

Mechanics Projects at DESY, ATLAS

[Volker Prah](#)

NIKHEF

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DESY-ATLAS Mechanics Team

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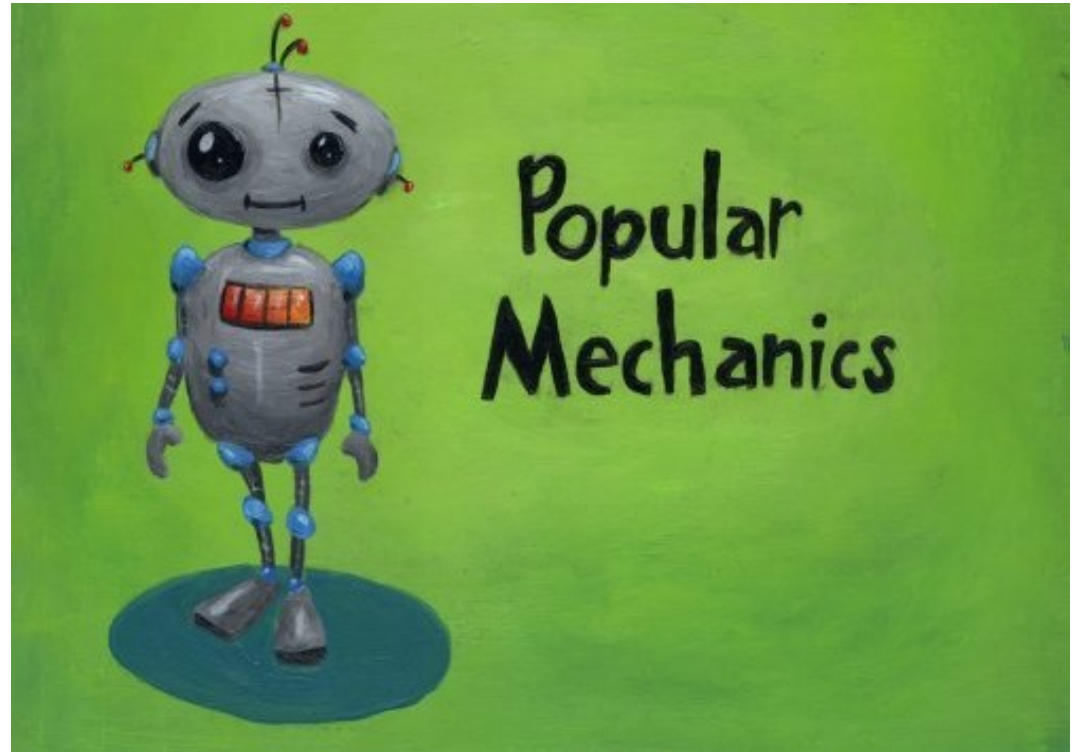
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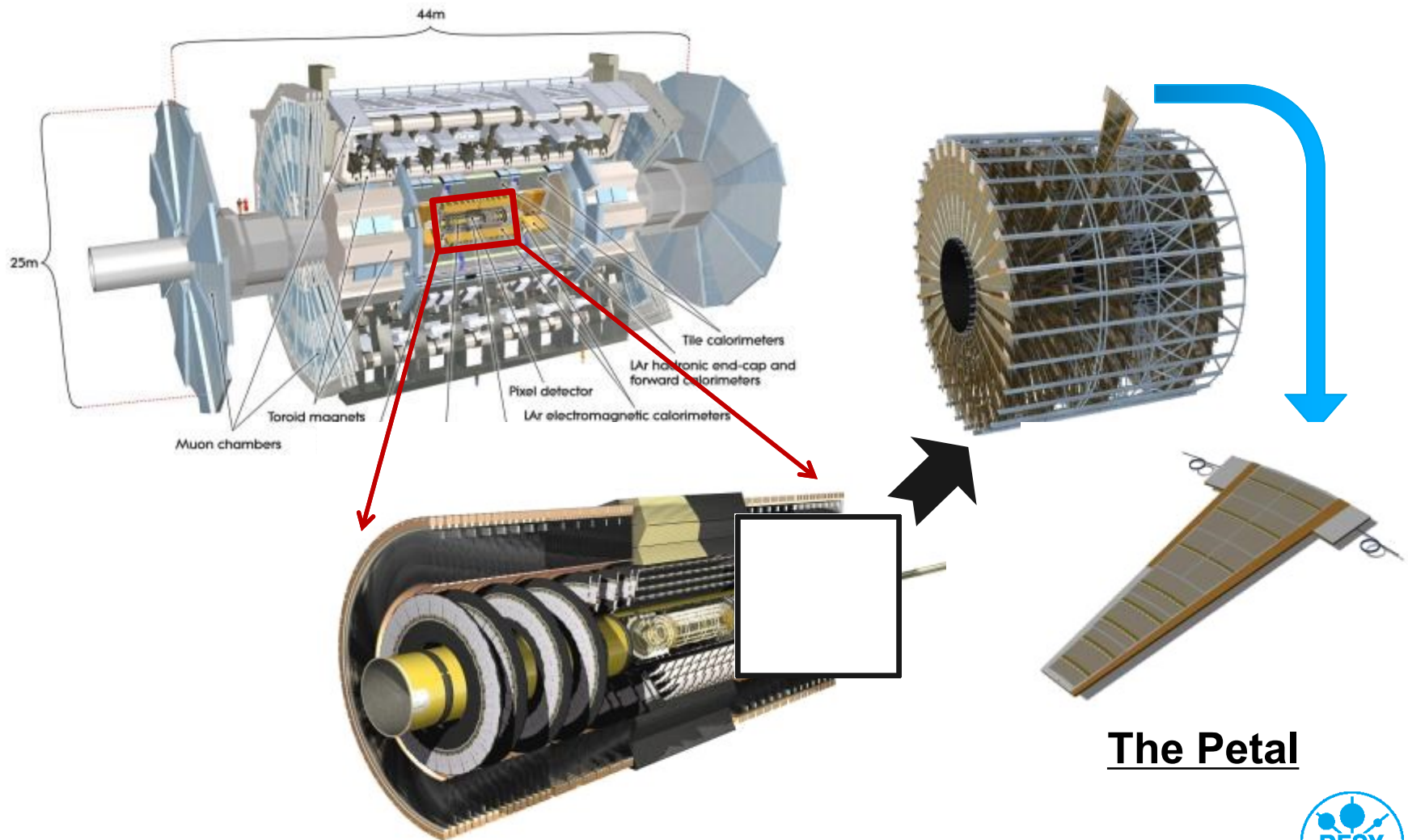
Volker Prah

