

A wide-angle photograph of a large industrial facility, likely a manufacturing plant. The scene is dominated by rows of large, grey, rectangular machinery units arranged in a long aisle. Above the machinery, a prominent yellow overhead crane spans the width of the aisle. The ceiling is high and filled with a complex network of pipes, conduits, and structural beams. The floor is covered in a metal grating. In the background, a bright doorway or opening is visible, suggesting an exit or entrance. The overall atmosphere is industrial and well-lit.

# Surface finishing

Leonel Ferreira on behalf of TE/VSC

# Outline

Objective

Surface finishing

Guided tour

Activities

Main issues

Perspectives

# Objective

Surface finishing is an additional process applied to the surface of an object/material with the purpose of adding functions in line with its final purpose

TE-VSC

# Surface finishing

## 1.a) Aqueous based degreasing

### Advantages:

- UHV compatible;

### Drawbacks:

- Some metals may be corroded;
- Needs a rinsing step;
- Some contaminants are hard or impossible to remove: Silicone based greases, dry lubricants (MoS)...

## 1.b) Organic based degreasing

### Advantages:

- Compatible with most metals;
- Less critical on complex geometries /porous materials;
- Can remove silicon based contaminants

### Drawbacks:

- Not always UHV compatible;
- Dry lubricants are difficult to remove.

# Wet surface finishing

2.a) Pickling: Removal of oxides

2.b) Passivation: Formation of a stable and uniform layer on the surface

2.c) Polishing (chemical & electrochemical)

Copper & alloys, Stainless steels, Niobium,  
Aluminium & alloys, Titanium...

