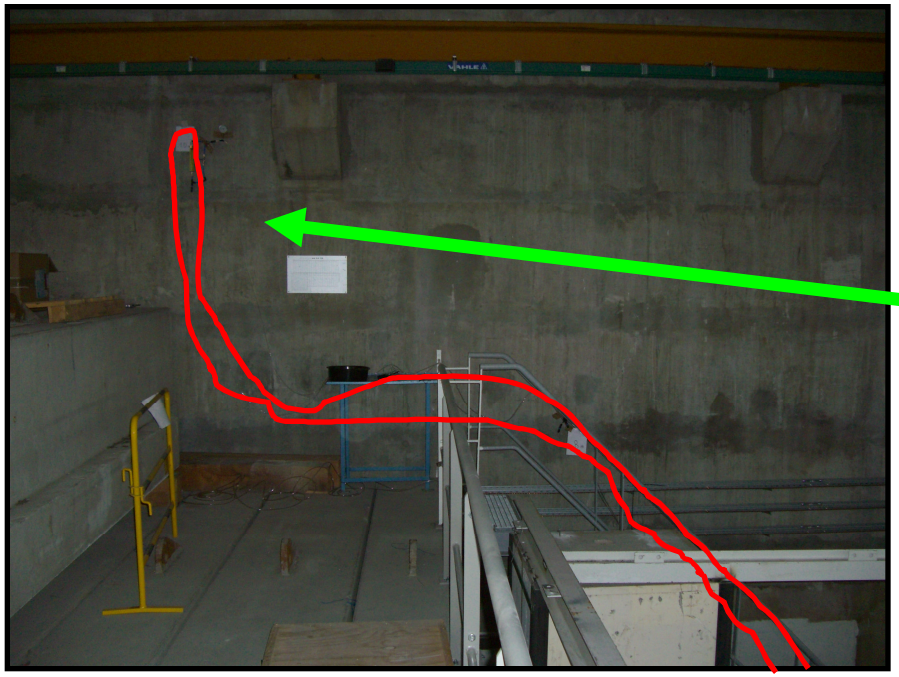
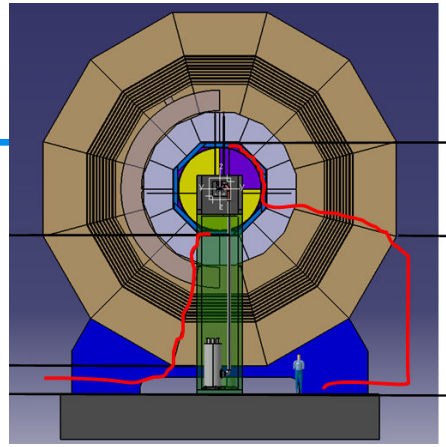
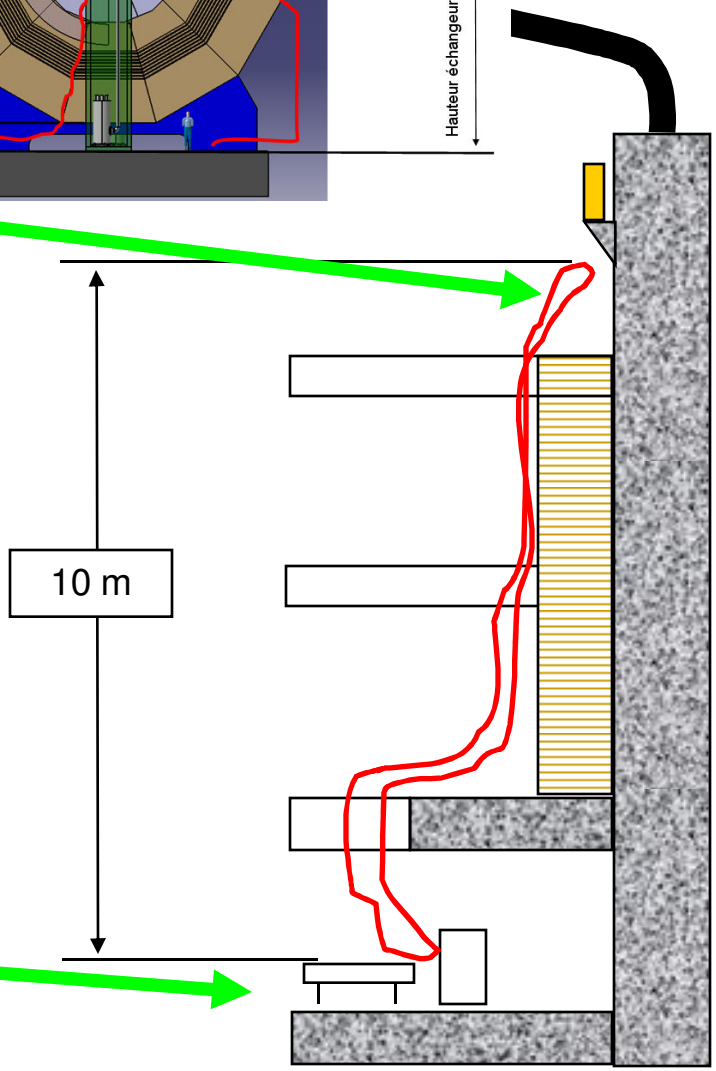
EUDET COOLING and MECHANIC 15/01 LLR