Volkert Sturm



- PETAL concept
- PETALET
- PETAL support structure
- Global support structure
- Tooling
- Fabrication
- Outlook

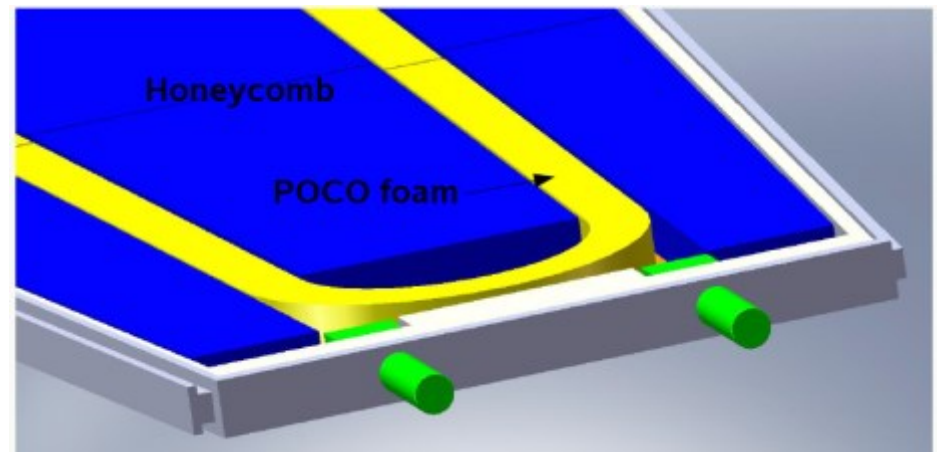
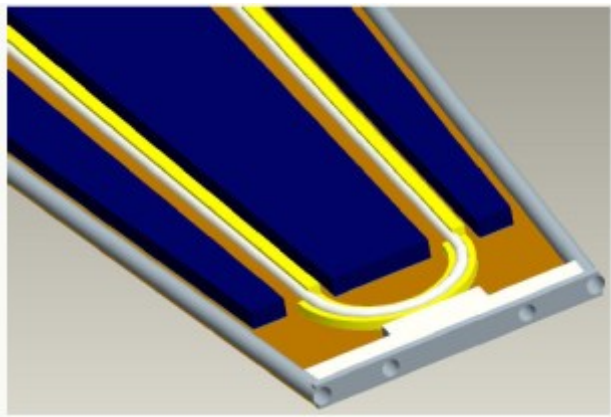
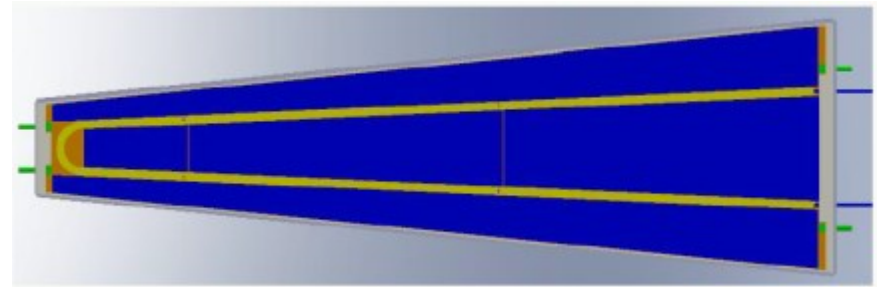
Background / Introduction