**Wet surface finishing**

**3) Electroplating**

**Nickel, Copper, Silver, Gold and Rhodium  
On  
Copper & alloys, Aluminium & alloys and Steel alloyed or not.**

Guided tour

Non aqueous solvent degreasing - MEG

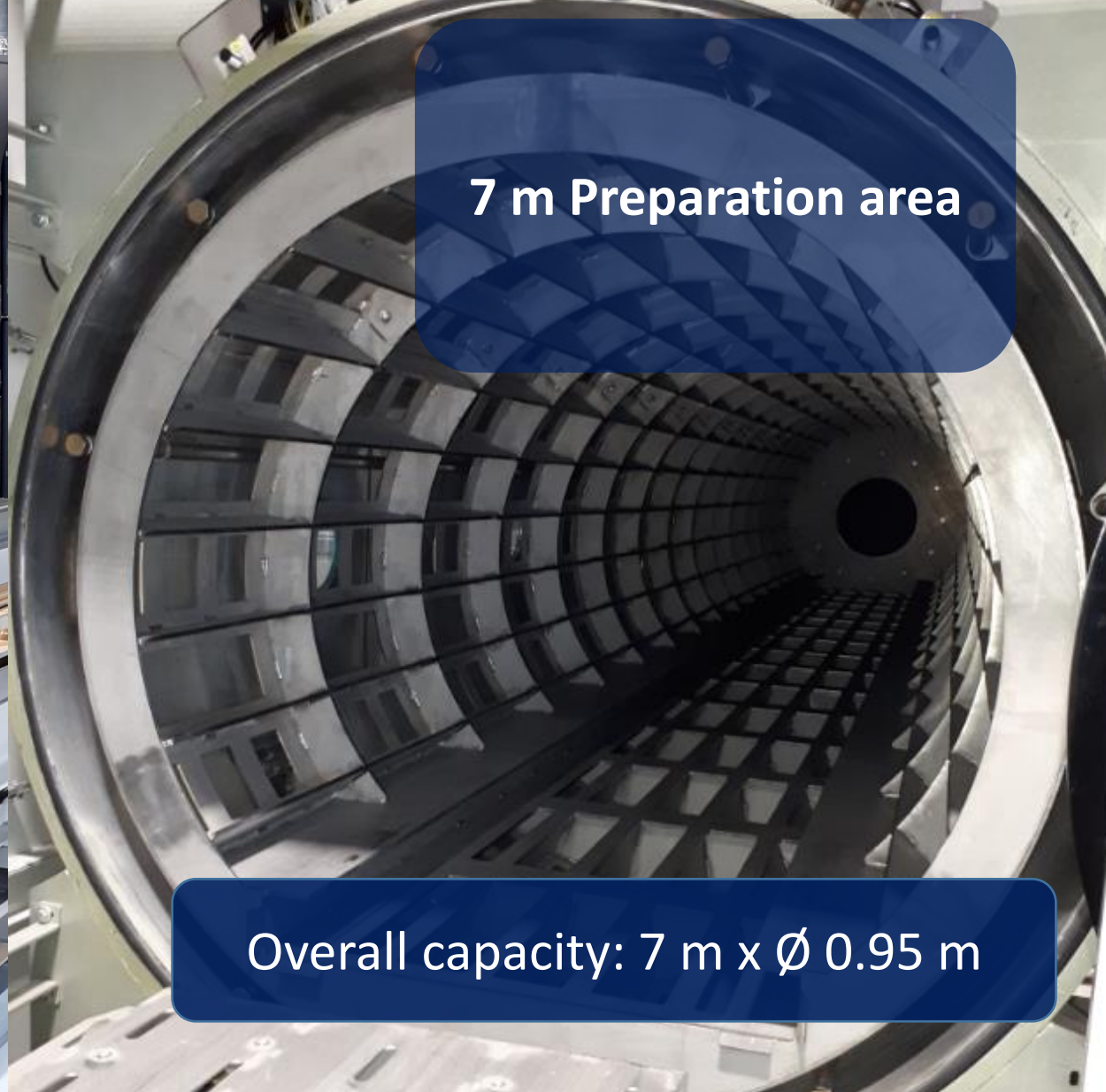
Overall capacity: 300 x 200 x 200 mm

Maximum load: 17.5 kg

Guided tour



Non aqueous solvent degreasing – Firbimatic



7 m Preparation area

Overall capacity: 7 m x  $\varnothing$  0.95 m

