

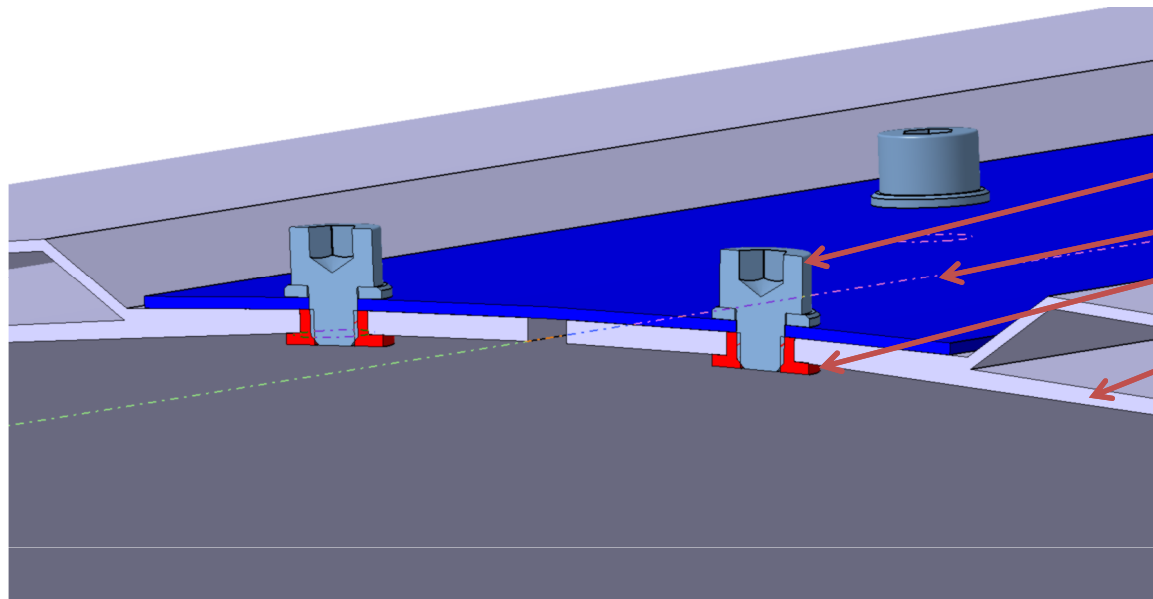
Updates on DHC Mechanical Structure

20 Mar 2012

DCH Mechanics and preliminary creep analysis

Joints detail

Longitudinal joint

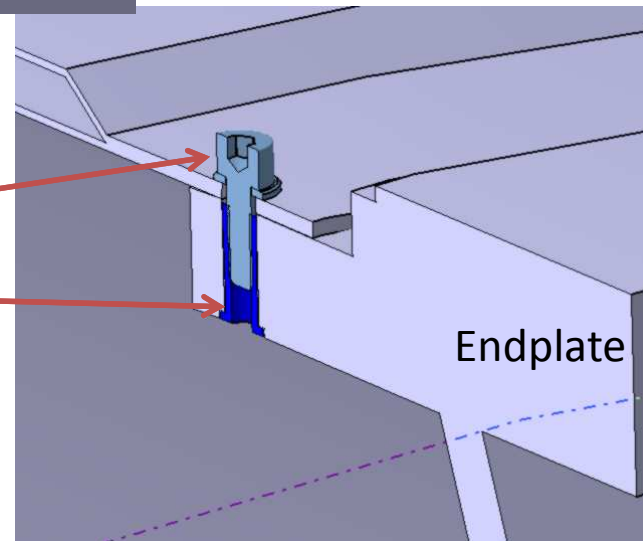


- Two rows AL M5 screw
- CF Connecting strip
- AL Insert
- CF sandwich

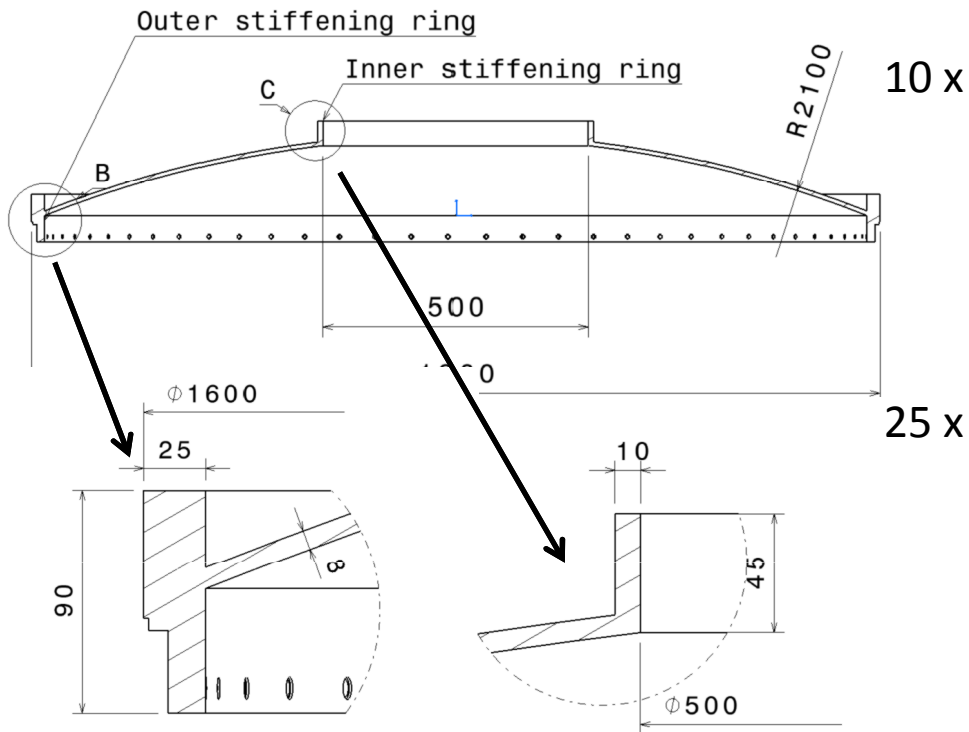
Radial joint

- 70 AL M5 screw
- AL insert

Gas Tightening is provided by a removable sealing paste



Geometry and materials



$E_x = 70.9 \text{ GPa}$ $\nu_{xy} = 0.03$ $G_{xy} = 4.8 \text{ GPa}$
 $E_y = 70.9 \text{ GPa}$ $\nu_{xz} = 0.38$ $G_{xz} = 4.8 \text{ GPa}$
 $E_z = 11.4 \text{ GPa}$ $\nu_{zy} = 0.38$ $G_{zy} = 3.8 \text{ GPa}$
 CF properties*

