Status of the MPD Support System

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Thanks to S. Sukhovarov, E. Belyaeva and TSNIISM

V-th Collaboration Meeting of the MPD Experiment at the NICA Facility

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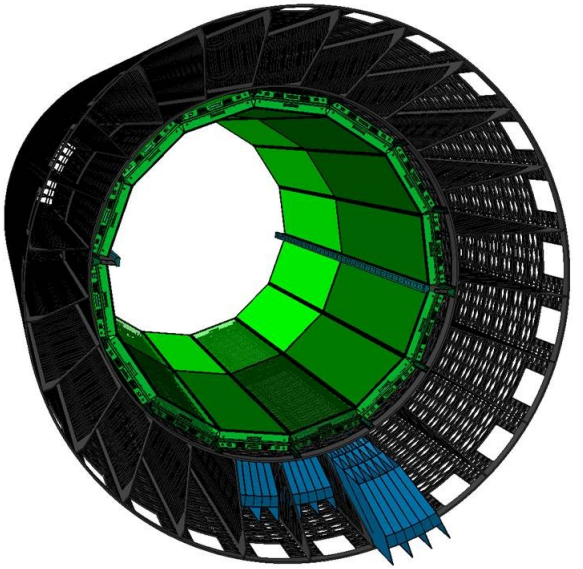
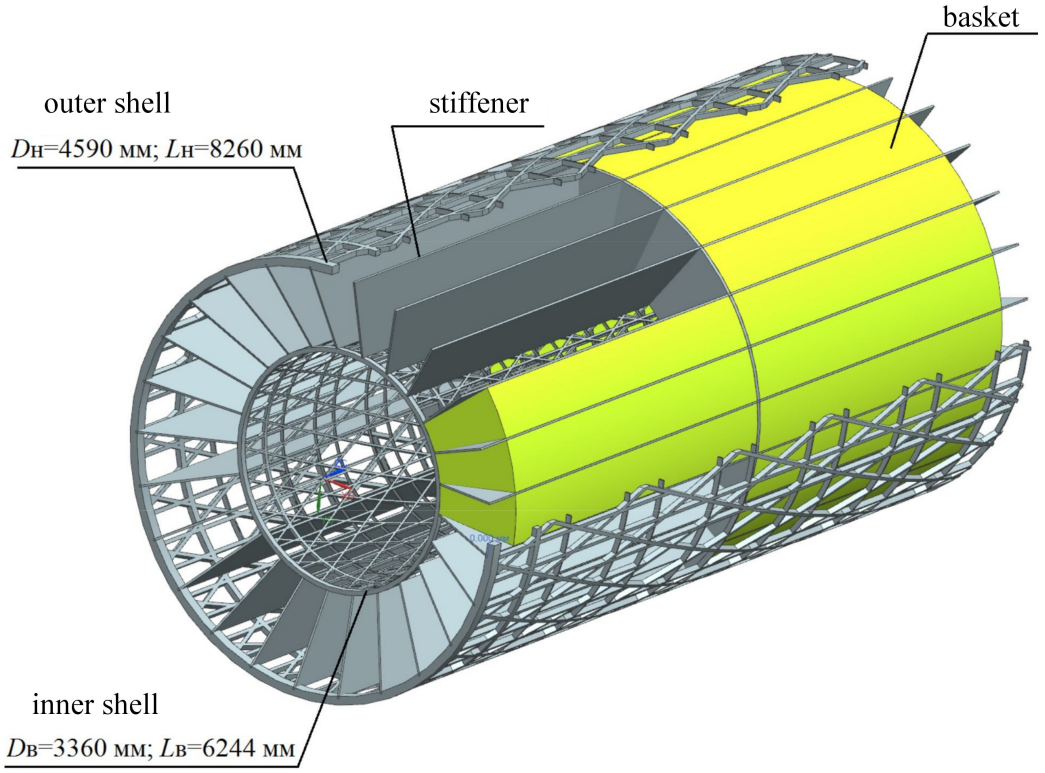
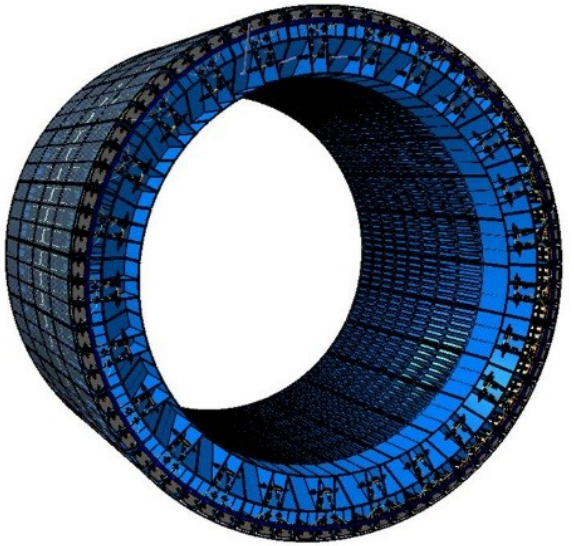
Power Frame Requirements

- Supports ECal, TOF and tracking systems.
- Allows re-install half-sectors.
- Total load of about 100 tons.
- Made of carbon composite.
- Max deformation less than 5 mm.