Maximum load: 2000 kg



**Guided tour**

**7 m Preparation area**

**Overall capacity: 7 x 0.9 x 1.1 m<sup>3</sup>**

**Maximum load\*: 2000 kg**  
\*Without crane

**Alkaline aqueous  
degreasing**

# Guided tour

## 7 m Preparation area



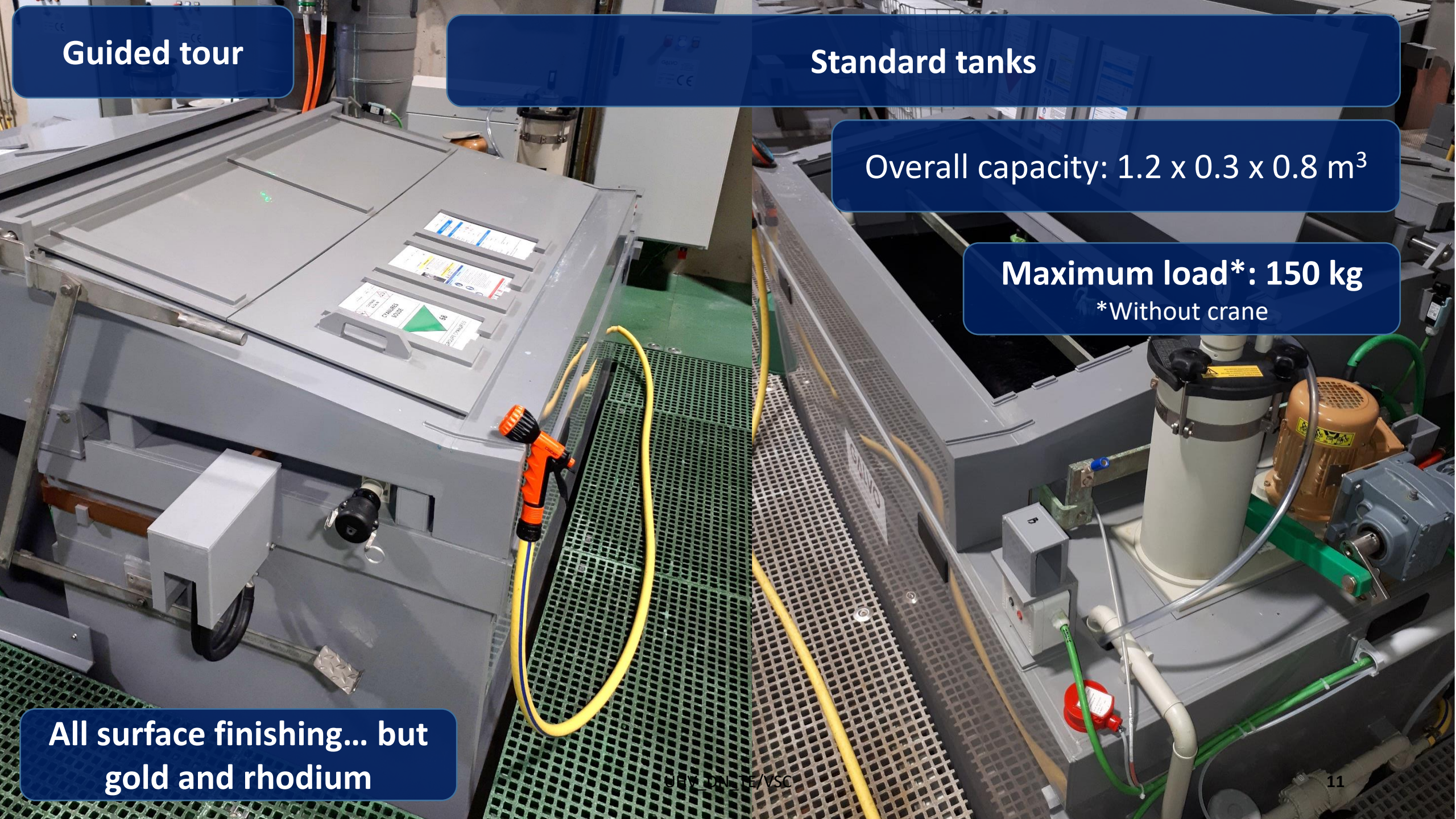
**Guided tour**

**Standard tanks**

**Overall capacity: 1.2 x 0.3 x 0.8 m<sup>3</sup>**

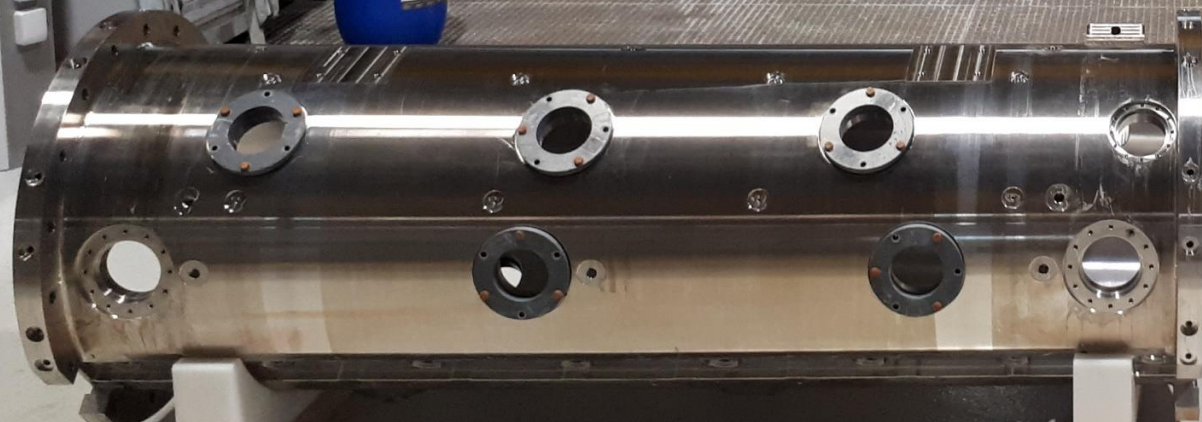
**Maximum load\*: 150 kg**  
\*Without crane

