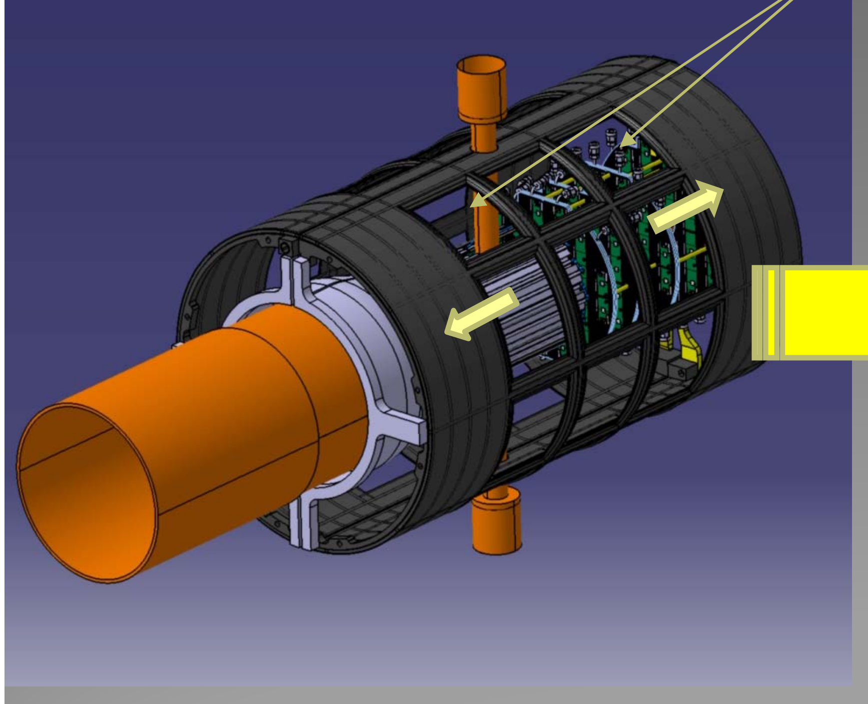
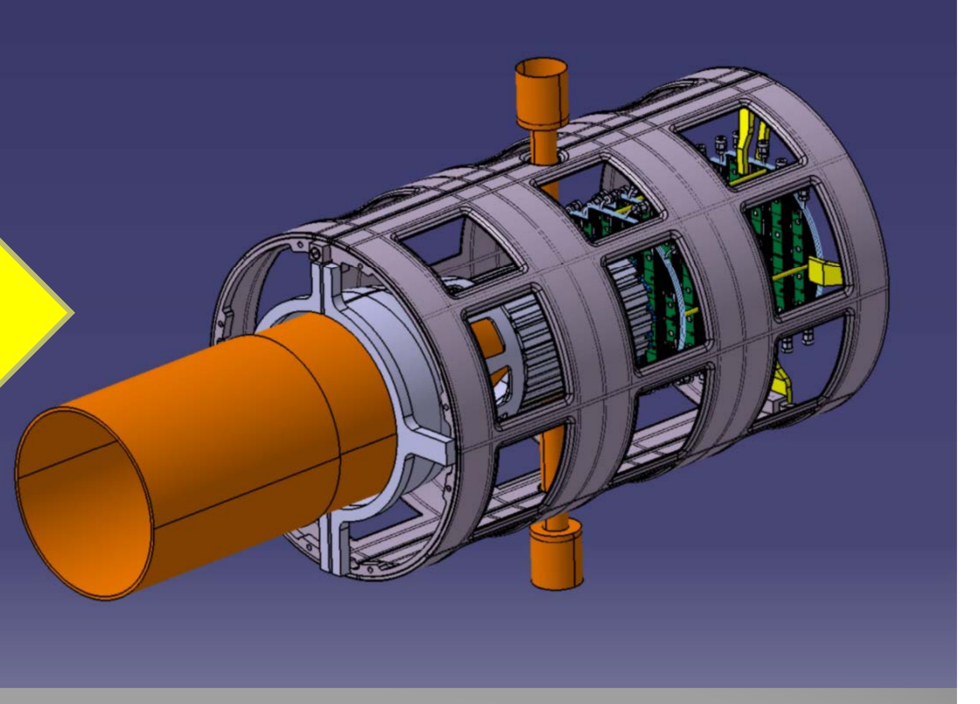
MVD UPDATES

