

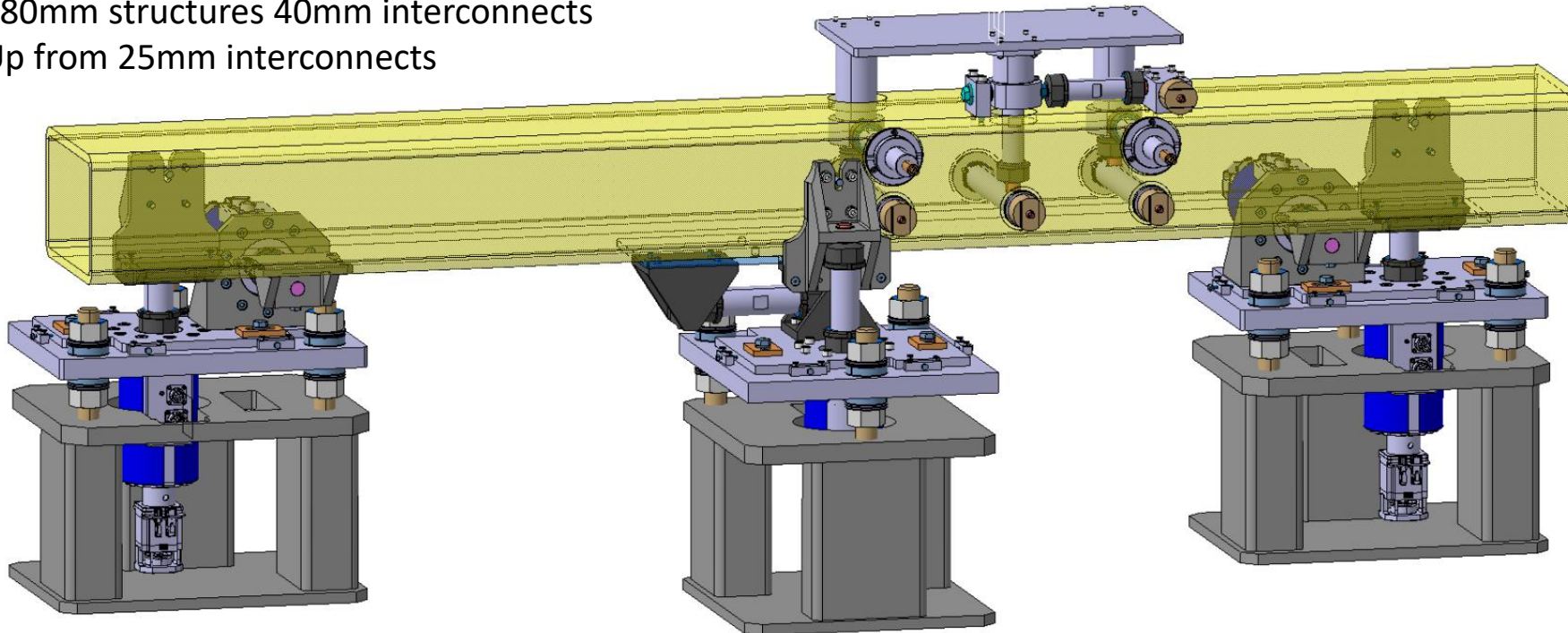
# Girder Support System Update 07/12/2021

Matthew Capstick

# Lab-Module Girder Layout

Current layout (one SAS platform shown). Key points:

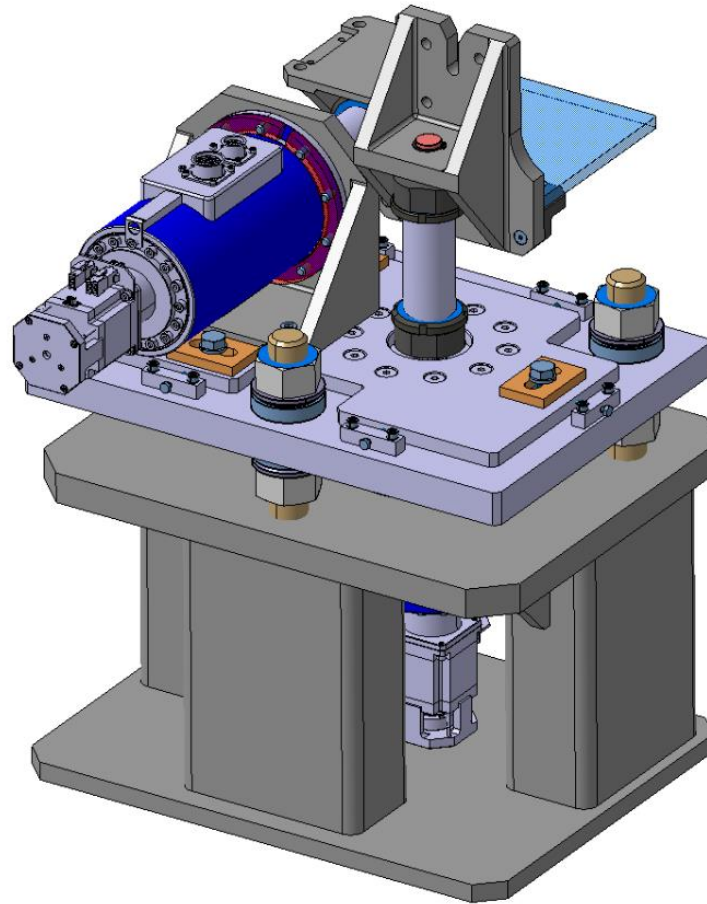
- Fixed non-adjustable longitudinal
- Reduced weight base plinths
- 2.08m length
  - 480mm structures 40mm interconnects
  - Up from 25mm interconnects



# End Support

End support

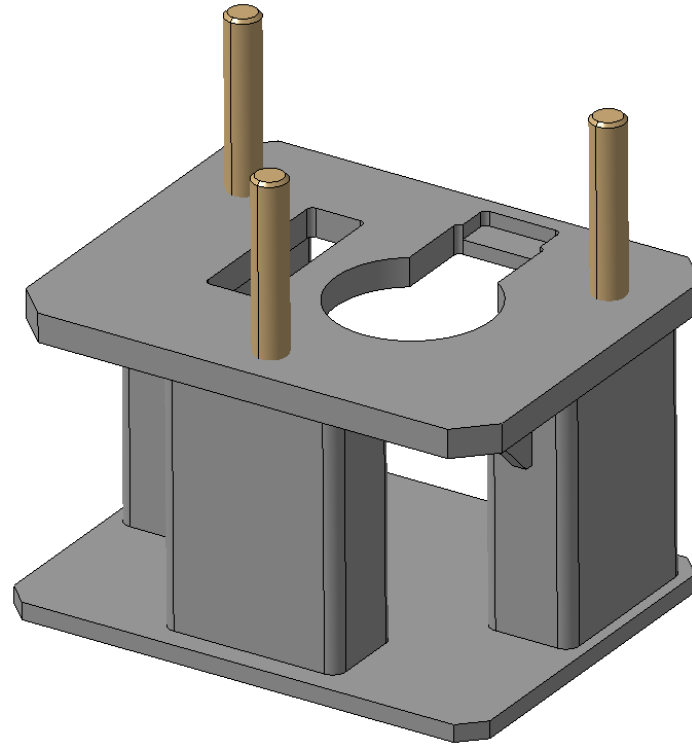
- Vertical and lateral actuators
- Same (mirrored) at each end



