

Backward Ecal / EEEMCal

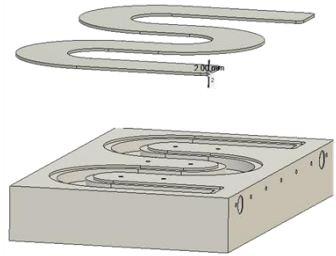
Triple I Engineering Meeting Update (27/10/2025)

Julien Bettane

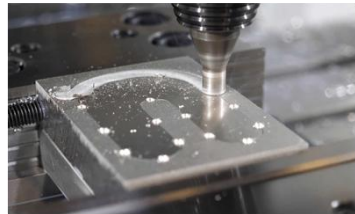
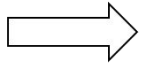


Prototype External structure – FSW

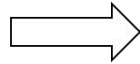
- ☐ FSW prototype
- ☐ Good watertightness (tests are OK)
- ☐ Machining of the steps with our mechanical workshop overed
- ☐ Thermal tests on going



Raw bloc machined



FSW



Prototype External structure – FSW



ZEISS CALYPSO

Nom de pièce: EIC PROTO plaque froide B

Numéro de plan: 7.2.0465

Numéro de commande: 9

Variante: UCL4B

Société: SRC2M

Département: ACCURA_2

Type MMT: 212259

No. MMT: Olivier

Opérateur: Olivier

Texte: 08/09/2025 14:44

Dernières 1 mesures: 22

Approbation # Bloqué: 0

Identifiant pièce: 00.00.01.0

Date/Heure: Toutes les caractéris...