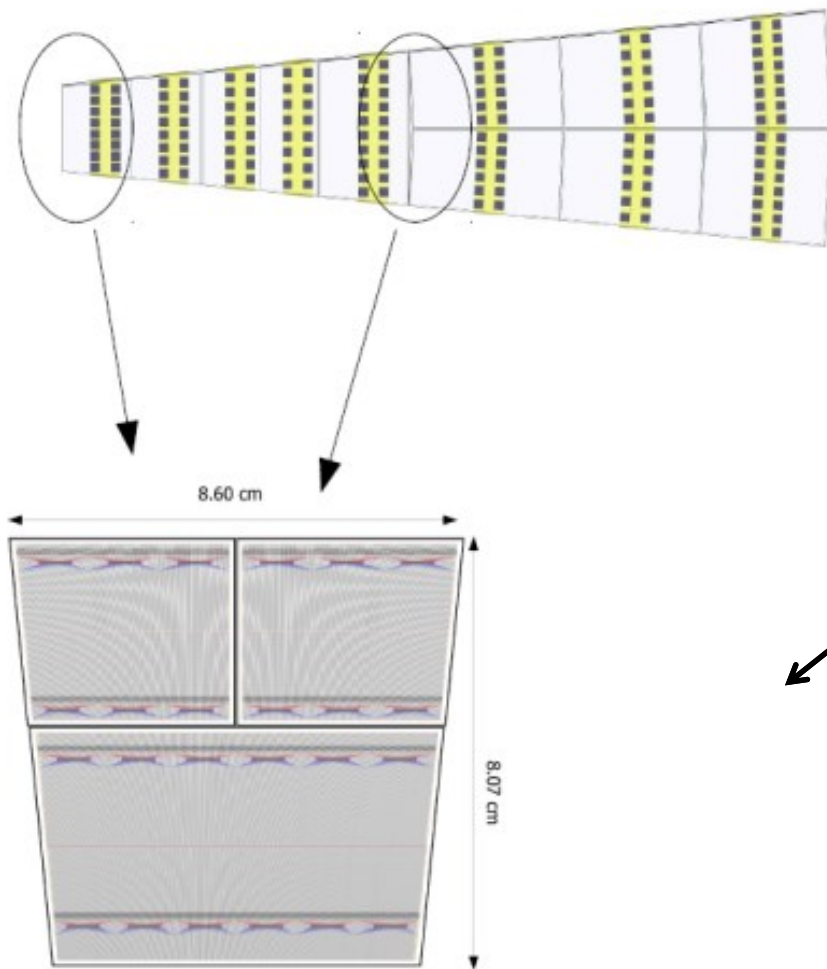
The Petal

The Petal concept

- ❑ Very similar to barrel stave concept
- ❑ 2 Carbon-fiber Facings + Honeycomb sandwich core
- ❑ Ti-Cooling Tube + Poco foam