# End Support Assembly

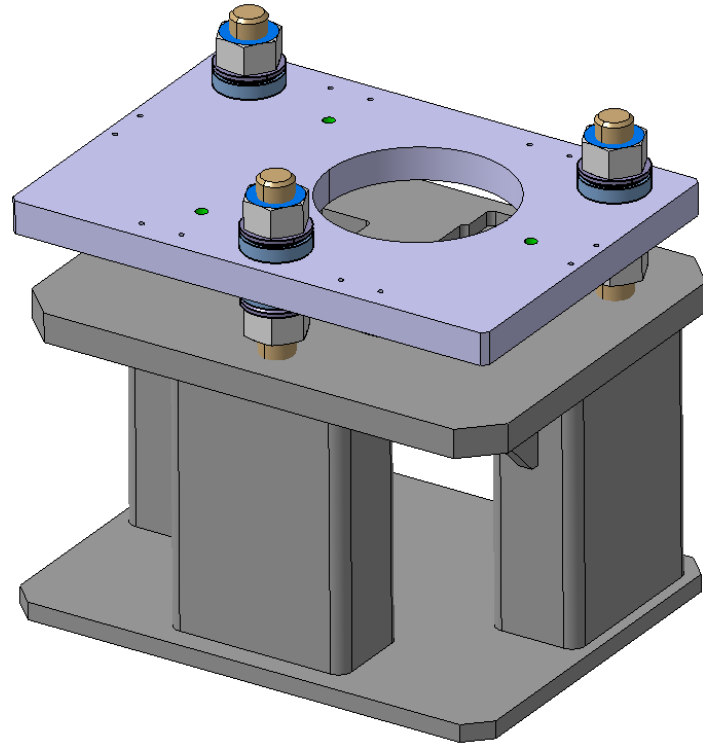
End support fabricated plinth

- Mass: ~65kg
  - Mild steel standard plate/sections
  - Painted
- Stainless threaded rods



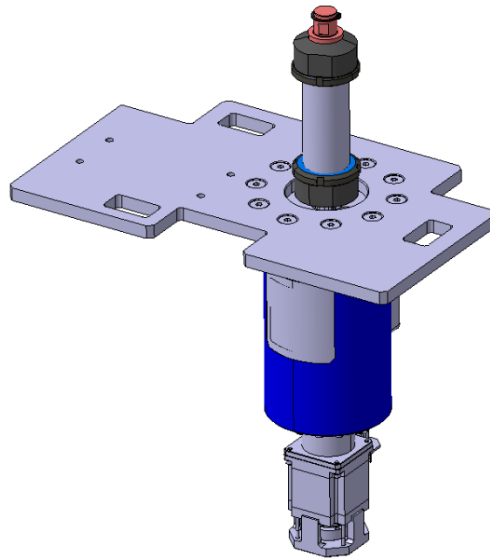
# End Support Assembly

End support base plate

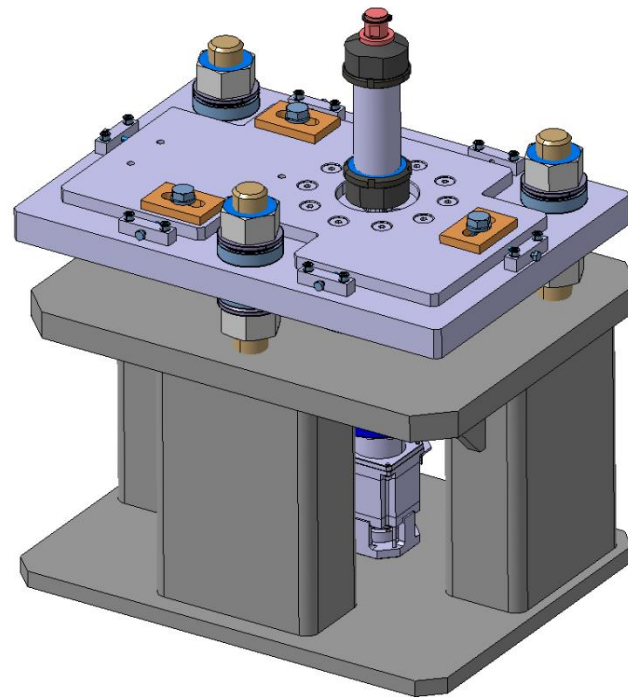


# End Support Assembly

- Vertical joint is assembled to the actuator, then the actuator is mounted to a plate
- This plate can be relatively thin, and possibly aluminium, without significantly impacting the stiffness, assuming that it can be clamped down onto the base plate