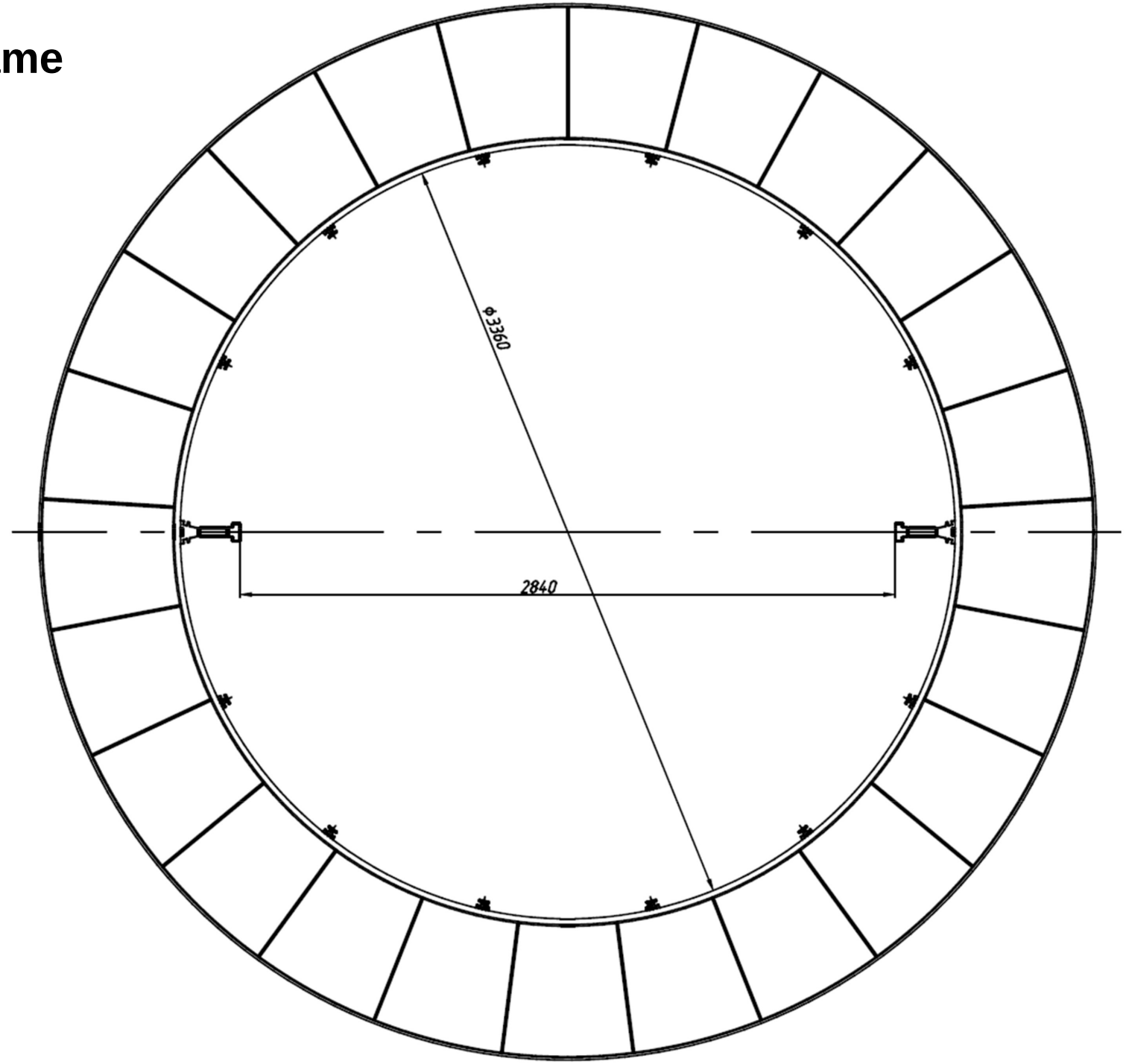




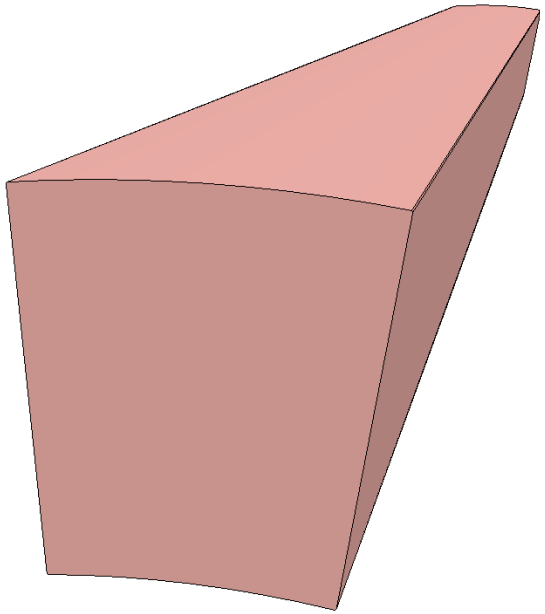


Power Frame

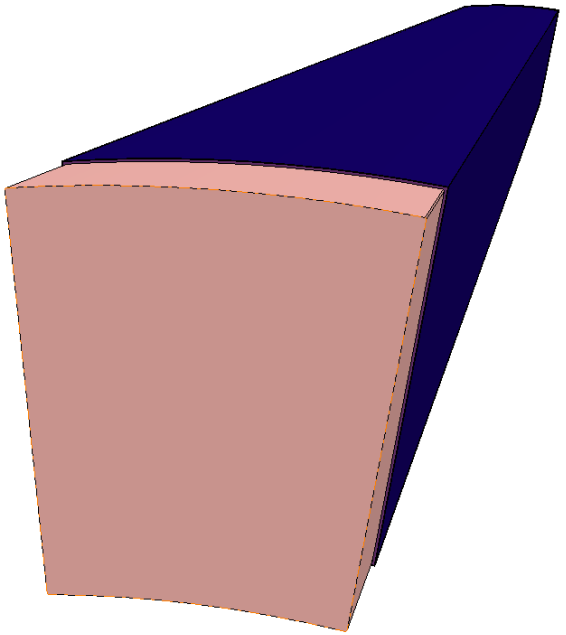
TSNIISM
Concept



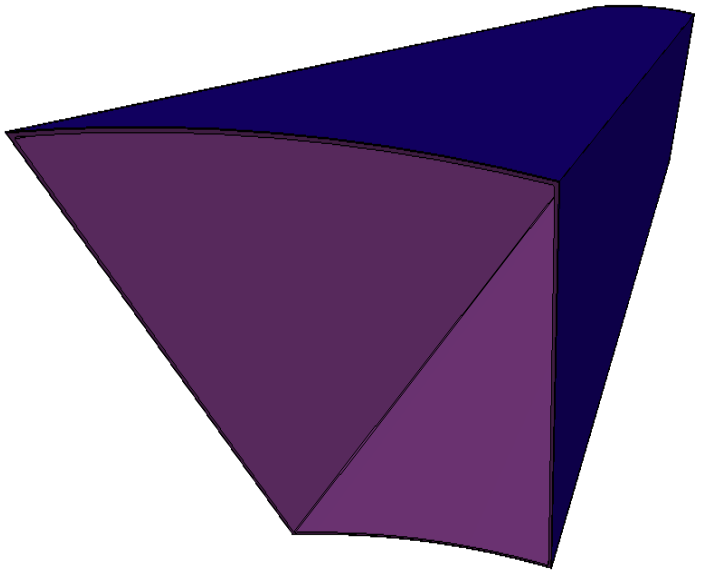
Power Frame Production: 25 Carbon Composite Boxes