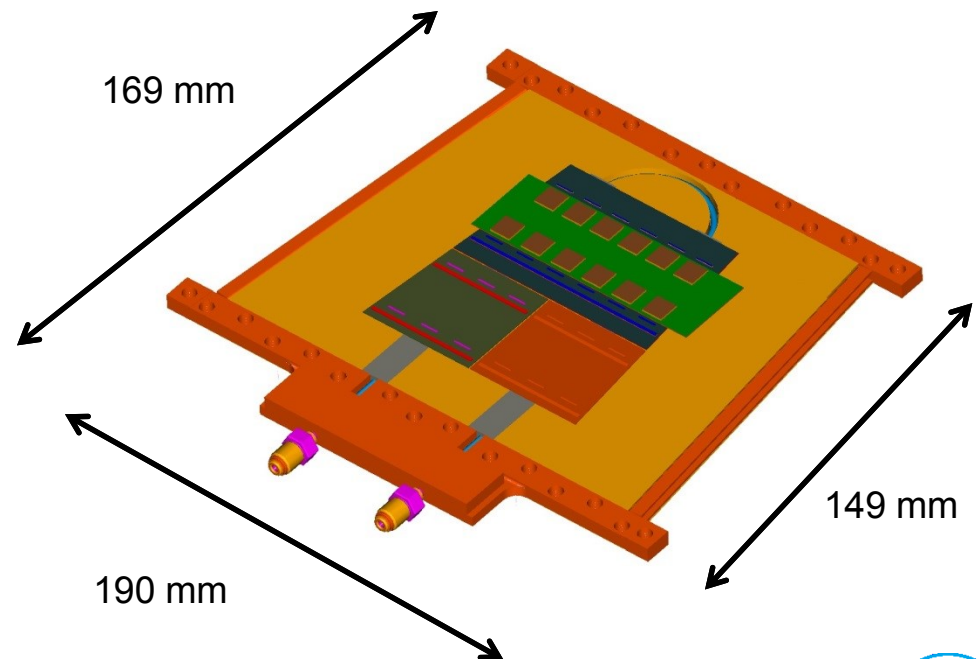


The Petalet

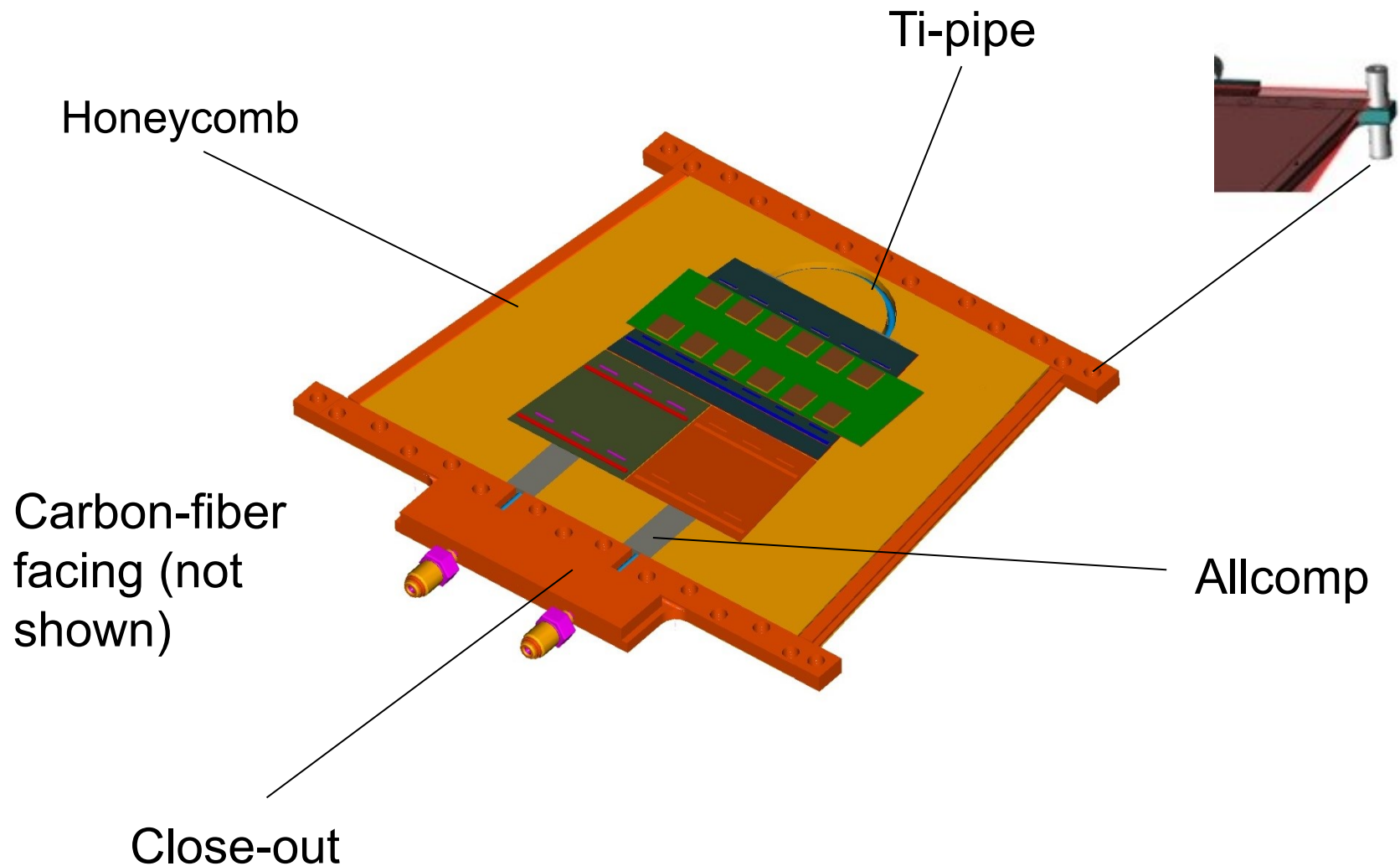


❑ Concentrate on a smaller scale petal helps understanding the overall system

❑ Cost & time

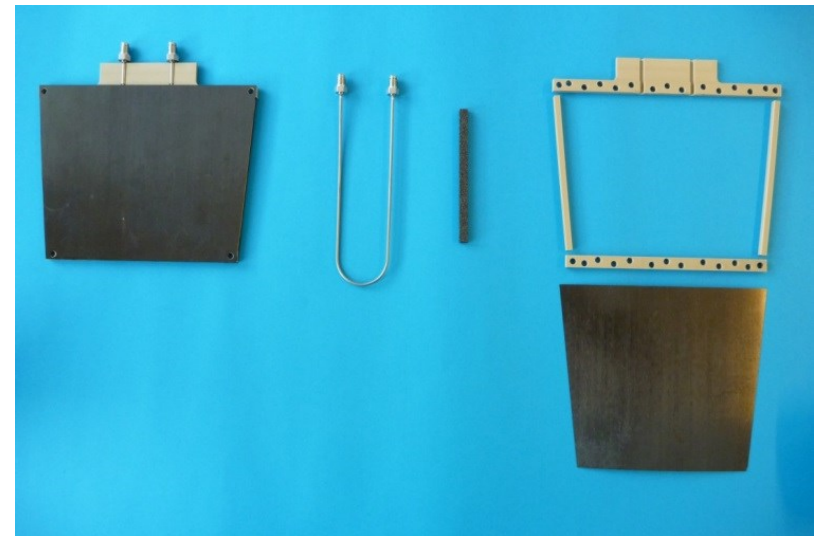


The Petalet



Design and fabrication of the Petalet

- Petalet Core
- Facings
- Honeycomb
- Closeouts
- Titanium-Stainless Steel Brazing
- Gluing
- Positioning system
- Cooling system
- Tooling

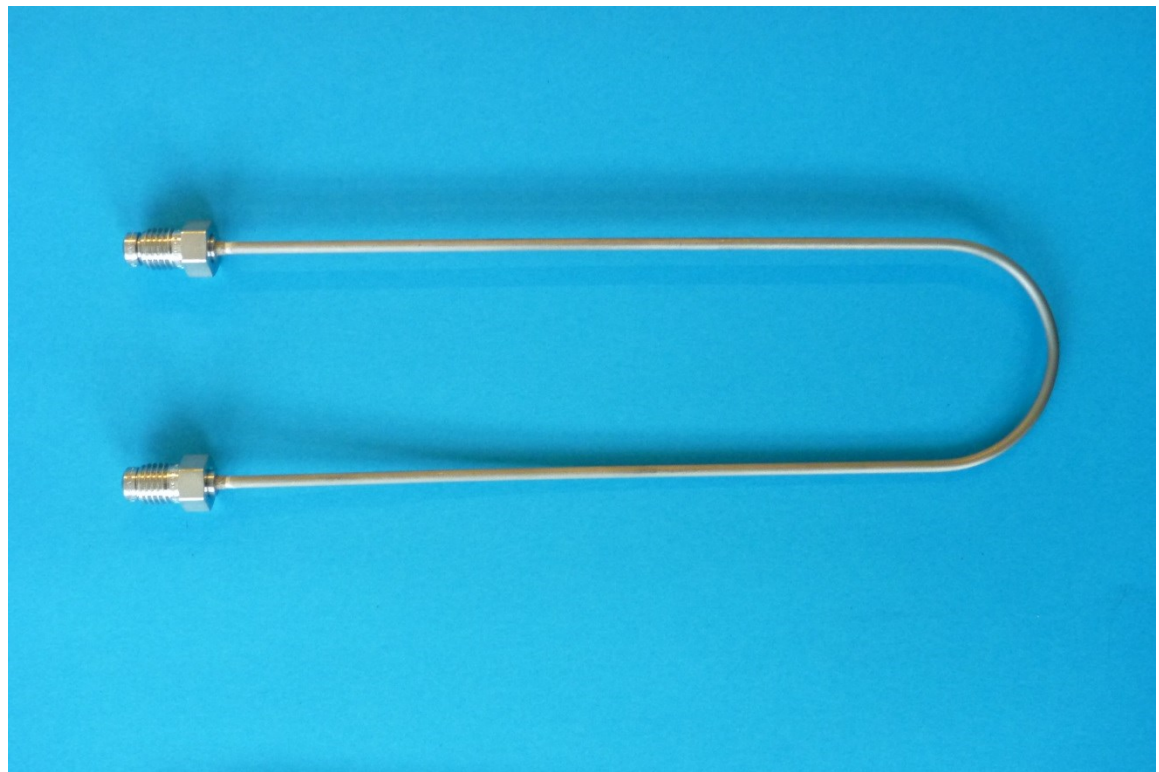
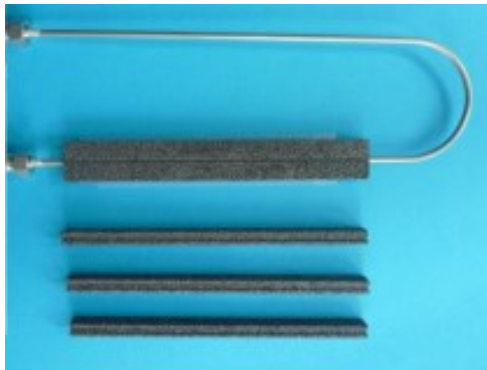