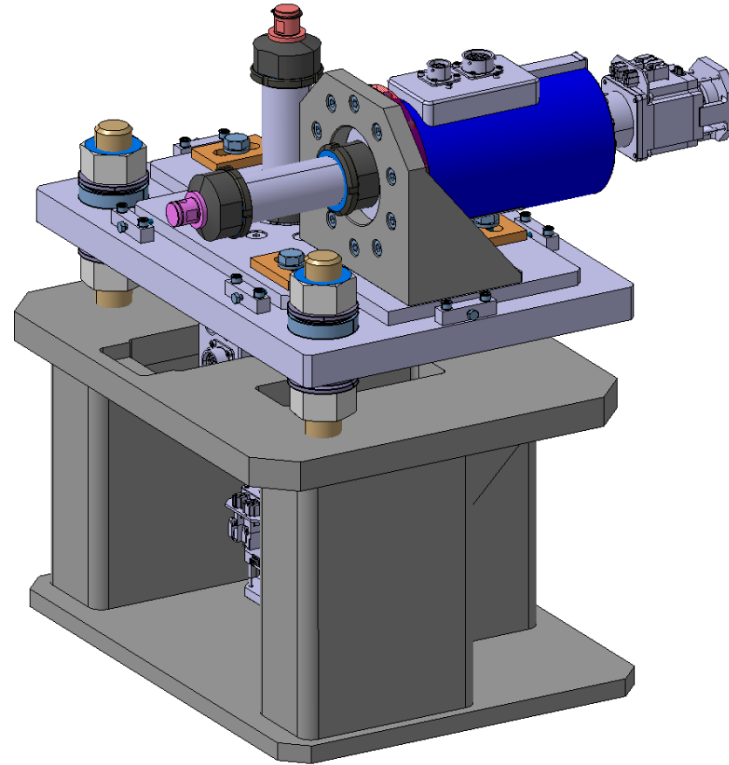


# End Support Assembly



# End Support Assembly

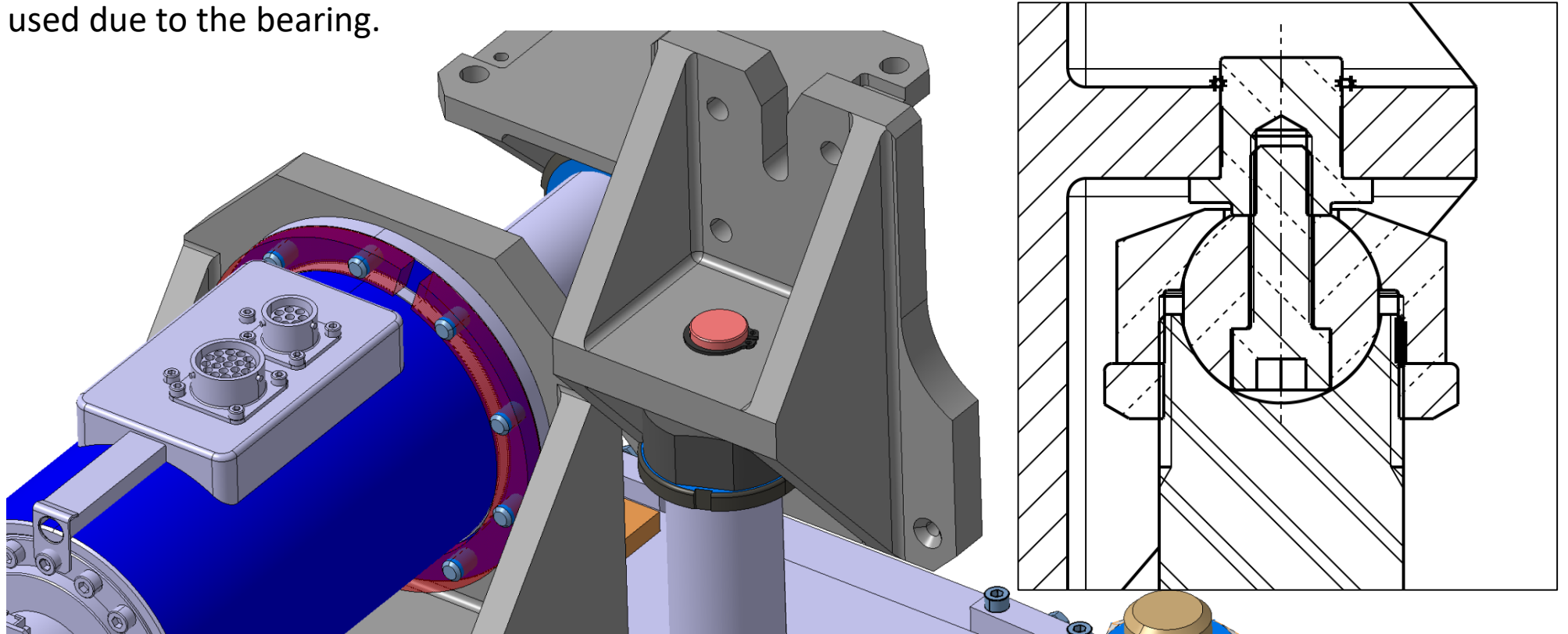
- Lateral actuator and joint would be assembled and mounted in the same way





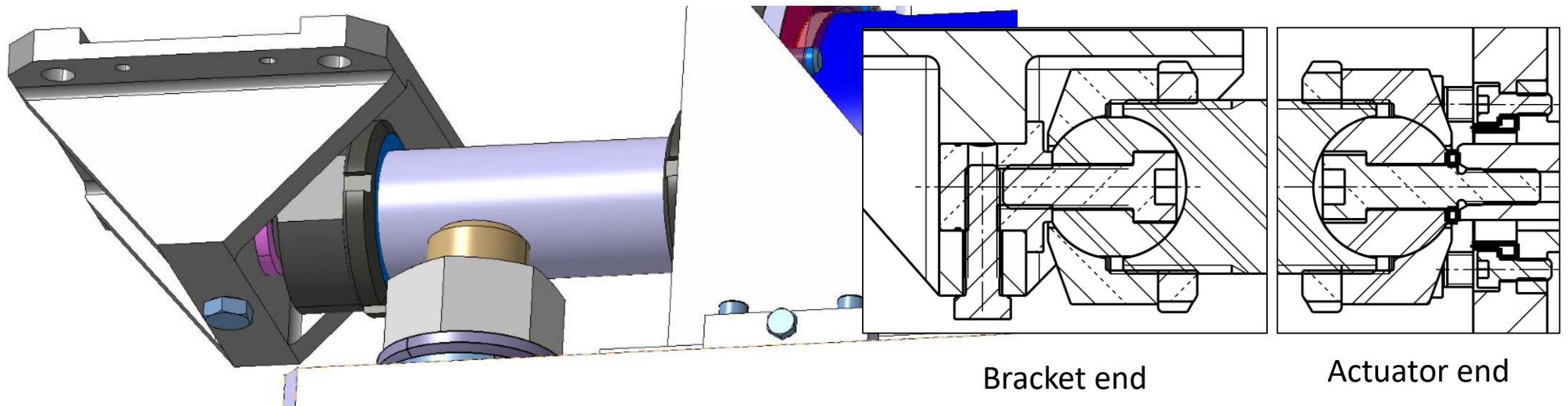
# End Support Assembly

- Vertical joint would be preassembled with a nut (shown in pink) with a step. The vertical bracket would sit on the nut against the step. It would be held in place due to gravity (also shown here with a circlip). A nut cannot be used due to the bearing.



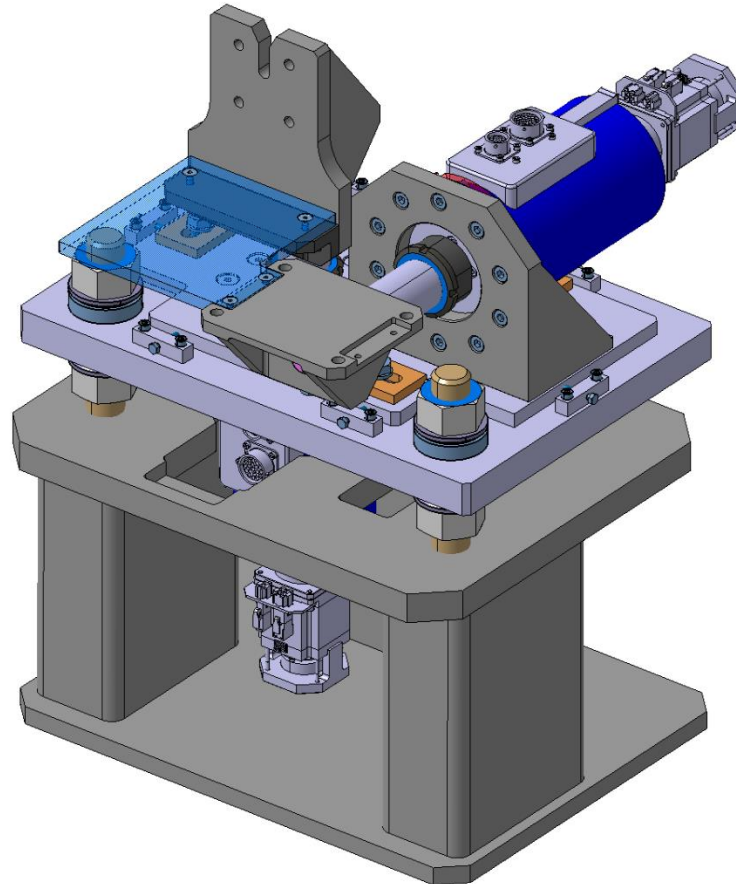
# End Support Assembly

- Lateral joint would be preassembled with a nut (shown in pink) with a step. The lateral bracket would sit on the nut against the step. Since there is not gravity in this case, I have inserted a bolt from below.
- Care taken to turn the nut to the correct orientation before bracket installation.