*Taken from datasheets, may vary 10-20 %
 ** Downgraded by a factor of 0.7 for endplates

20 Mar 2012

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10 x

Ply#	Lamina Type	Thickness(mm)	Angle (deg)
1	Graphite/Epoxy	0.250	0
2	Graphite/Epoxy	0.250	45
3	Graphite/Epoxy	0.250	45
4	Graphite/Epoxy	0.250	0

Inner stiffening ring

25 x

Ply#	Lamina Type	Thickness(mm)	Angle (deg)
1	Graphite/Epoxy	0.250	0
2	Graphite/Epoxy	0.250	45
3	Graphite/Epoxy	0.250	45
4	Graphite/Epoxy	0.250	0

Outer stiffening ring

8 x

Ply#	Lamina Type	Thickness(mm)	Angle (deg)
1	Graphite/Epoxy	0.250	0
2	Graphite/Epoxy	0.250	45
3	Graphite/Epoxy	0.250	45
4	Graphite/Epoxy	0.250	0



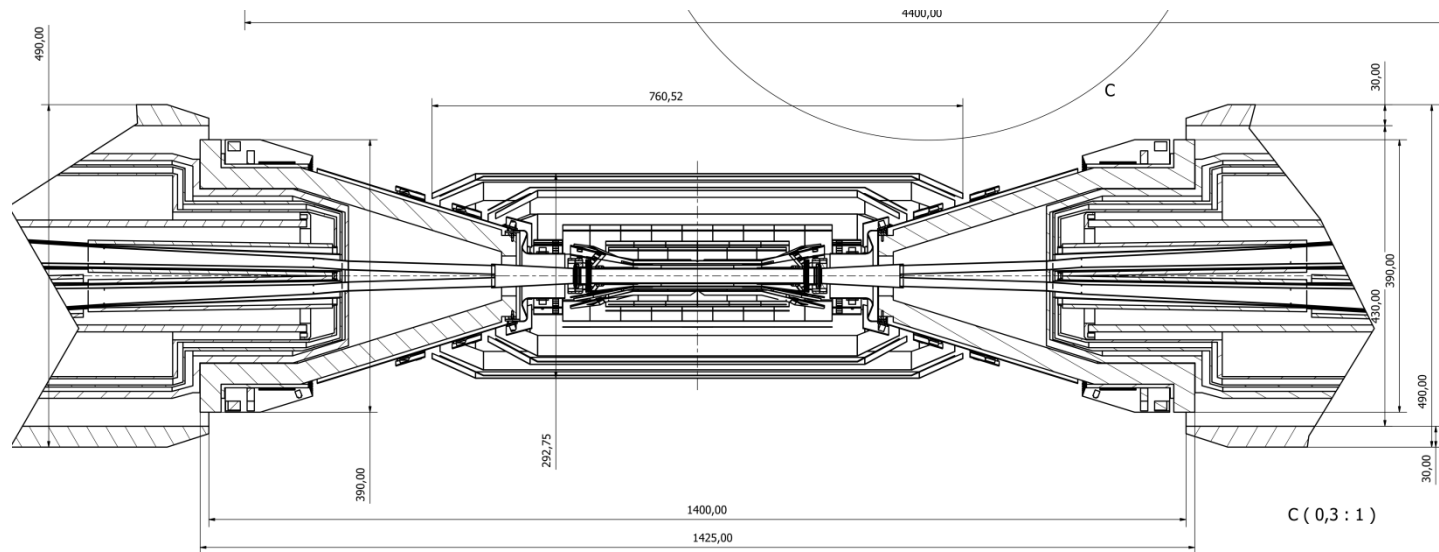
Endplates

0/90 fabric

Dimensions

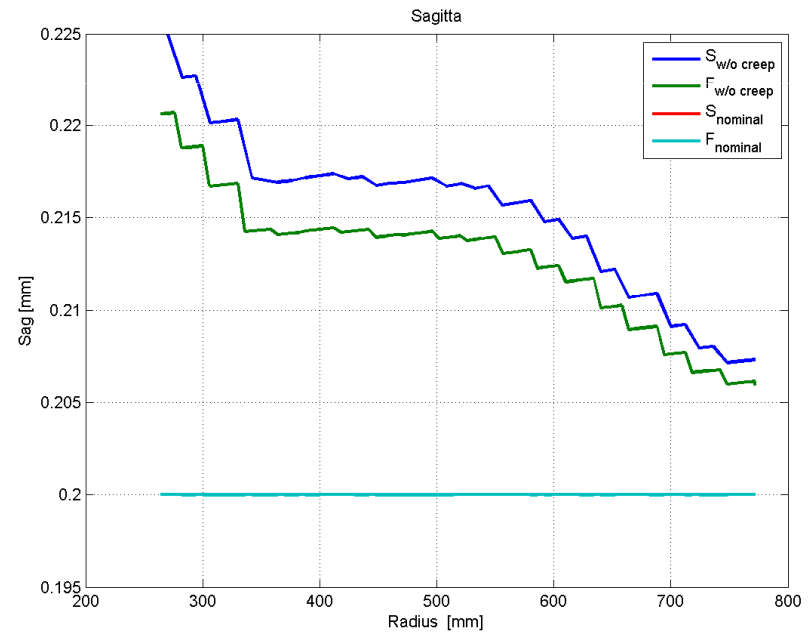
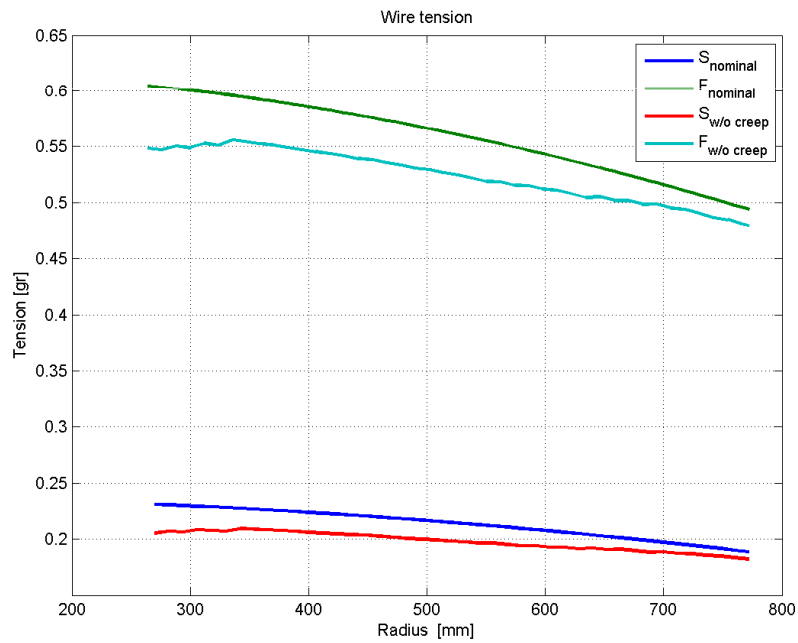
- SVT outer radius: 245mm
- DHC-SVT clearance: 5mm
- Inner stiffening ring thickness: 10mm
- Guard wire clearance: 6mm
- Gap Guard-Sense wire: 12mm
- DHC outer radius: 800mm
- Outer stiffening ring: 25mm
- Guard wire clearance: 6mm
- Gap Guard-Sense wire: 12mm
- First Layer: R258 -> **R278**
- Last Layer: R784 -> **R757**