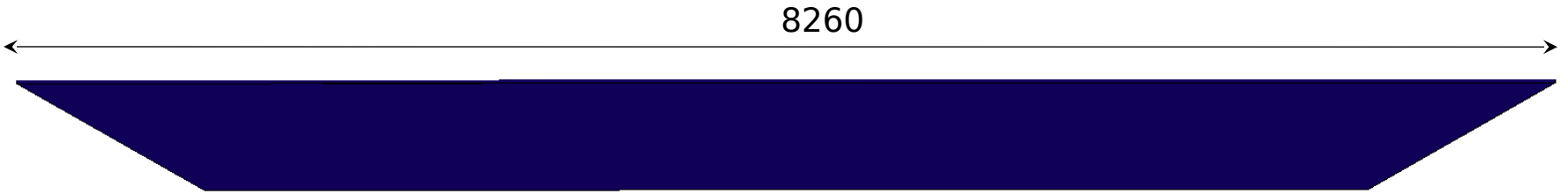
Step 1:
Steel ingot



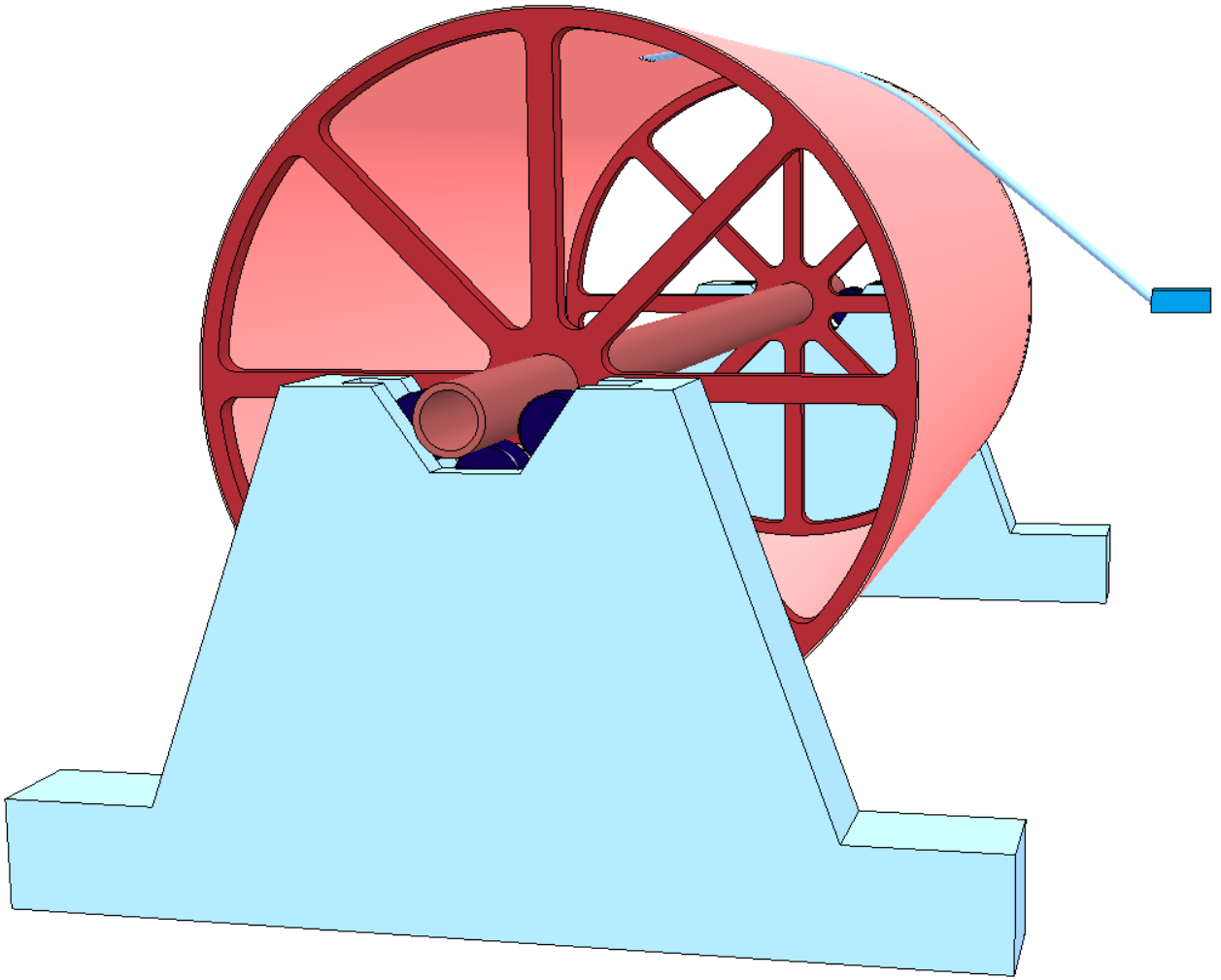
Step 2:
Winding of carbon composite material



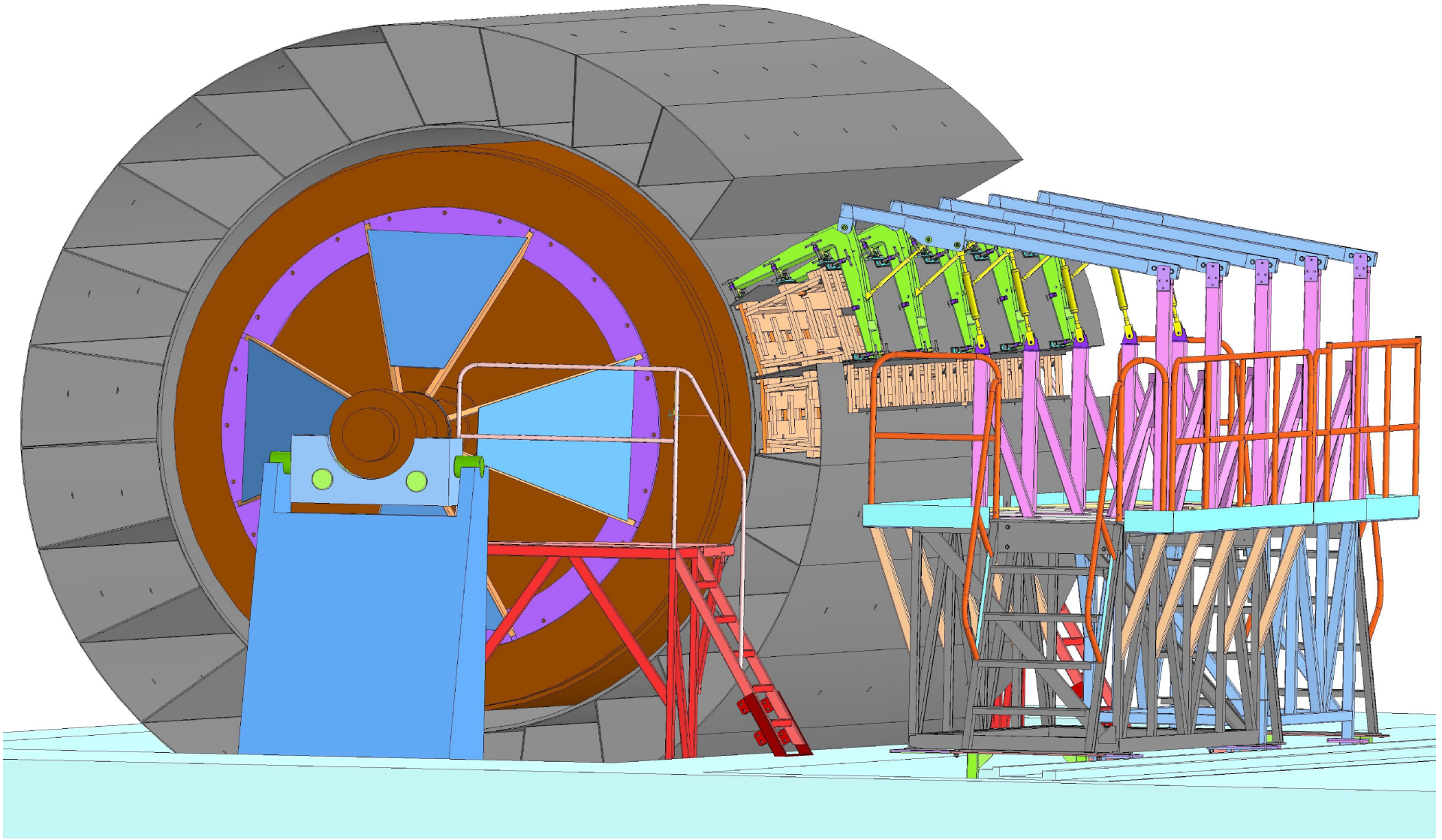
Step 3:
Carbon composite box



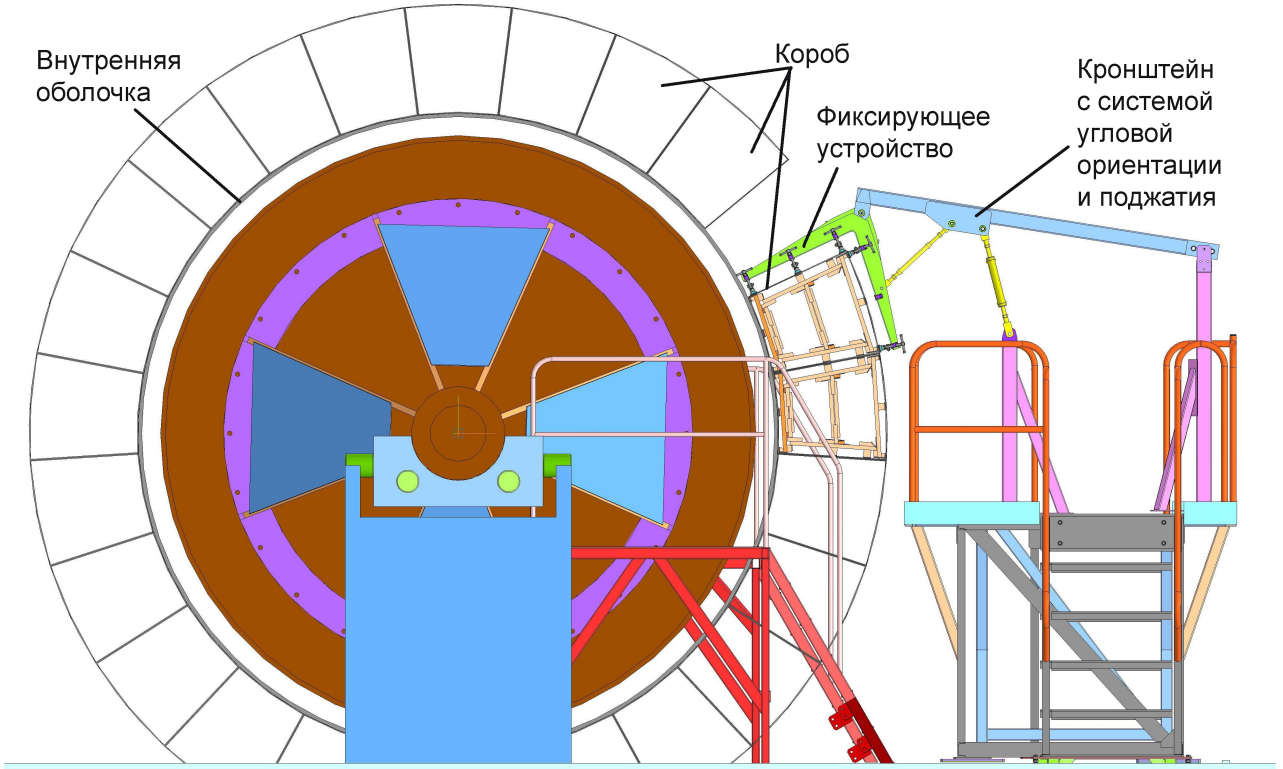
Power Frame Production: Winding of the Inner Shell

