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Mechanical Dept

TEDD – DEE PROTOTYPING STATUS OF ART

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05/12/2018-IPNL

- **GLOBAL STRUCTURE**
 - TEDD 12 beams (2017)
 - TEDD 8 beams (2018 – study in progress) (P. Dene; E. Schibler)
- **DEE PROTOTYPES**
 - Dee prototype (2016)
 - Dee prototype 2017-2018 – results (N. Lumb)
 - Dee prototype 2018-2019 – full size (in progress)





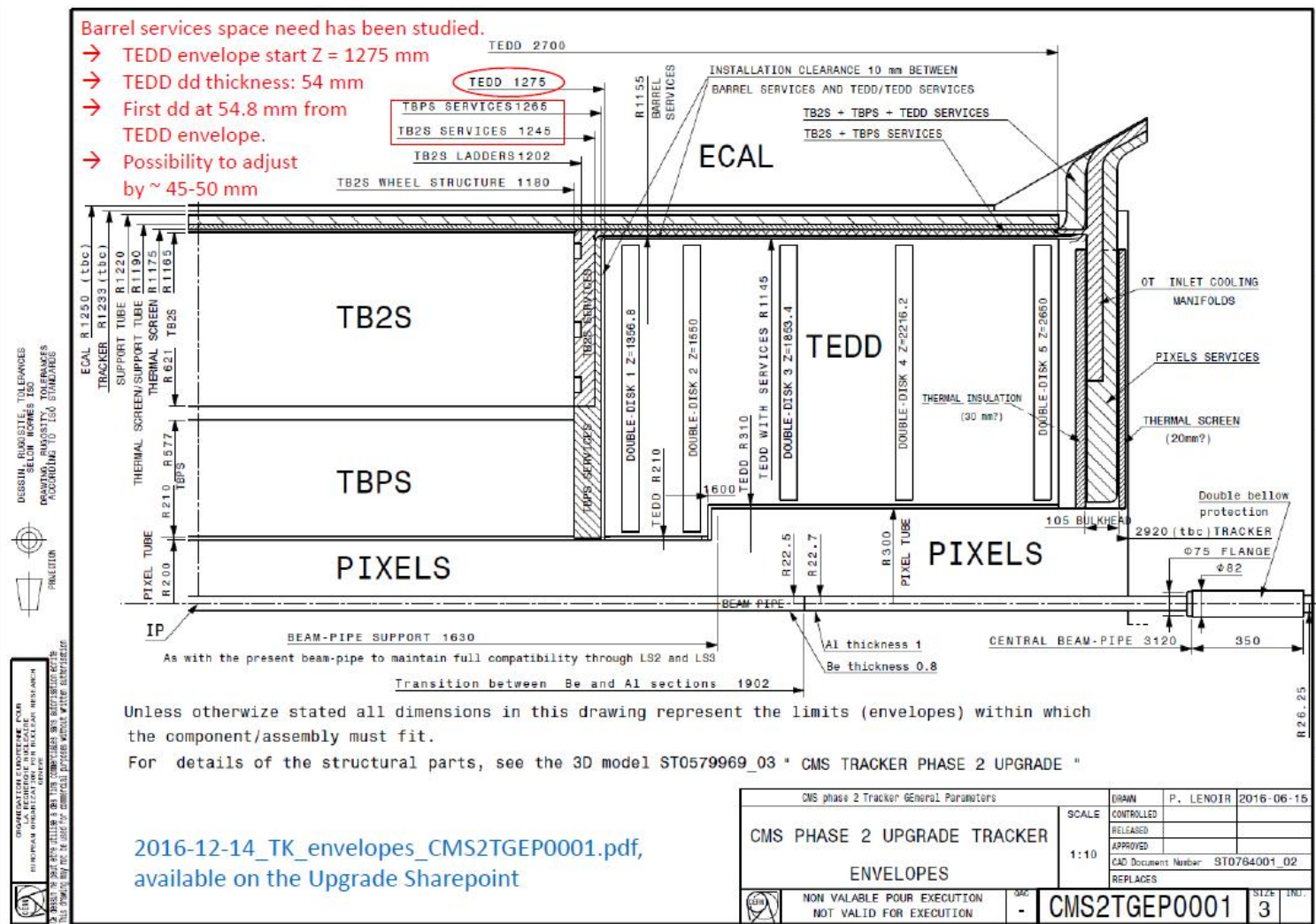
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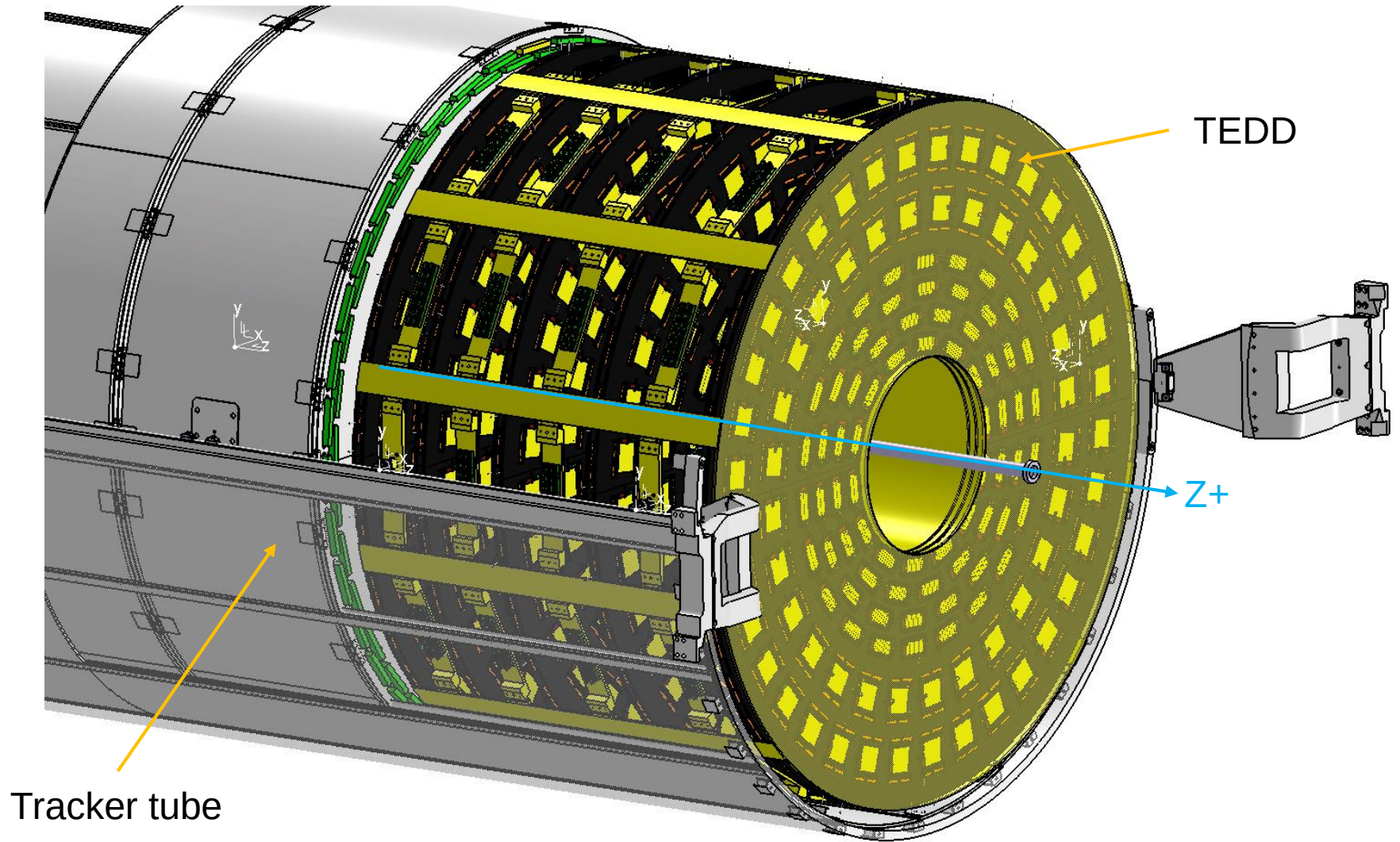
TEDD