- Mechanics
  - Frame *(optimization & manufacturing)*
  - Disks *(manufacturing)*
- Cooling.
  - Big disk thermal behavior *(FE analysis)*

Windows that must be moved

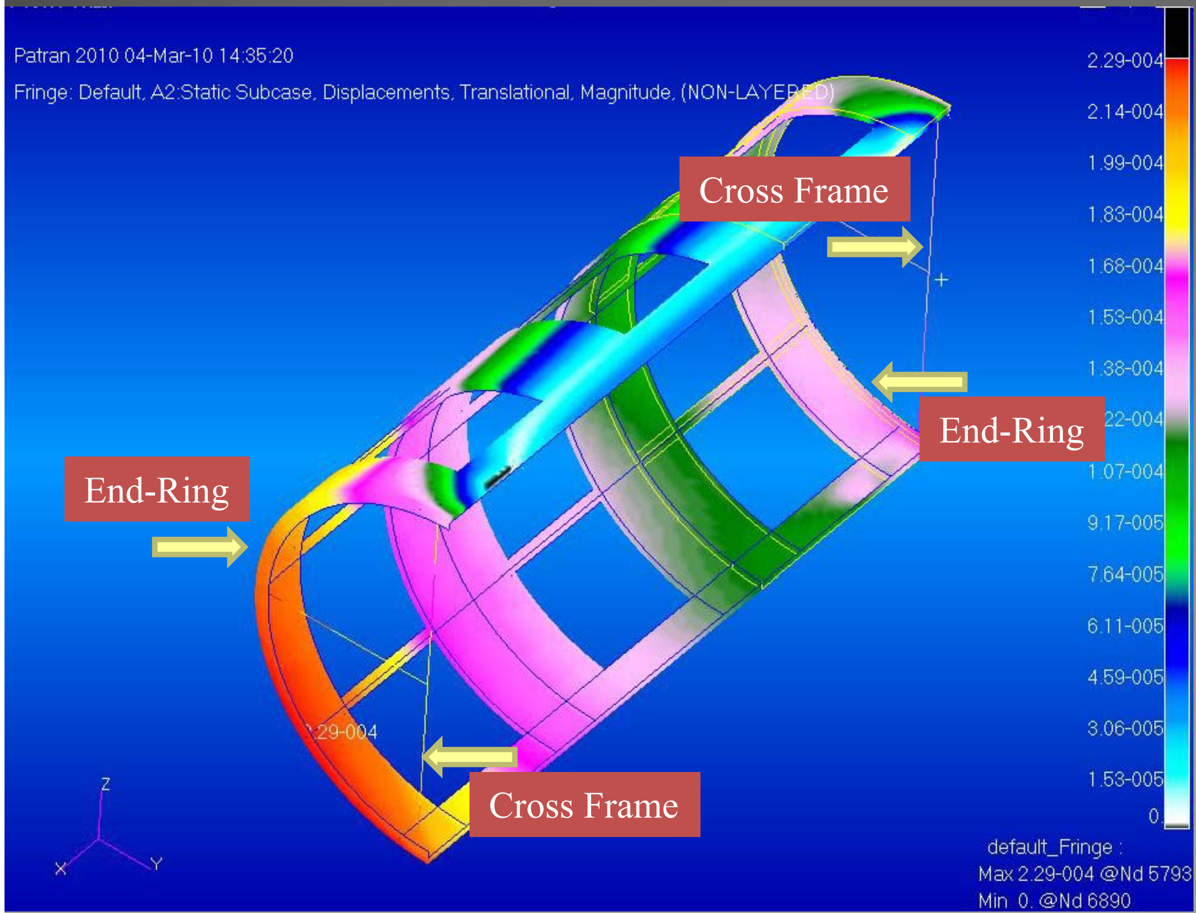


PREVIOUS DESIGN



ACTUAL DESIGN

FE SIMULATION - GRAVITATIONAL LOAD



Simulation include
End-Rings & Cross Frame.