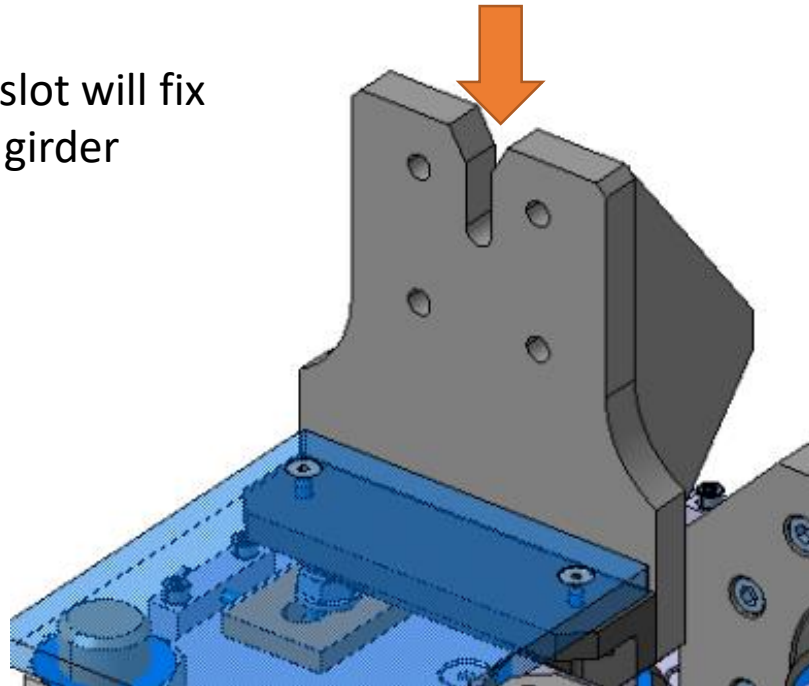
# End Support Assembly

- Final plate (blue) would link the two brackets to constrain each other during the assembly.
- The longitudinal position of this plate would be unconstrained. Experience with our joint suggests this isn't an issue.



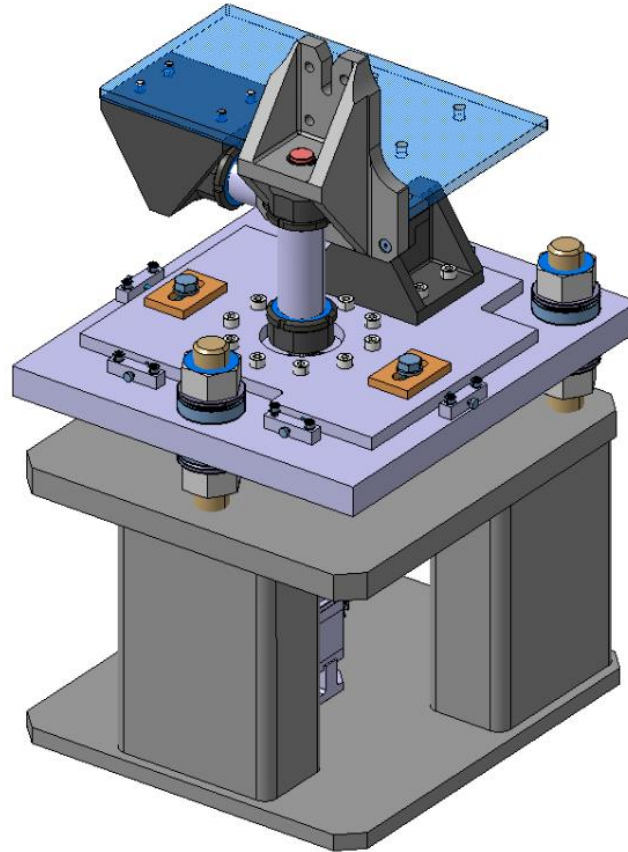
# End Support Assembly

- Final plate (blue) would link the two brackets to constrain each other during the assembly.
- The longitudinal position of this plate would be unconstrained. Experience with our joint suggests this isn't an issue.
- Dowel pin in girder and guided slot will fix the longitudinal position of the girder during installation



# Centre Support Assembly

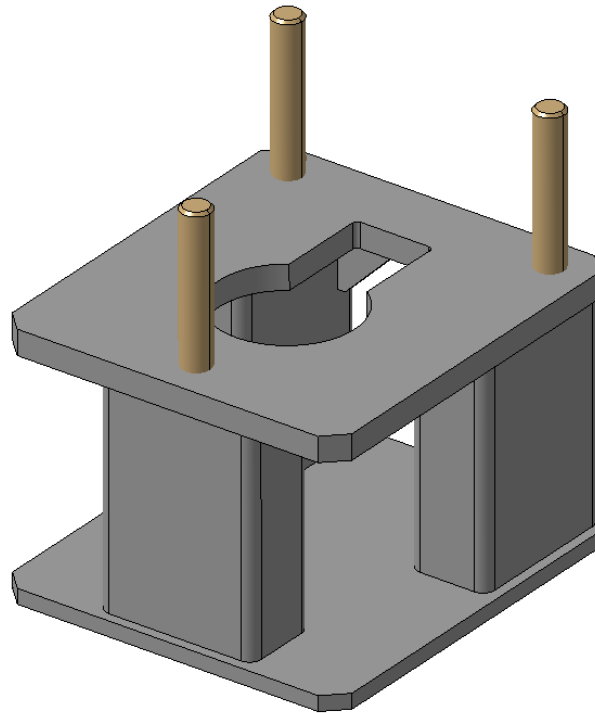
- Centre support (vertical and longitudinal joints)
  - Removed independent longitudinal joint plinth and adjustment.
  - Simplified plinth



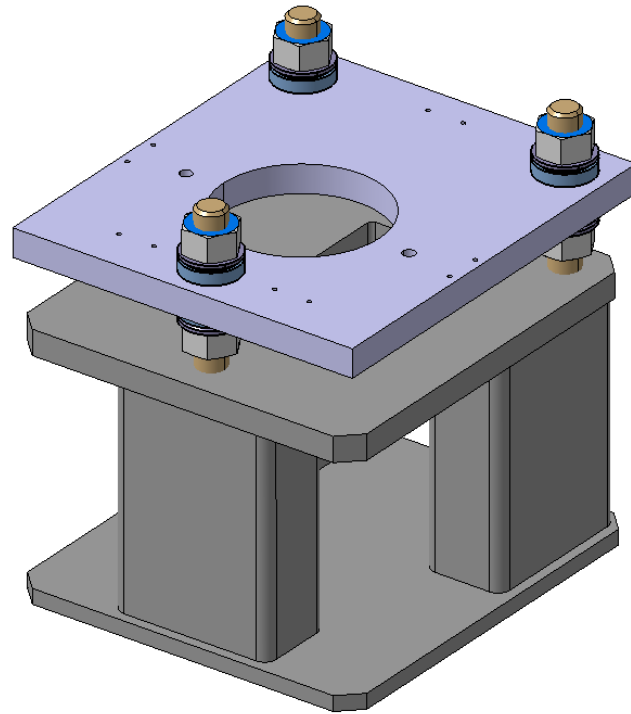
# Centre Support Assembly

End support fabricated plinth

- Mass: ~60kg
- Mild steel standard plate/sections
  - Painted
- Stainless threaded rods