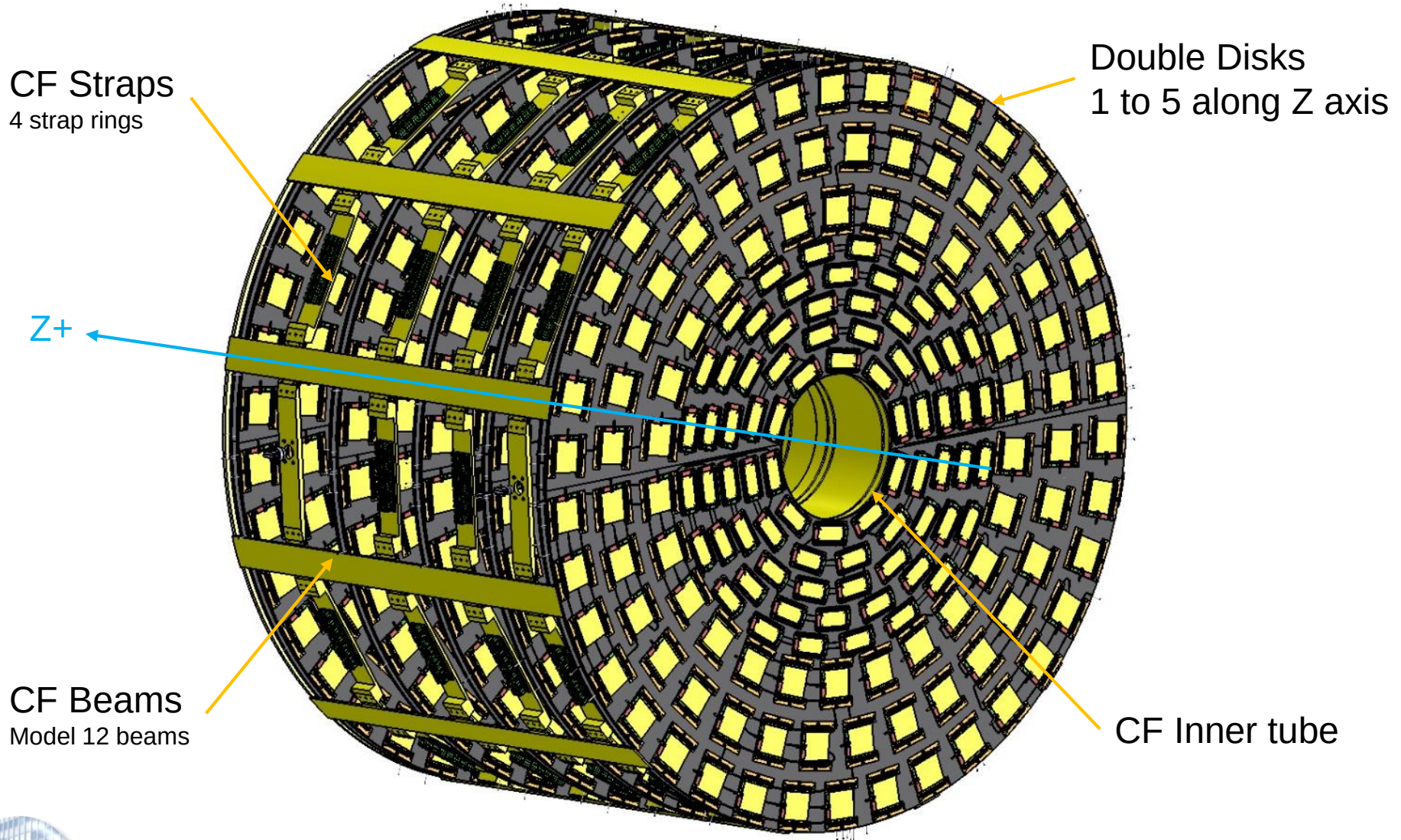
PRELIMINARY DESIGN FOR TEDD

GLOBAL STRUCTURE

05/12/2018-IPNL







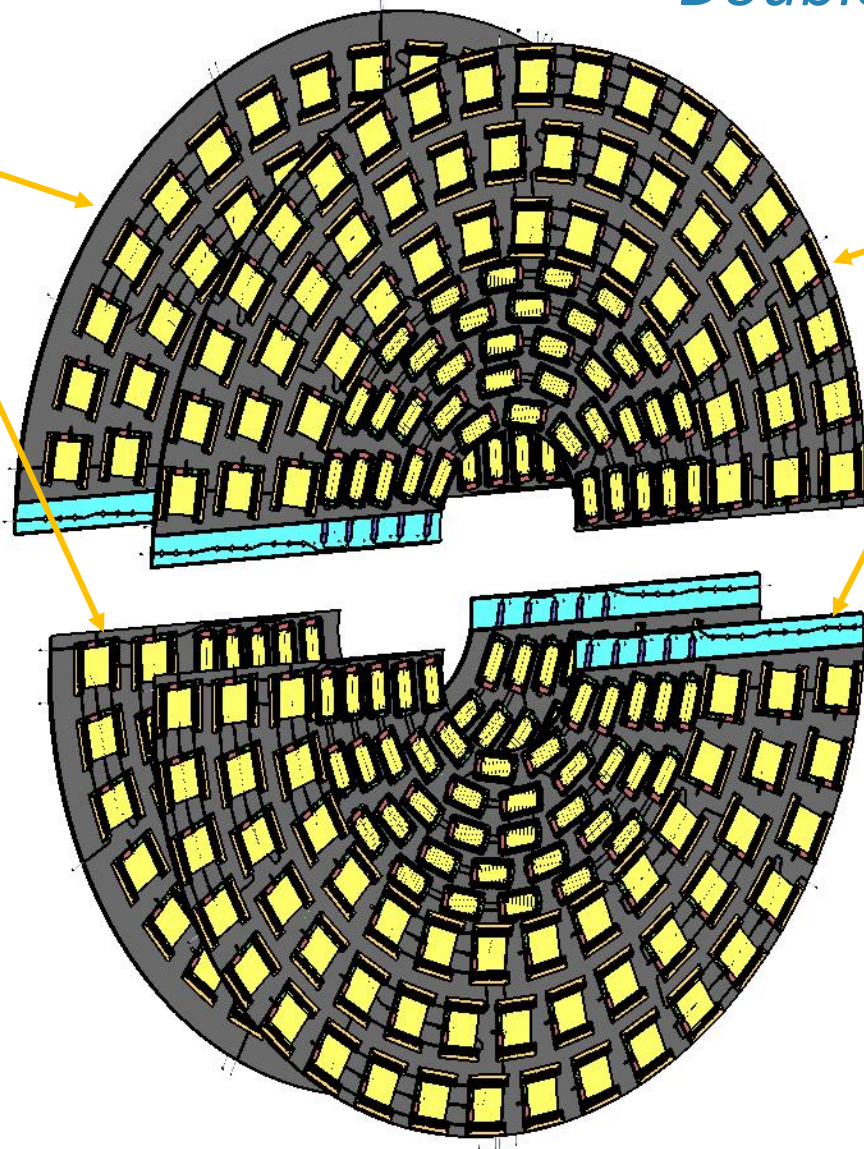
Double Disk composition

1 Disk Even

- 1Dee Upper
- 1Dee Lower

1Disk Odd

- 1Dee Upper
- 1Dee Lower



For each disk,
Dees upper & lower
are the same

Dee_1_2_Odd_Upper (last version)