Julien Giraud (giraud@lpsc.in2p3.fr)

LPSC Leakless test





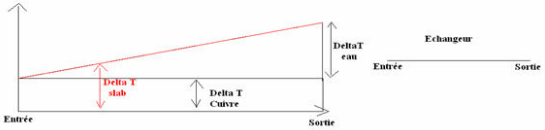


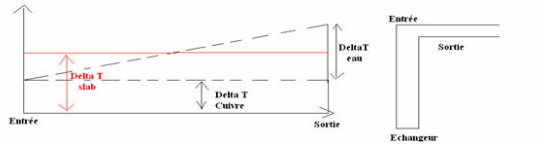
LPSC Leakless test

Exchanger determination

Caractéristiques circuit	
Puissance à évacuer (W)	150
Diamètre intérieur tuyau (mm)	4
Longueur échangeur (mm)	600
Débit (l/min)	0.3
Caractéristiques fluide	
Température fluide à l'entrée (°C)	18
Viscosité dynamique (Pa*s)	0.000952
Conductivité (W/(m*K))	0.598
Cp (J/(Kg*K))	4183
Masse volumique (kg/m3)	1000
Section (m²)	1.26E-05
Surface échange (m²)	7.54E-03
Vitesse (m/s)	3.98E-01
Régime écoulement	Laminaire
Reynolds	1672
Prandt	6.66
Nusselt	3.66
h (w/m²)	547

ΔTmax cuivre (°C)	36.36
Δ Tmax eau (°C)	7.17
Δ T entrée/sortie (°C)	39.94
T sortie (°C)	57.94
Perte charge échangeur (bar)	0.0045