Titanium Cooling Tube

➤ Titanium material:

Ti-tube 2.275x0.14, Grade II, ASTM B338-9

Swagelok fitting will be used
only at the Petalet



Stainless Steel to Ti

Test I: 19.11.12, $t = 830^{\circ}\text{C}$

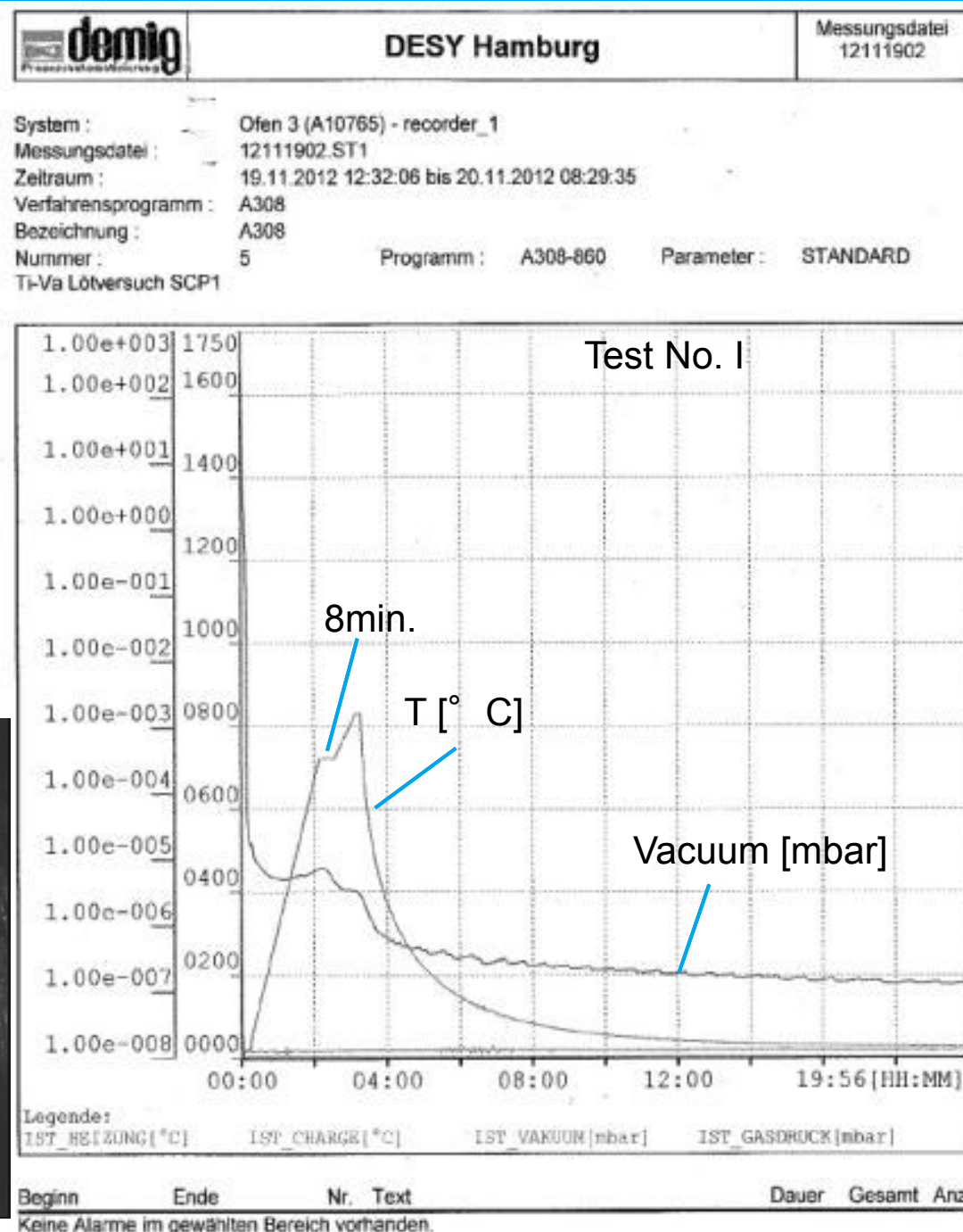
Test II: 21.11.12, $t = 820^{\circ}\text{C}$