Asymmetry in the displacement is due to the asymmetry of the constraint.

A safety factor of 2 is considered.

According to data from the simulation, a prototype of the frame is under construction:

sandwich structure

- 1 skin → 4 plies of carbon fibre M55J/LTM110 (0°, 45°, 90°, 135°)
- core → Rohacell 51IG
- 1 skin → 4 plies of carbon fibre M55J/LTM110 (0°, 45°, 90°, 135°)

Total thickness → 4mm

inner radius = 137 mm

outer radius = 141 mm

Length = 460 mm

Radiation Length $X_O \approx 0{,}4\%$

Tests to be done:

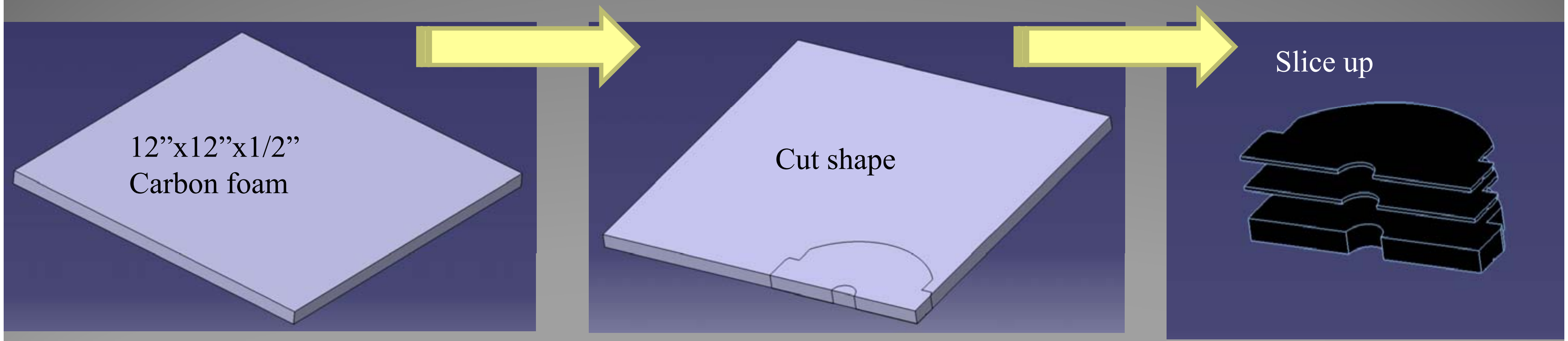
- General survey: dimension, shape.
- Displacement under static load.
- Long term dimensional stability.

EXPECTED DELIVERY → end of April

With the aim of producing a half disk, several cutting technology was investigated.

The goal is to obtain the final part with minor possible machine rejection.