Cooling pipes 6 sectors
Inserts & C-Foams

Composite sandwich
with cooling pipes & inserts

CF Skins

Modules 2S – PS

Airex Fillers





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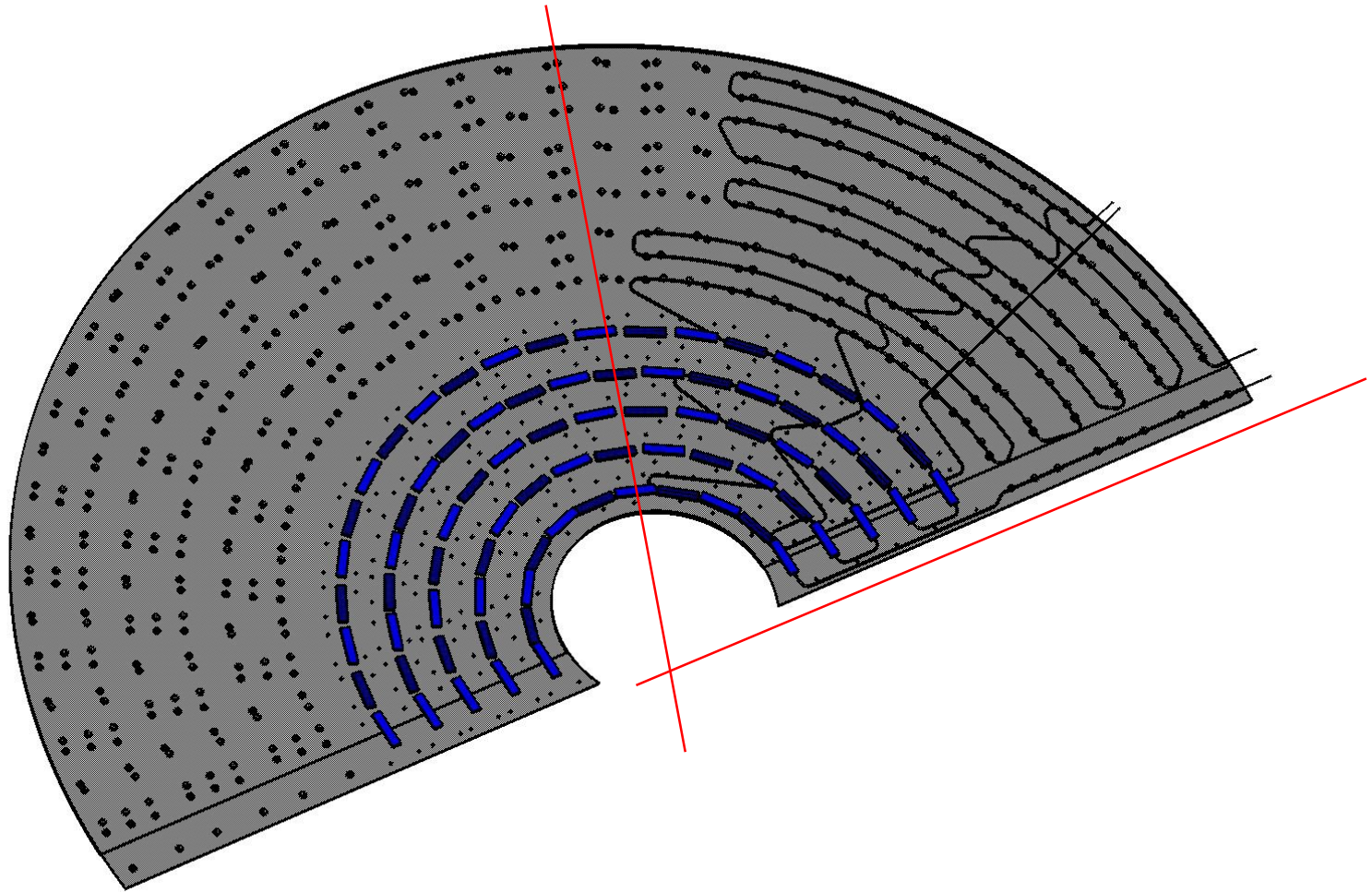
TEDD

DEE 2 SECTORS PROTOTYPE (2016)

Design & Assembly

05/12/2018-IPNL

Model used for prototype



« 2 sectors » prototype concept

Material layers(Sandwich):

Skin A : Carbon fiber 0,5mm

Filler A : Airex 82 4,5mm

Filler B : Airex 82 4,5mm

Skin B : Carbon fiber 0,5mm

Inner parts:

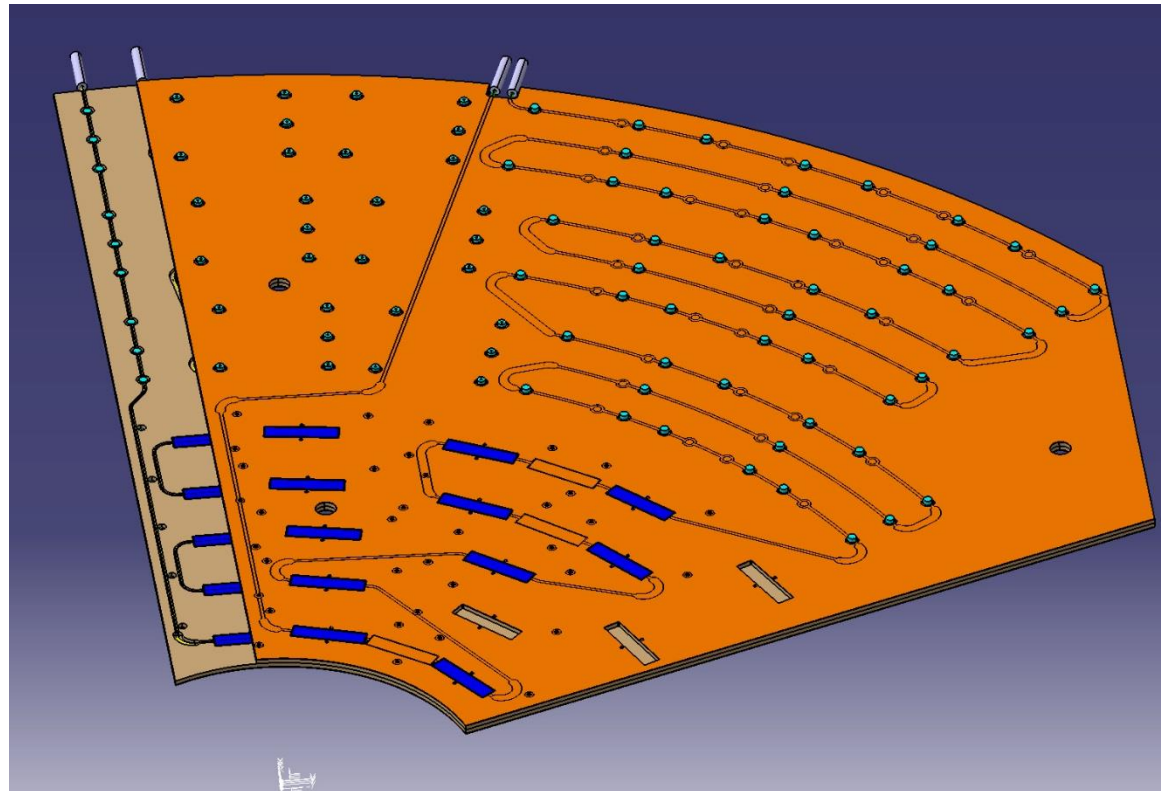
Cooling S1

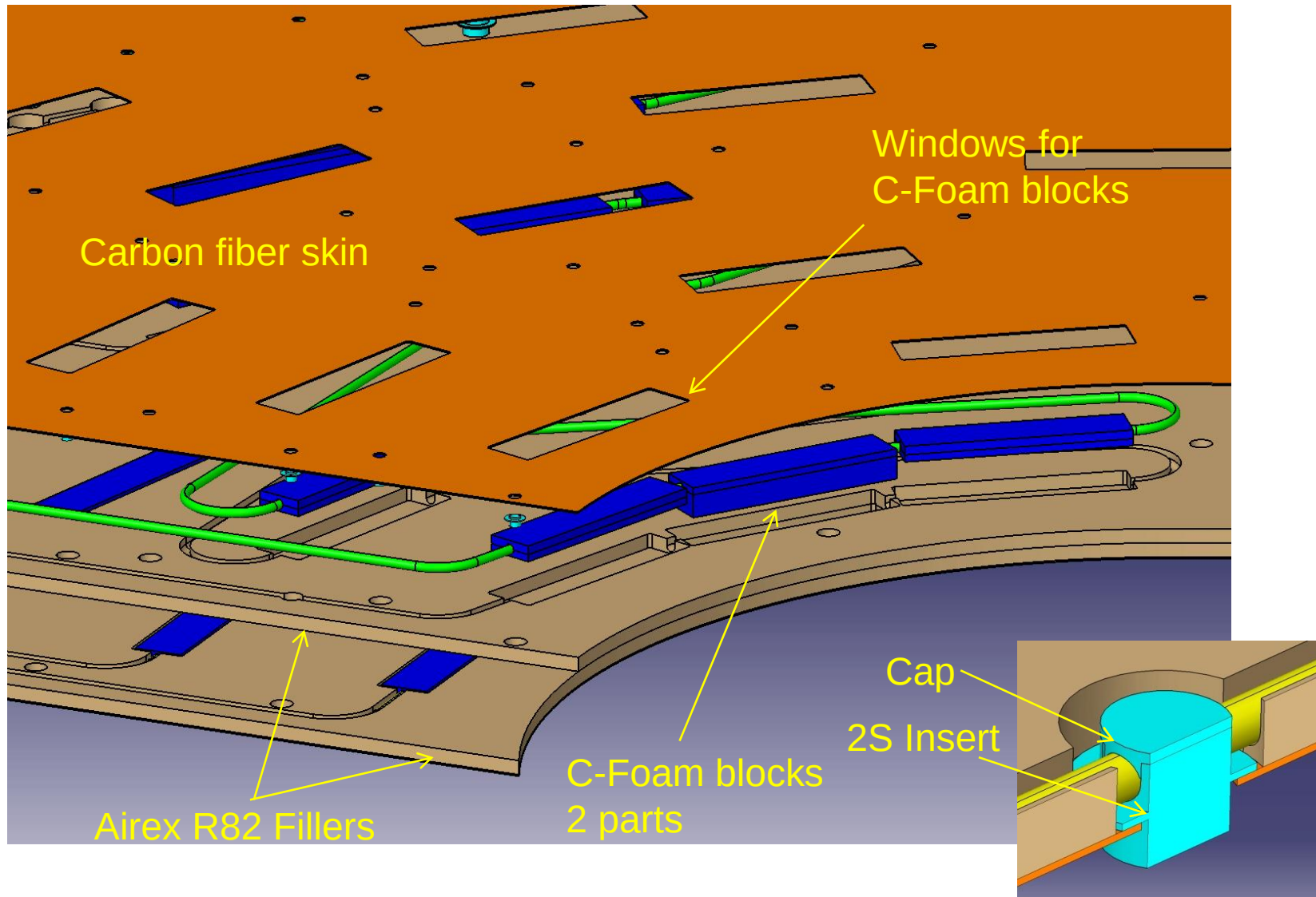
Cooling S2

Inserts Modules 2S

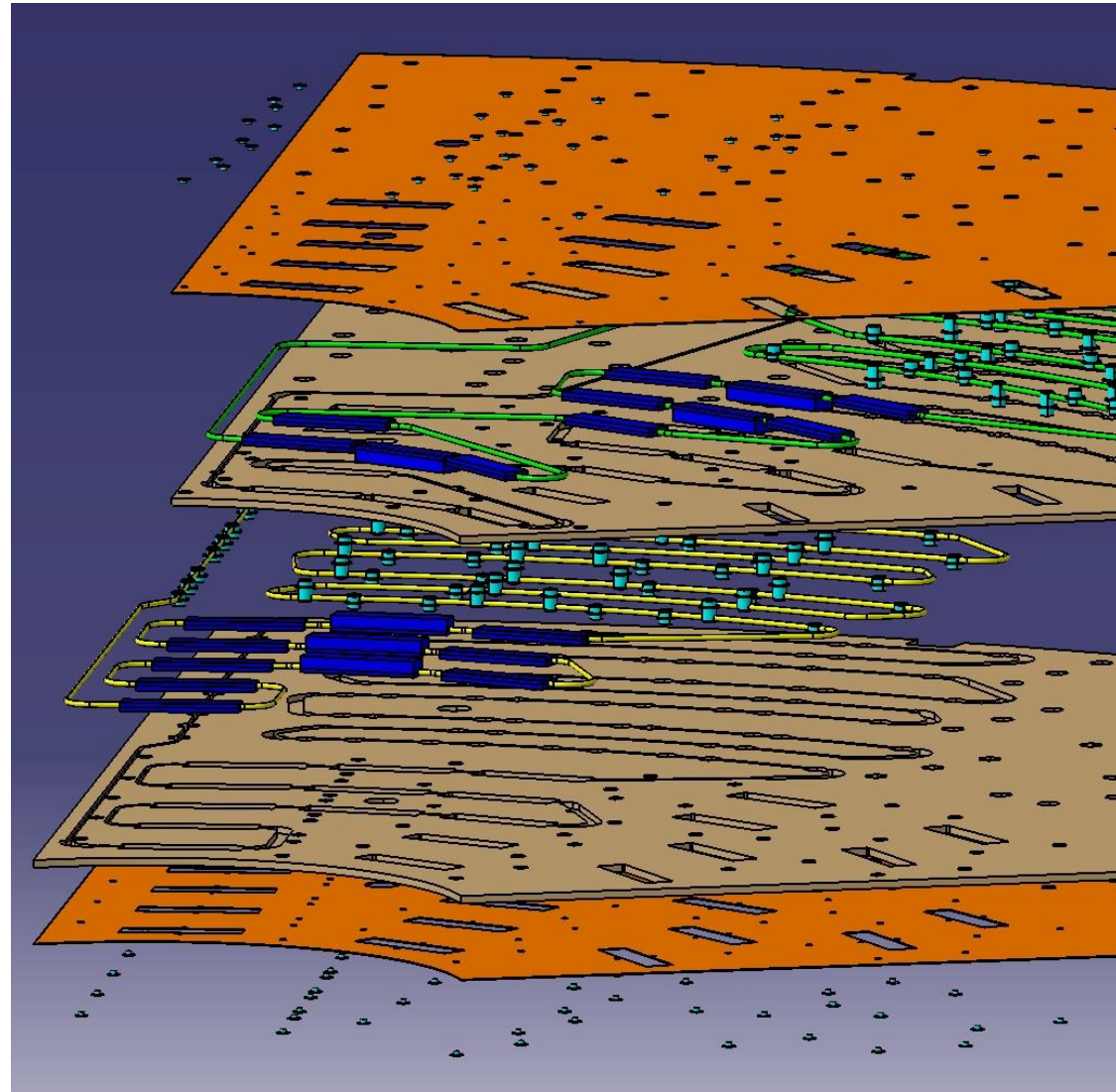
Inserts Modules PS

C-Foams

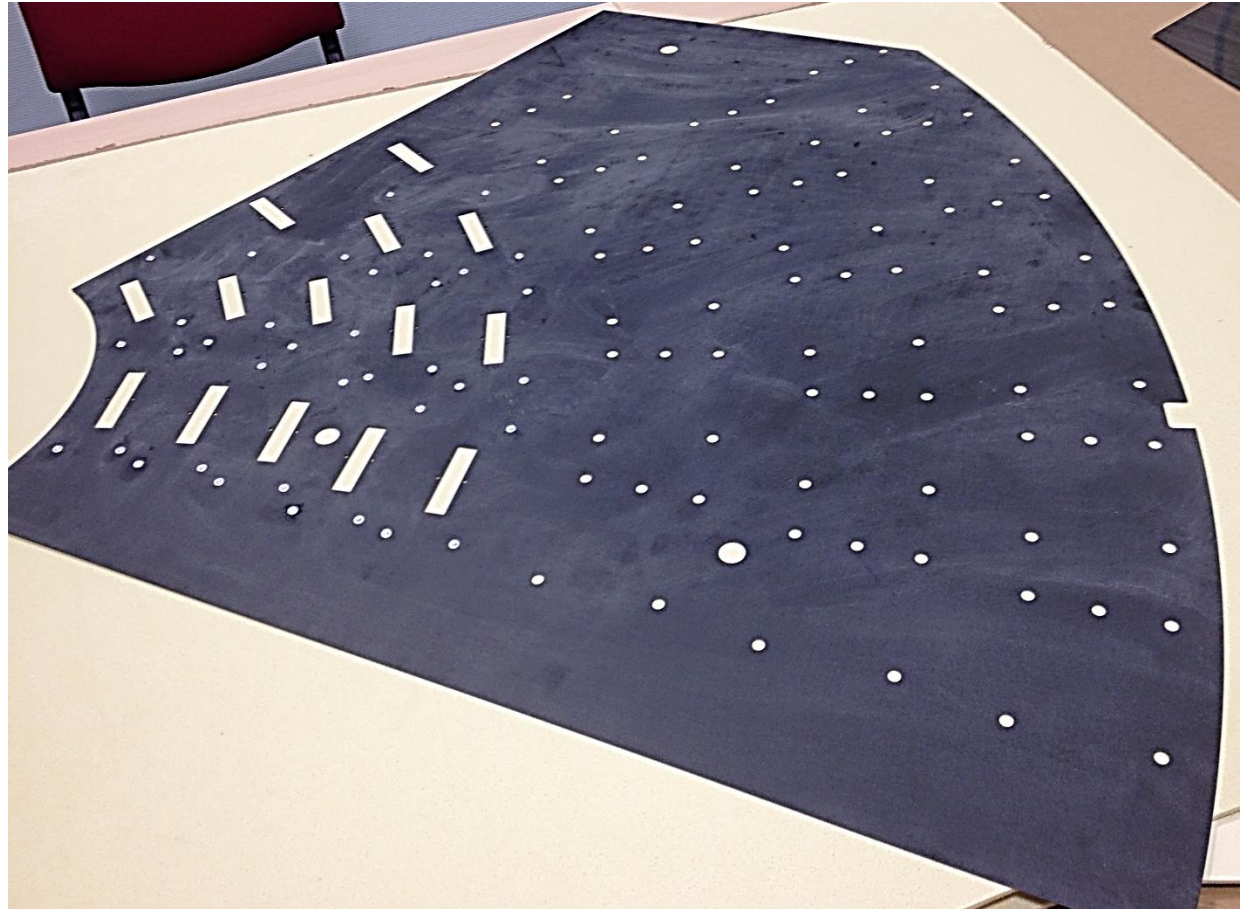




- **Material layers(Sandwich):**
 - Skin A : Carbon fiber 0,5mm
 - Filler A : Airex 82 4,5mm
 - Filler B : Airex 82 4,5mm
 - Skin B : Carbon fiber 0,5mm
- **Inner parts:**
 - Cooling S1
 - Cooling S2
 - Inserts Modules 2S
 - Inserts Modules PS
 - C-Foams
- **Construction**
 - Grows up from one skin to the other
 - Logical construction