Duration: 8min @ 750°C

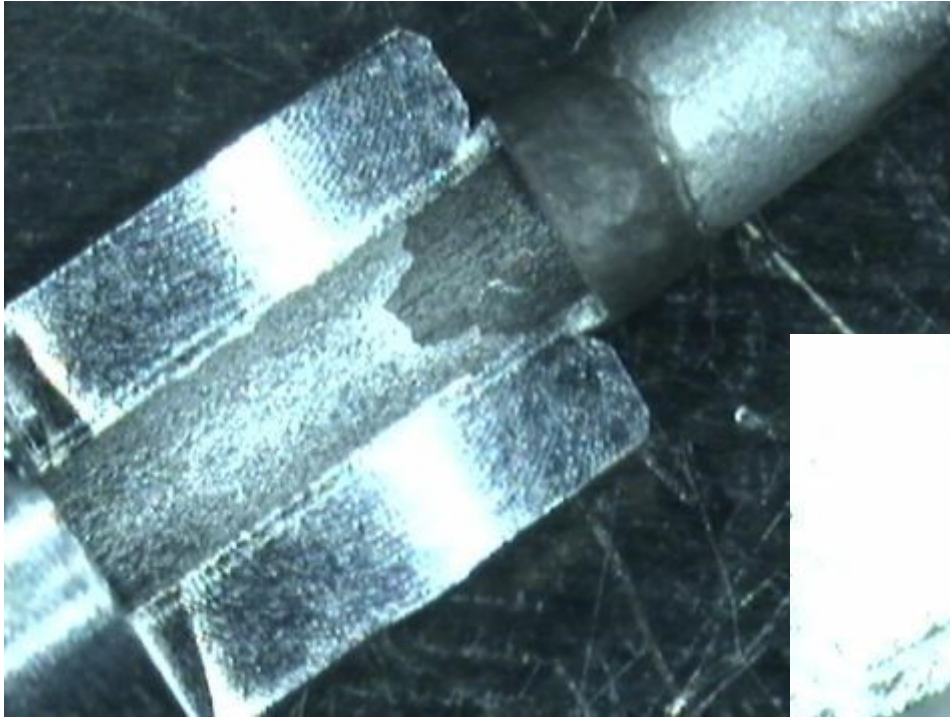
Solder:

SCP1: Ag68.4%, Cu26.6%, Pd5%

- Test 2 showed better results
- All further tube were brazed at 820°C



Brazing test



The cut is not at the centerline !



Pictures from Test No. I

Ti-Brazing pressure-test

Proposed stress test procedure for the Ti-brazing joint on cooling tube:

1.1 Pressure test (150 bar)

1.2 Helium leak test

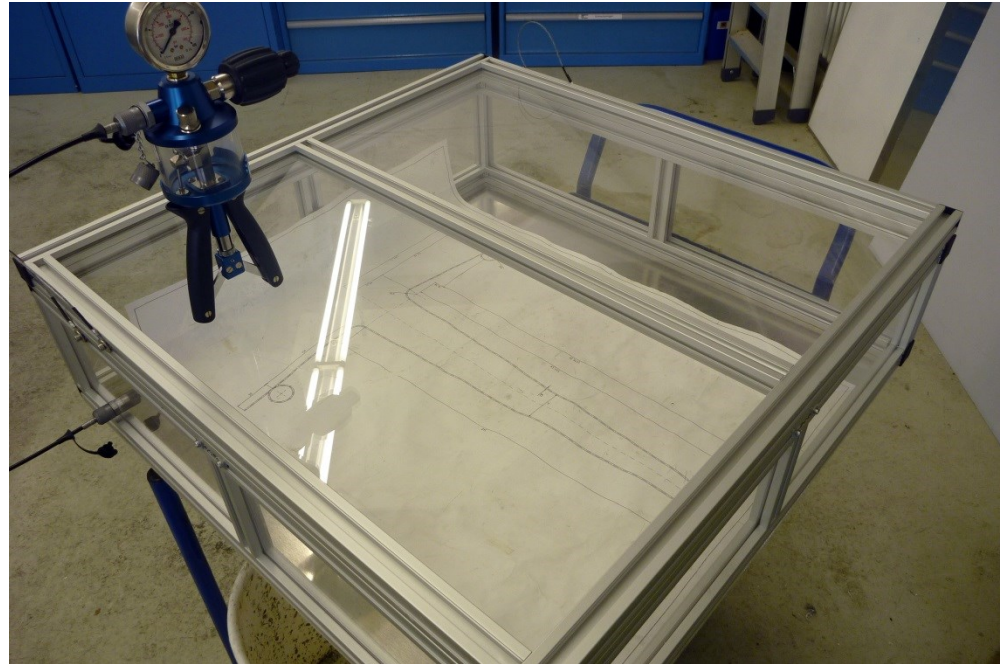
2.1 Nitrogen immersion test
with liquid N₂