44 Layers -> **40 Layers**

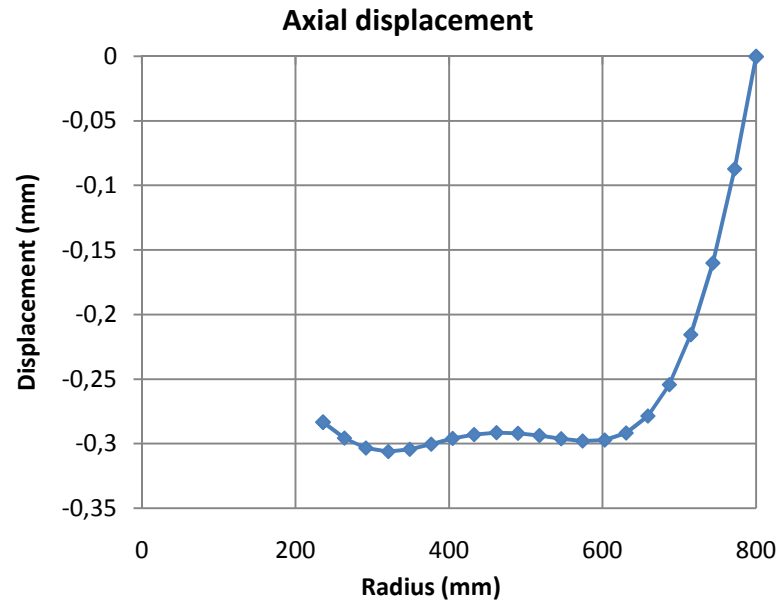


Wires

Wire type	Mat	r (mm)	N° Wires	Sag. (mm)	T(gr)
Field	Aluminium	0.04	22914	0.2	≈50
Sense	Molybdenum (AU coated)	0.0125	7638	0.2	≈23

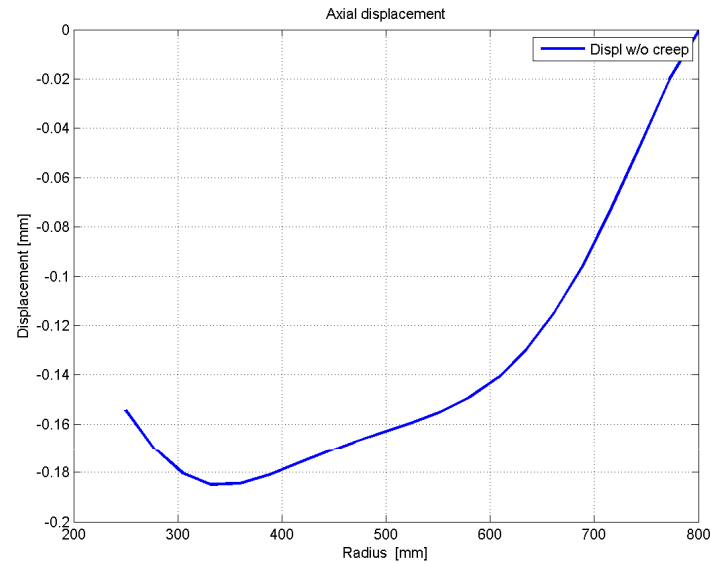


Endplate displacements



Max displacement: 0.31mm
Total nominal load: 15677 N
Total real load: 14711 N

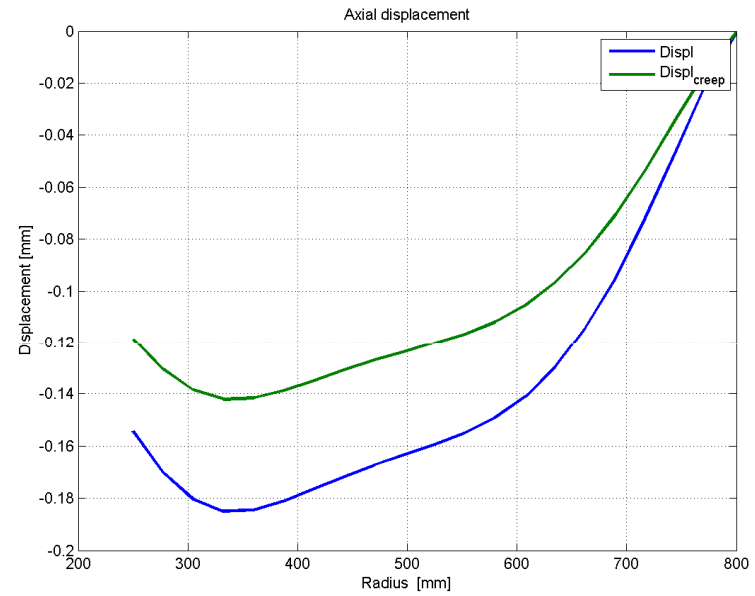
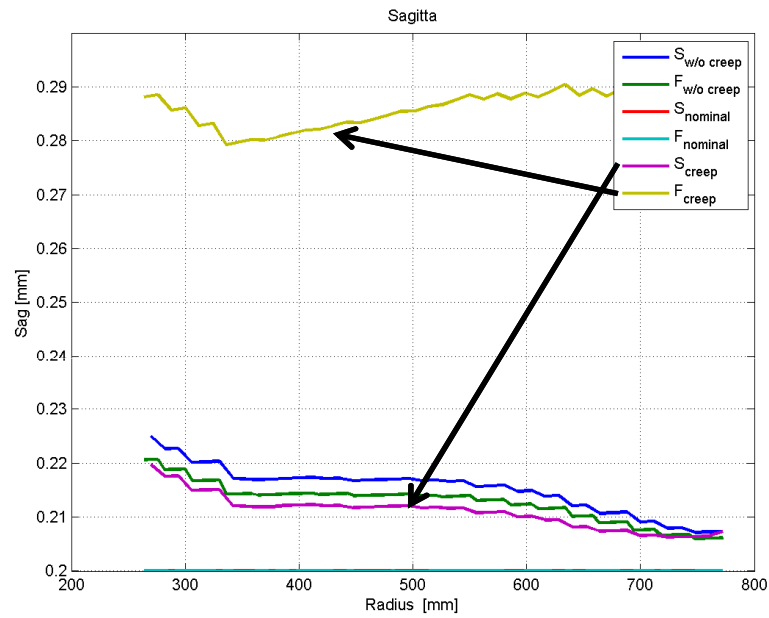
Old results