Exécution: 0

Nbre de valeurs mesurées: 0

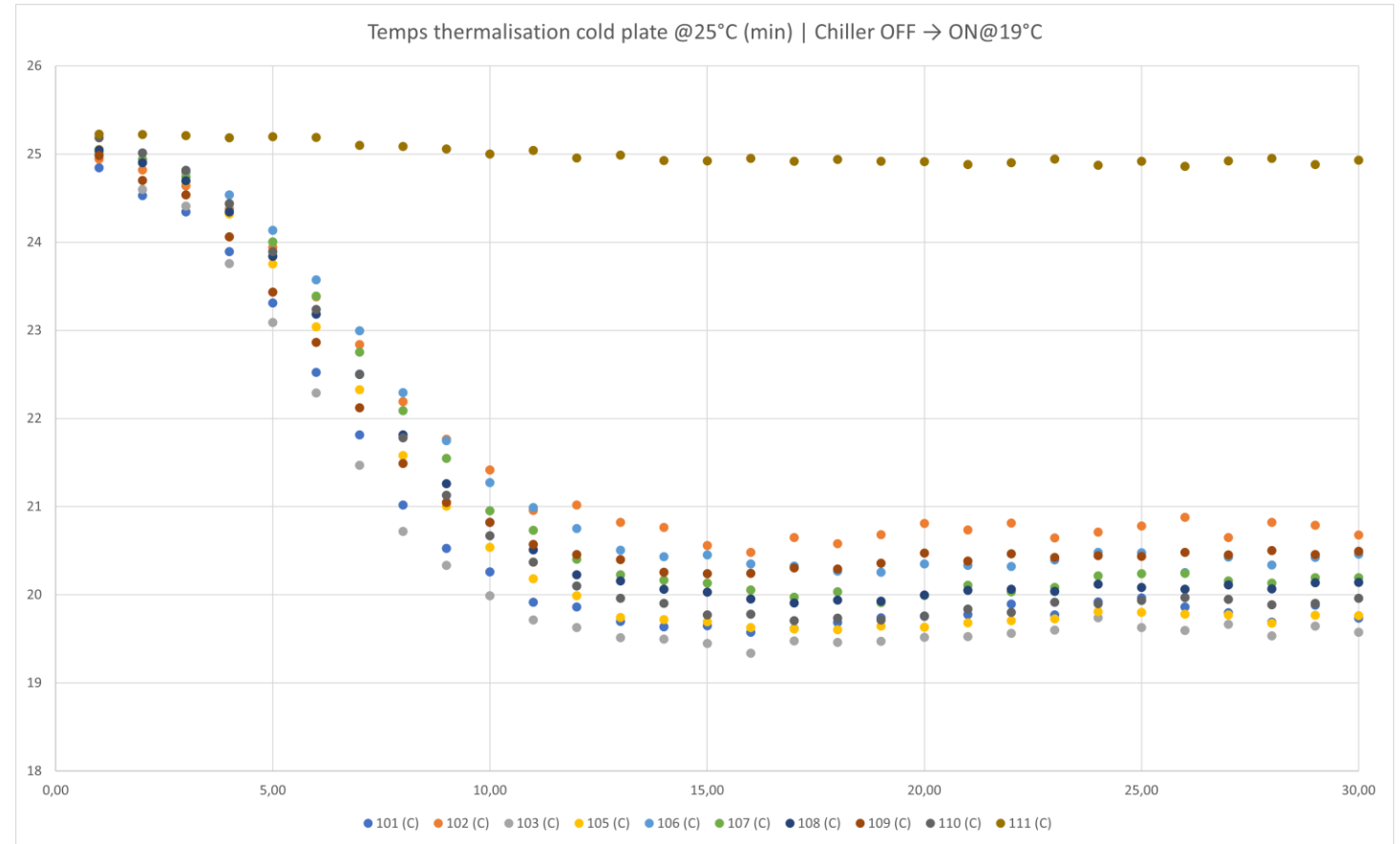
Nombre de valeurs: rouge 0

Temps de mesure: 00.00.01.0

Nom	Valeur mesurée	Valeur nominale	+Tol	-Tol	Ecart +/-
X Valeur X_Plan 3	6,4770	4,6562	0,0079	0,0078	1,8209
Y Valeur Y_Plan 3	-43,7841	-47,3506	0,0079	0,0078	3,5665
Z Valeur Z_Plan 3	-201,0458	-205,0396	0,0079	0,0078	3,9938
Distance P2 P4	21,2494	21,2600	0,0100	-0,1000	-0,0106
Distance P4 P6	21,2898	21,2600	0,0100	-0,1000	0,0298
Distance P6 P8	21,2547	21,2600	0,0100	-0,1000	-0,0053
Distance P8 P10	21,2439	21,2600	0,0100	-0,1000	-0,0161
Distance P10 P12	21,2153	21,2600	0,0100	-0,1000	-0,0447
Distance P12 P14	21,2632	21,2600	0,0100	-0,1000	0,0032
Distance P14 P16	21,2462	21,2600	0,0100	-0,1000	-0,0138
Distance P16 P18	21,2812	21,2600	0,0100	-0,1000	0,0212
Distance P3 P5	21,2585	21,2600	0,0100	-0,1000	-0,0015
Distance P5 P7	42,5246	42,5200	0,0046	-0,1500	0,0046
Distance P7 P9	21,2510	21,2600	0,0090	-0,1000	-0,0090
Distance P9 P11	42,5402	42,5200	0,0202	-0,1500	0,0202
Distance P11 P13	42,5415	42,5200	0,0215	-0,1500	0,0215
Distance P13 P15	42,5224	42,5200	0,0024	-0,1500	0,0024
Distance P15 P17	21,2568	21,2600	0,0032	-0,1000	-0,0032
Angle P1 P19	29,8251	30,0000	0,0000	-0,1749	-0,1749
Y Valeur Y_Plan2	-0,0168	0,0000	0,0000	-0,0500	-0,0168
Z Valeur Z_Plan ZB	0,0345	0,0604	0,0500	-0,0500	-0,0259
X Valeur X_Cercle XB	-0,0013	0,0000	0,0000	-0,0000	-0,0013

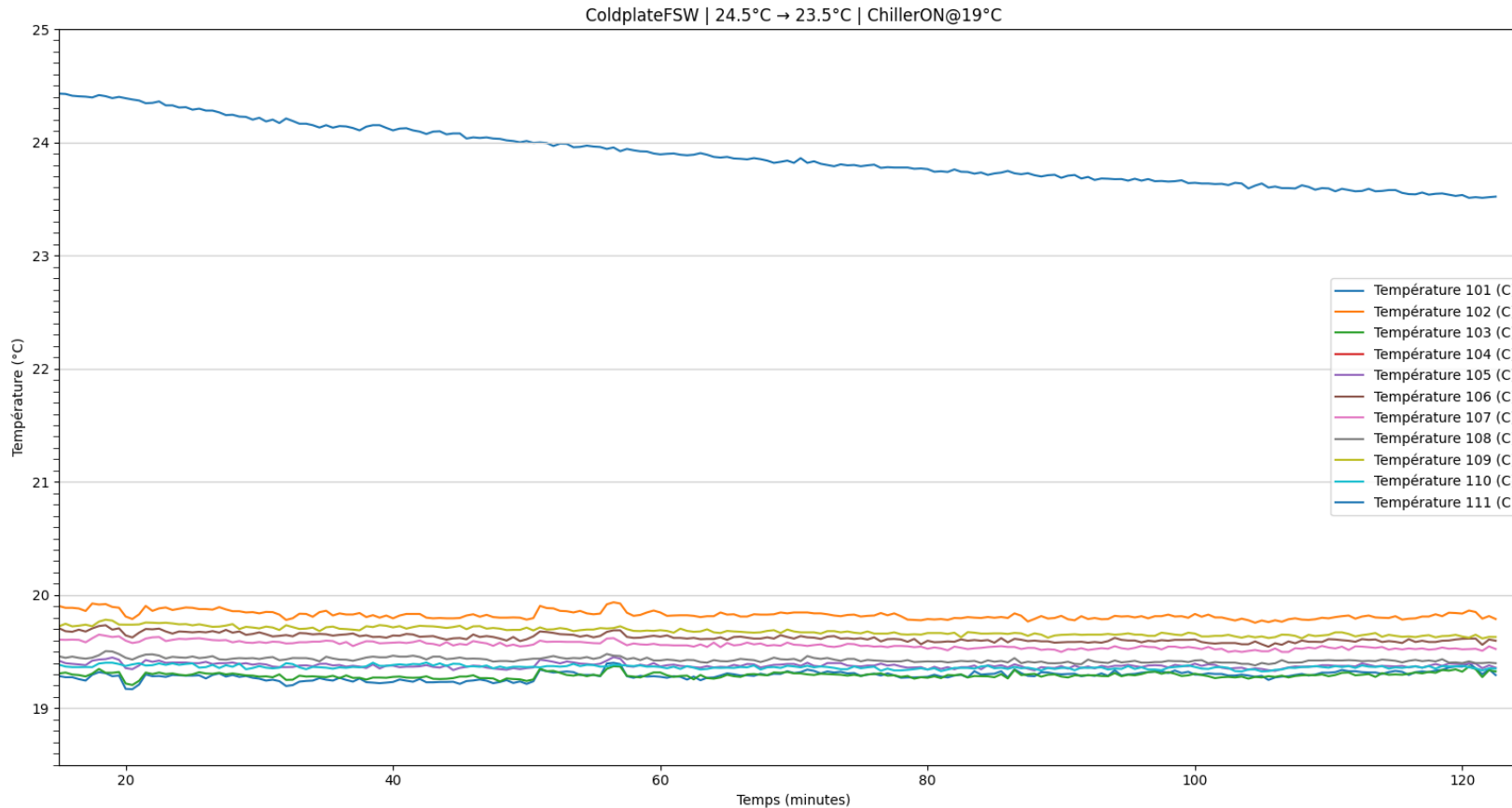
Dimensional inspection
→ OK (< 0,1 mm)