**All surface finishing... but  
gold and rhodium**



Guided tour

Multipurpose  
area



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Guided tour

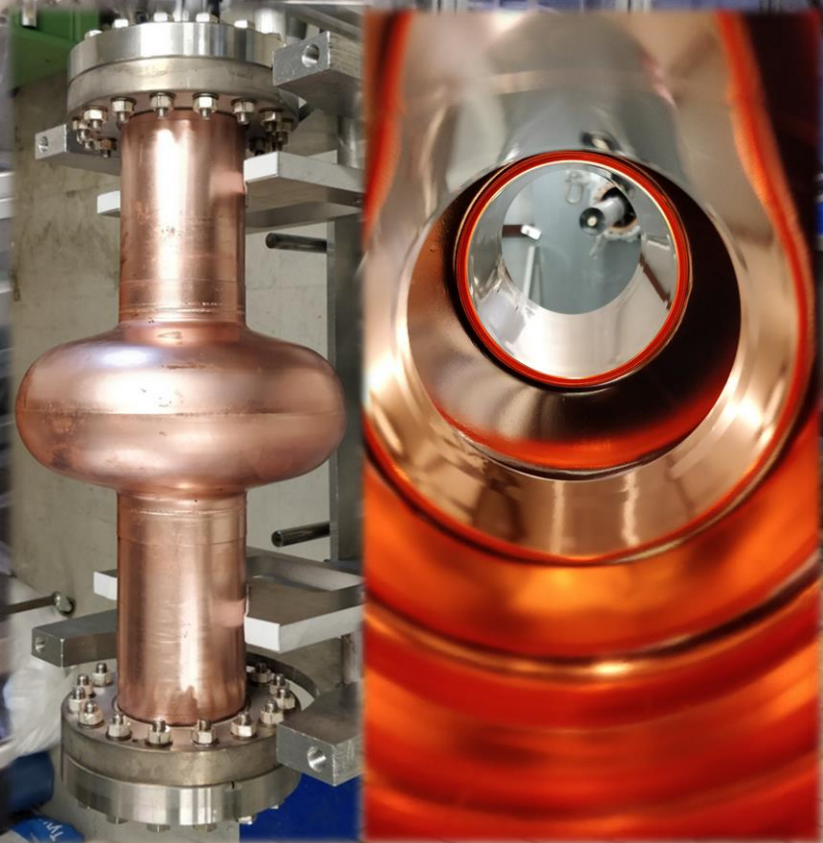
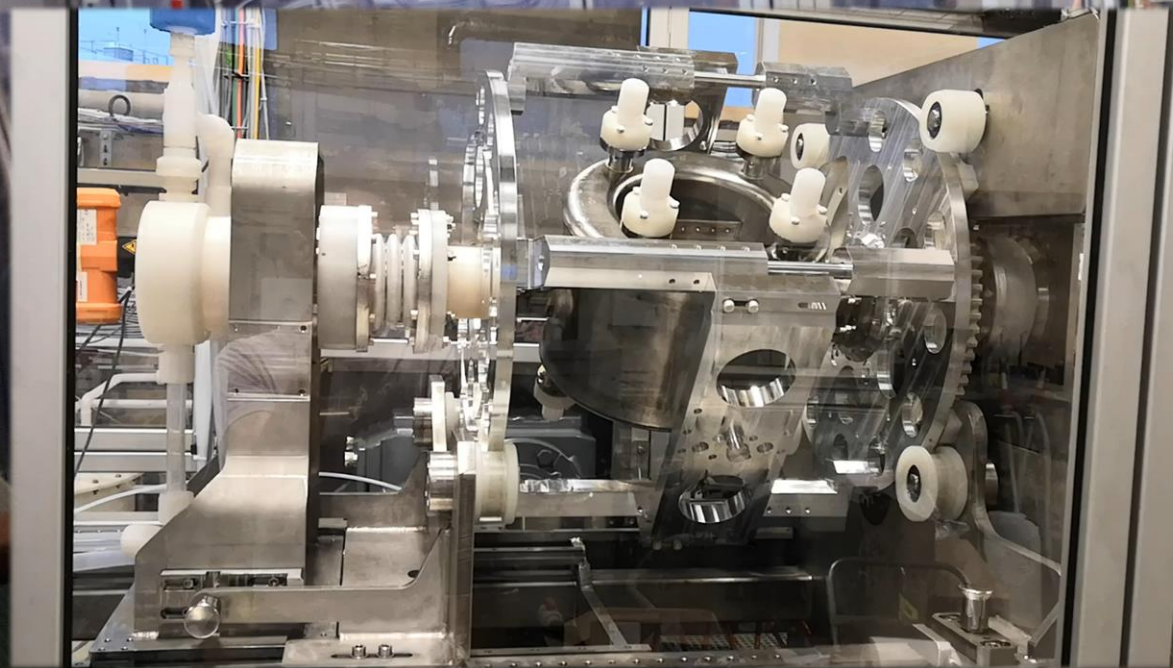
Chemical /  
Electrochemical  
polishing