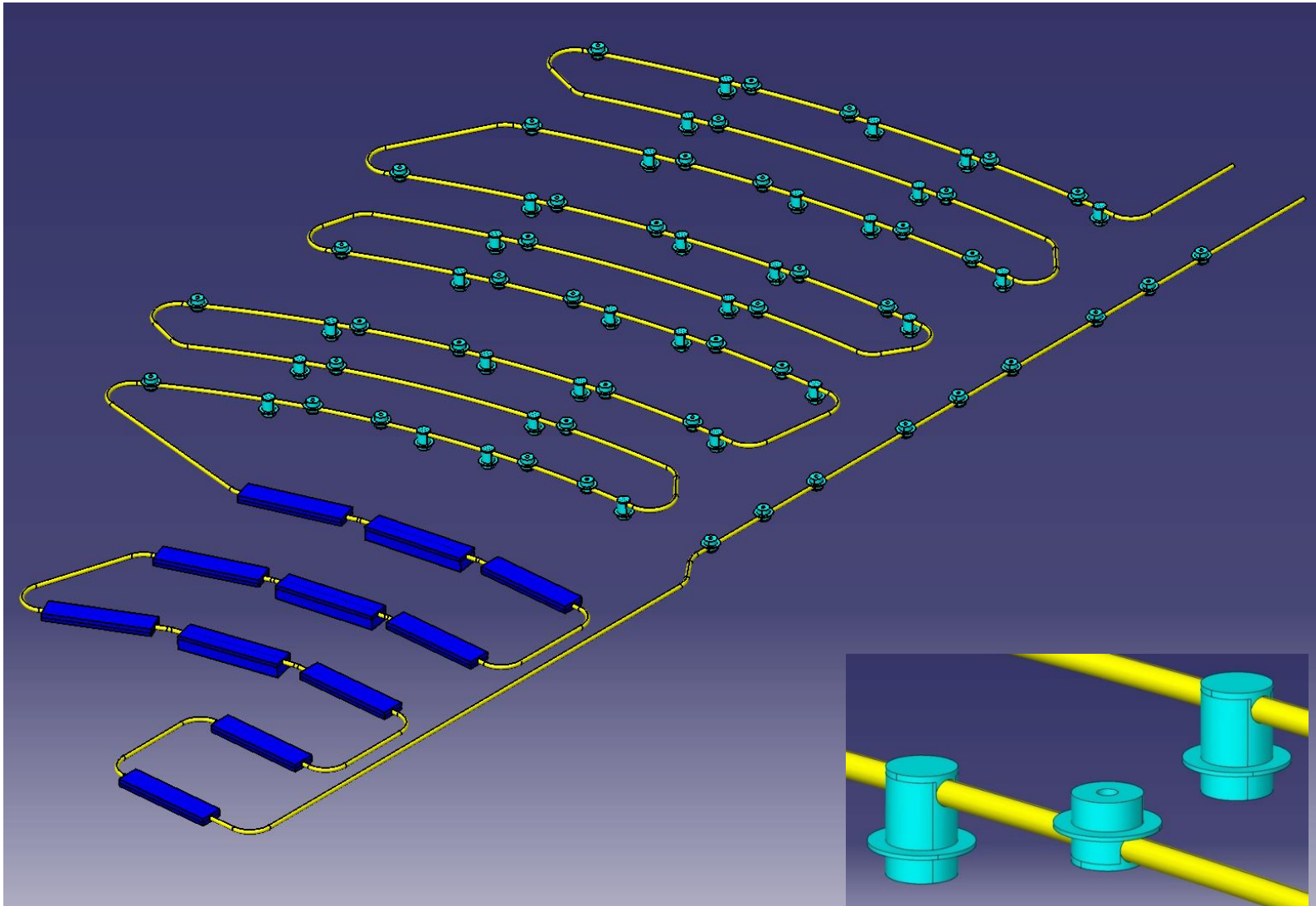
- Skins
 - 10 layers of UD carbon fiber
 - without « tissu d'arrachage » (*Peel plies?*)
 - on glass plate
 - Thickness 0.48mm
 - Flatness < 0,05mm (Workshape)
- Airex
 - R82
 - Thickness 4,5mm
 - Grooves 3.2mm

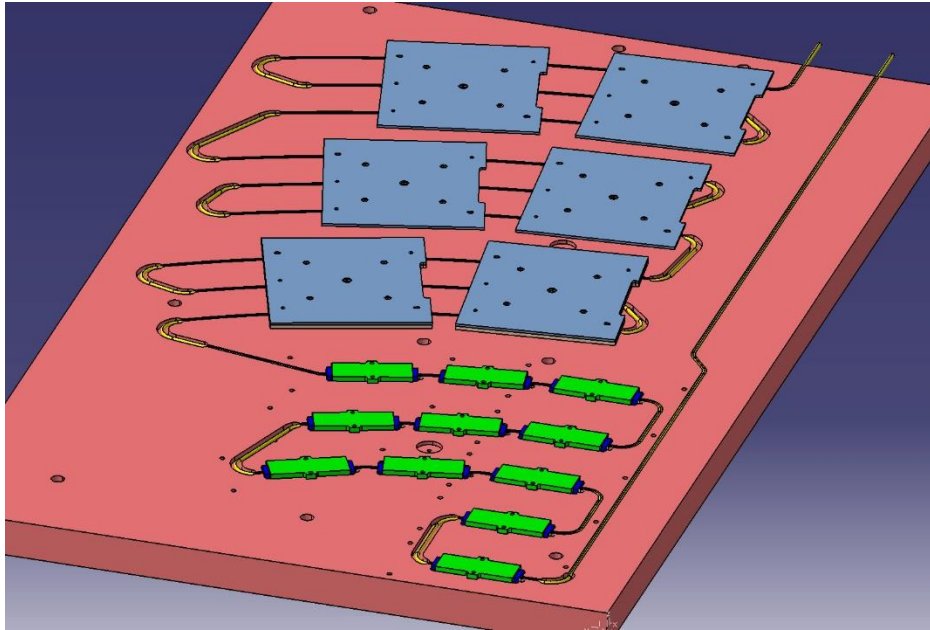


- Cooling sectors gabarit S1 & S2

Cooling sectors production

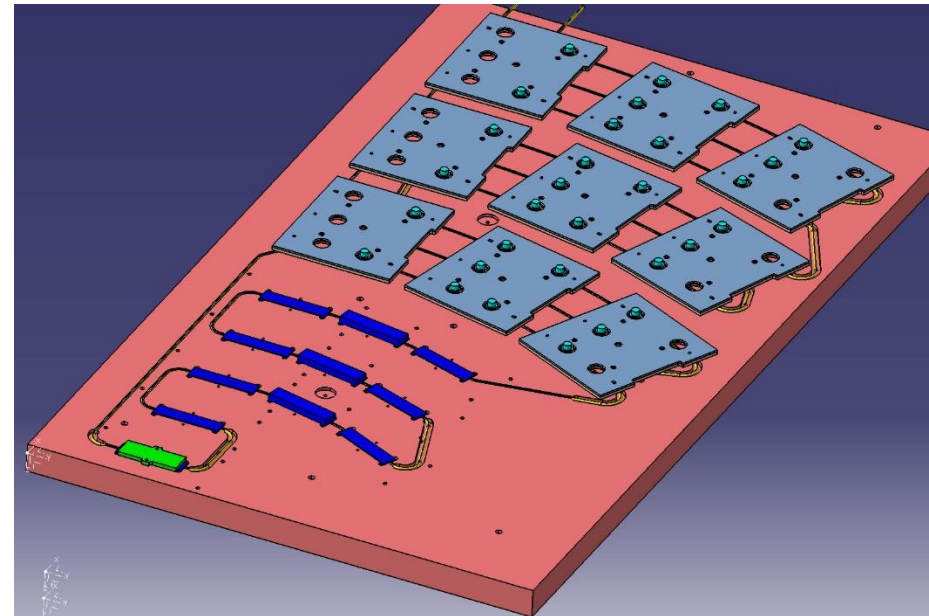
Cooling sectors concept





- Gabarit S1 (IPNL)
 - 2 Sides
 - Groove for tube
 - Inserts 2S
 - C-Foams
 - Material Fortal 7075