Prototype External structure – FSW



Time for thermal stabilisation of the cold plate = 15 minutes

Prototype External structure – FSW



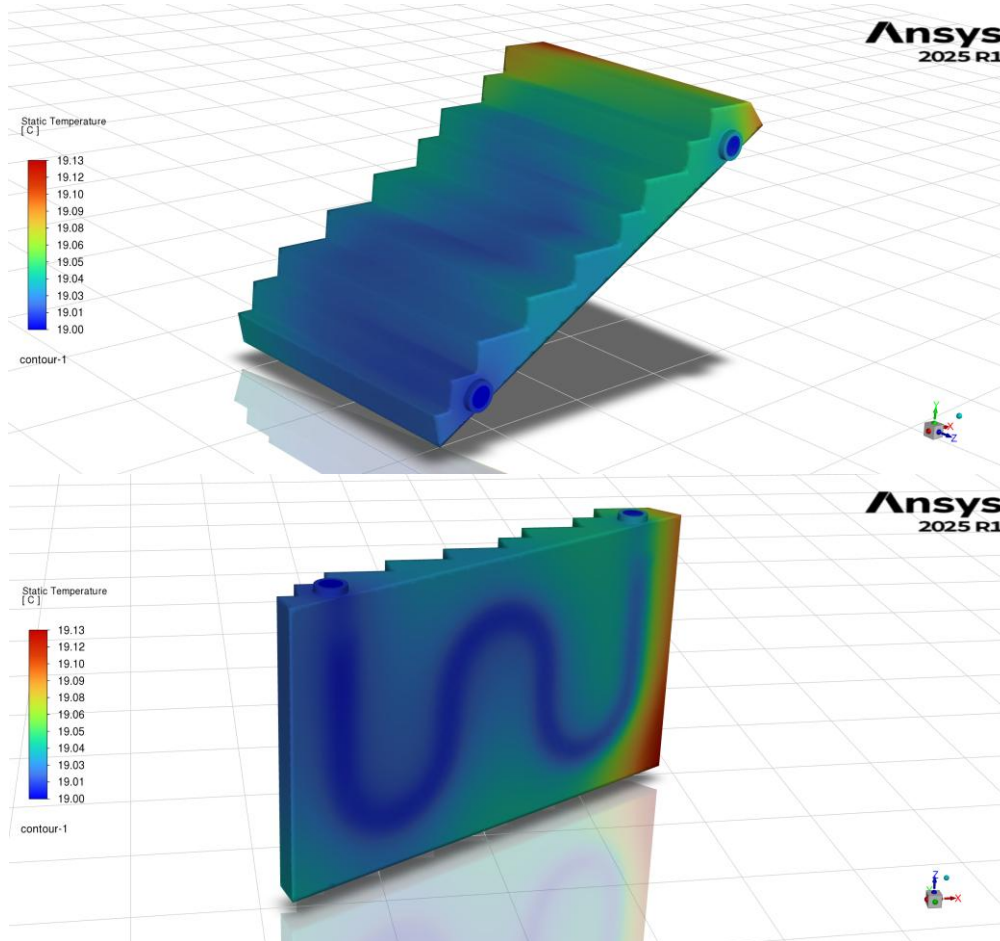
Temperature variation from 24,5°C → 23,5°C

Standard deviation

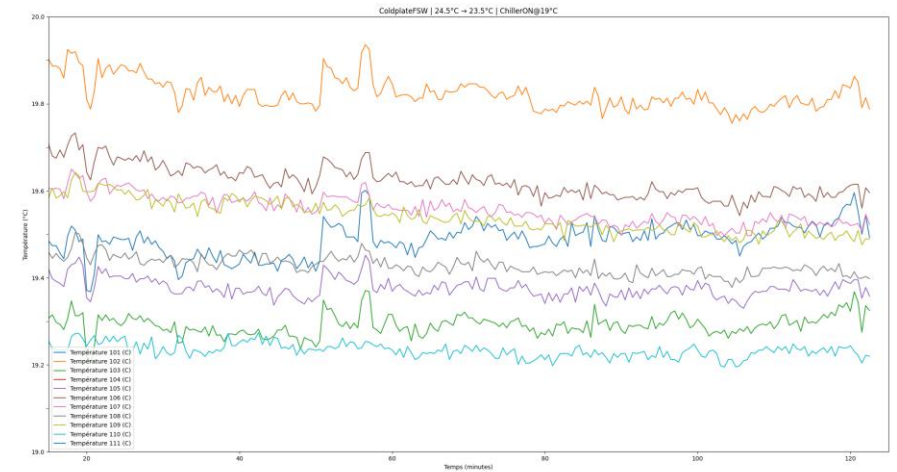
	1 Sigma	2 Sigma	3 Sigma
101 (C)	0.04	0.08	0.11
102 (C)	0.04	0.07	0.11
103 (C)	0.02	0.05	0.07
104 (C)	0.0	0.0	0.0
105 (C)	0.02	0.04	0.06
106 (C)	0.04	0.07	0.11
107 (C)	0.03	0.06	0.1
108 (C)	0.02	0.04	0.06

