

LBNF - Structural Discussion

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LBNF Cryostat Slab and Final design workshop

Fermilab, 10-11 April 2018



LBNF - Weight summary

- ❖ Steel Structure: **3'000 T** (this includes: Steel profiles, steel plate, insulation and membrane)
 - Steel profiles & Steel plate: 2'500 T
 - Insulation and membrane: 500 T
- ❖ LAr: **18'000 T** (full no gas)
- ❖ Detector wet weight: unknown
- ❖ Detector services: unknown

Total: 21'000 T

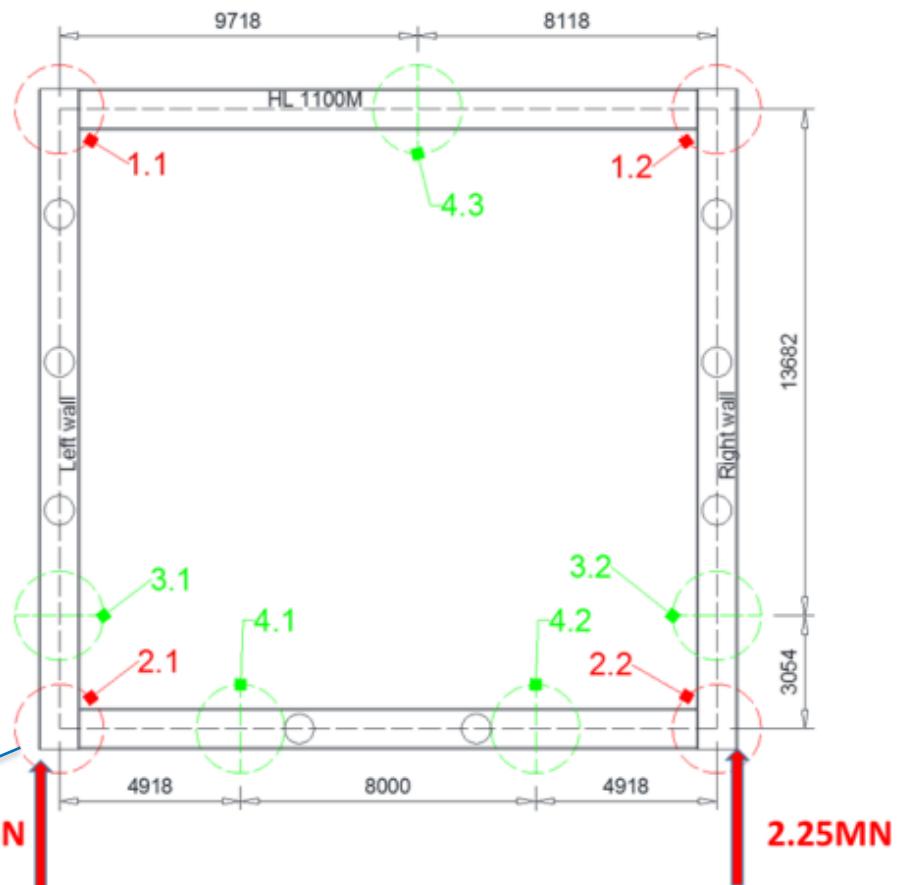
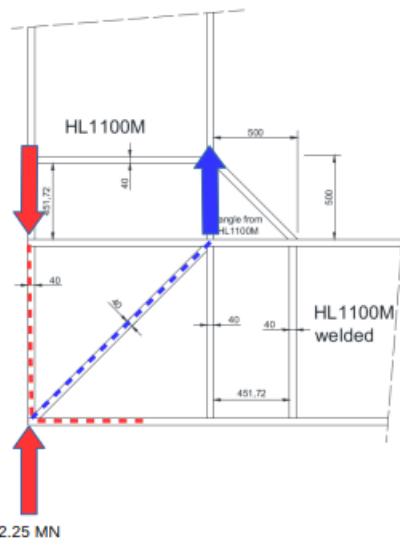
(excluding a detector and services on the roof)