Max displacement: 0.19mm
Total nominal load: 14268 N
Total real load: 13893 N

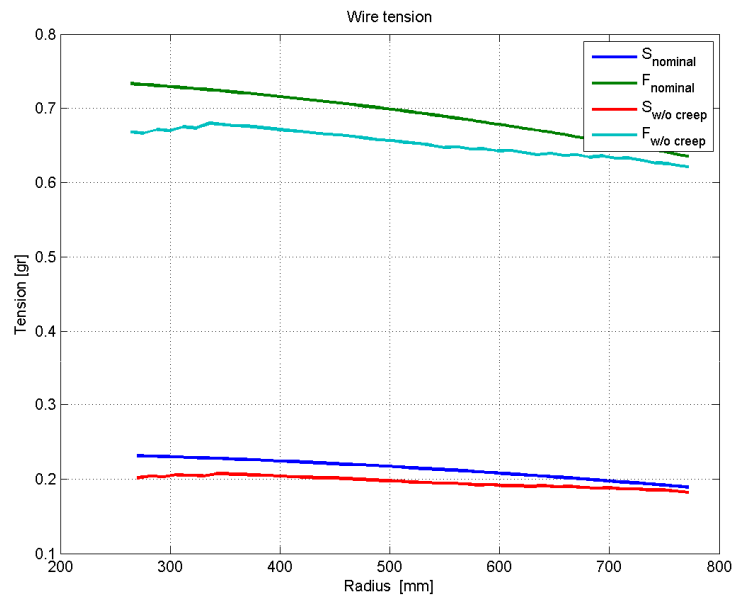
New results

Creep effect

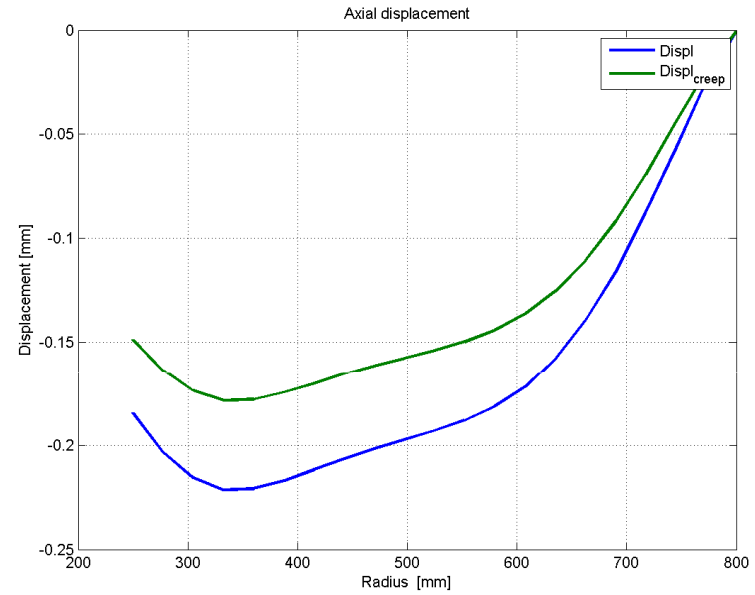


Al creep = 1mm
No Molybdenum creep

Overtension in field wires