2.2 Helium leak test

3.1 Pressure test (150 bar)

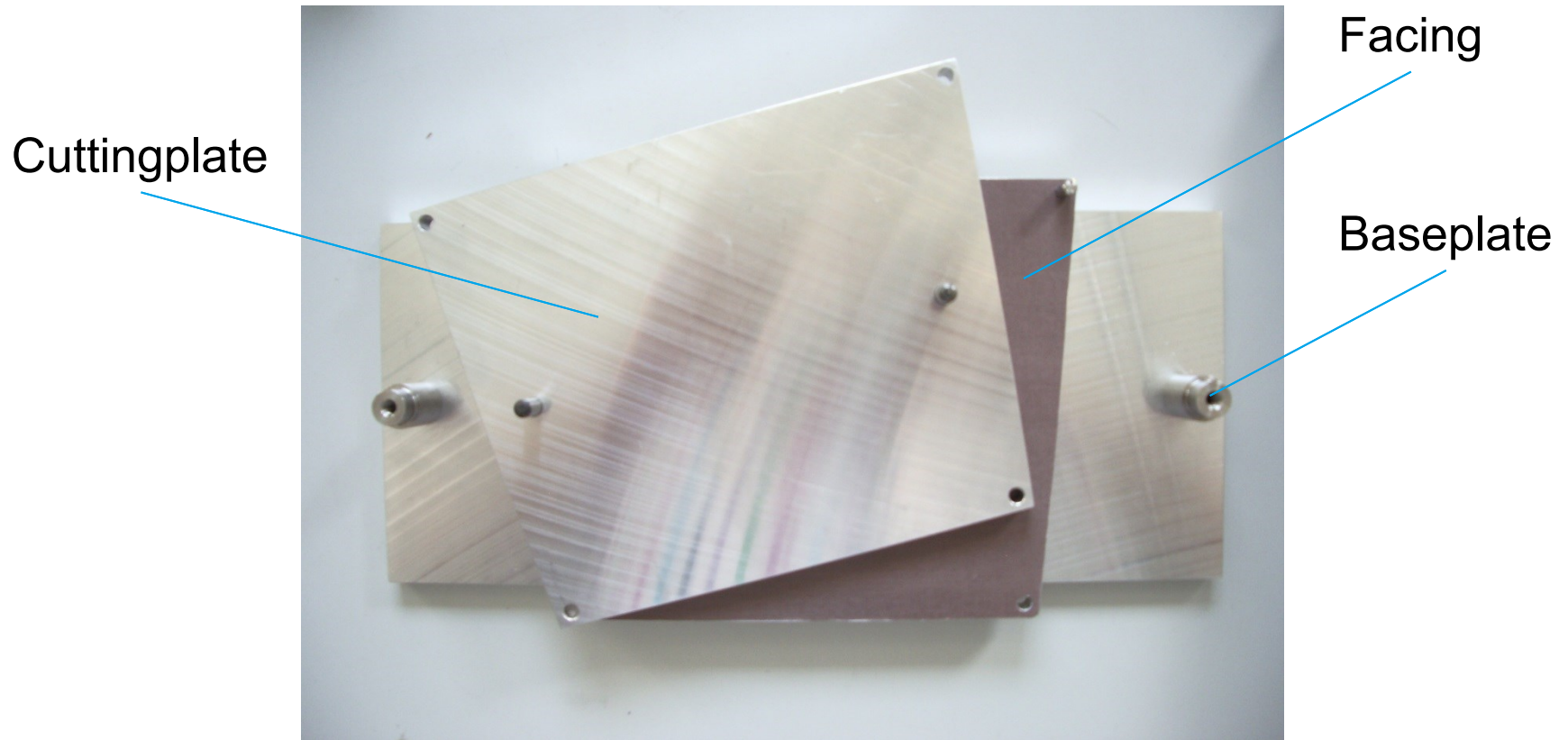
3.2 Helium leak test

(4. REM Analysis needed? Before and/or after ??)



Facing cutting tool

- Cutting the border and the four pinholes



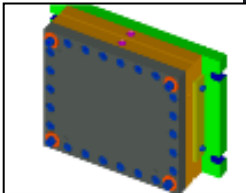
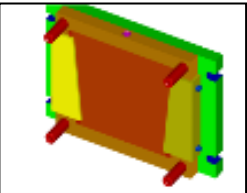
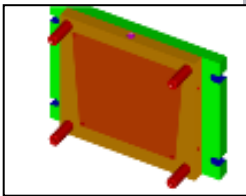
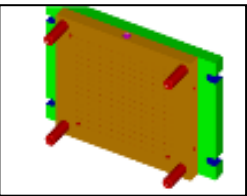
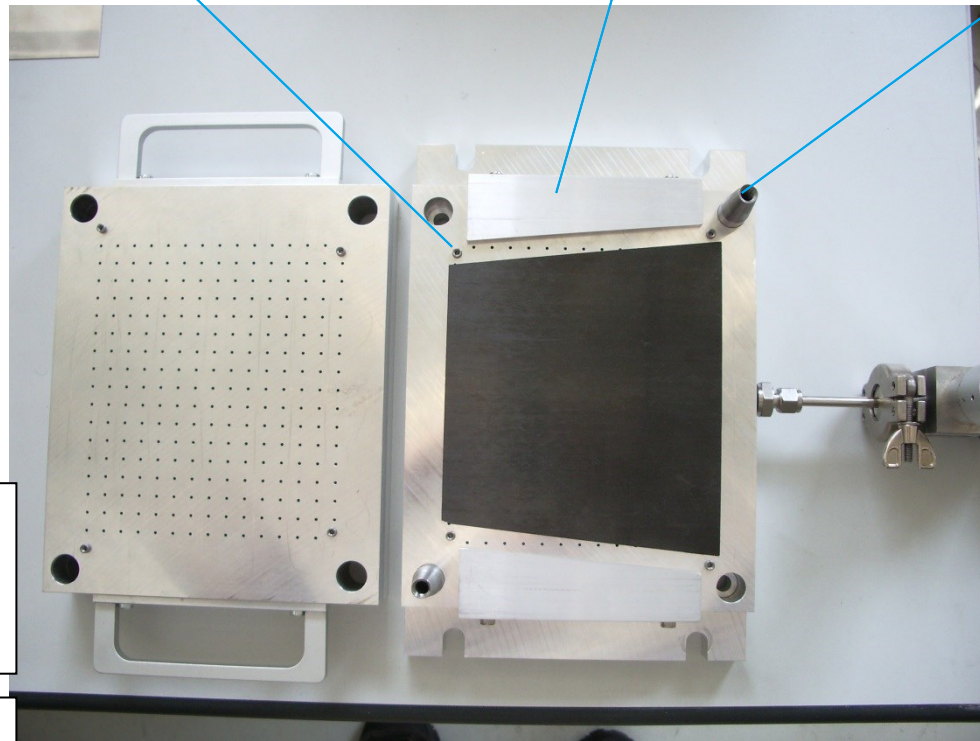
Facing gluing jig