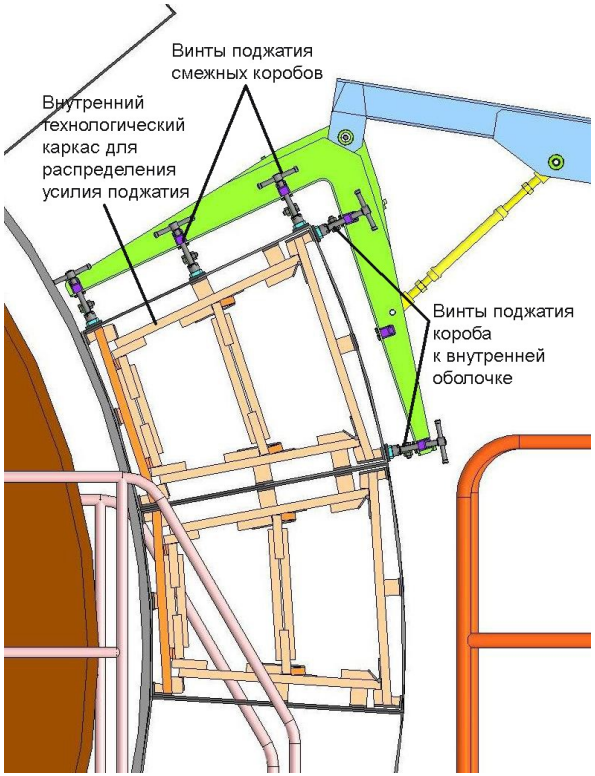


Power Frame Production: Assembly of the Boxes

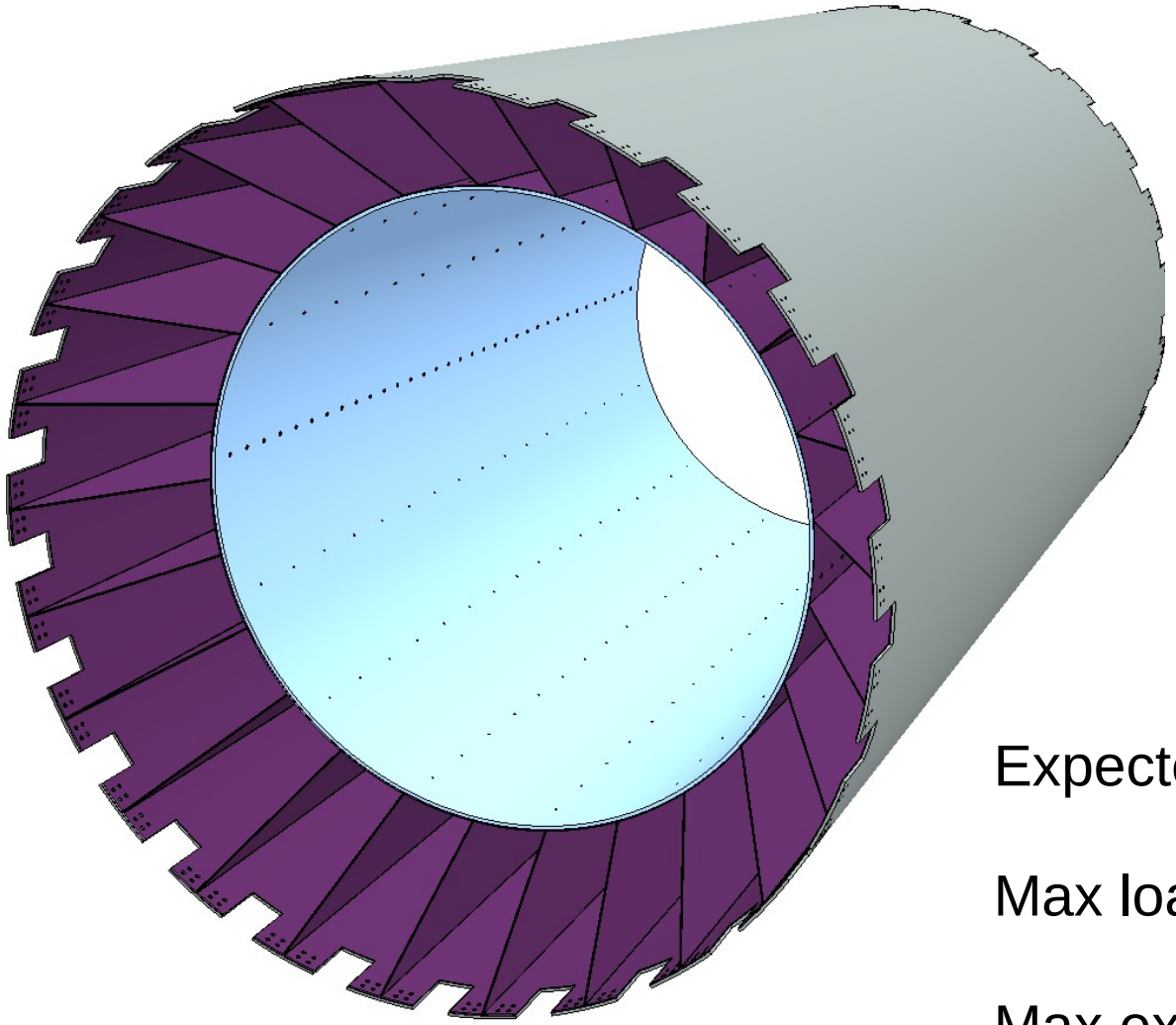


Power Frame Production: Assembly of the Boxes





Power Frame Production: Outer Shell and Windows

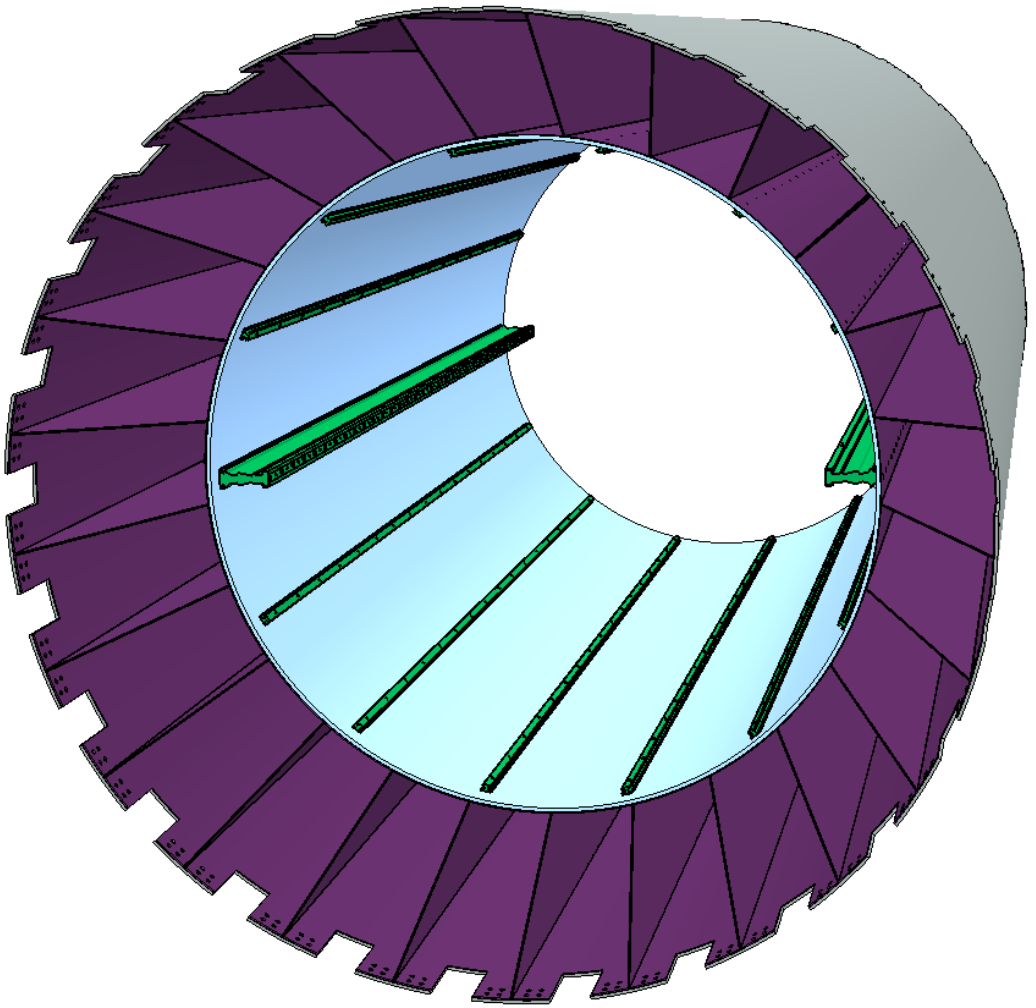


Expected mass: about 9 tons