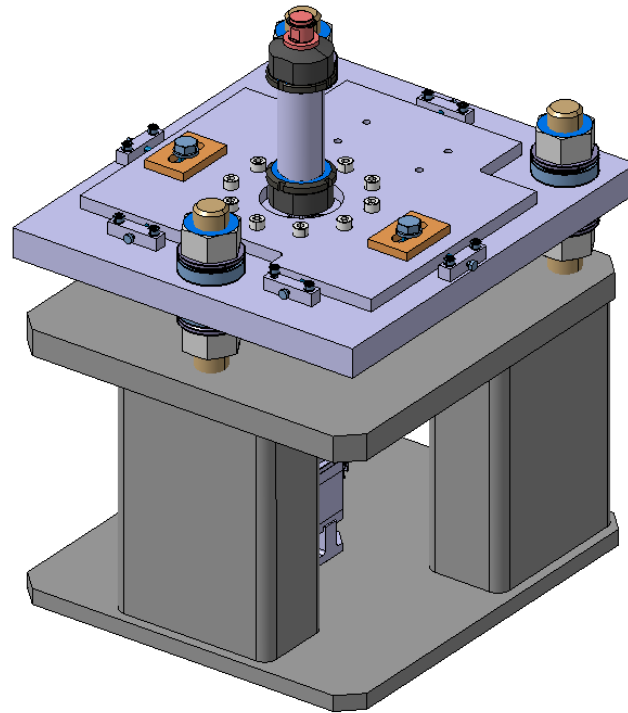


# Centre Support Assembly



# Centre Support Assembly

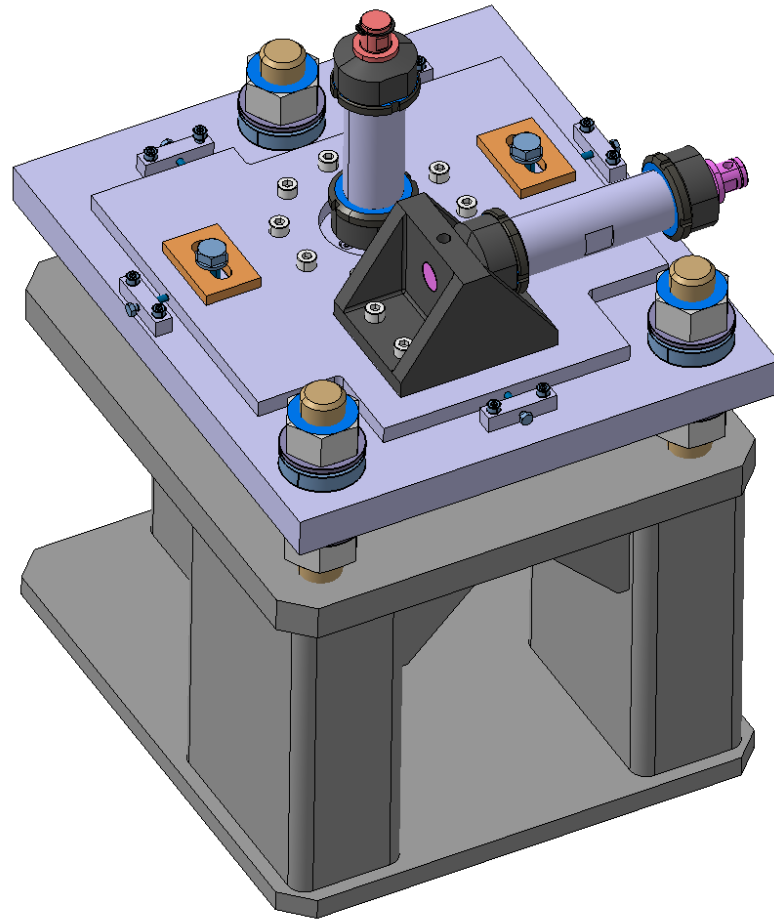
Vertical actuator and joint assembled and installed as before.





# Centre Support Assembly

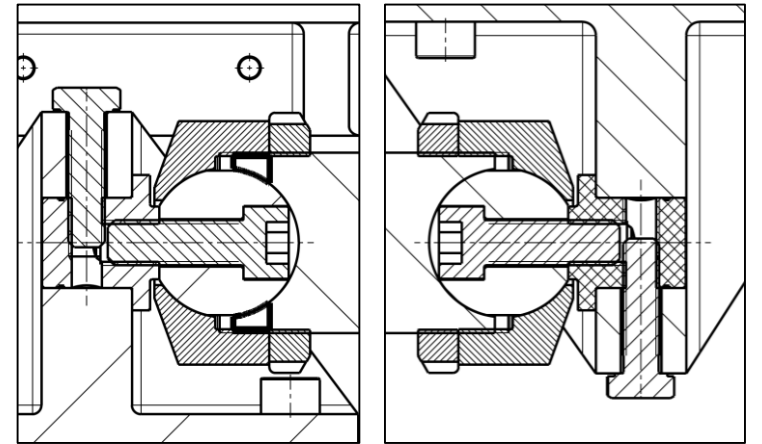
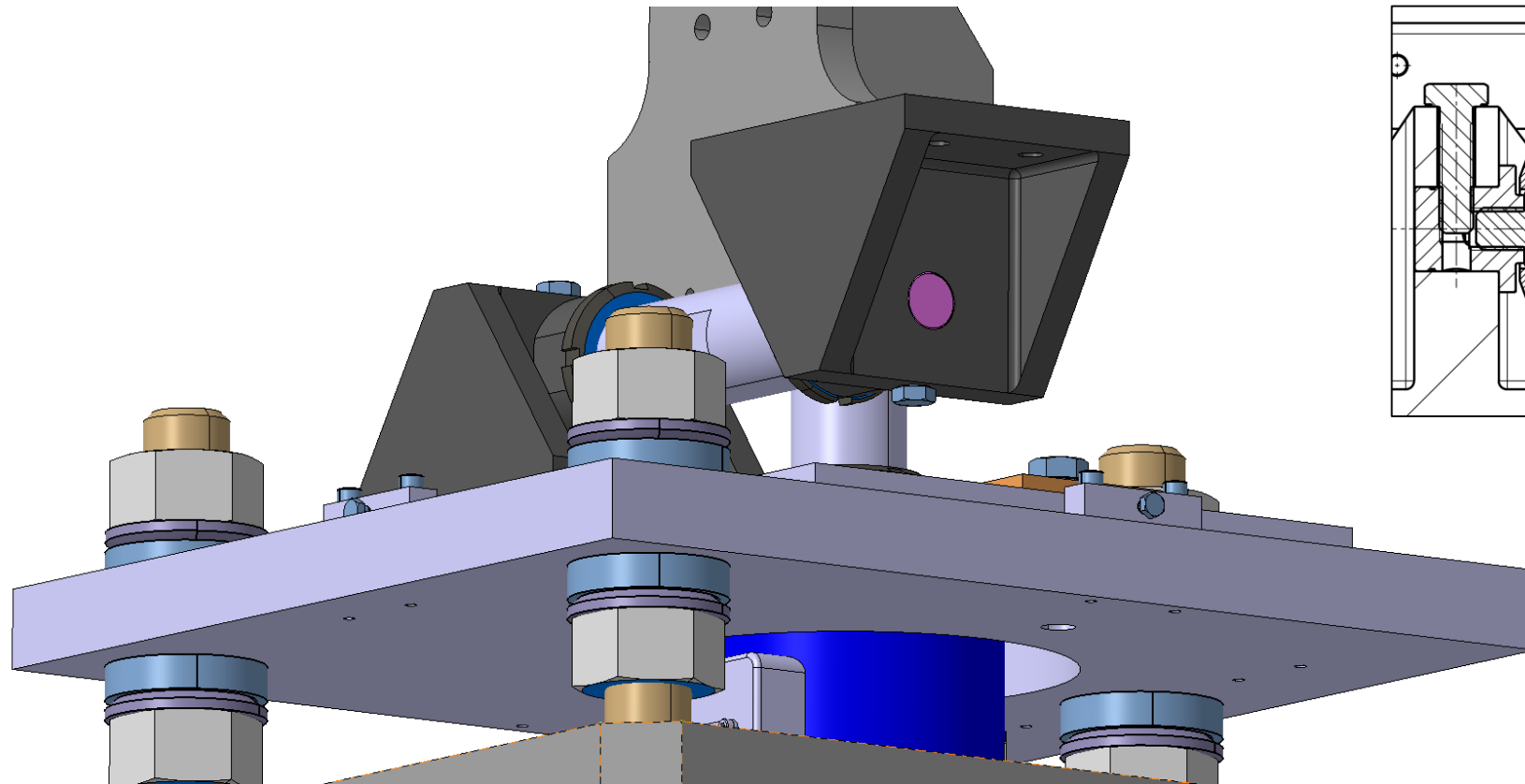
Bracket for longitudinal joint installed on base plate, and joint inserted.