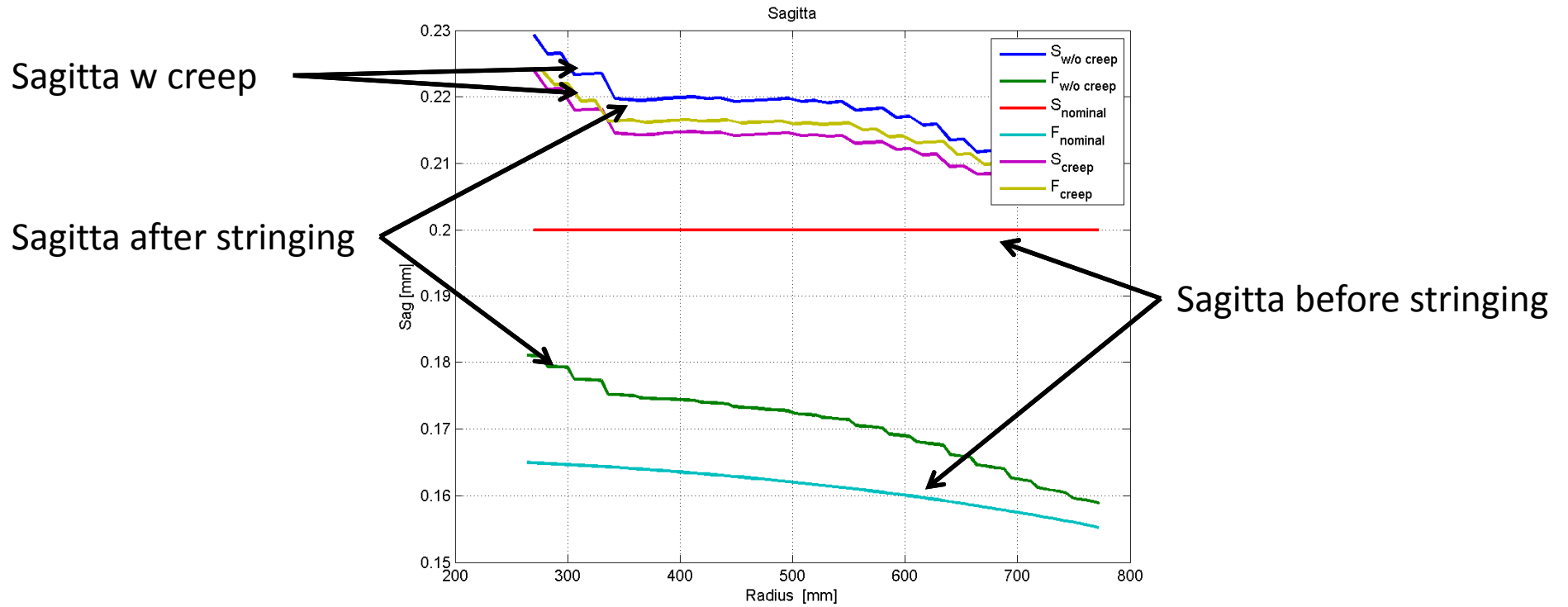


Overtension in AL wire: ≈ 68 gr



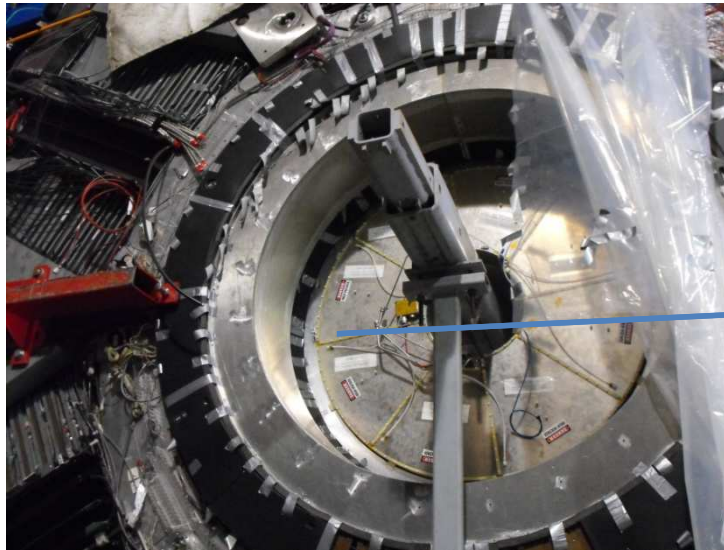
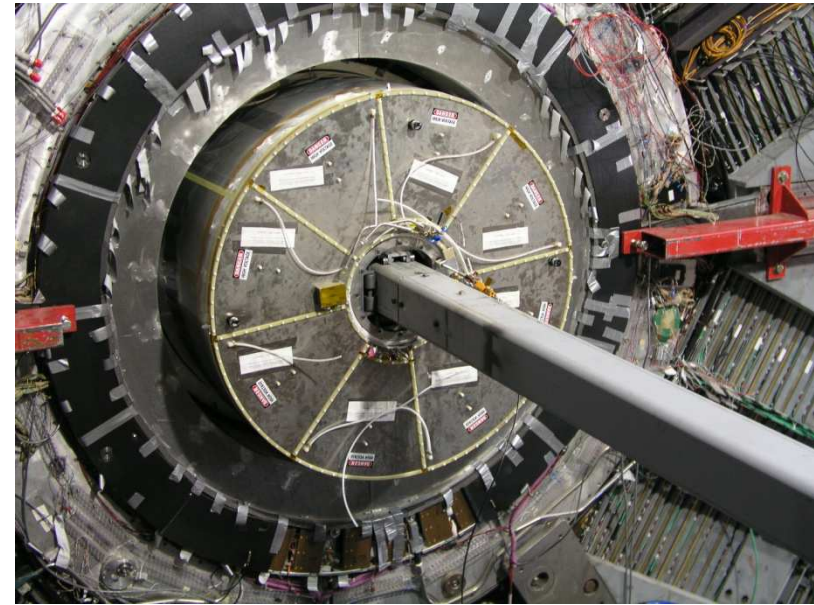
Same tension in Mo wire: ≈ 23 gr

Creep effect



Electronics and DCH supports (DIRC-DCH interface)