Floor load case

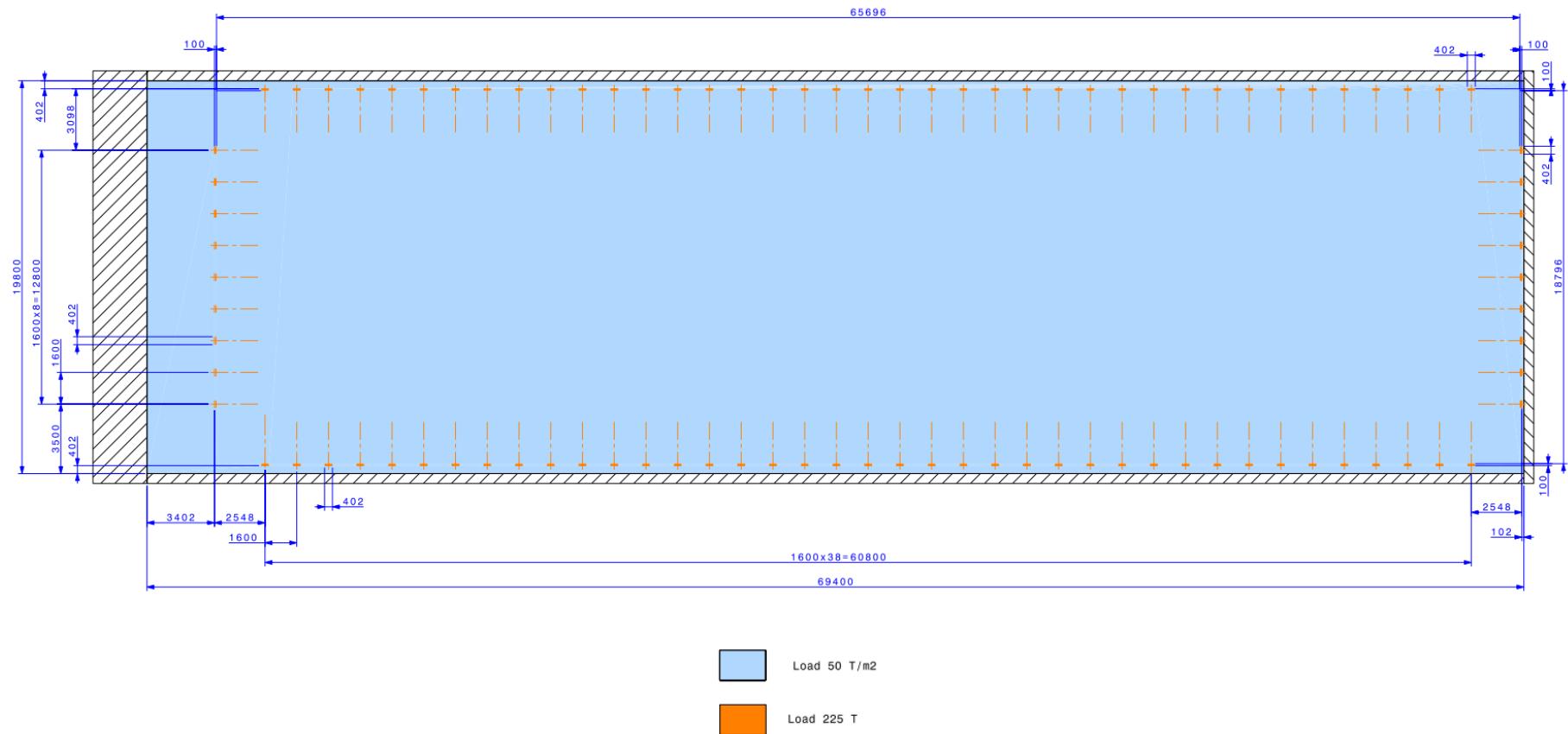
The total surface of beams in contact with the concrete: 450m²