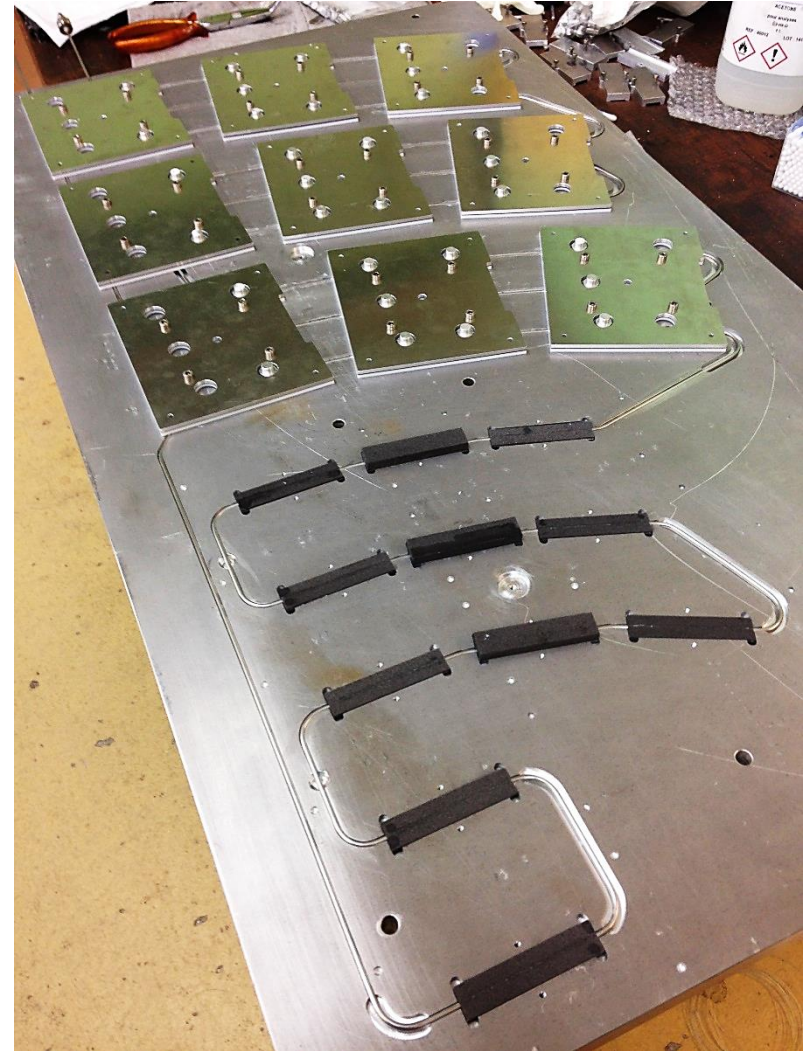
- Tools S1 (IPNL)
 - Inserts 2S plates
 - 3 different models for 3 rings
 - 3mm Aluminium plate with 3mm teflon sheet glued
 - C-Foam bridges
 - 2 different thickness
 - Aluminium

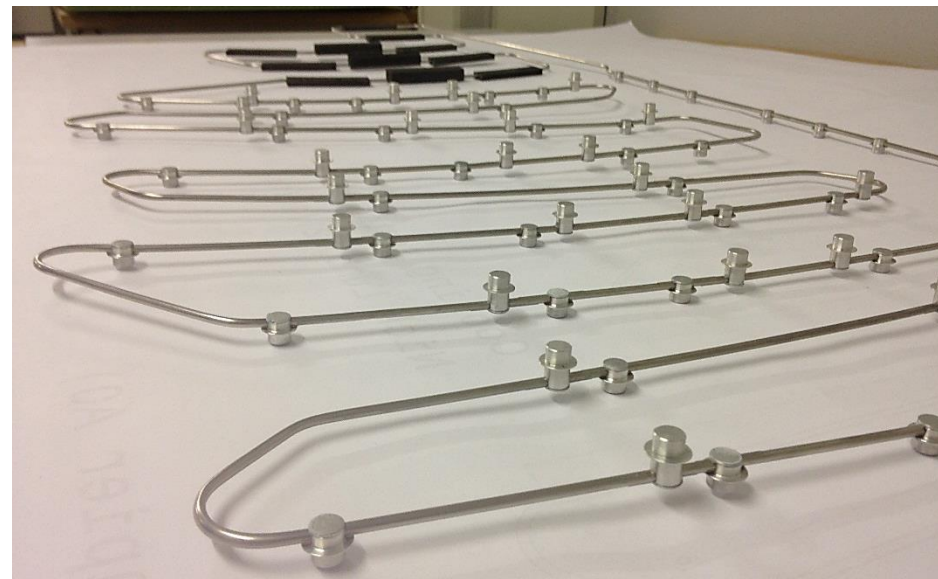
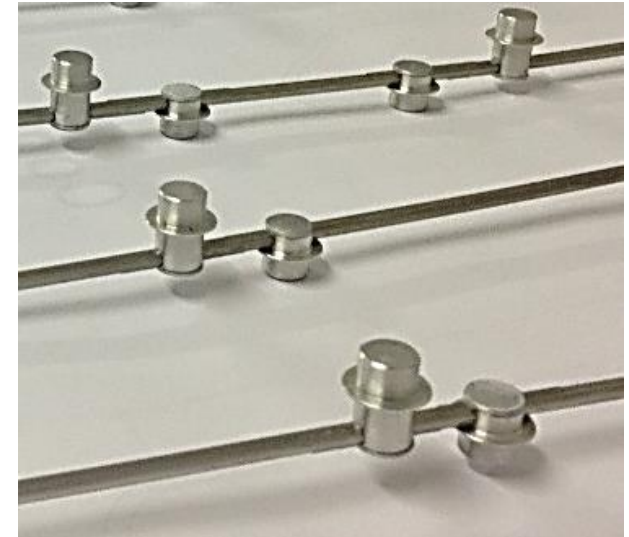
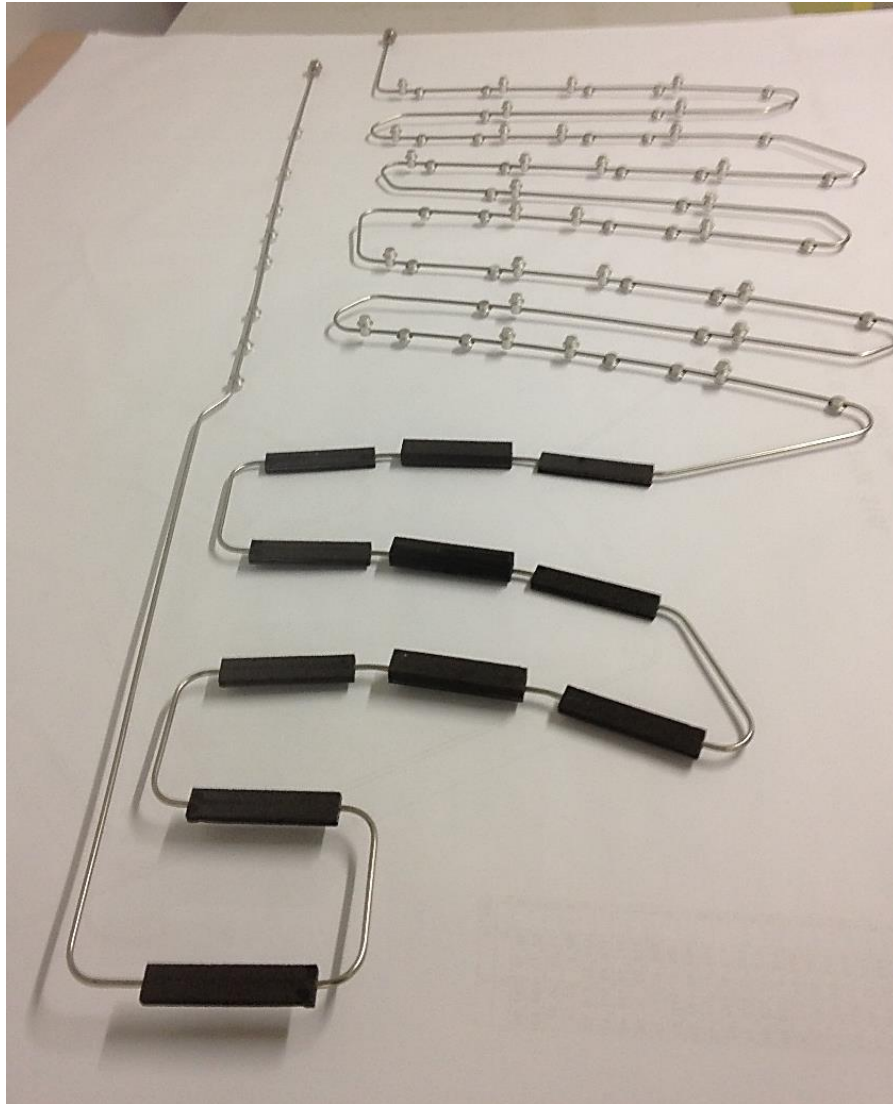