BABAr Electronics and DCH supports

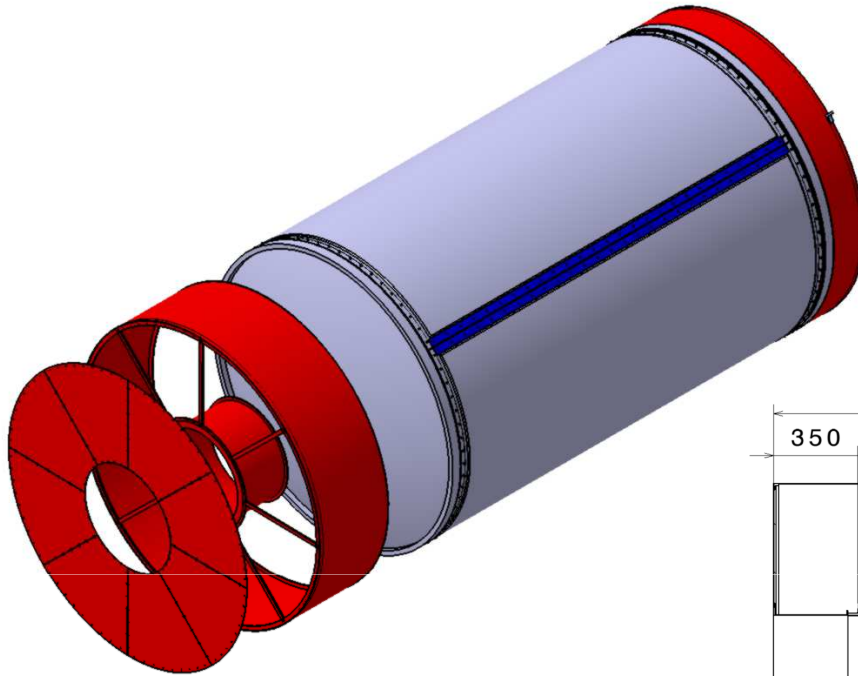


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Flat support

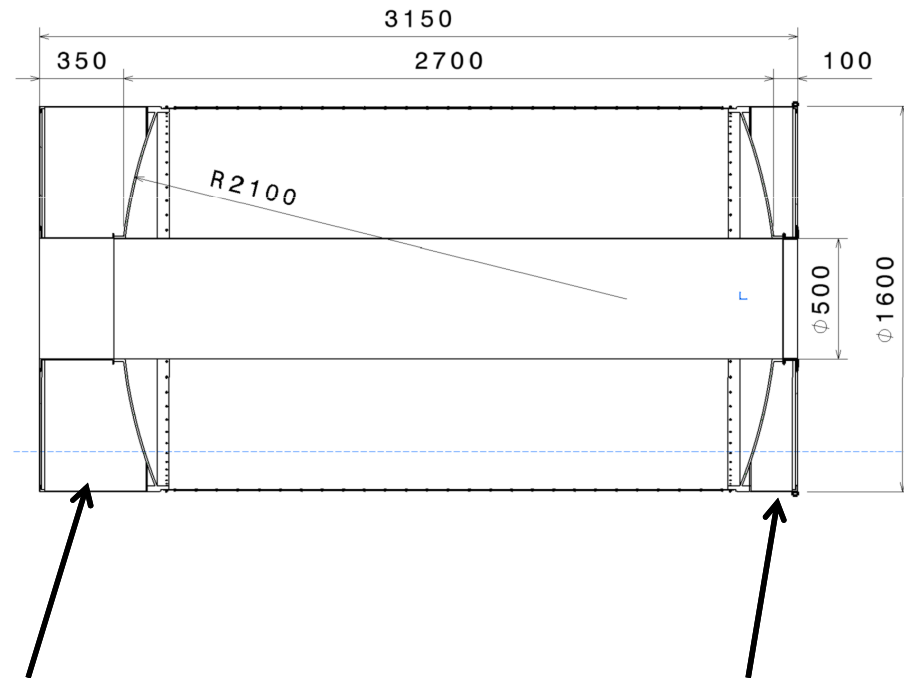


DCH weigth:

- Endplate*: 34 kg
- Cylindrical shell: 19 kg

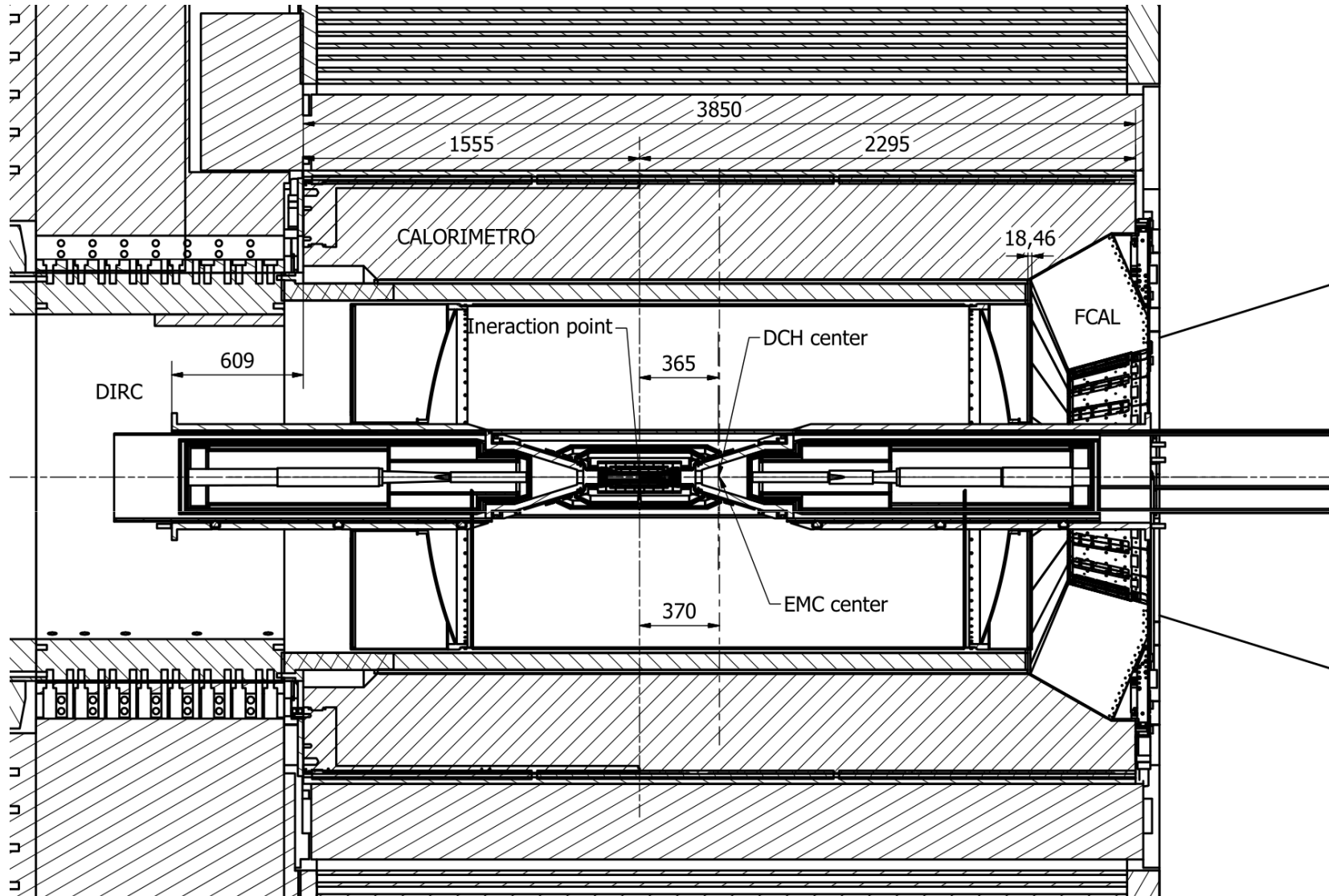
Total: 112 Kg

* $\varnothing_{\text{sense}}=3\text{mm}$
 $\varnothing_{\text{field}}=2\text{mm}$