Load under the beams: 21'000T / 450m² = **47 T/m²**

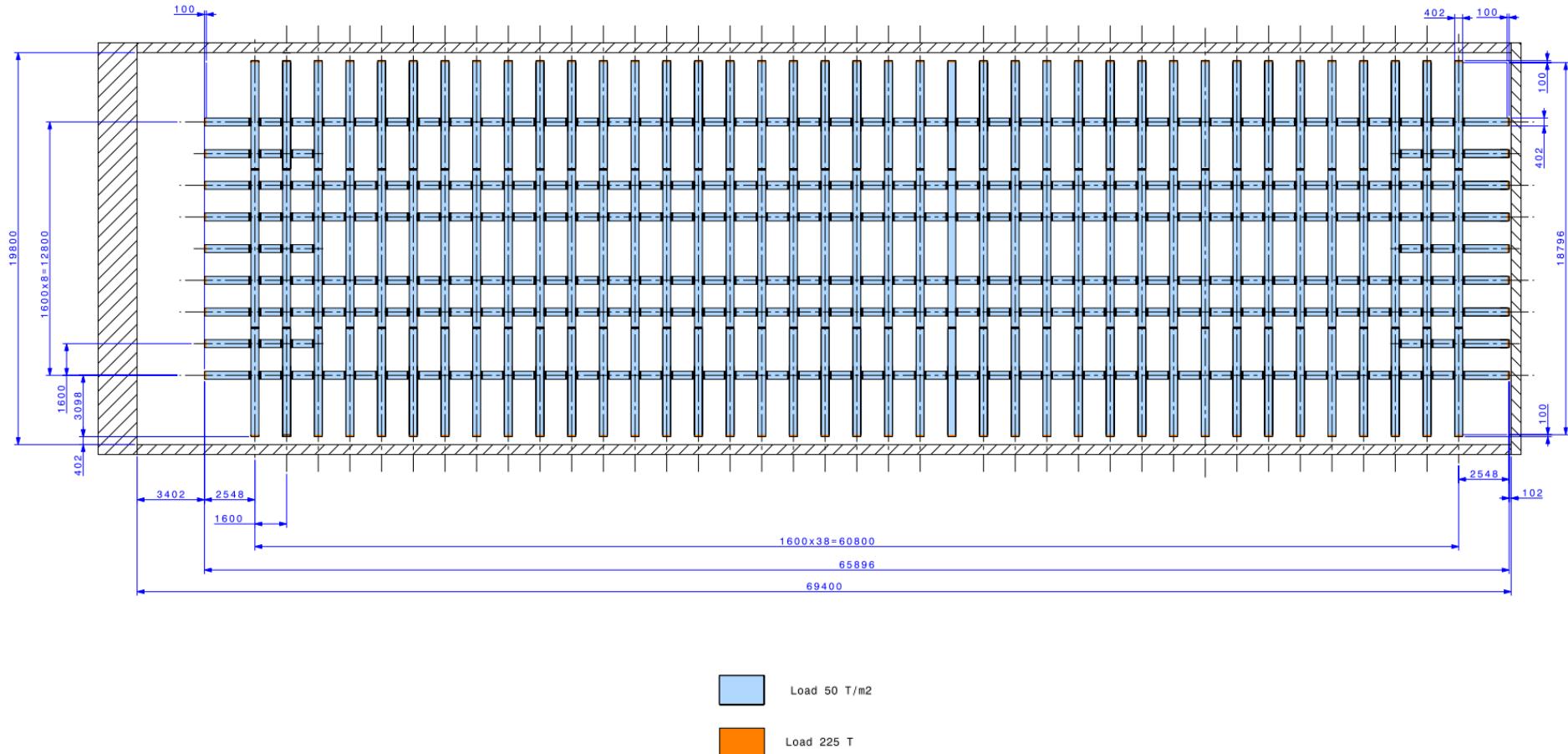
LBNF – Floor point loads



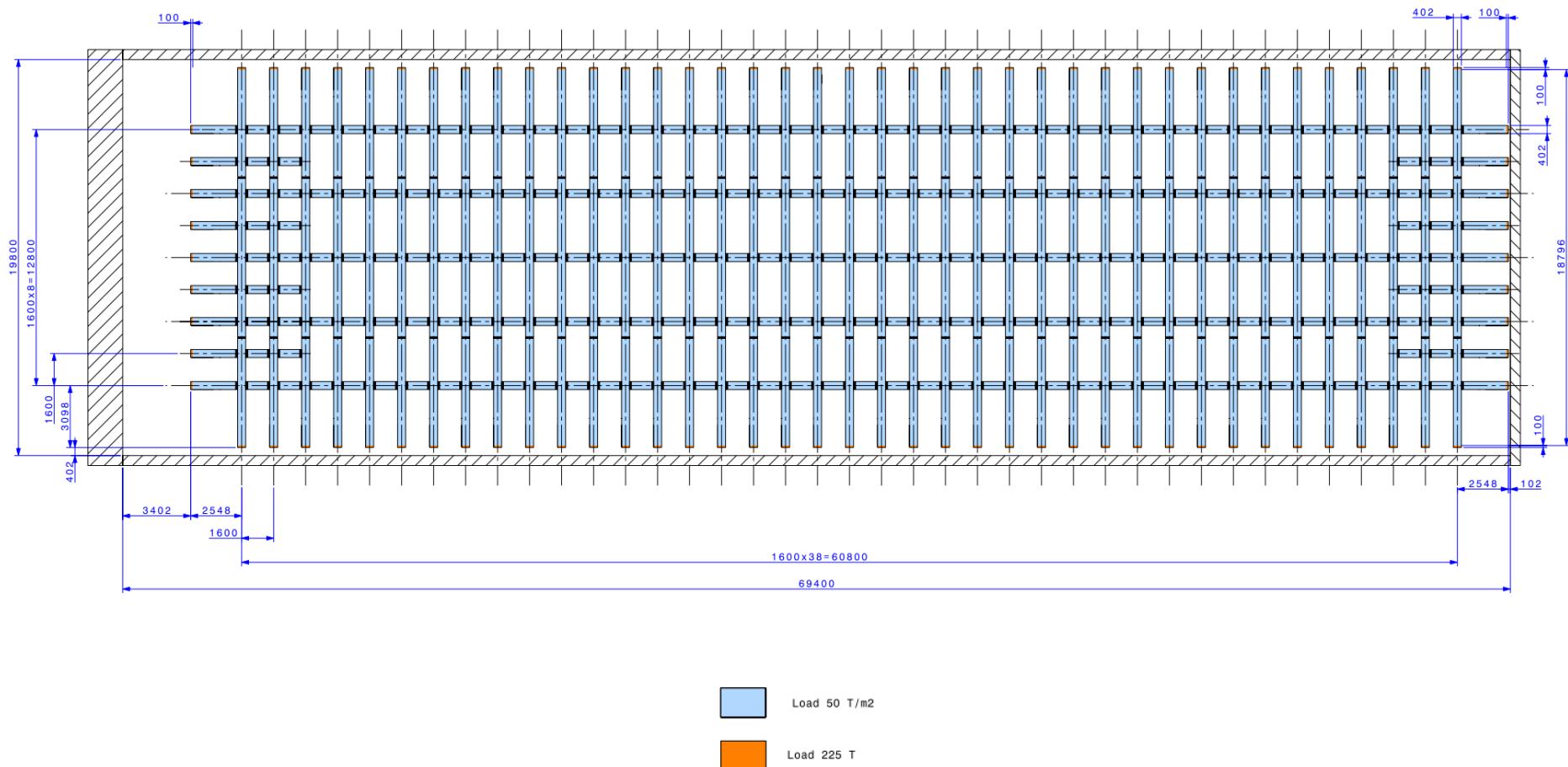
LBNF – Floor point loads