Closed circuit polishing  
with two chemical plants  
(Cu & Nb)

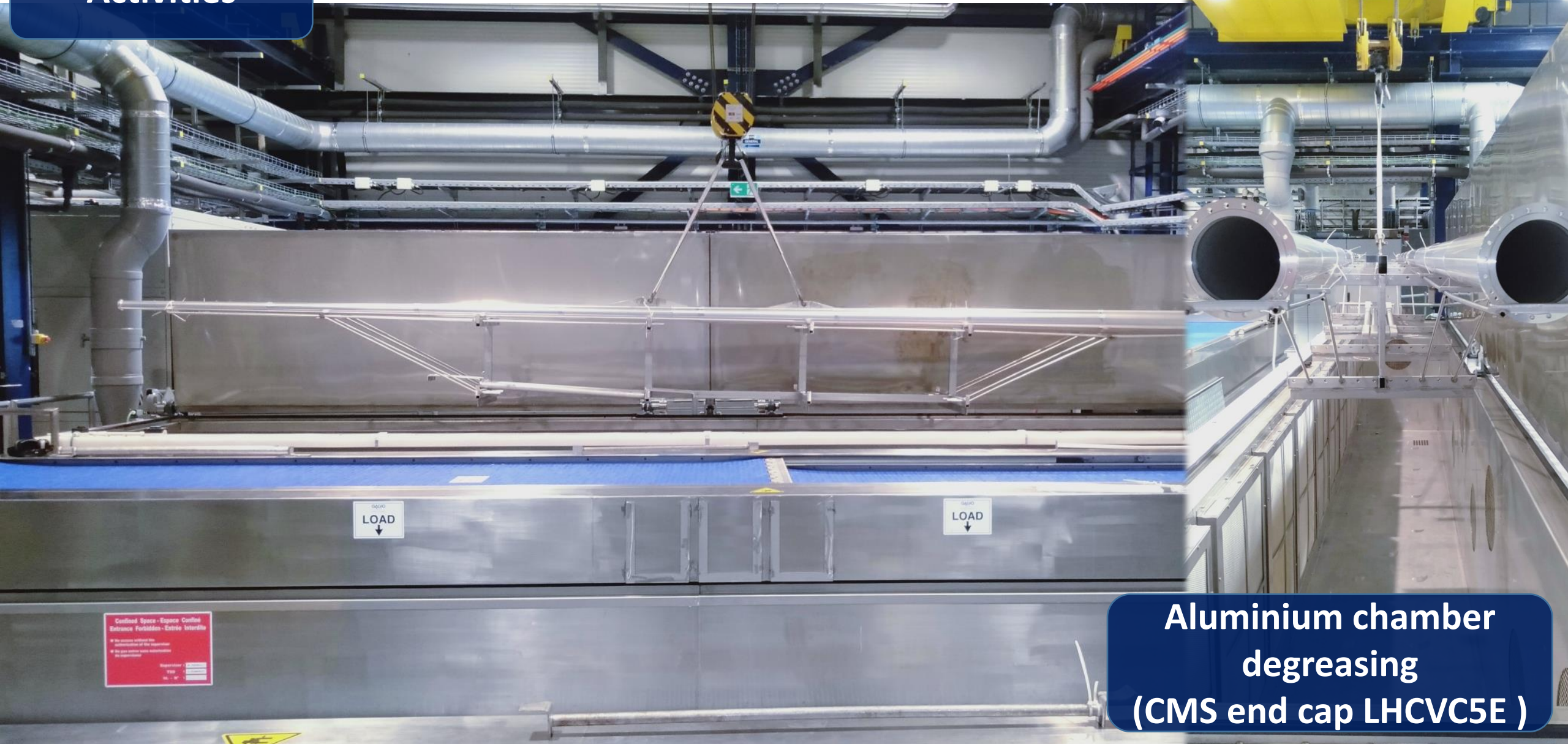
# Activities

(Nb)