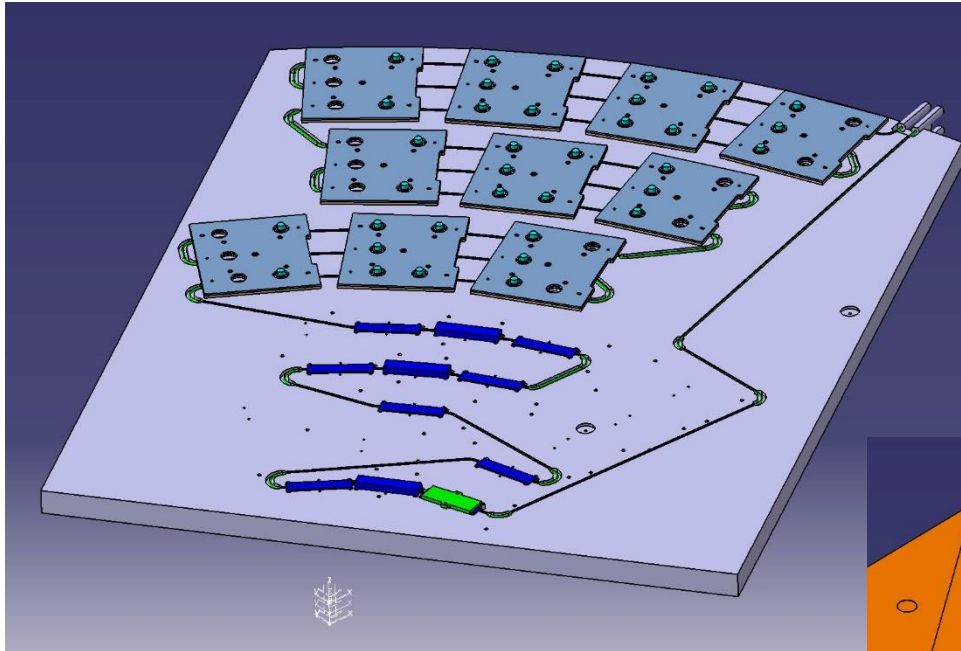
C-Foams



Inserts 2S

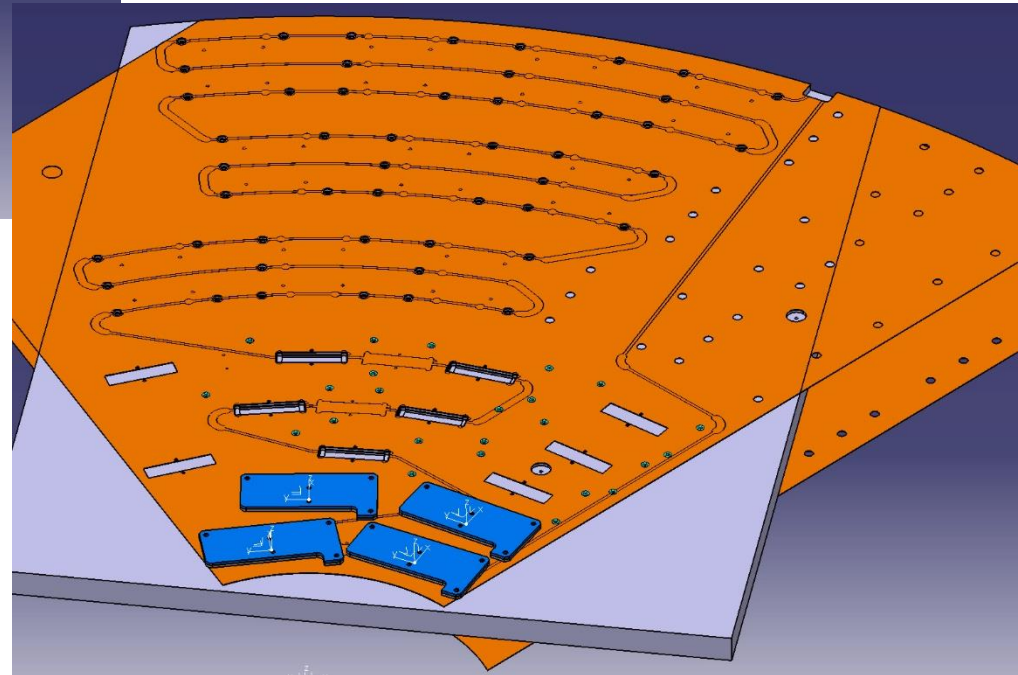






- Gabarit S2 (Sub contractor - Lyon)
 - 2 Sides
 - Groove for tube
 - Inserts 2S
 - Skins, both sides
 - Inserts PS
 - C-Foams
 - Material Fortal 7075

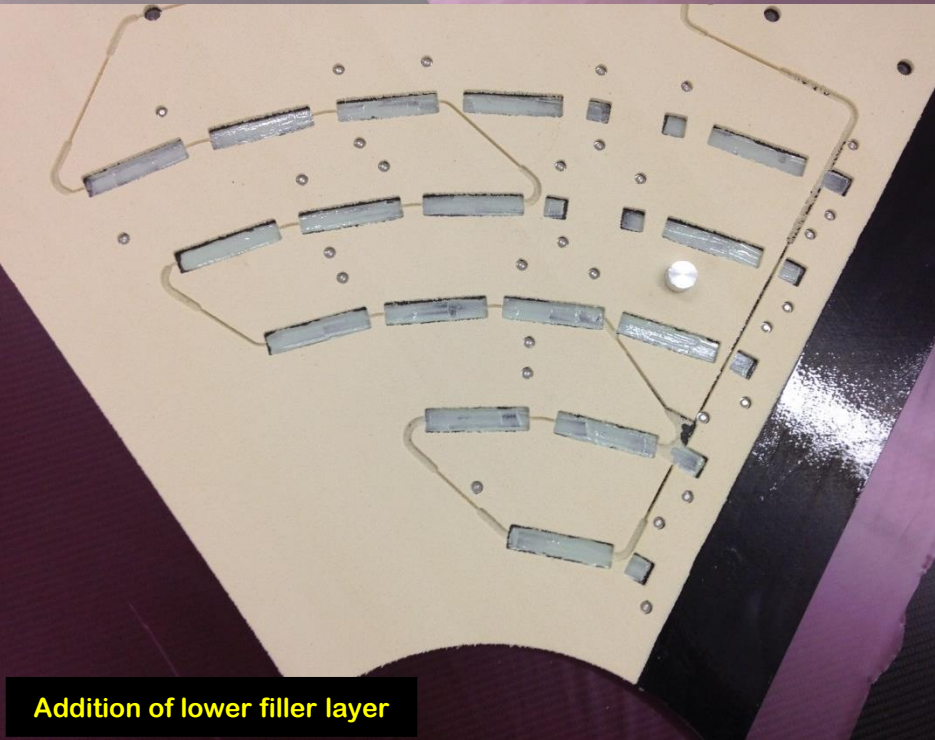
- Tools S1 (IPNL)
 - Inserts 2S and inserts PS plates
 - 3 different models for 3 rings (2S)
 - 3mm Aluminium plate with 3mm teflon sheet glued
 - C-Foam bridges
 - 2 different thickness
 - Aluminium



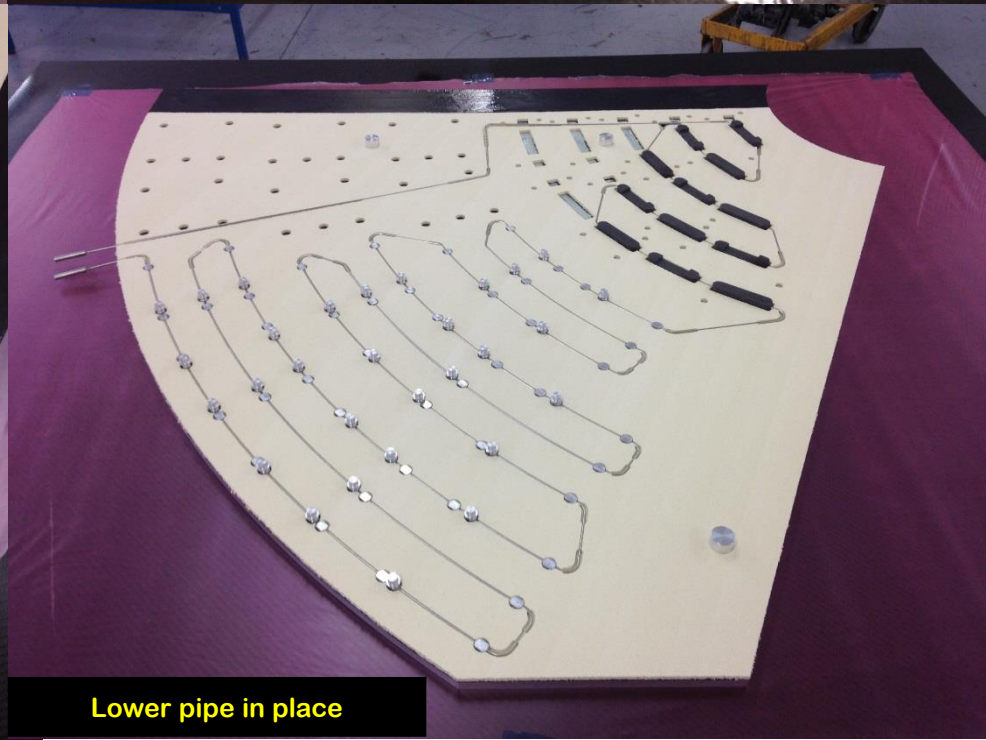
Lower CF skin with 'step'