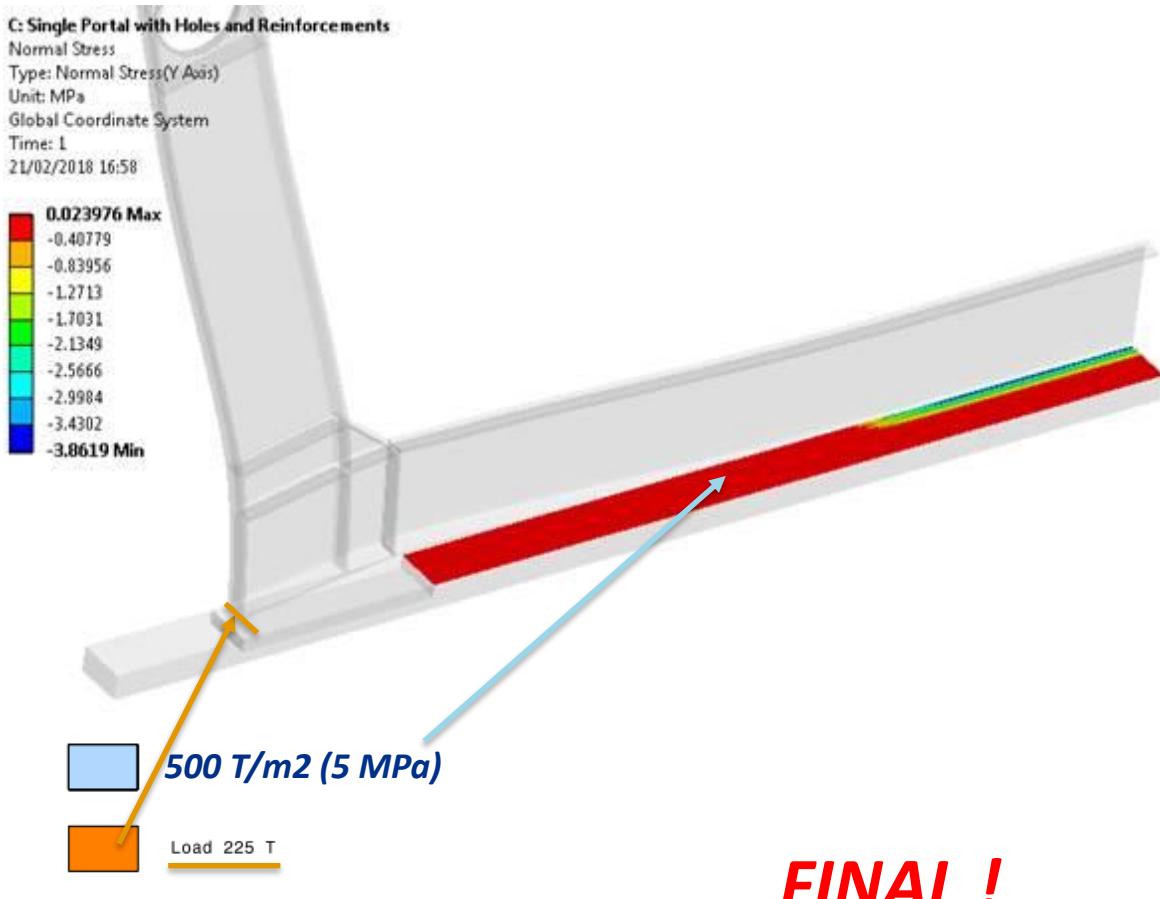
LBNF – Floor point loads - SP



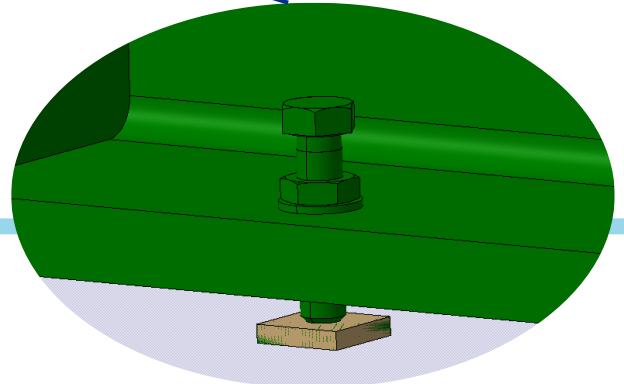
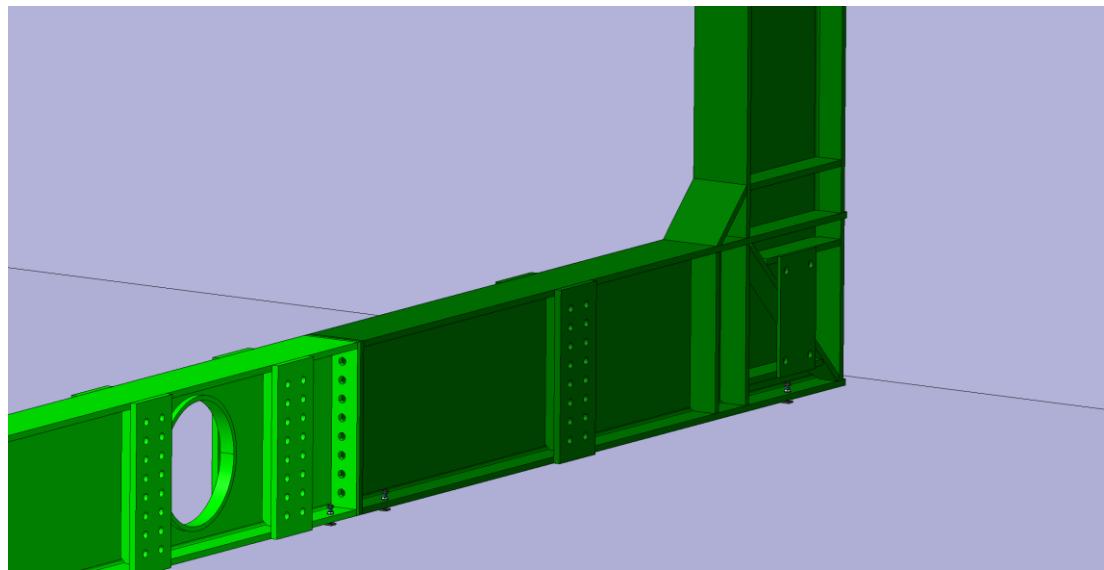
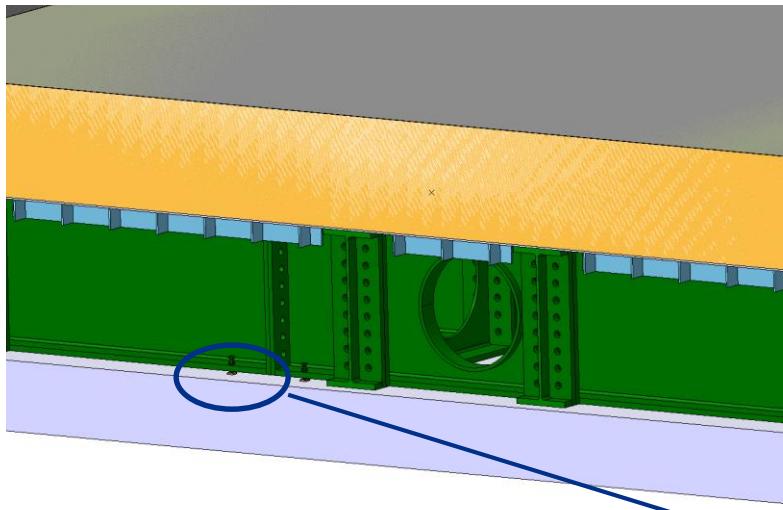