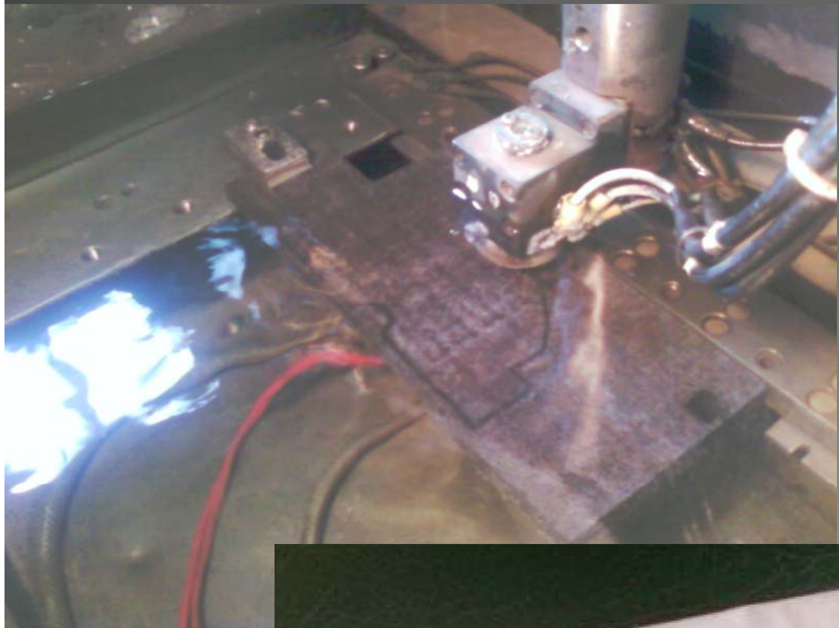
Philosophy ….



THE MOST EFFICIENT WAY IS TO CUT WITH WIRE EDM

DISK PRODUCTION

WIRE EDM



TROUBLESHOOTING

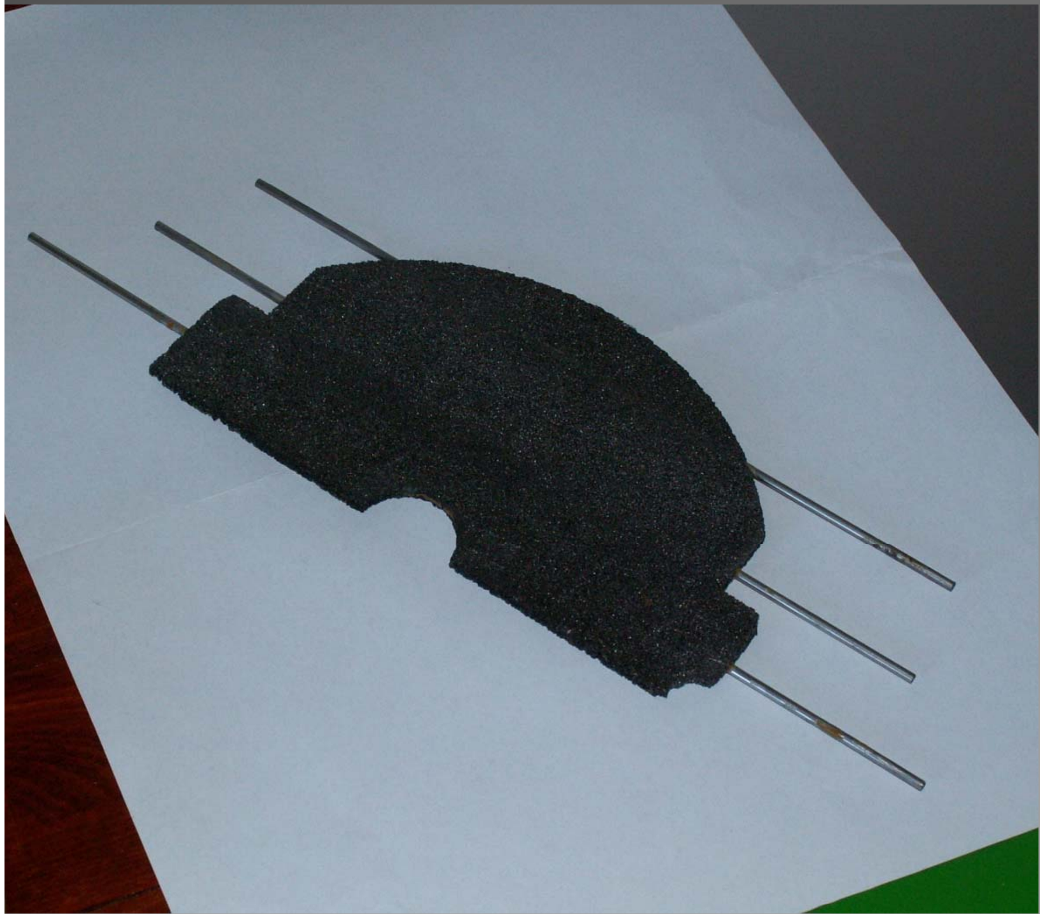
The wire EDM operates with the material immersed into water.
The foam act as a “sponge”. After the cut a big quantity of water was embedded into the specimen.

