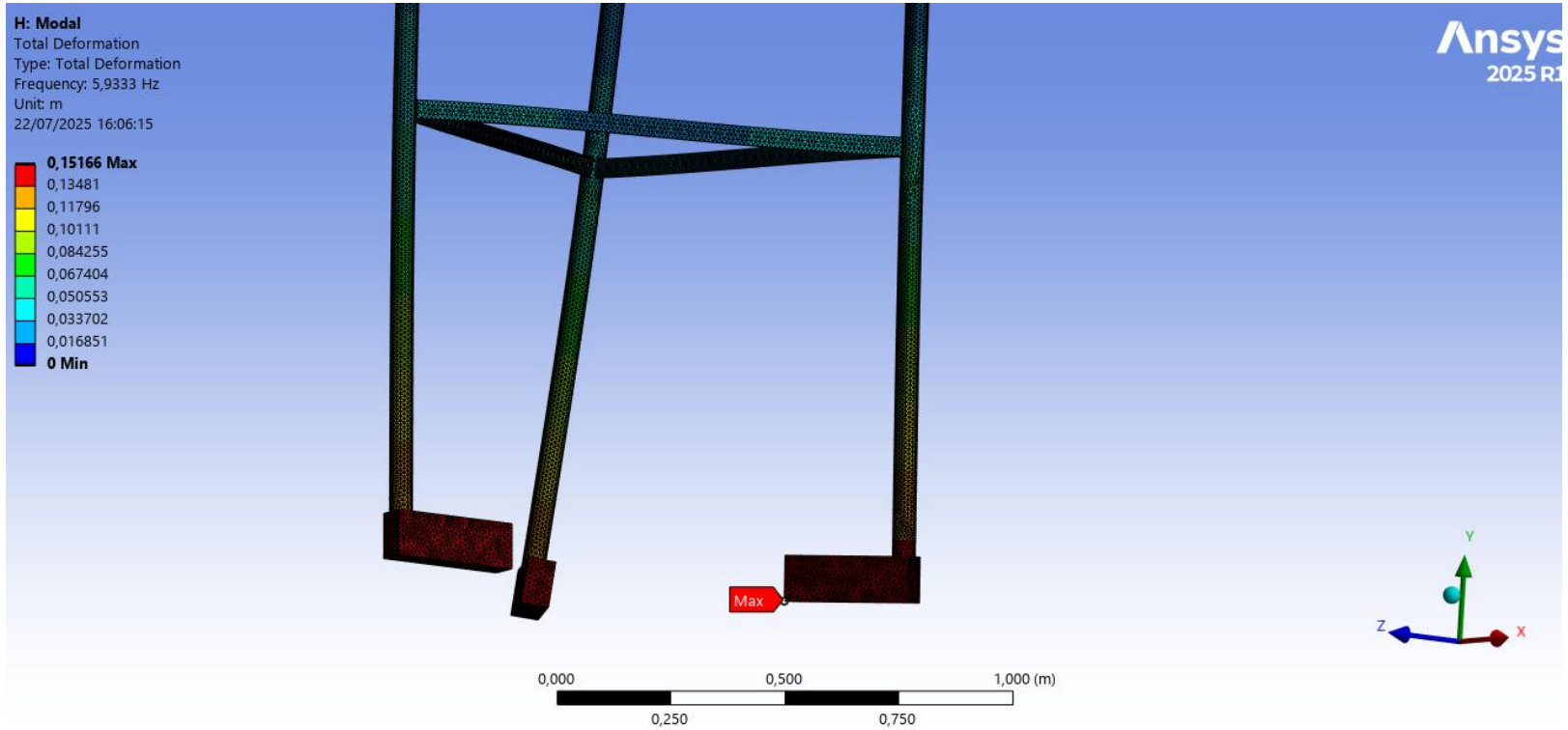
- Max Von Mises stress: 737 MPa
- Convergence: 6%