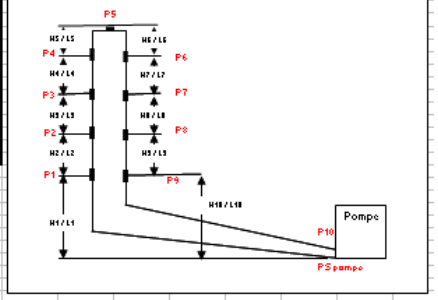


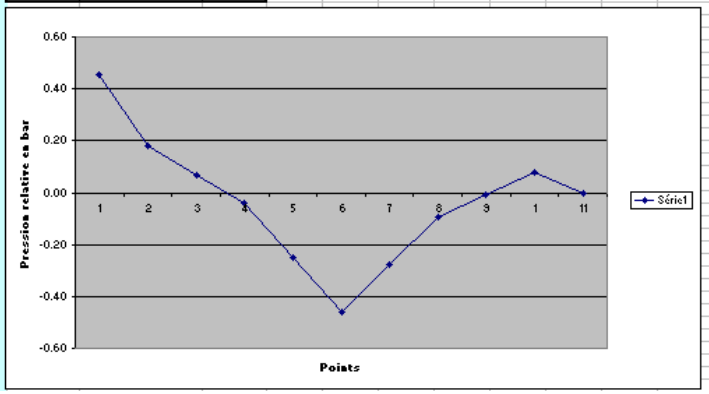
Vitesse cinématique (m²/s)	9.52E-07
Masse volumique (Kg/m³)	1000
Diam int tuyaux aller (mm)	12
Diam int tuyaux retour (mm)	12
Perte charge échangeur (bar	0
Débit (l/min)	3
P relative pompe (bar)	0.456
P relative réservoir (bar)	0
Limite régime lam turb	2000
L1 (m)	6.0
H1 (m)	1
L2 (m)	4
H2 (m)	1
L3 (m)	4
H3 (m)	1
L4 (m)	4
H4 (m)	2
L5 (m)	4.5
H5 (m)	2
Sommet	
L6 (m)	4.5
H6 (m)	2
L7 (m)	4
H7 (m)	2
L8 (m)	4
H8 (m)	1
L9 (m)	4
H9 (m)	1
L10 (m)	6.0
H10 (m)	1
Aller	
Reynoldr	5572
Vitesse (m/s)	0.44
Régime	Turbulent
Retour	
Reynoldr	5572
Vitesse (m/s)	0.44
Régime	Turbulent
Général	
Pression au point haut (bar)	-0.46
Hauteur surface atm retour	0.00
Hauteur surface atm aller	2.50
Hauteur zone leakless retour	7.00
Hauteur zone leakless aller	4.49
ATTENTION DESAMORCAGE SITUITE	
Pression sommet OK	

Répartion des pression (Bar)		P hauteur	P Requilibre	Somme	Somme
P sortie pompe	0.46				
P1	0.18	0.10	0.179		0.18
P2	0.07	0.10	0.012		0.07
P3	-0.04	0.10	0.012		-0.04
P4	-0.25	0.20	0.012		-0.25
P saint haut (P5)	-0.4588	0.20	0.013	0.228	-0.46
P6	-0.28	0.20	0.013		-0.28
P7	-0.09	0.20	0.012		-0.09
P8	-0.01	0.10	0.012		-0.01
P9	0.08	0.10	0.012		0.08
P10	0.00	0.10	0.179	0.228	0.00
			Somme	0.456	