Glue applied to lower skin

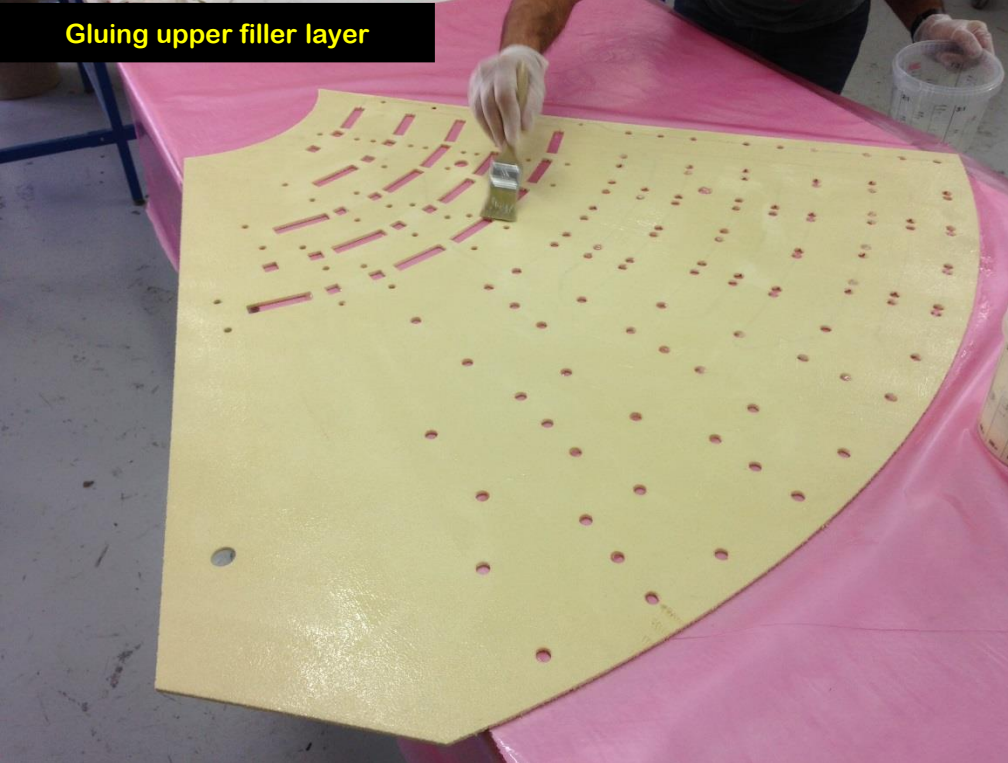


Addition of lower filler layer



Lower pipe in place

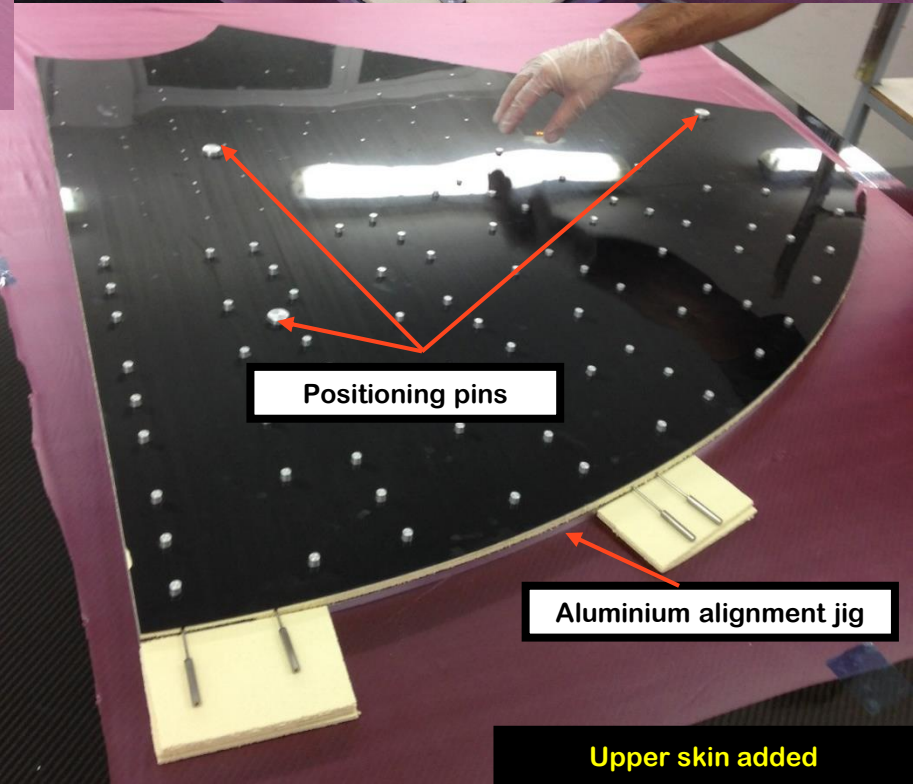
Gluing upper filler layer



Upper pipe added



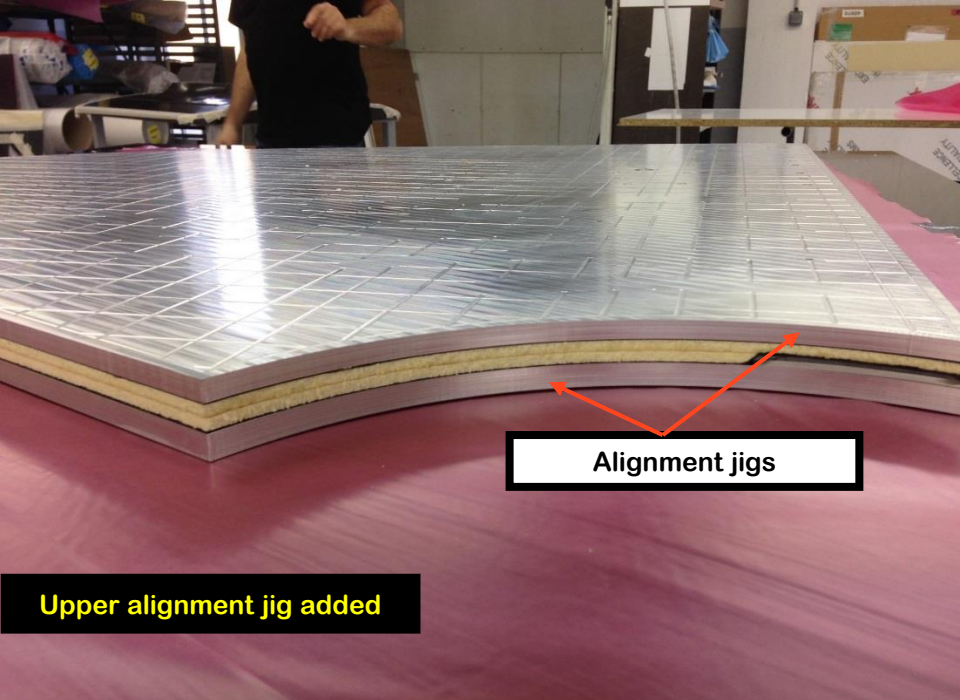
Airex machined to be flush with C-foams



Positioning pins

Aluminium alignment jig

Upper skin added



Vacuum bagging



Apply vacuum



Autoclave 1 bar vacuum + 1 bar overpressure, 250C for 24 heures

Final machining



- Brand new large area 5 axis CNC machine
- 2S inserts: machined to correct level in Z, nipple, fixation holes
- PS inserts: machining to correct level in Z (~flush with CF skin), fixation holes