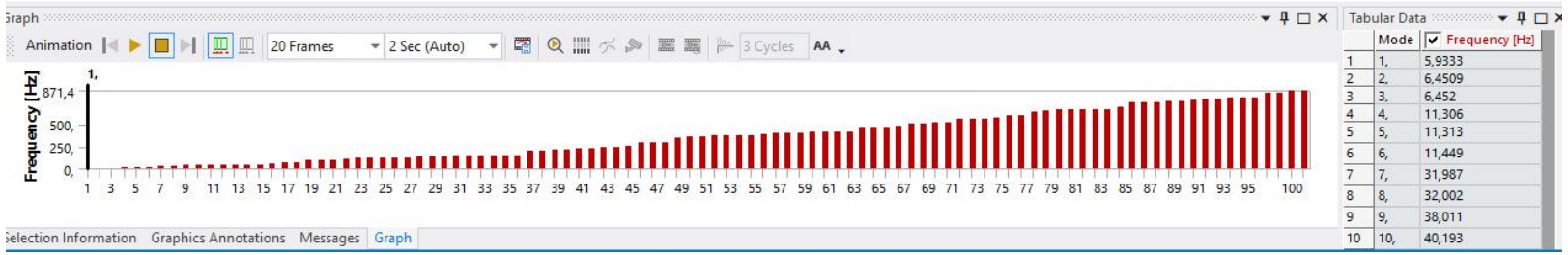




	Equivalent Stress (Pa)	Change (%)	Nodes	Elements
1	5,8875e+008		234703	128831
2	6,9057e+008	15,917	264786	148502
3	7,3572e+008	6,332	348679	205746