Max load: 195 tons

Max expected bending: 1.32 mm

Power Frame Parts

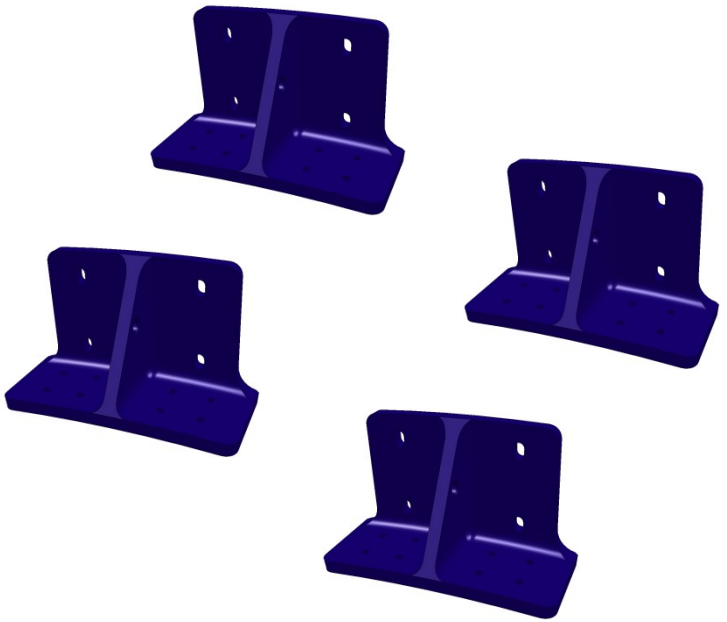


Power frame : 1

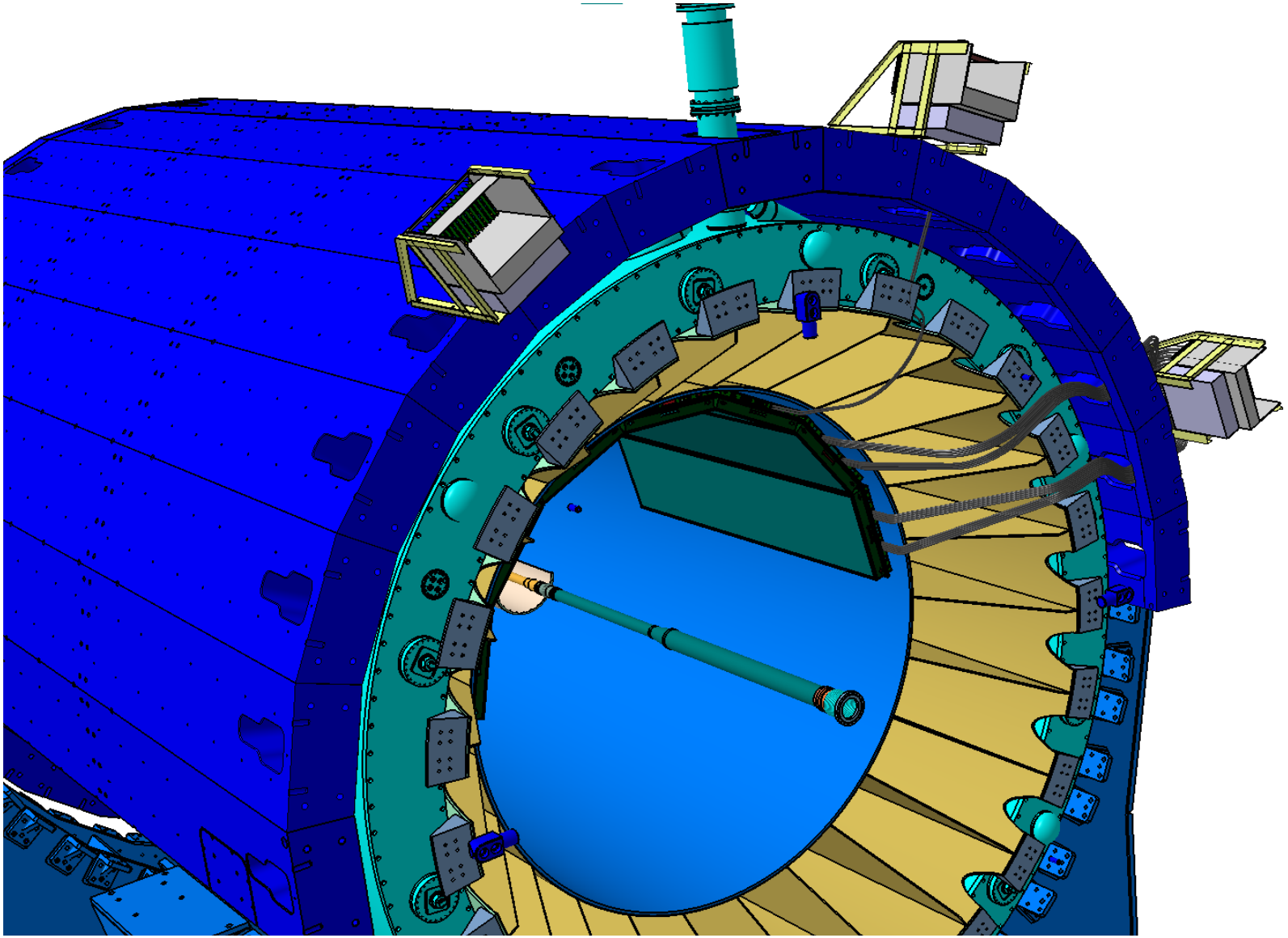
TPC & TOF rails : 2

TOF rails : 12

Mounting brackets : 50



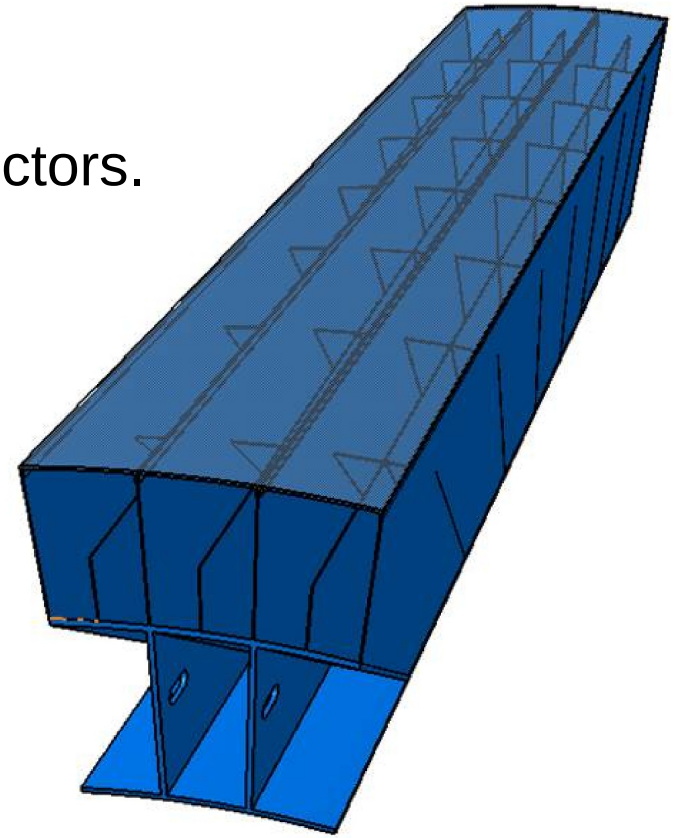
Power Frame in the MPD Magnet