Hauteur Aller (m)	
H0 -> H1	1
H0 -> H2	2
H0 -> H3	3
H0 -> H4	5
H0 -> H5	7

Hauteur Retour (m)	
H10 -> H9	1
H10 -> H8	2
H10 -> H7	3
H10 -> H6	5
H10 -> H5	7





Leak less loop determination

LPSC Leakless test

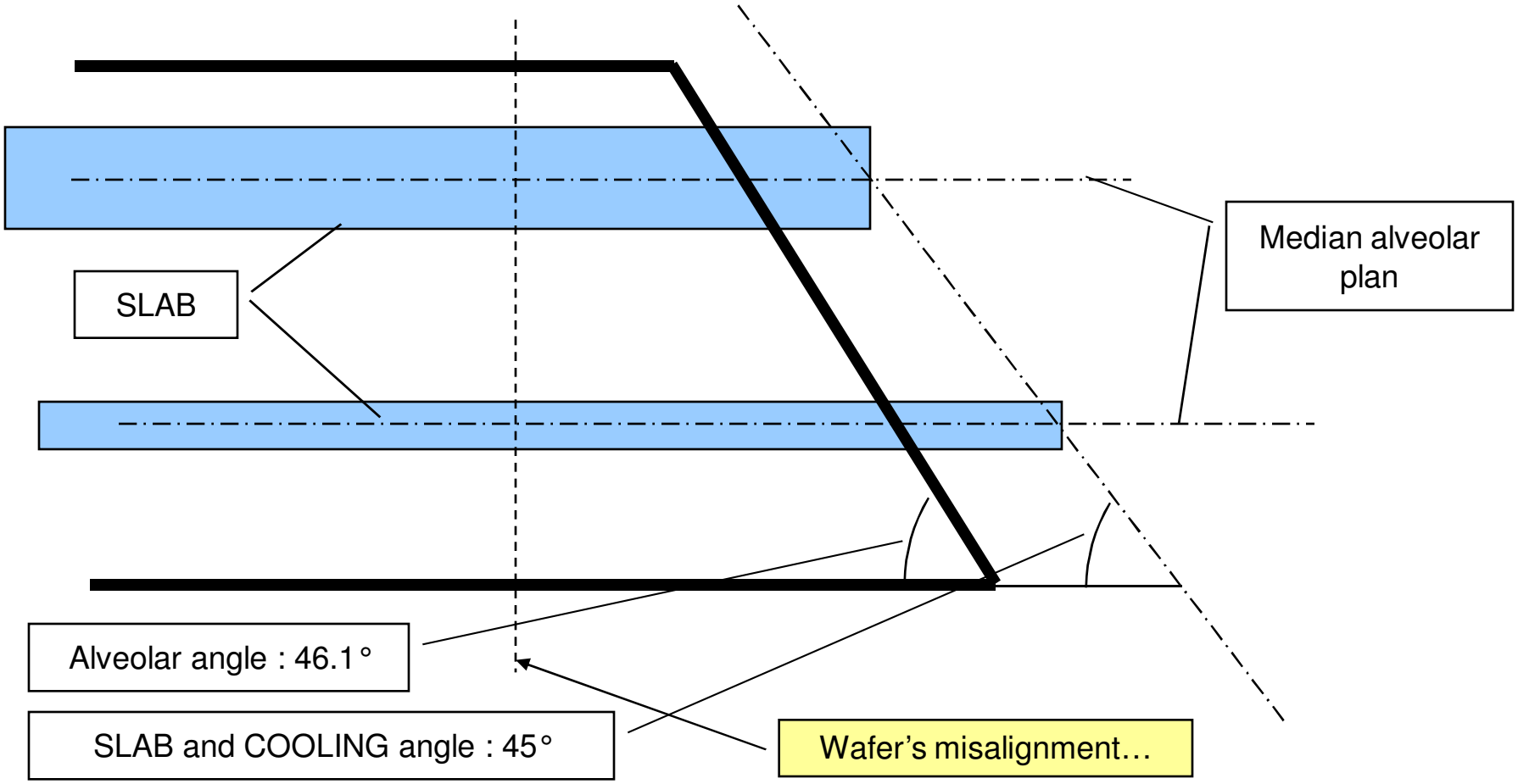
Some pictures:

Top of loop => -0.8 bar => cavitation start (extrem point) => LEAK LESS SYSTEM

1°) ANGLE

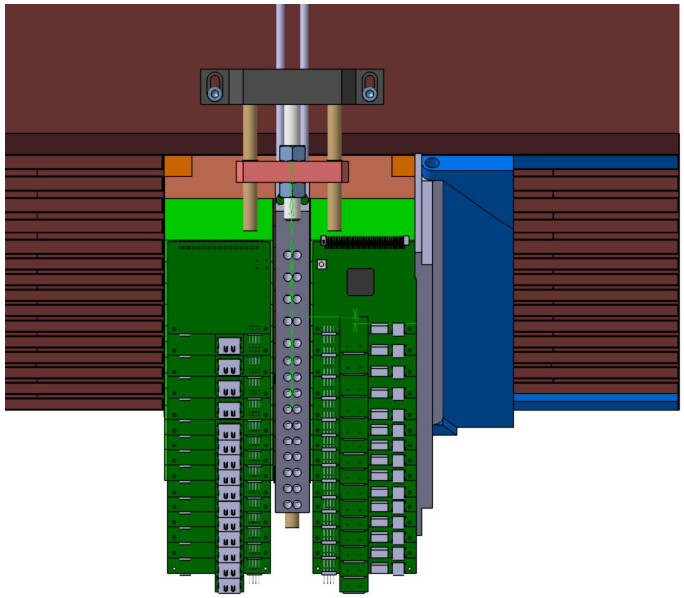
Alveolar structure => about 46.1° (CATIA MODEL) => not a problem