# Centre Support Assembly

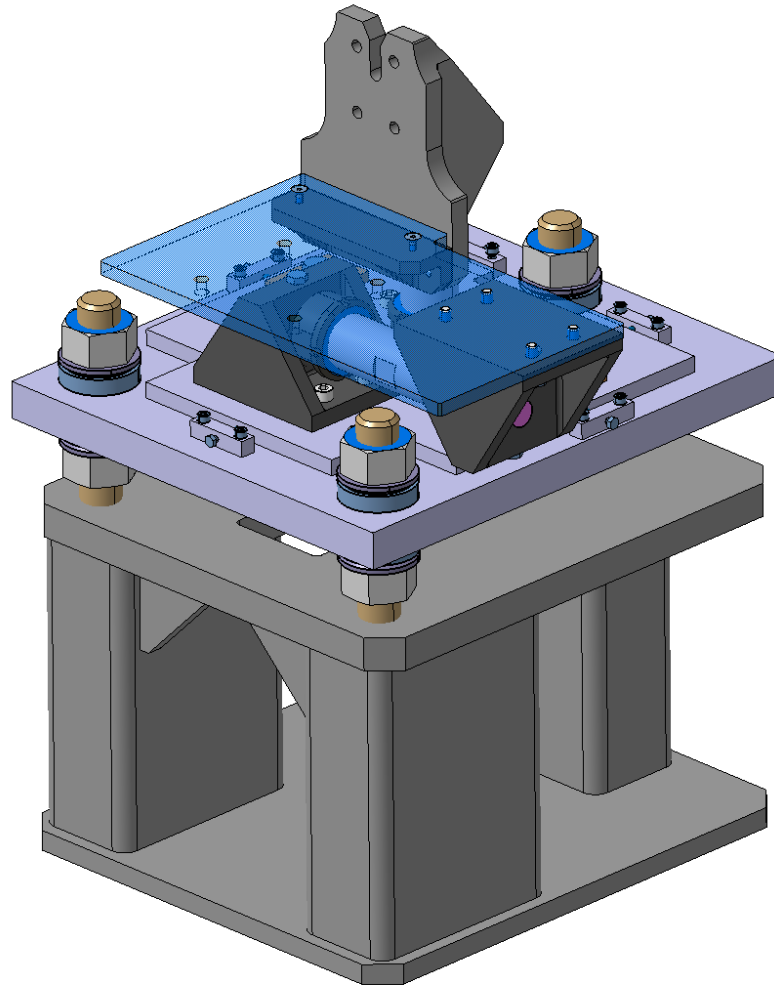
Vertical bracket installed as before.

Second longitudinal bracket installed as before. Same 'Lateral joint end nut' at each end. Secured with bolts.



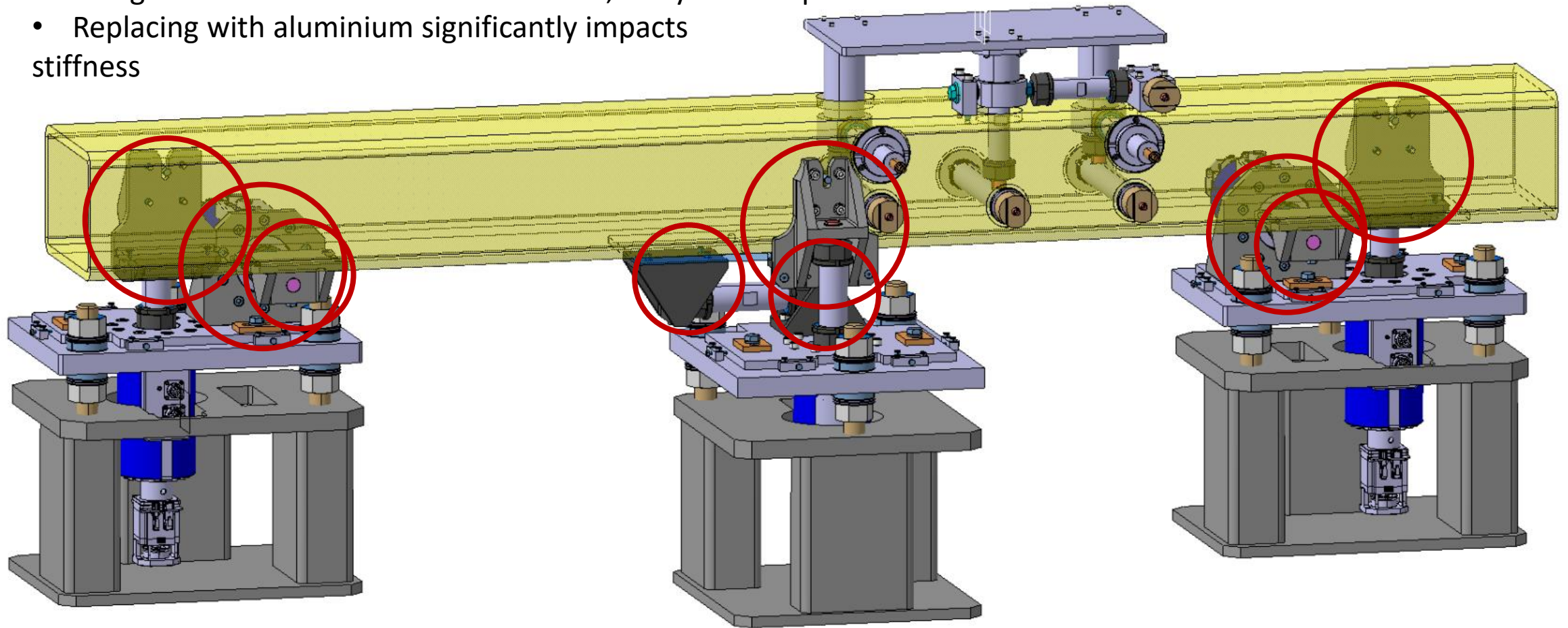
# Centre Support Assembly

- Final plate (blue) would link the two brackets to constrain each other during the assembly.
- The lateral position of this plate would be unconstrained. Experience with our joint suggests this isn't an issue.