SOLUTION: baking for 48 hours into oven at 60 °C.

12 HOUR AT 60 °C

Weight after cut → 15,12 g
Weight after 24 hours at 60 °C → 13,5g
Weight after 48 hours at 60 °C → 13,12g

FINAL ASSEMBLY



Disk is made by two halves and three tubes embedded.
The halves and the tubes are glued with thermal epoxy (EPOTEK H70E)

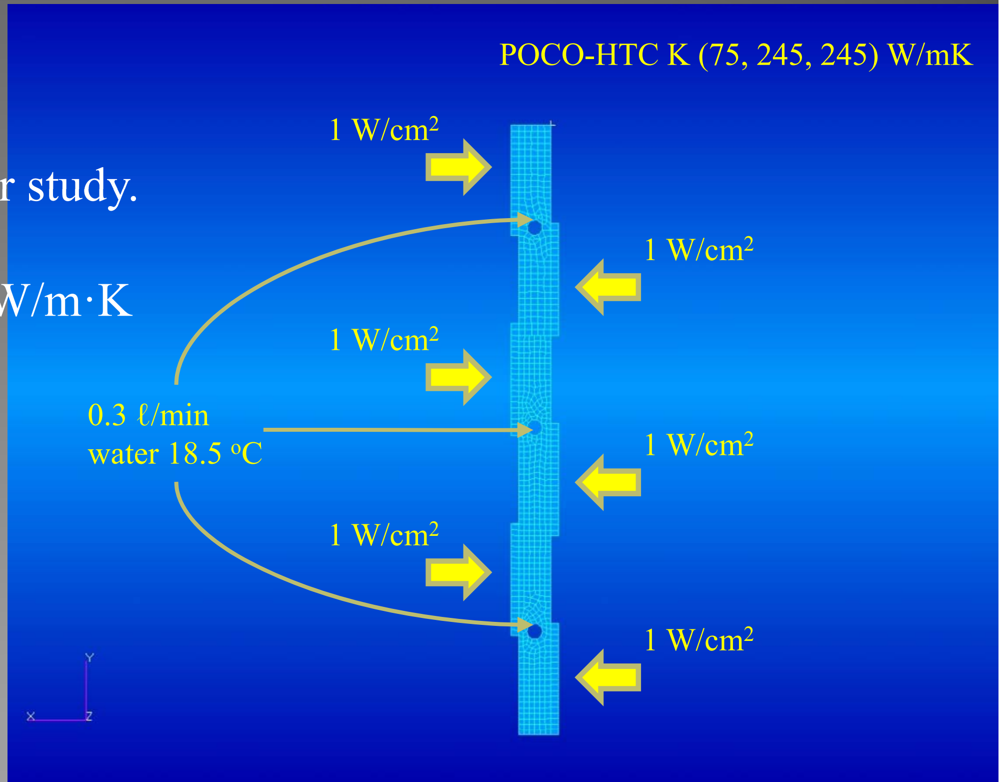
The surfaces are milling machined to final thickness (4 mm)

Planarity reached < 20 µm/m

Ancillary cooling elements delivered – end February.