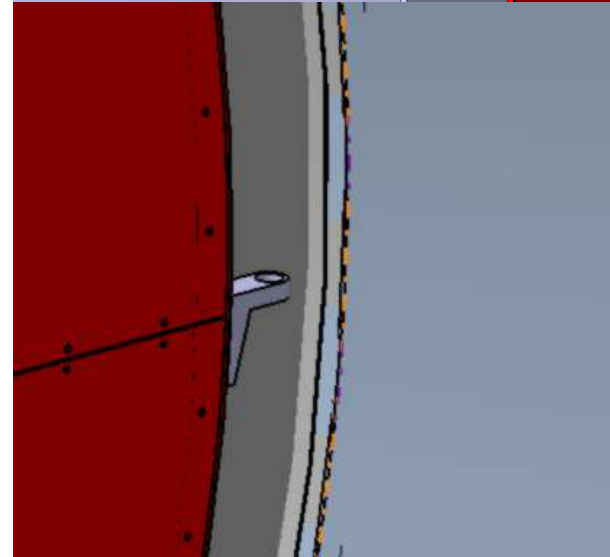
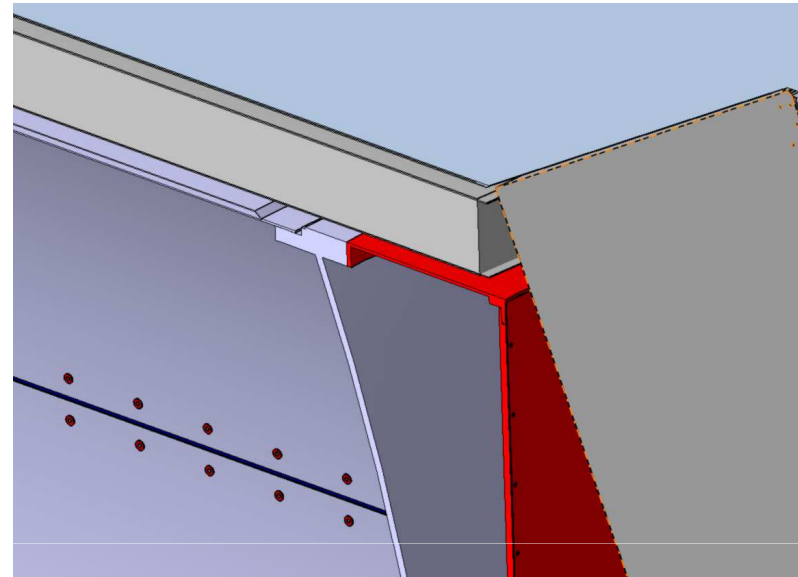
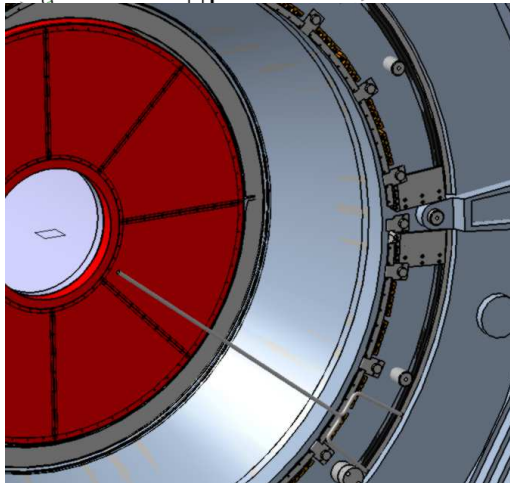
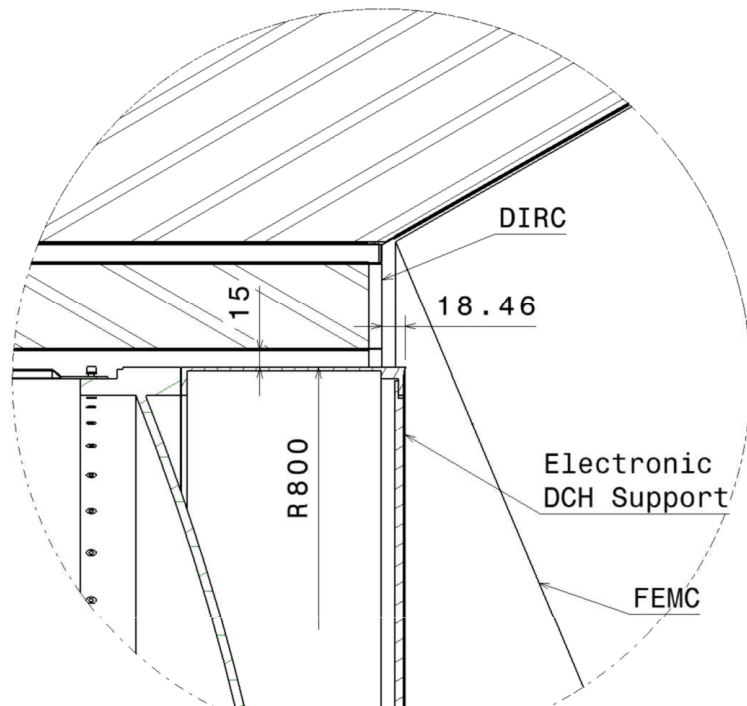
BWD electronic and support

FWD electronic and support

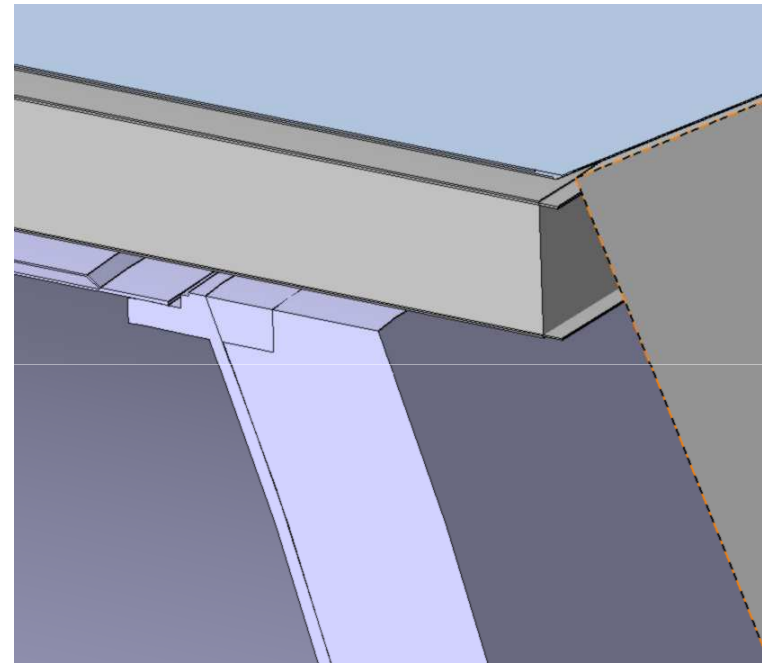
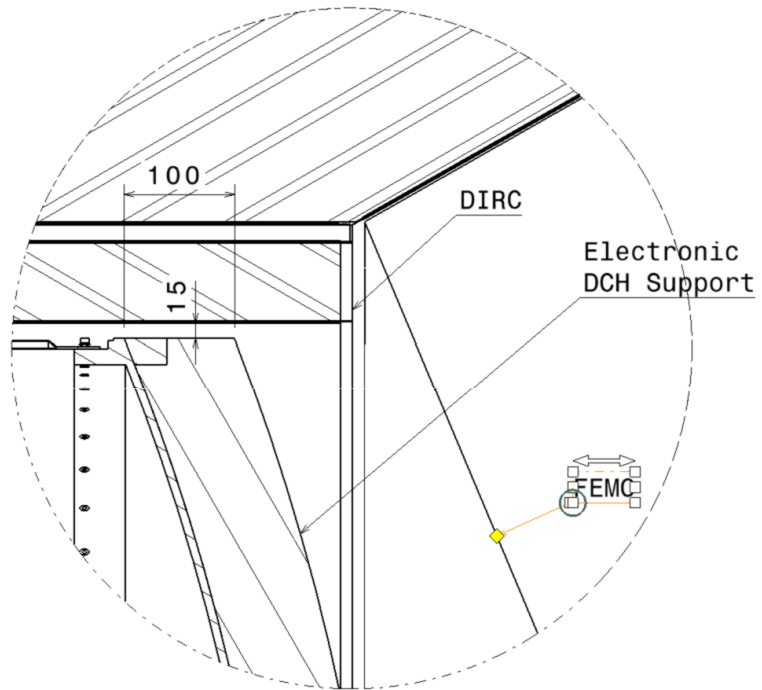