LBNF – Floor point loads - DP



LBNF – Beam load



LBNF – Leveling screw point loads



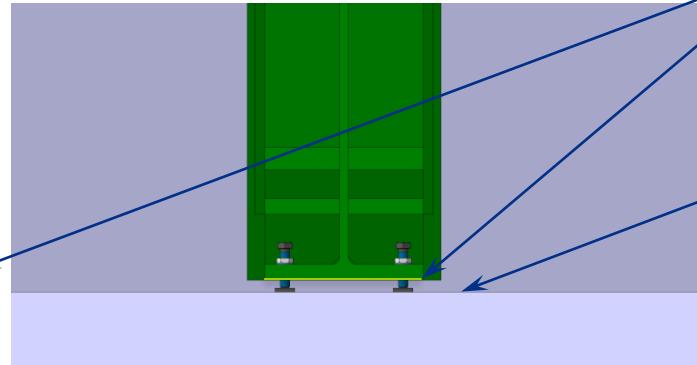
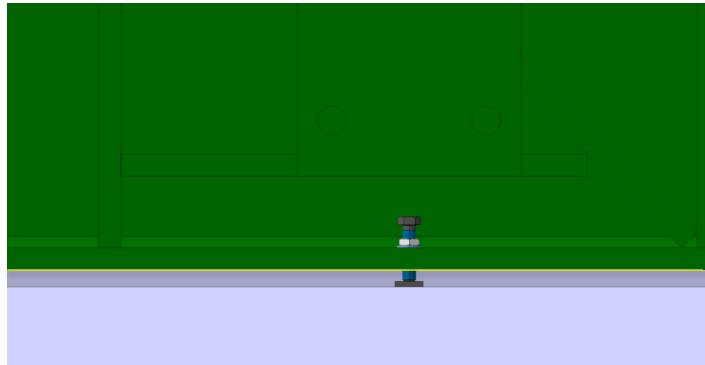
3T on 100mm x 100mm pads