Positioning dowel pins for the Closeouts

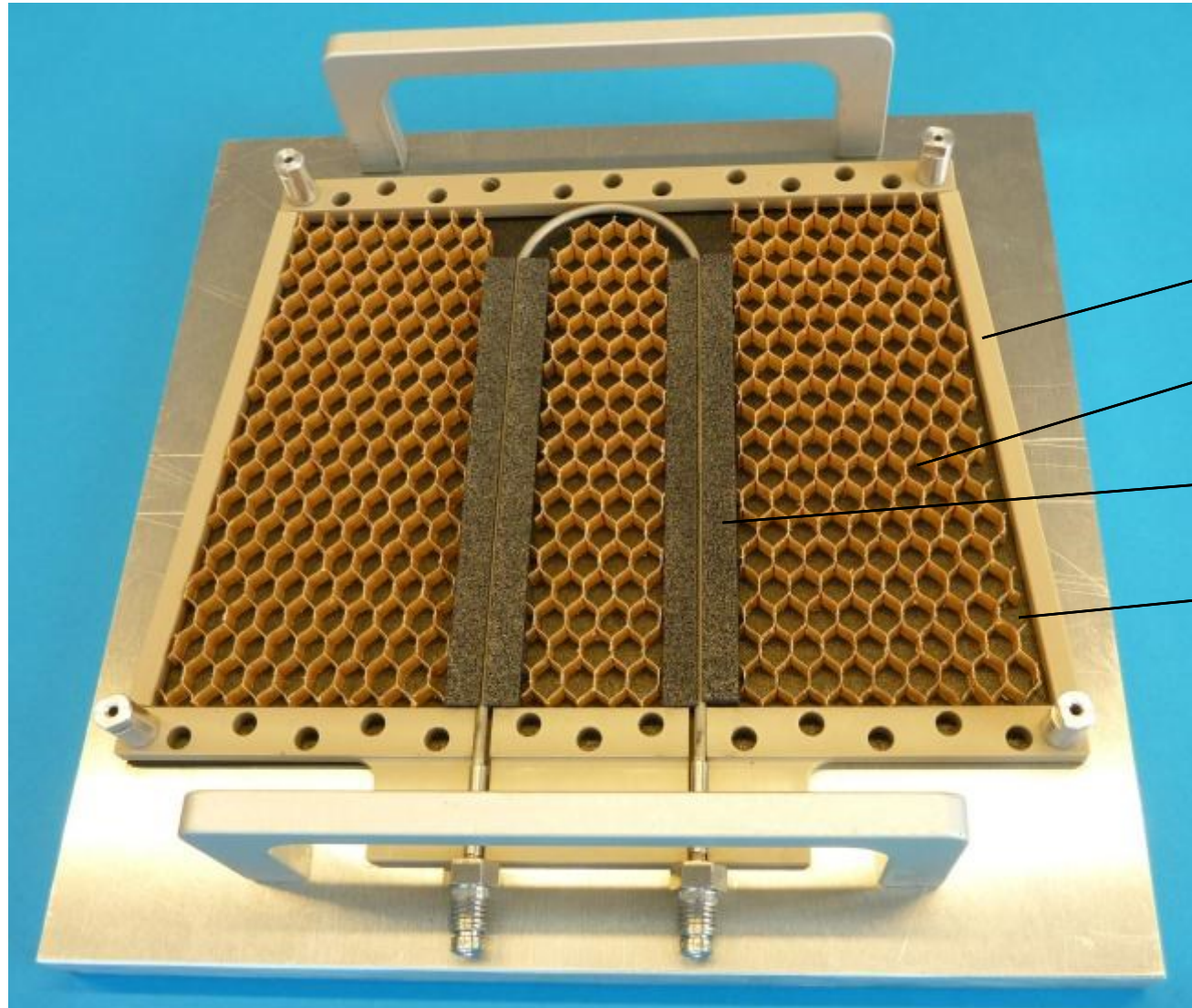
Alignment bracket

Dowel pins of the jig

Vacuum pump



PETALET Status of Fabrication



Closeouts (PEEK)

Honeycomb
(Nomex) NIKHEF

Cooling, Ti-tube/
Pocofoam → Alcomp
(no gap after gluing)

Facing 3Layer 0,90,0
NIKHEF

Glue: Hysol 9396

Last assembly
check of the Petalet
before gluing

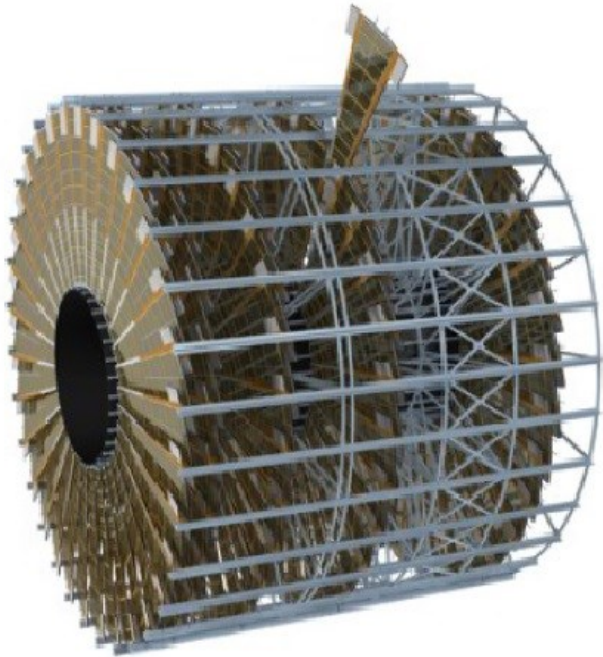
PETALET quality control



3D Measurement device

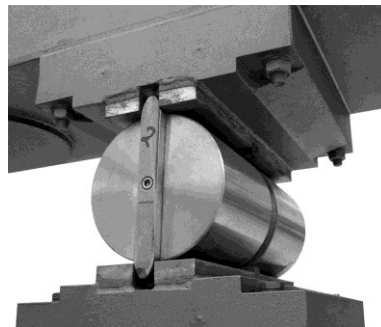


Outlook, future tasks



NIKHEF

- Fabrication of Petalets with cured facings
- Fabrication of co-cured Petalet
- Design of positioning tooling system
- Petal local support
- Petal supportstructure
- Infrastructure, Cable, Coolingtube, Connectors
- Petal assembly procedure
- Tooling
- FEA simulations



Very heavy supportstructure