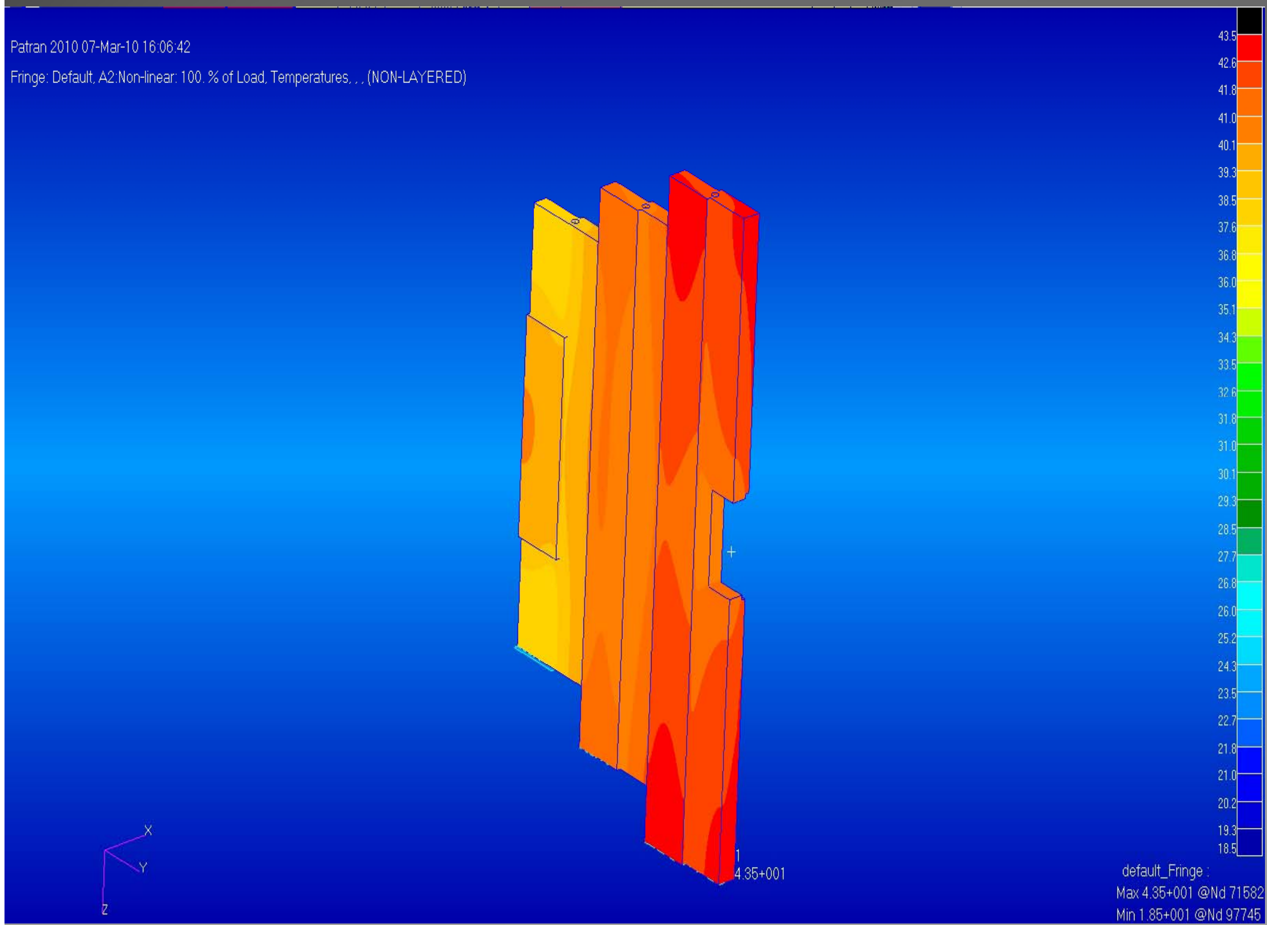
Pressure/vacuum test in preparation.

A full half disk is modeled for thermal behavior study.



MATERIAL → POCO HTC *k* (75, 245, 245) W/m·K
THERMAL FLOW → 1 W/cm^2
TOTAL POWER → 95 W
WATER FLOW RATE → 0.3 ℓ/min
WATER INLET TEMP. → 18.5 °C

COOLING FEM - RESULTS



Max Temp.= 43.5 °C

Temp. uniformity ΔT ≈5 °C