Temperature stability
→ OK (<+/-0,1°C)

Prototype External structure – FSW



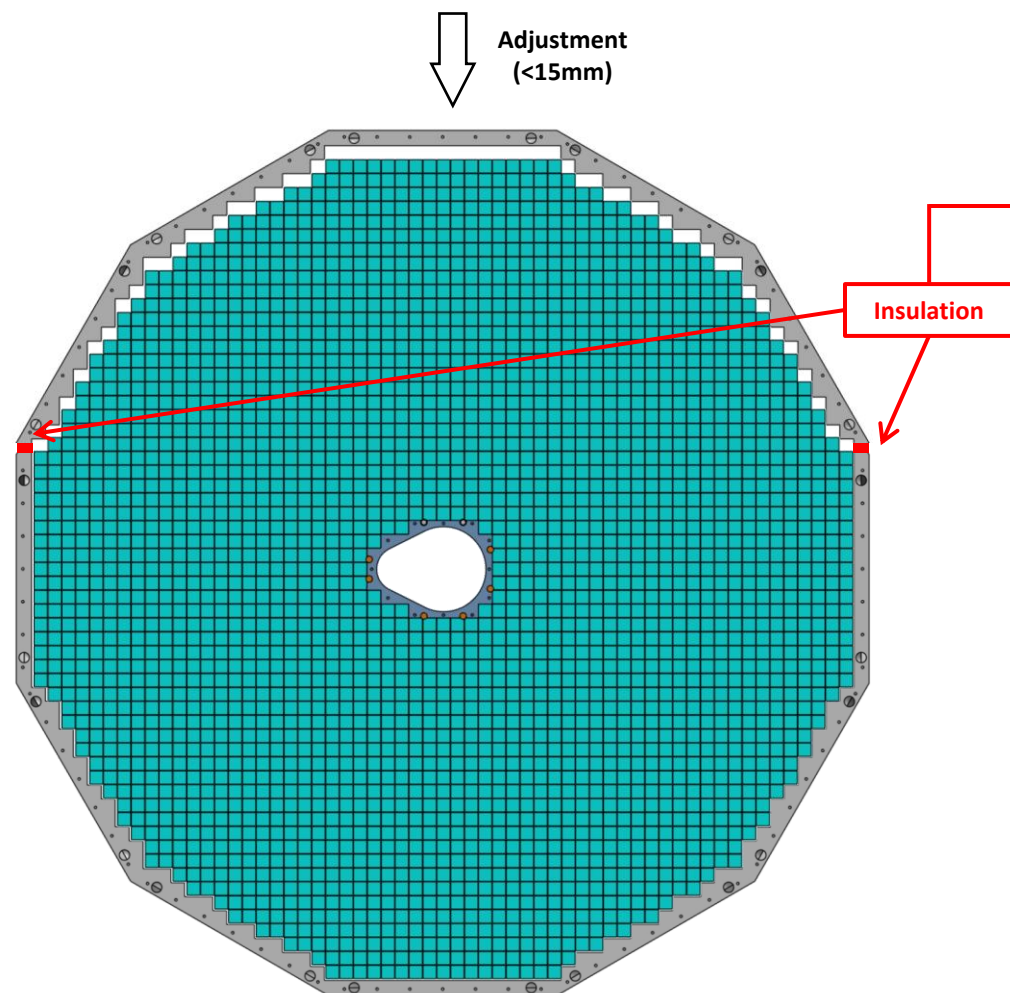
Fluent simulation (Water= 19°C / T ext = 23°C)
→ $\Delta T(^{\circ}\text{C}) = 0,13^{\circ}\text{C}$



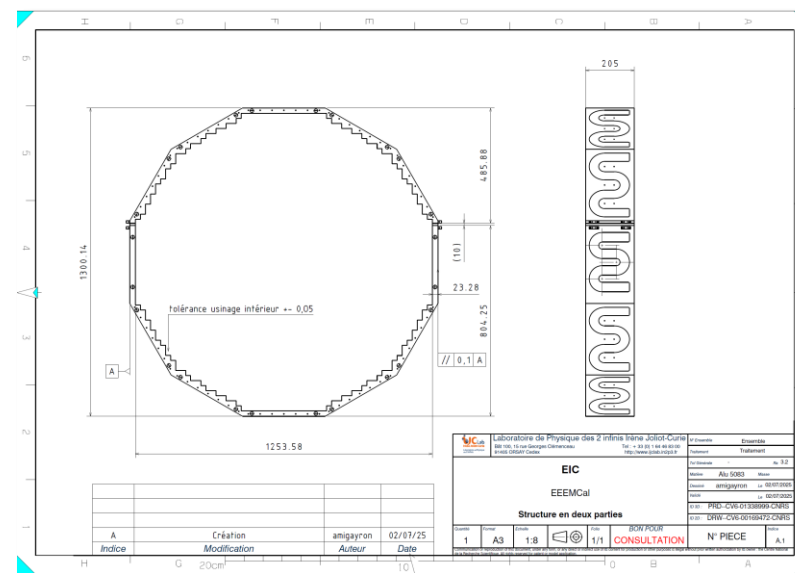
Climatic room
 $\Delta T(^{\circ}\text{C}) = 0,6^{\circ}\text{C}$

Difference between simulation and measures
→ Climatic room not equivalent to air convection