3 MPa

Total number of screws per cryostat: ~300

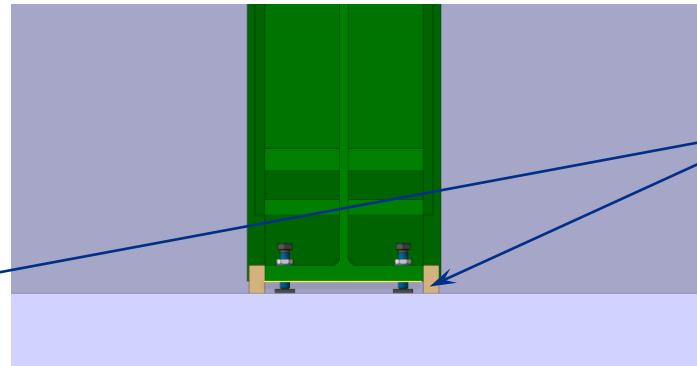
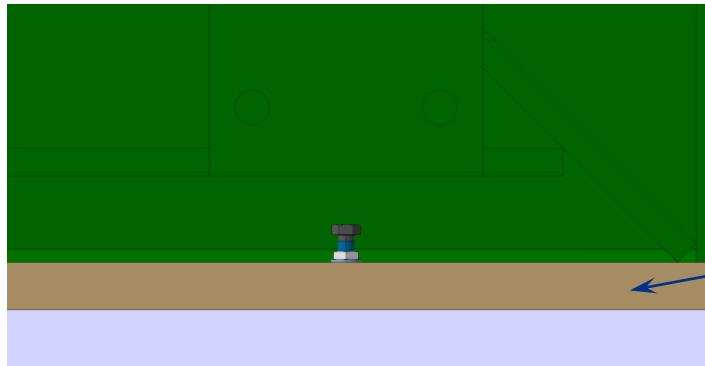
LBNF

LBNF – Grouting under beams



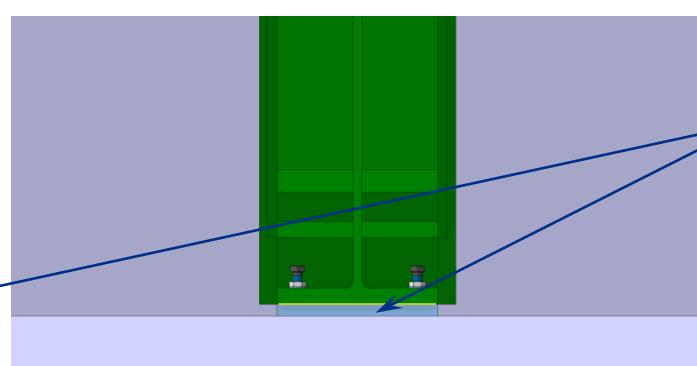
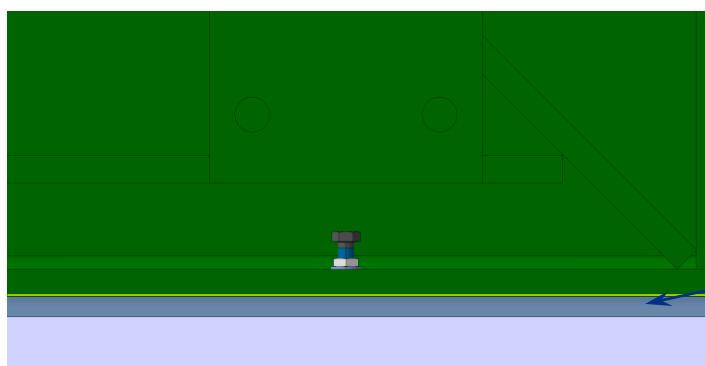
G10 coming with the beam