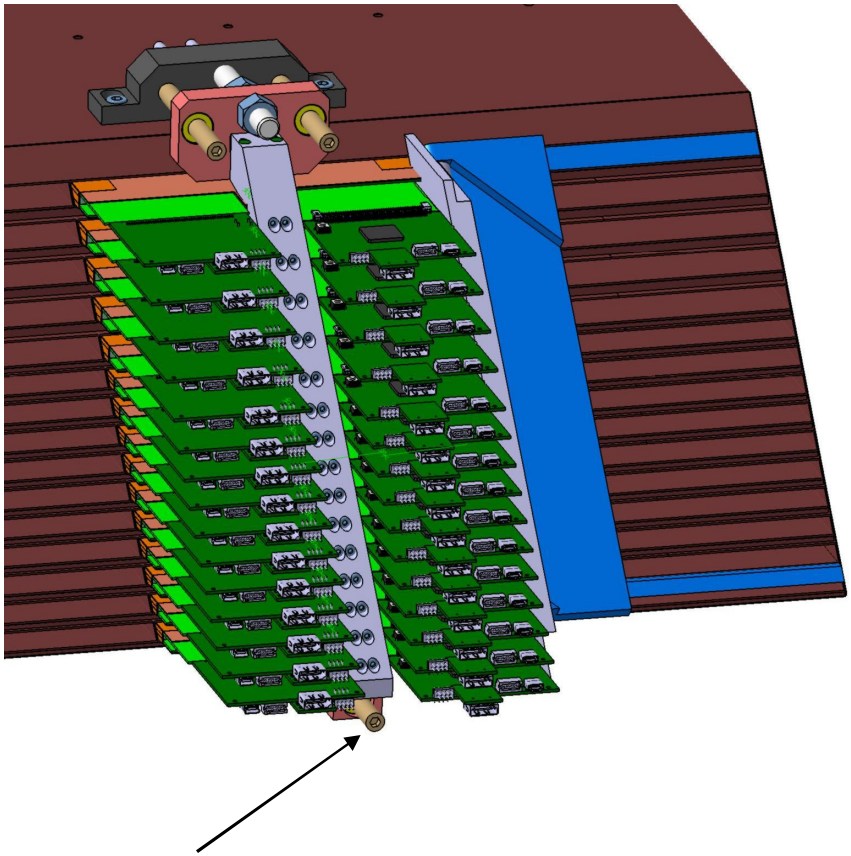
SLAB and COOLING angle 45° => IMPORTANT FOR THE COOLING INTEGRATION



2°) ADAPT / DIFF SUPPORT

- Other support in development ? Cable support ?
- 0.8 mm free for LPSC side support (half of the diff)