Prototype External structure – FSW

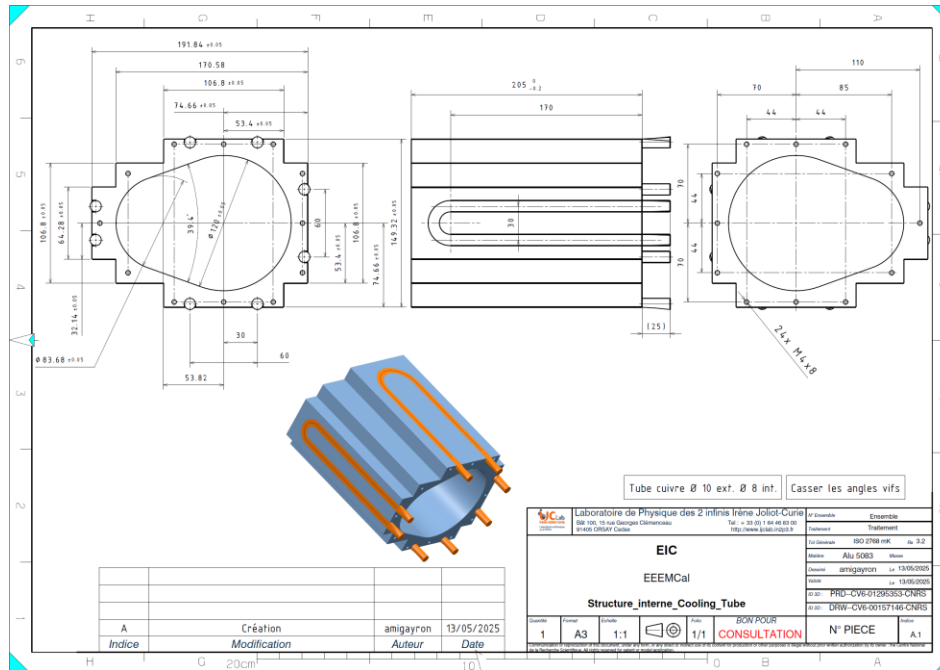


- ☐ External structure in one block at the beginning
- ☐ External structure in two parts at the end (after machining)
 - *Better for the Eddy current*
 - *Better for the contact with crystals on the top (cooling)*
- ☐ Good for the deflection & the stress
- ☐ Good for the tolerances and the positioning of the crystals
- ☐ **Current discussion with Company**

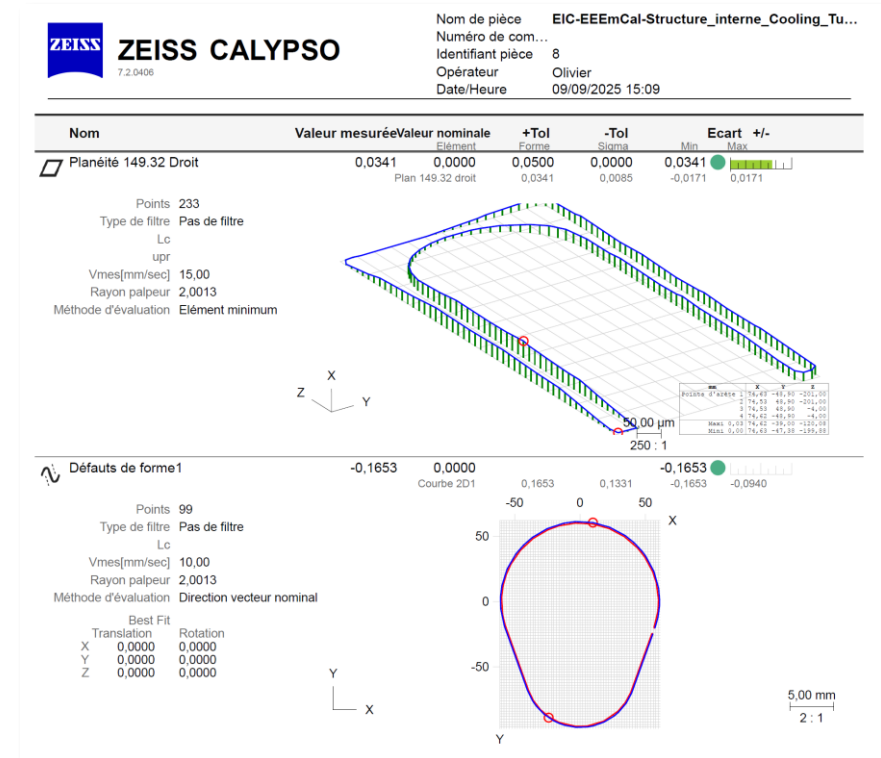
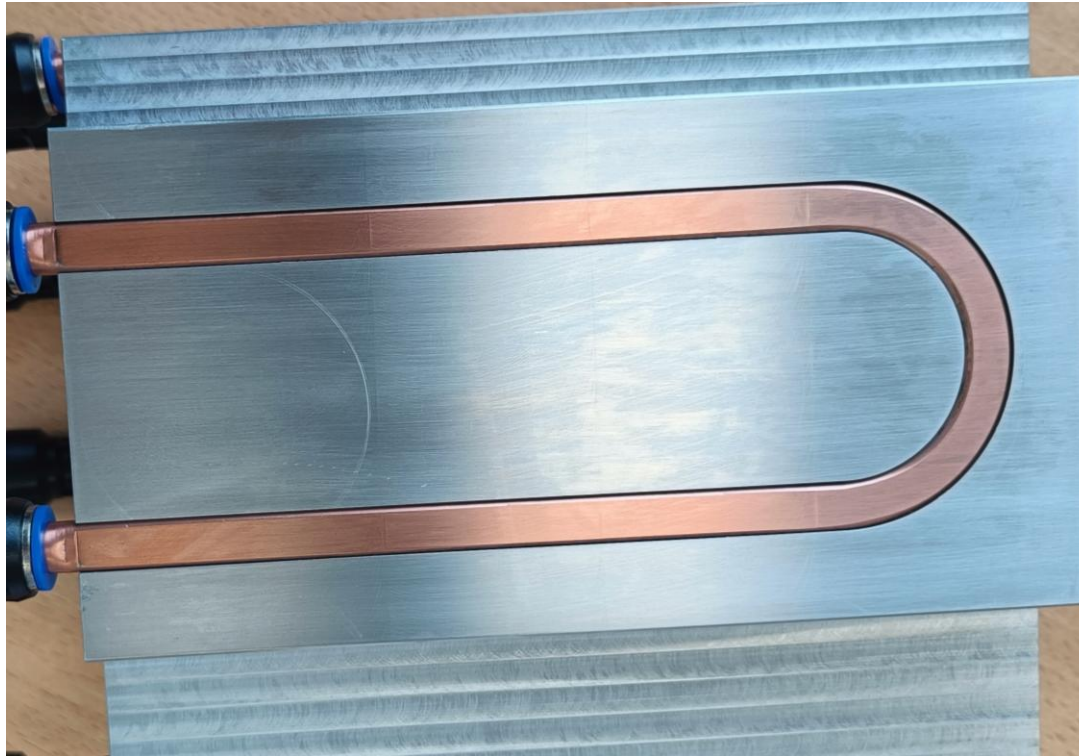