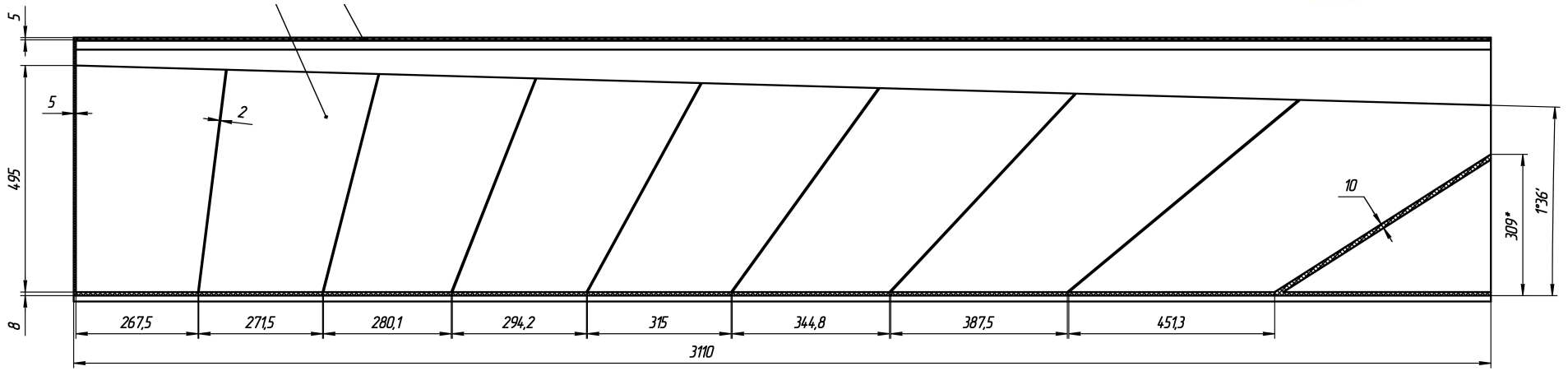


ECal Containers (Baskets)

- ECal is organized into 25 sectors or 50 half-sectors.
- Each half-sector contains 48 modules.
- Fiberglass container (basket).
- Total half-sector weight is about 1.5 tons.

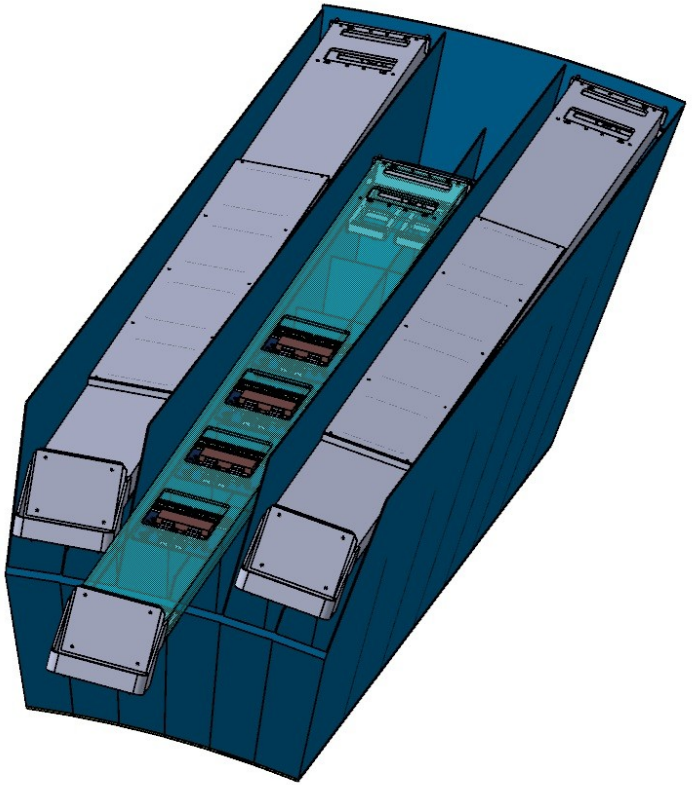
- Max deformation is less than 0.5 mm.