1. Leveling

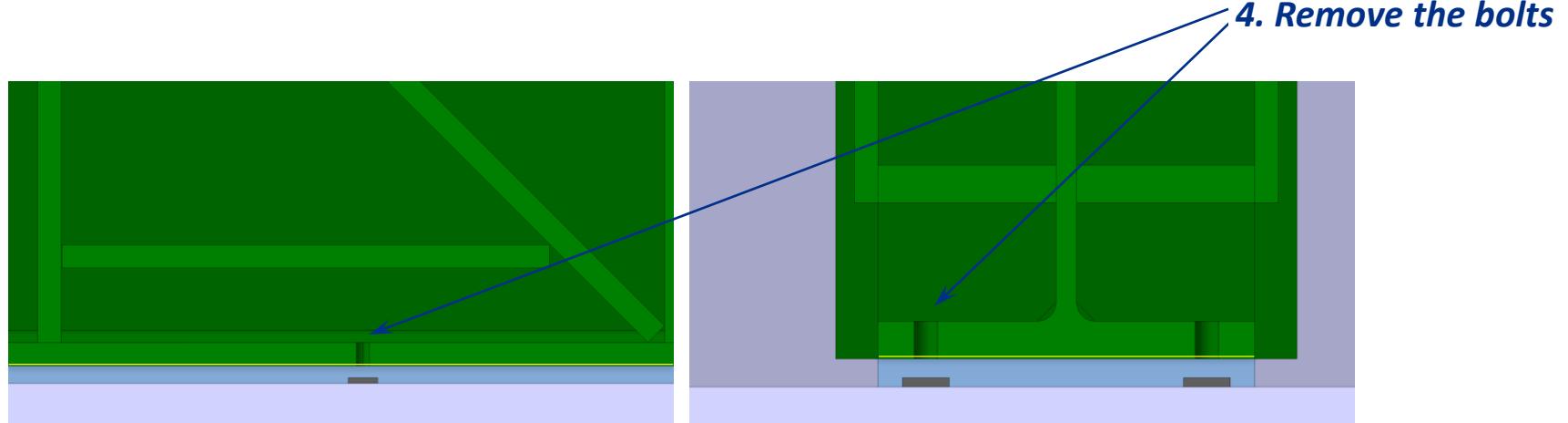


2. Wooden Formwork

3. Pour the concrete
4. Wait to dry
5. Remove the wood

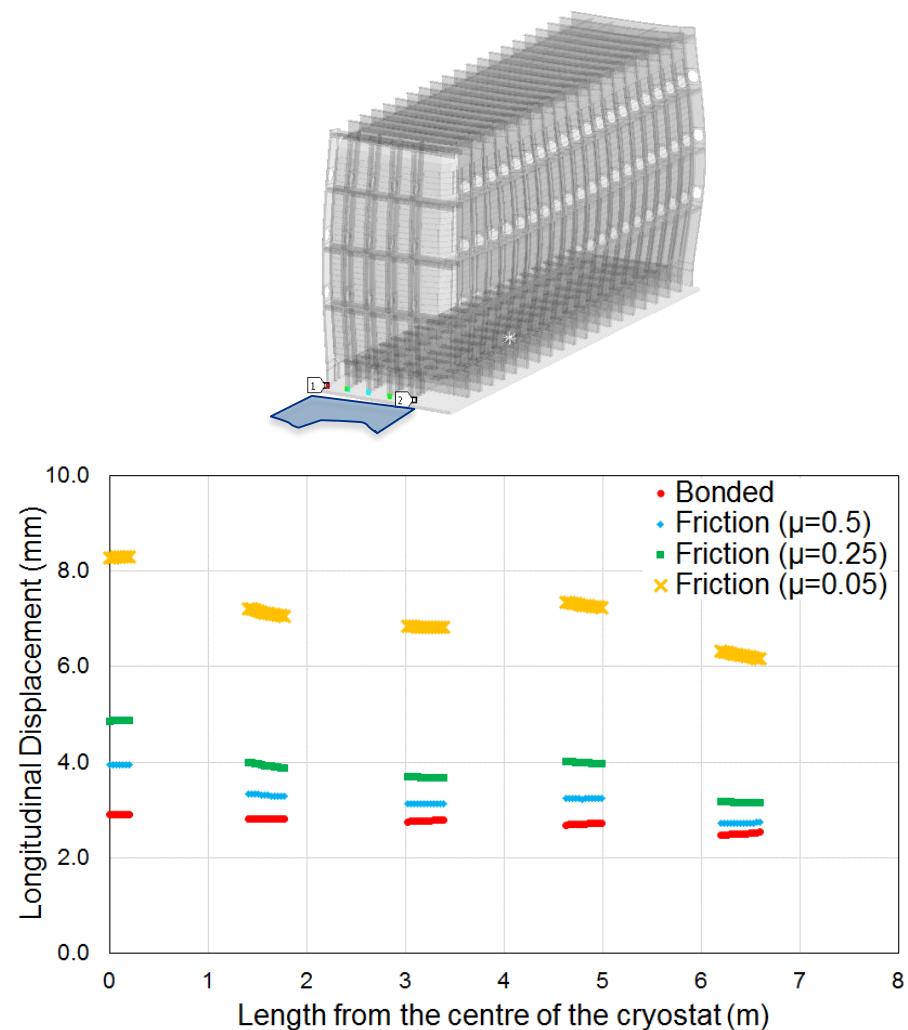
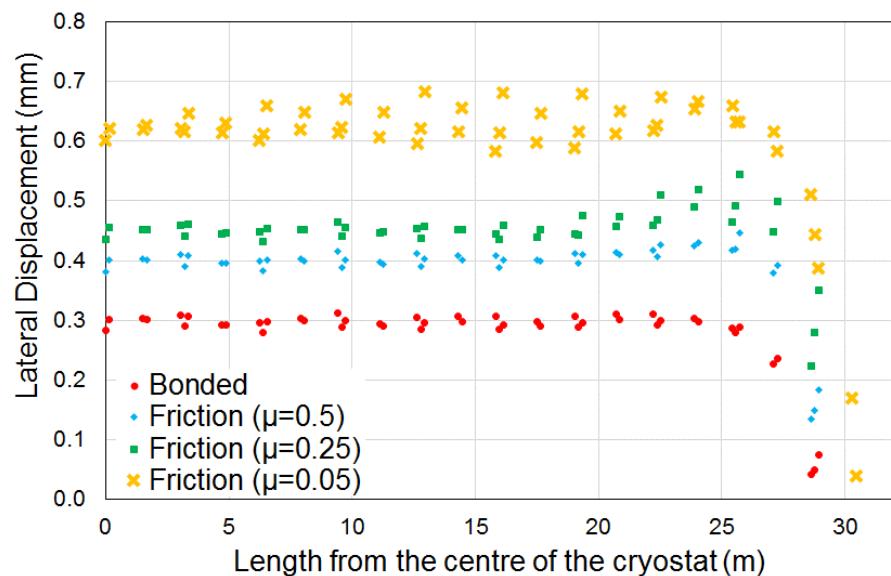
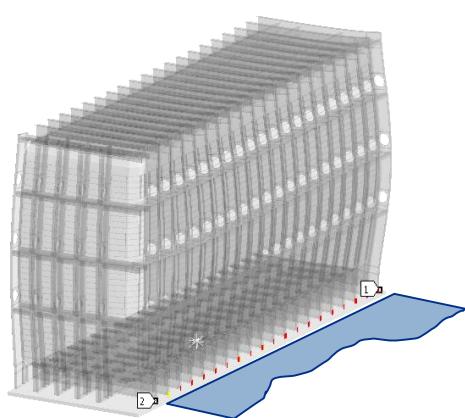