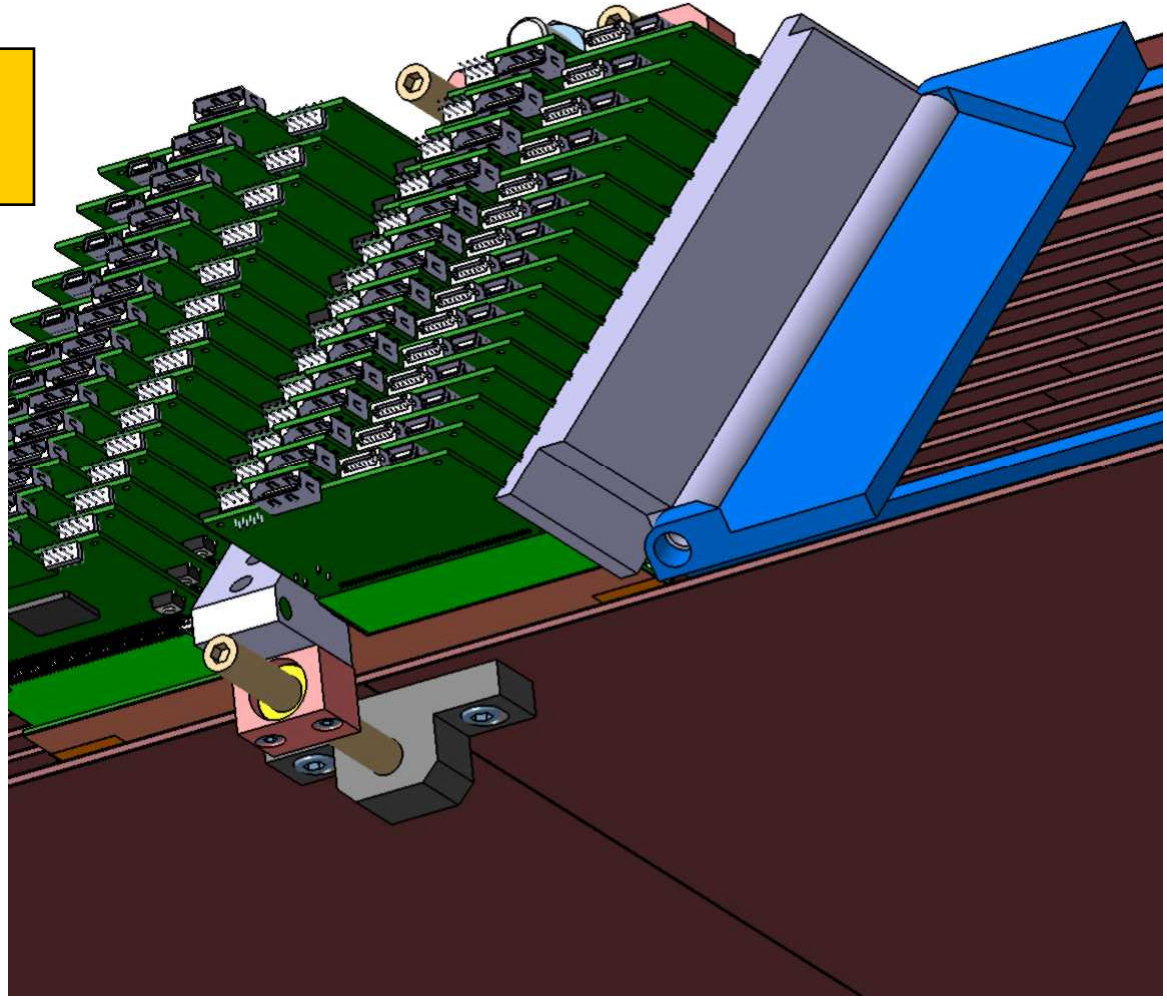




ADAPT / COOLING SUPPORT: OK ?

3°) ETD or HCAL

Note that the cooling support is fix on the thin (2mm) carbon plate => We have to check if no problem



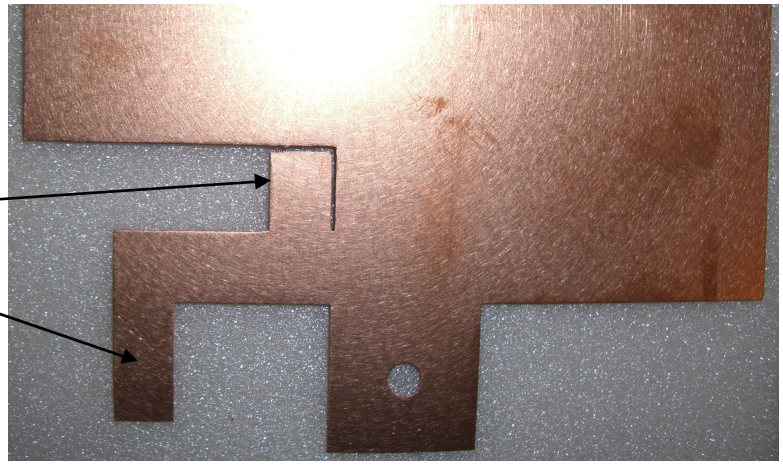
- **Rails**: aluminium or composite
- **Pipe connectors**: disconnection of cooling threw the rails or development of tiny connectors in front end.

IMPORTANT NEEDS FOR COOLING AND ADAPT / DIFF SUPPORT

-Final thickness of the slabs (U or H).

(distance between copper drain)

- Thickness of the copper drain (0.4 or 0.5 mm)
- POWER dissipation : DIFF and ADAPT ?
- TOTAL POWER dissipation ?



Cooling during EUDET life:

Do we have to build a small autonomous cooling station for EUDET ? (small chiller / flow measurement / Temperature measurement), the existing installation going on for further tests.

Or can we connect the cooling system to existing cooling on beam test areas?

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