Tungsten tubes will be attached to IFR

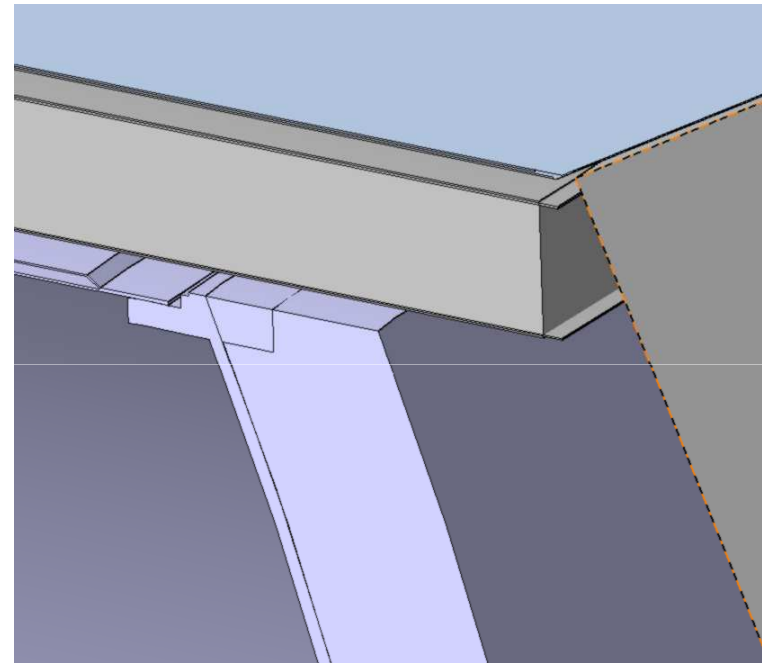
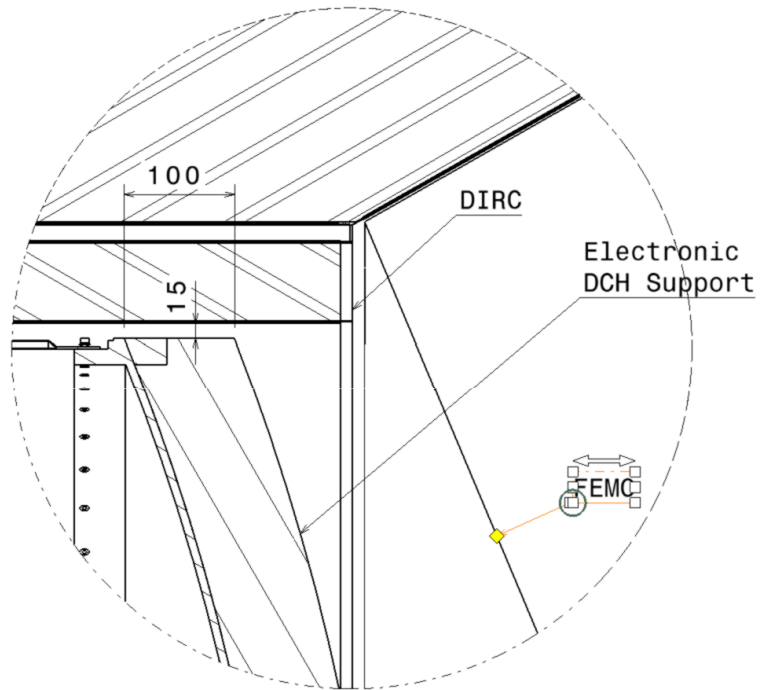
Flat support



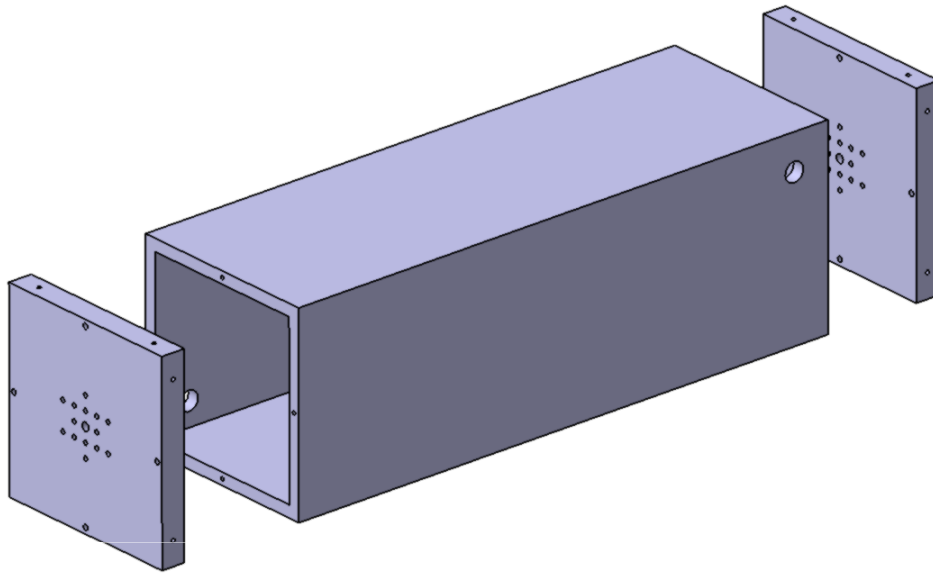
Shaped support



Shaped support



Tests



Aging test

- We have asked for an estimate
- Low degassing resin

Wires test

- Creep in Al and Mo have to be investigated

Conclusions and plans

- Due to mechanics, we lose 4 layers (40 Layers)
- Should we reduce the thickness of endplates?
- Creep has a small effect on sagitta, but can be further reduced overtensioning wires
- Support and alignment system of chamber should be on electronics supports
- Flat supports, probably are not acceptable for FPID
- DCH could be attached to the inside surface of DIRC ??
- How and where will FPID be attached?
- To improve the technical drawing i need the geometry and weight of electronics, gas pipes etc...
- Tests will start asap