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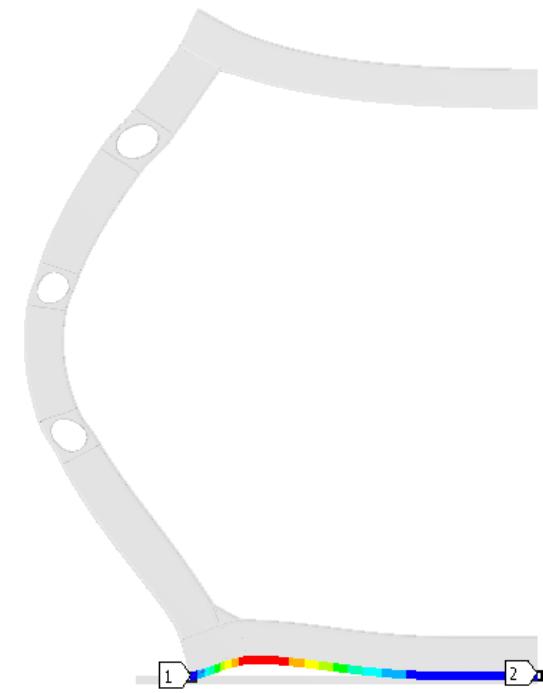
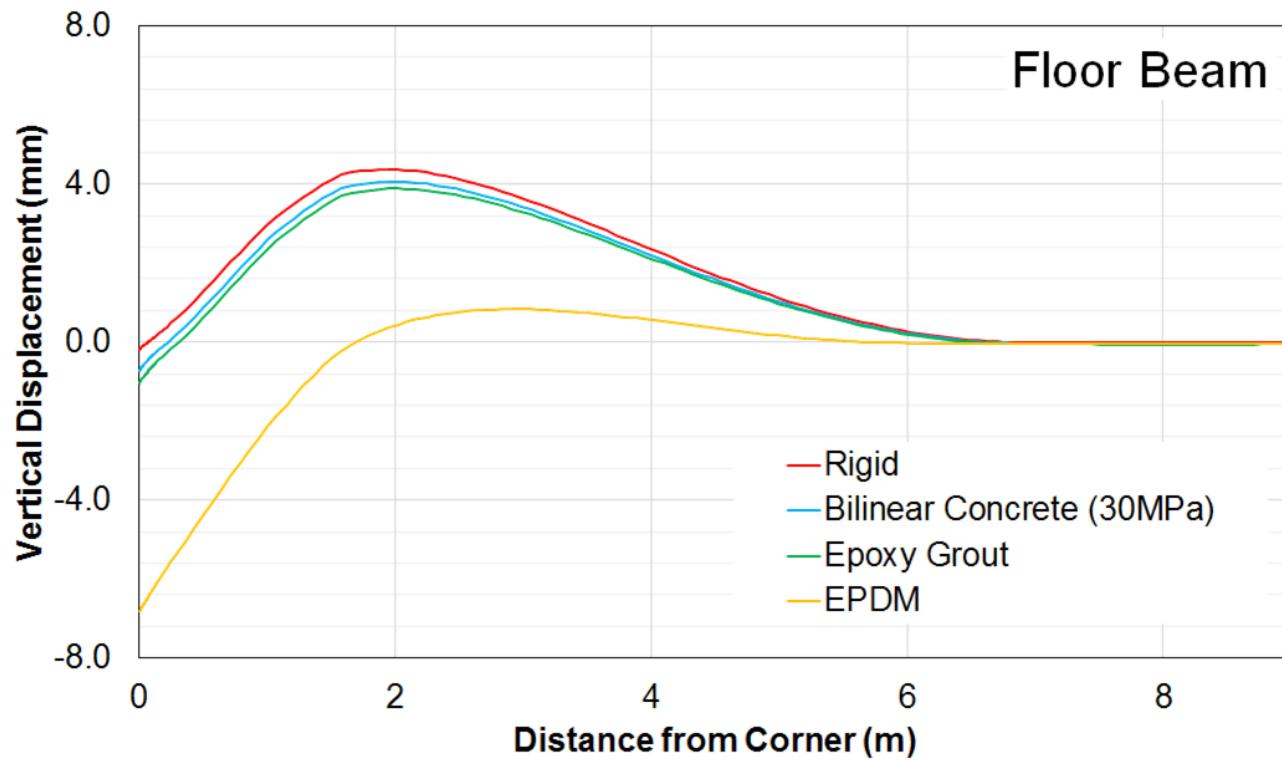
LBNF – Deflections and movements of cryostat on concrete slabs

Sliding of the primary structure on rigid floor



LBNF – Deflections and movements of cryostat on concrete slabs

Floor Conditions



LBNF – Test Pieces



LBNF