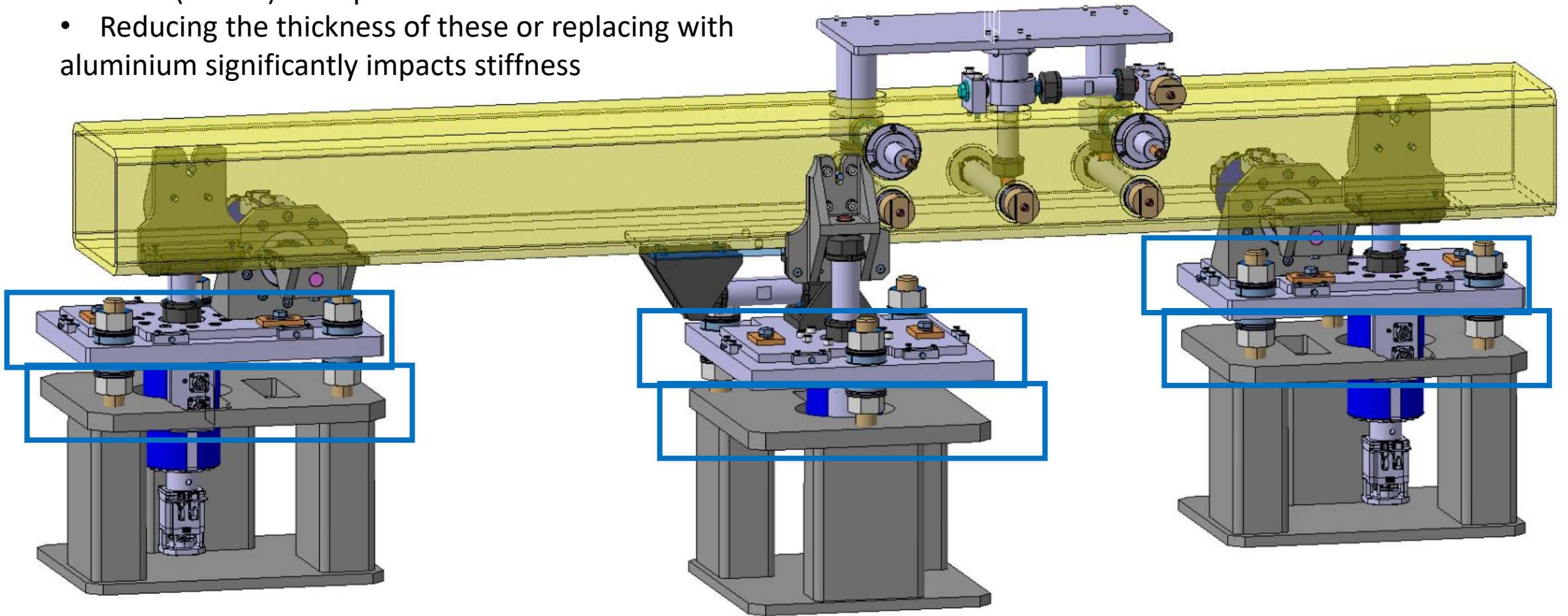
# Key Components

- 9 large stainless steel machined brackets, likely to be expensive
- Replacing with aluminium significantly impacts stiffness



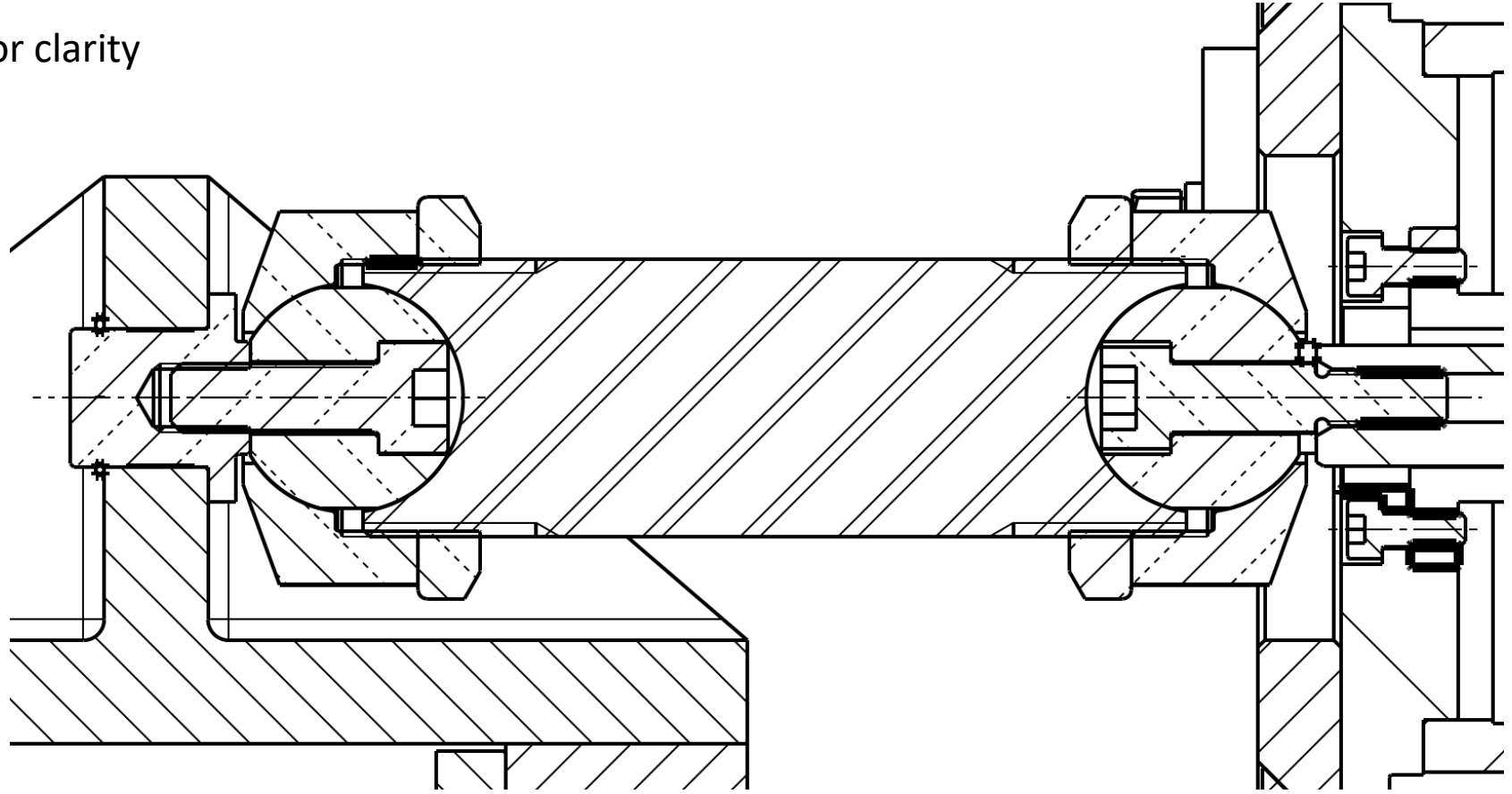
# Key Components

- Thick (20mm) steel plates
- Reducing the thickness of these or replacing with aluminium significantly impacts stiffness