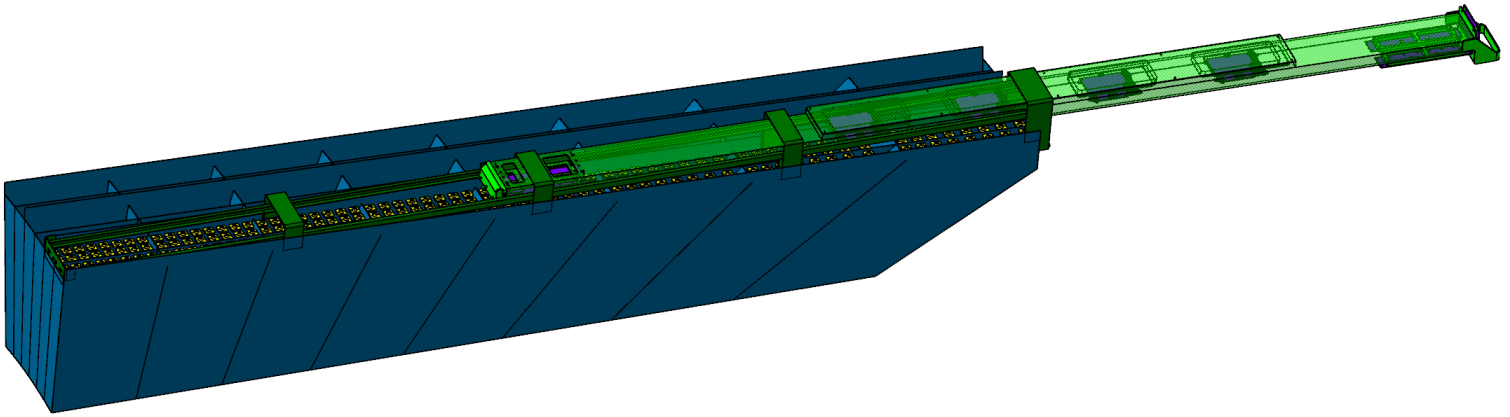




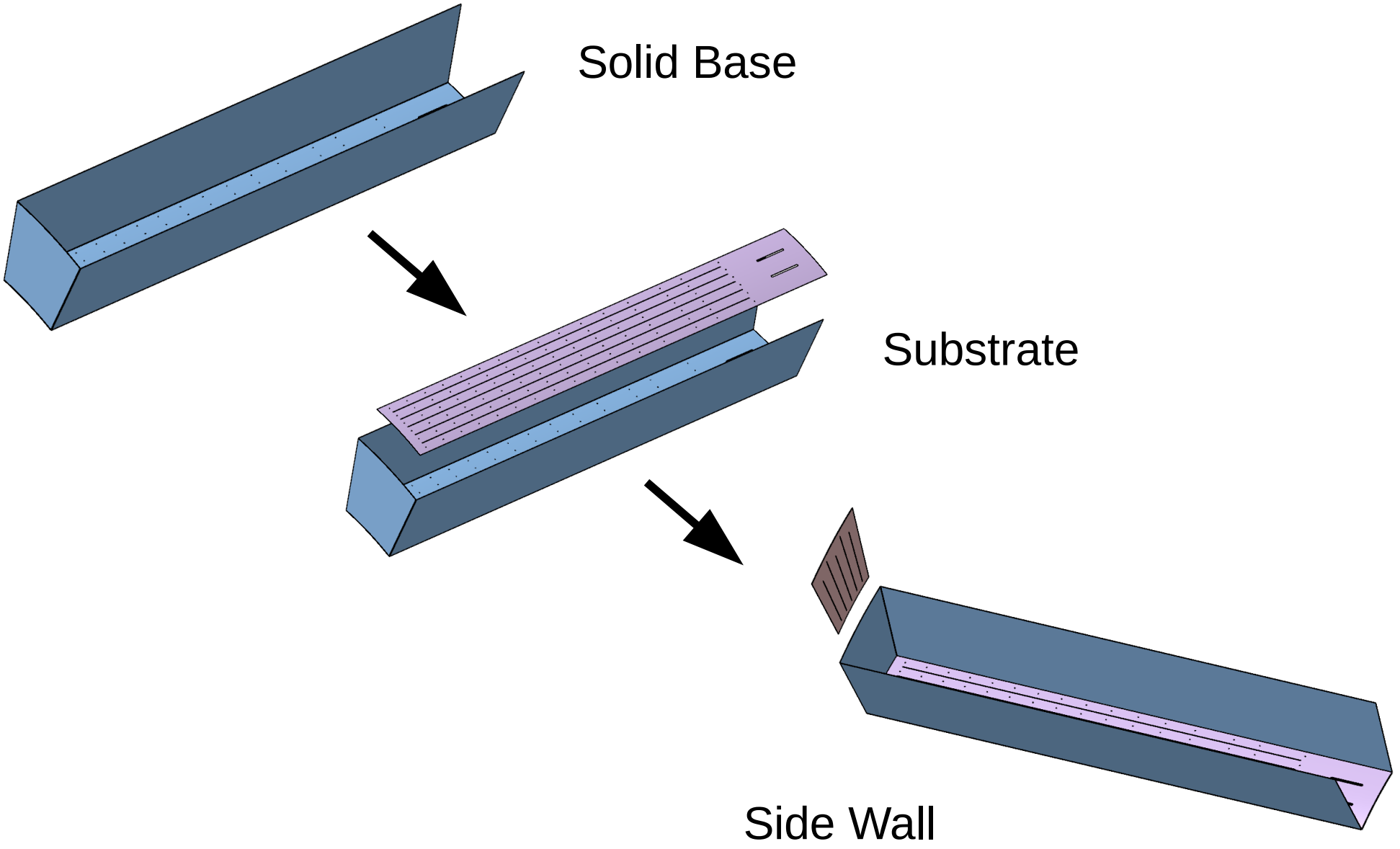
ECal Electronics Install System

- Replacement of electronics without calorimeter dismantle.
- SiPMs and WLS fibers match precision better than 0.5 mm.
- Heat isolation box as a support.
- 16 readout boards are located outside the box.
- 3 boxes per half-sector.