Prototype Internal structure – Copper tubes

- ❑ Prototype with copper tubes
- ❑ Internal structure received
- ❑ Clearance with beam pipe = 11 mm
- ❑ Thermal tests ongoing

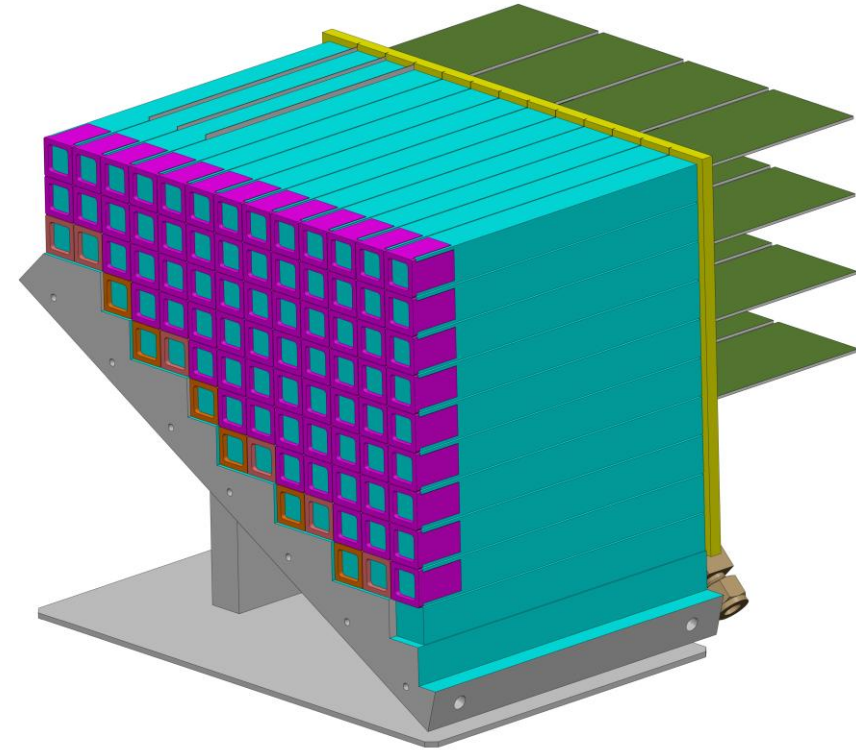
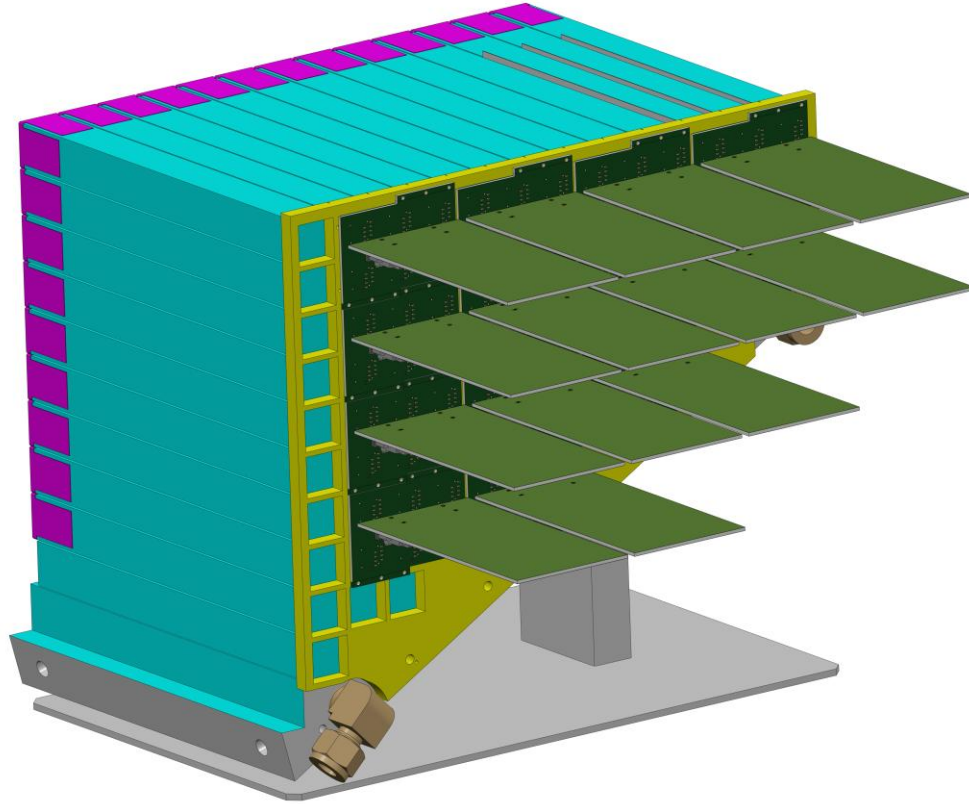