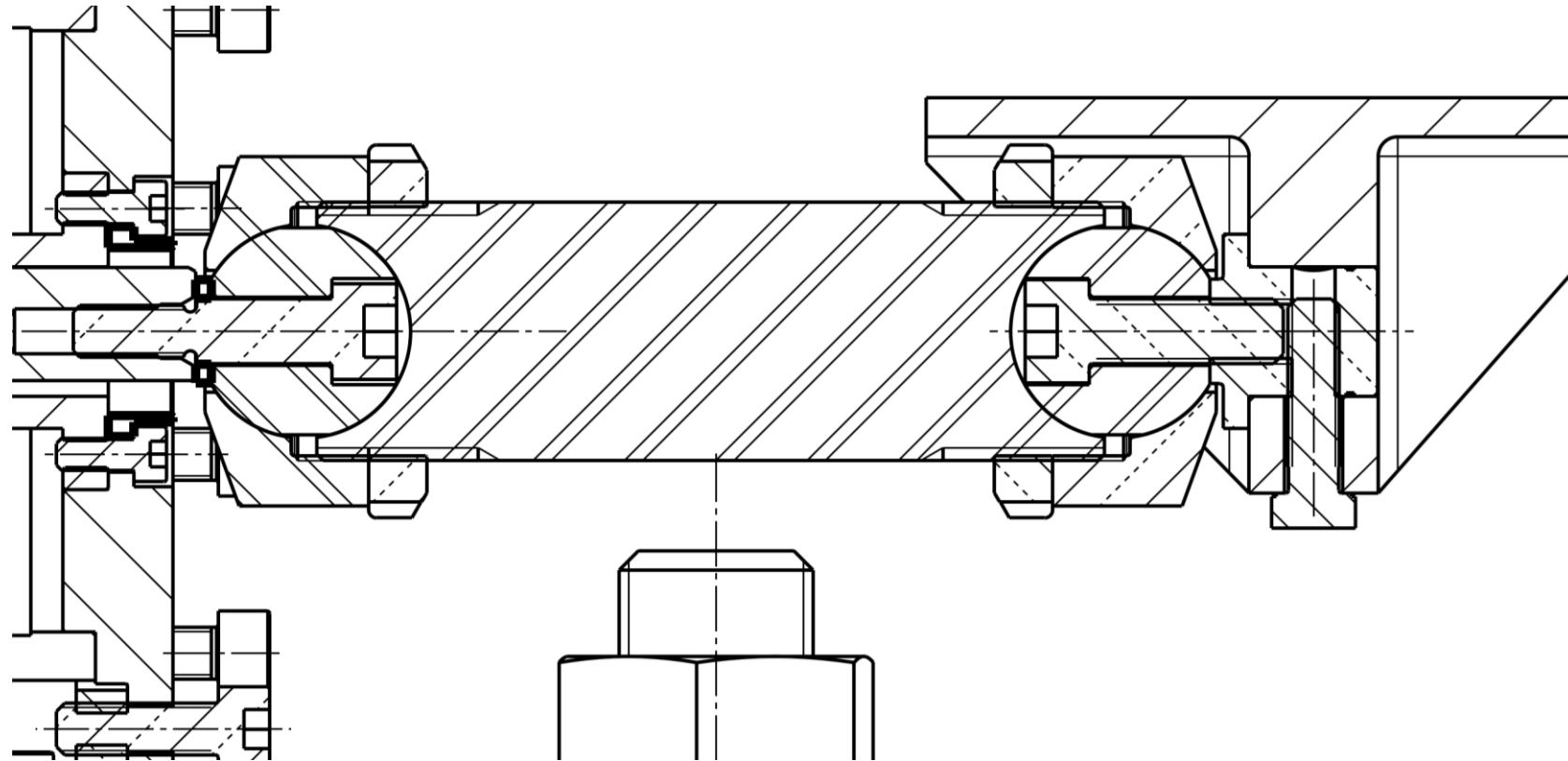
# Vertical Joint

- Rotated for clarity

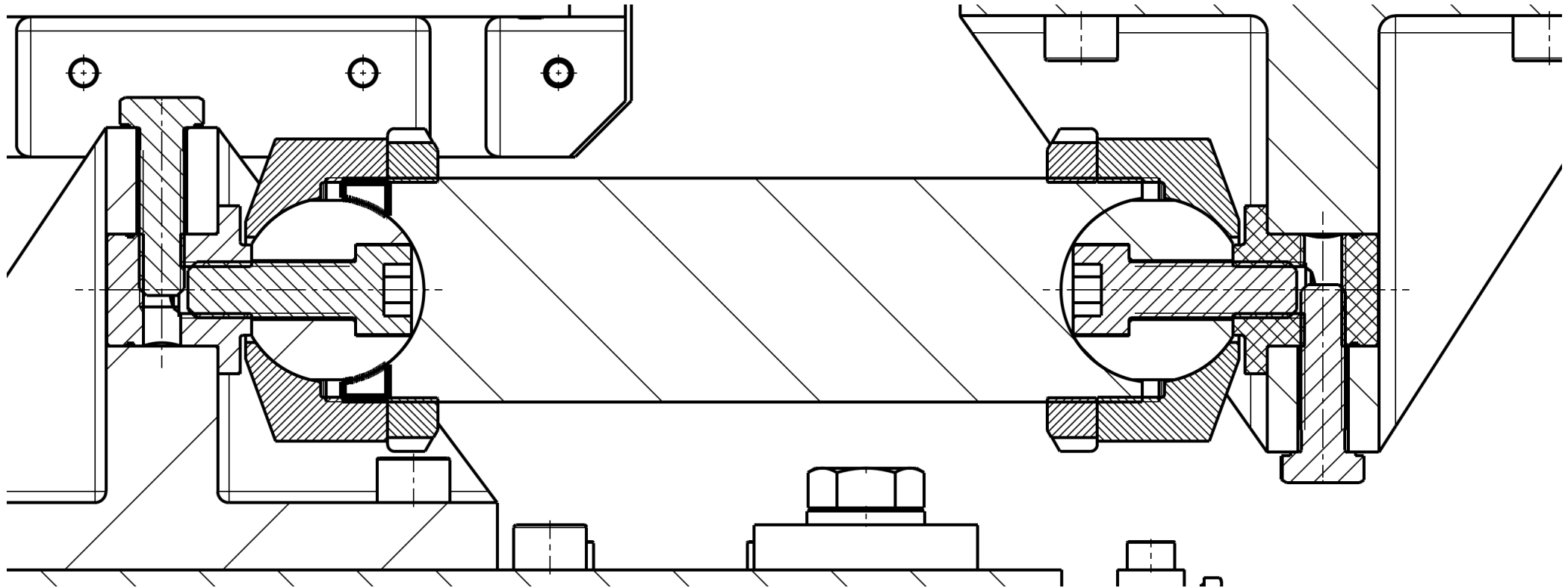


# Lateral Joint

- Actuator on the left



# Longitudinal Joint





# In Lab Clearance

- Clearance with wires and neighbouring module