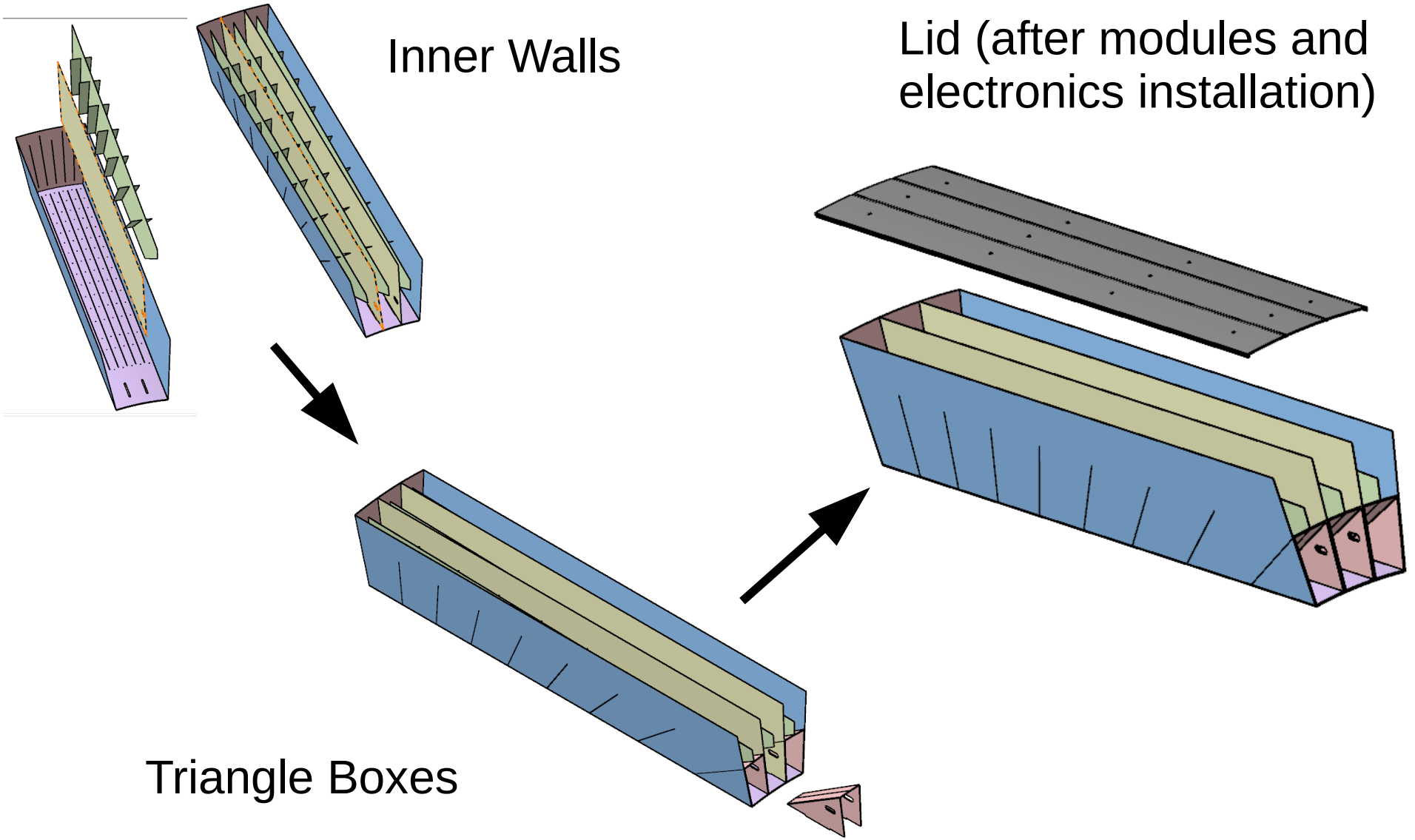




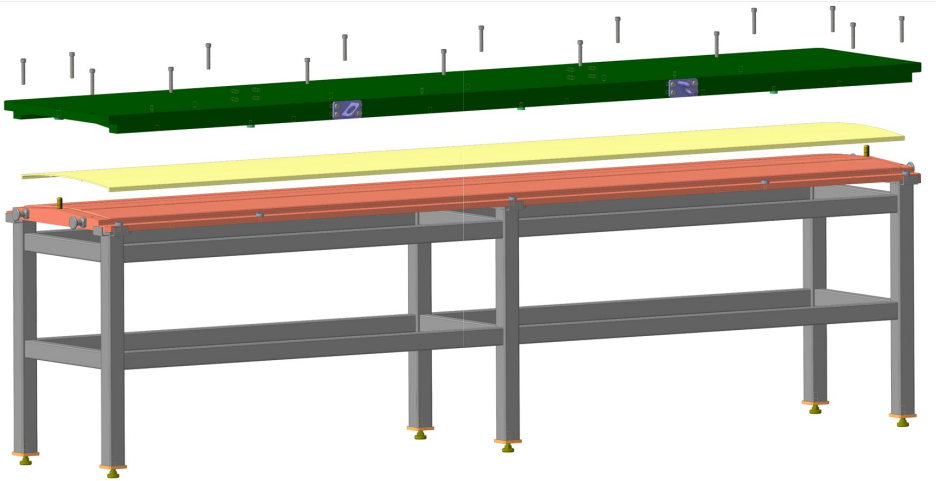
Baskets Production

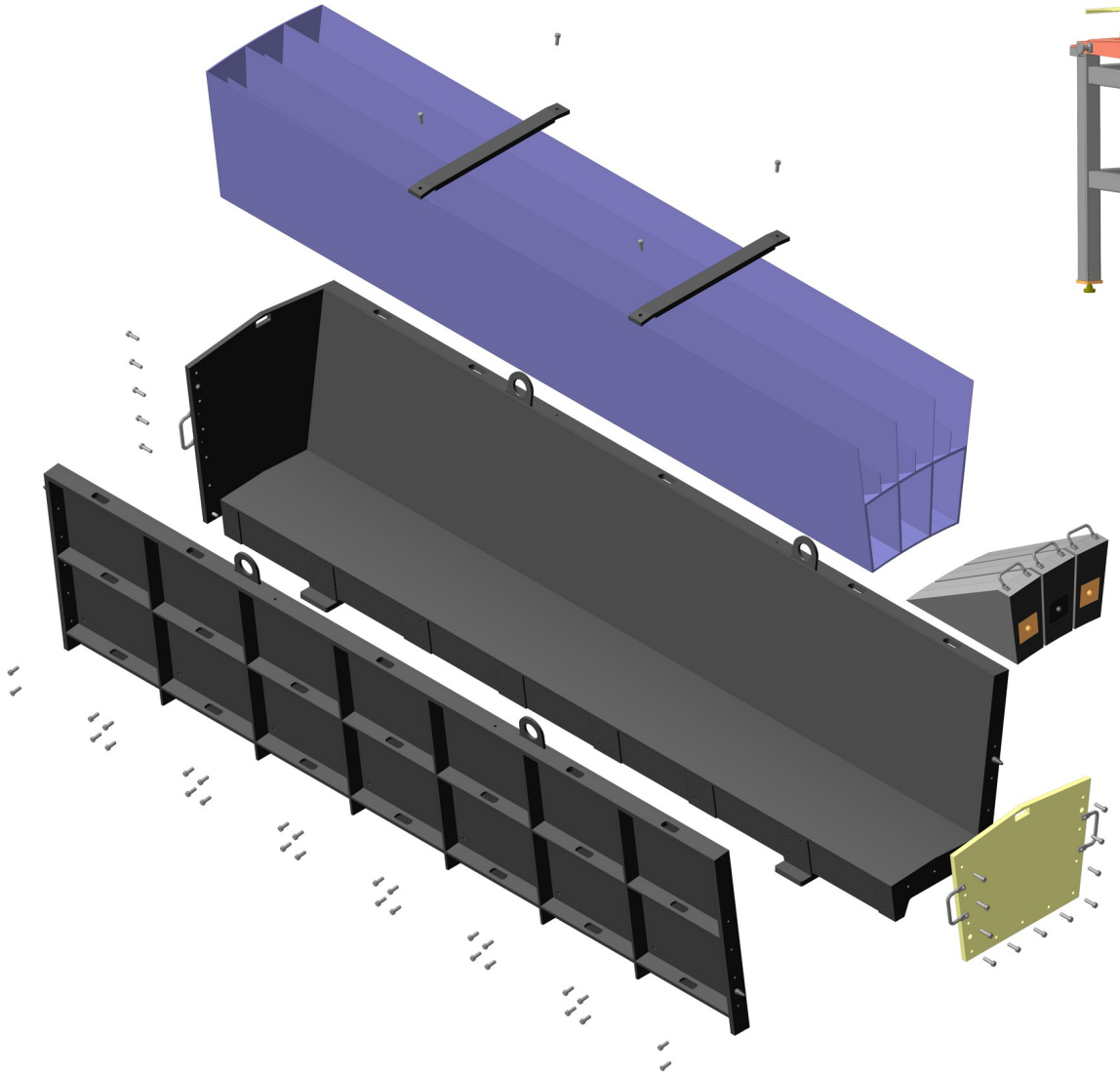


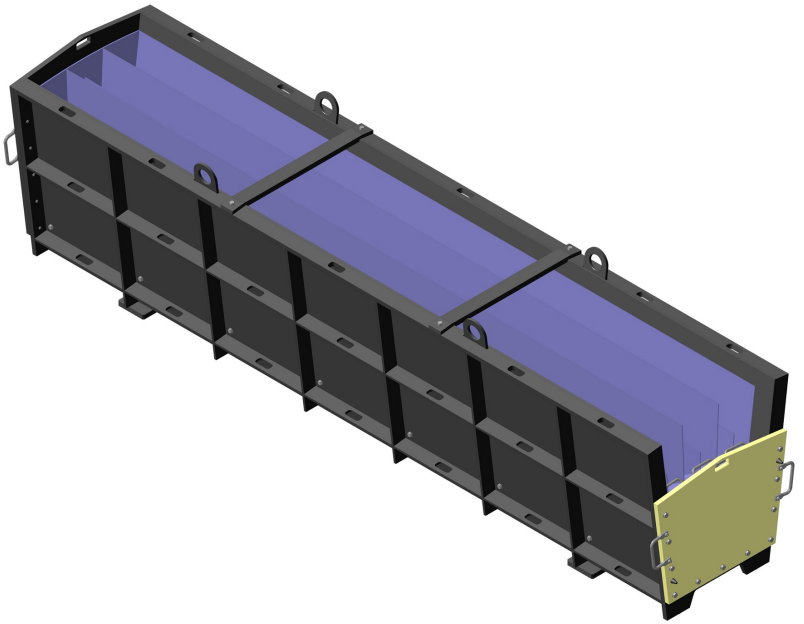
Baskets Production (Cont)



Tools to Bake Baskets







Original Timeline (Contract №100-2064)

1. Engineering Documentation : 30/04/2020
2. Baskets Production : 08/2020 → 10/2021
3. Power Frame Delivery : 01/11/2020
4. Power Frame Installation : 30/11/2020
5. Instructions & Manuals : 08/2020

Delays should be expected !

– Only 30% of personnel work on site

– Problems with subcontractors

Conclusions

- Contractor will meet the technical requirements.
- Engineering documentation is on time (almost).
- Materials for frame and baskets production are OK.
- Unclear delays with production should be expected.
- Installation should be re-scheduled.