Prototype Internal structure – Copper tubes



Dimensional inspection
→ OK (< 0,1 mm)

Prototype 1/12 (one twelfth)



Upcoming thermal tests:

- ☐ Temperature variation from 26°C to 23°C in 12h (one week)
- ☐ Map of the distribution of the temperature on the cold plate
- ☐ Comparison with the calculation (fluent)
- ☐ Add the hygrometry (80%) to check the due point

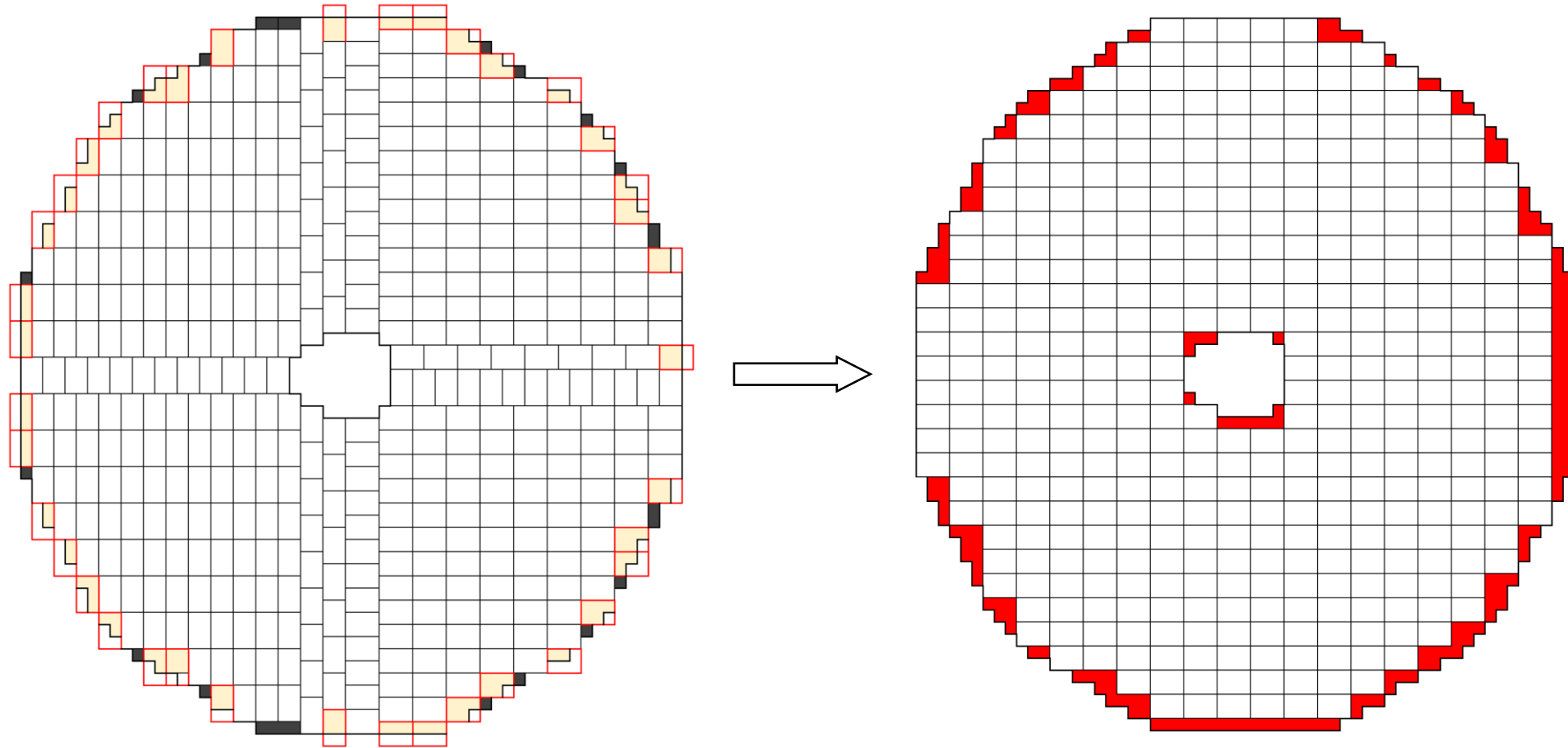
External structure:

- ☐ Validate the proof of concept with the company (machining + FSW)
- ☐ Make a prototype for mechanical and feasibility tests