Modal

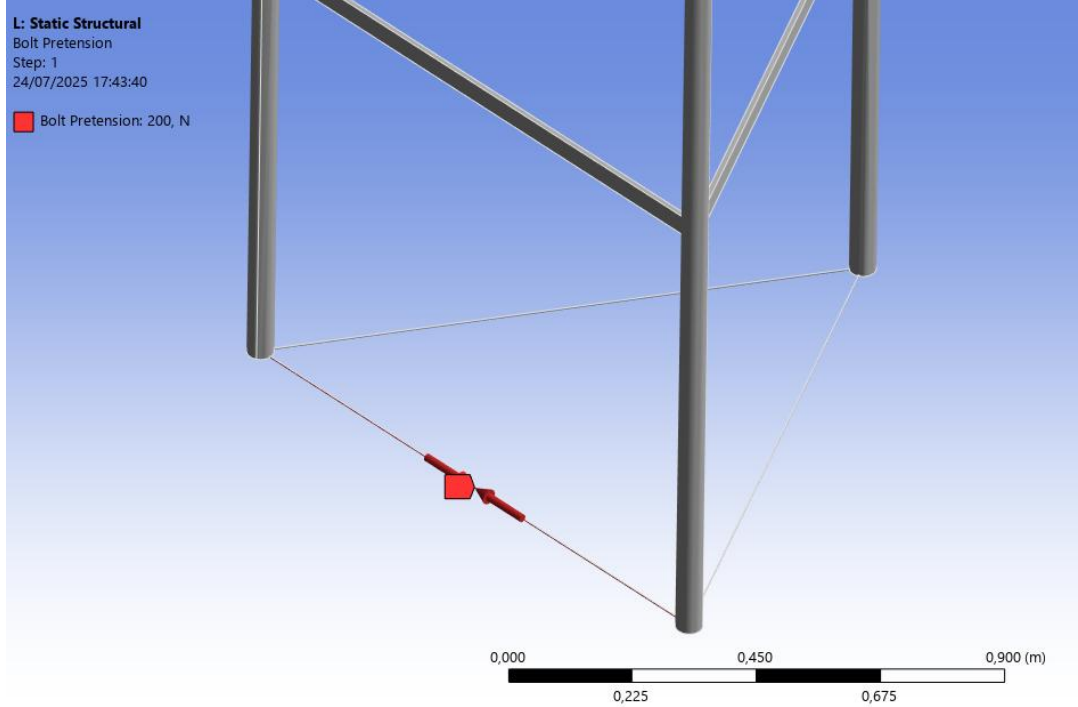




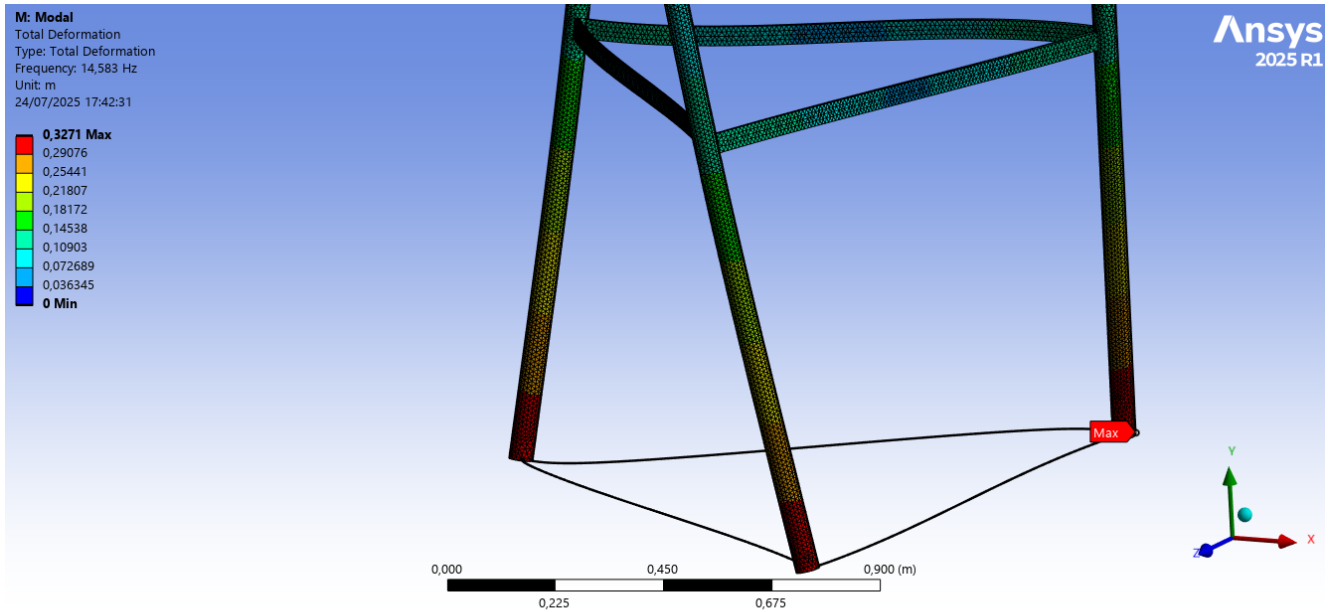
- Problem is that the final part is a «pendulum»
- Normal frequency do not dipend by the beam cross section

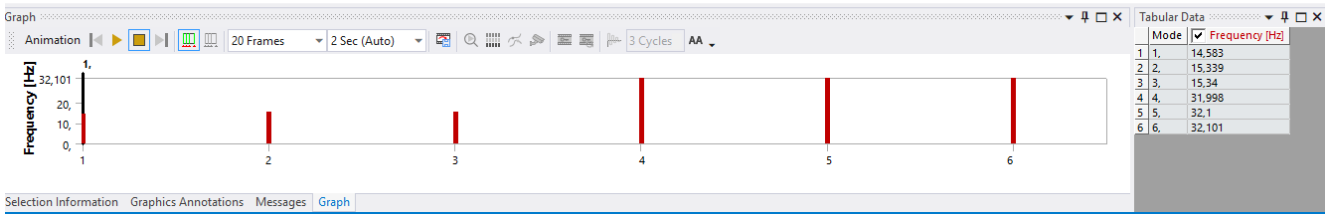
Modal

- Ends connected with pre tensioned wire
- 3mm diameter stainless steel wire



- Bolt pretension to simulate a tension wire
- 200N of pre tension





- 1° mode: 14Hz

Improving the PF safety&stop structure

- Work in progress

CPF Counter Platform to let the PF stop in case of suspension failure

Nail head stop