Prototype 1/12

BACKUP SLIDES

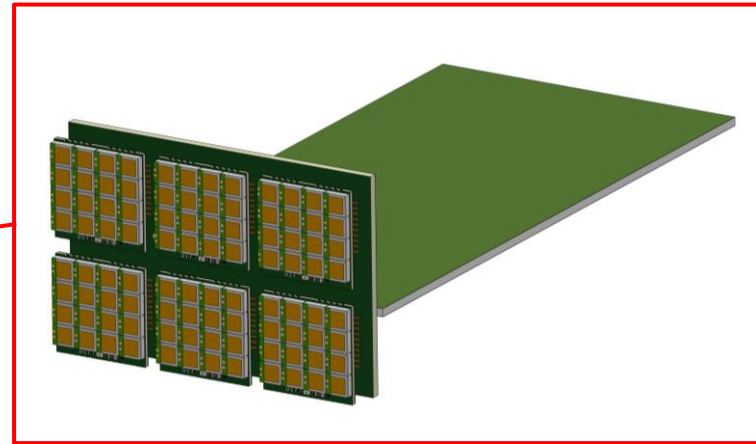
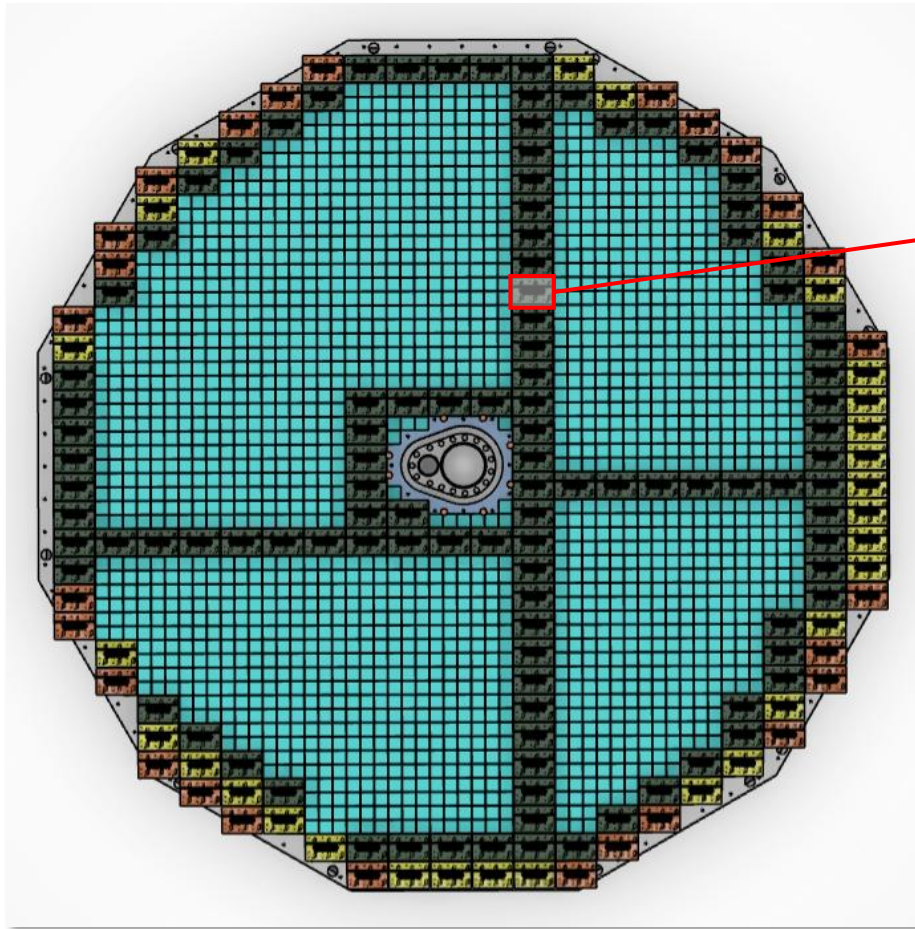
Design & Cooling for the FEB



+	-
Good mapping	Hard to cool
Good fitting at the center	Bad fitting on the edge

+	-
Easier to cool	Bad fitting at the center
	Bad fitting on the edge

Design & Cooling for the FEB

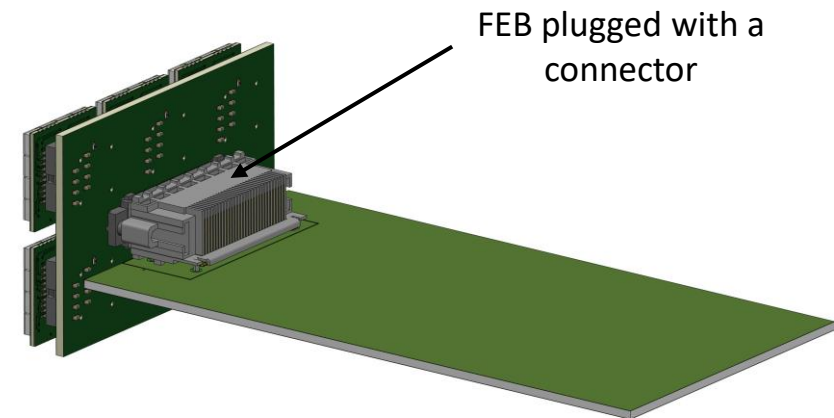


≈ 500 (Adapter + FEB)

→ Work in progress

Based on the optimum for the Asics
→ 1 IpGBT for 3 EICROC (OMEGA, IN2P3)

1 FEB for
6 crystals



-  Clearance OK
-  Clearance OK – On structure
-  Clearance KO – Adjustment required

Installation

- ☐ Two rails at 3 & 9 o'clock
- ☐ Validate the kind of rails
- ☐ Mass= 2,5 tons
- ☐ Increase the surface to reduce local stress on the structure
- ☐ Two Guide bearing or Plain bearing per face
- ☐ Carbon tube removed ?
- ☐ PFRICH attached ?