(Cu)



# Activities



**Aluminium chamber  
degreasing  
(CMS end cap LHCVC5E)**

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# Activities



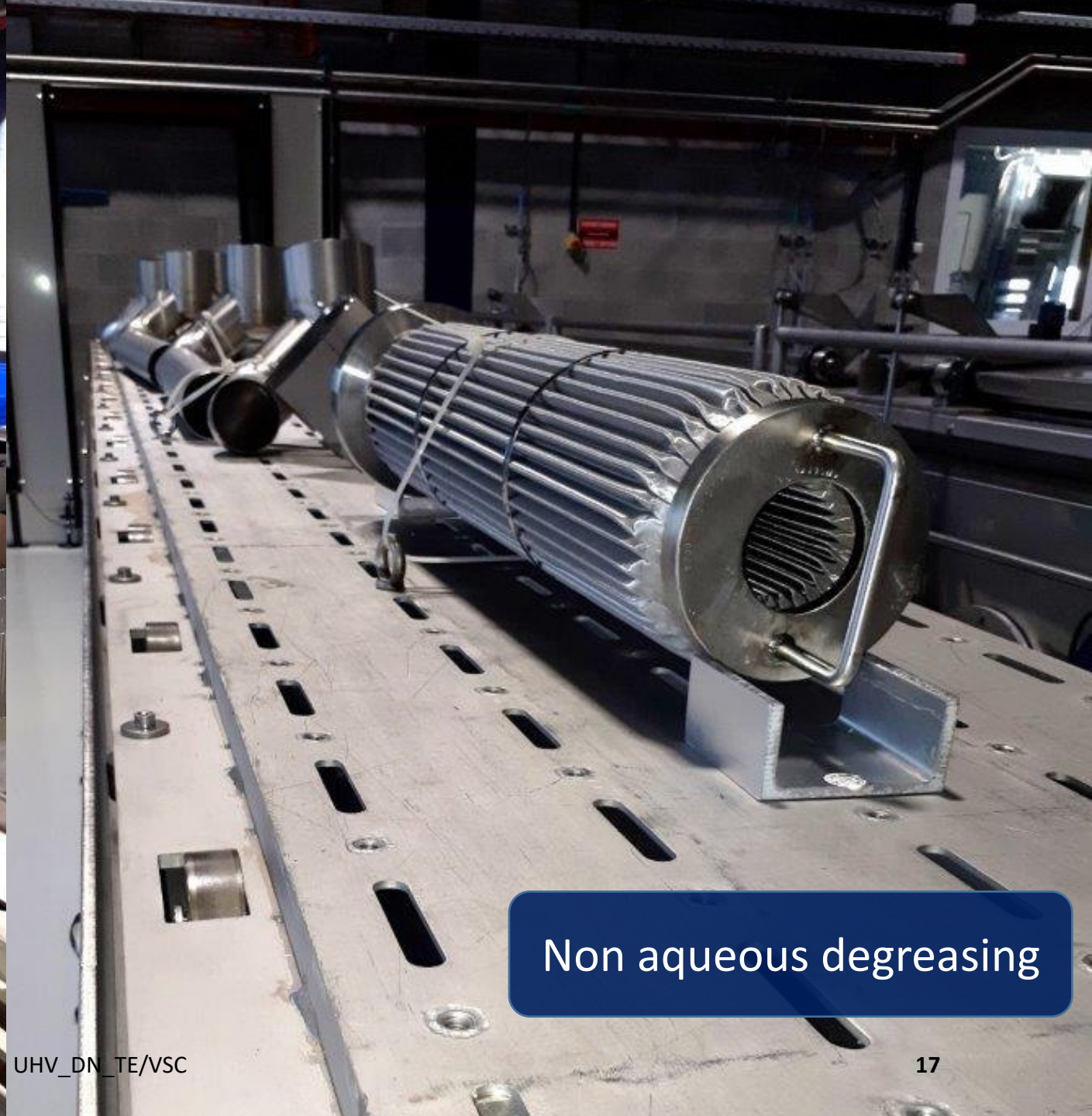
**CRAB RFD (SPS) aqueous degreasing**



# Activities



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Non aqueous degreasing

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# Activities



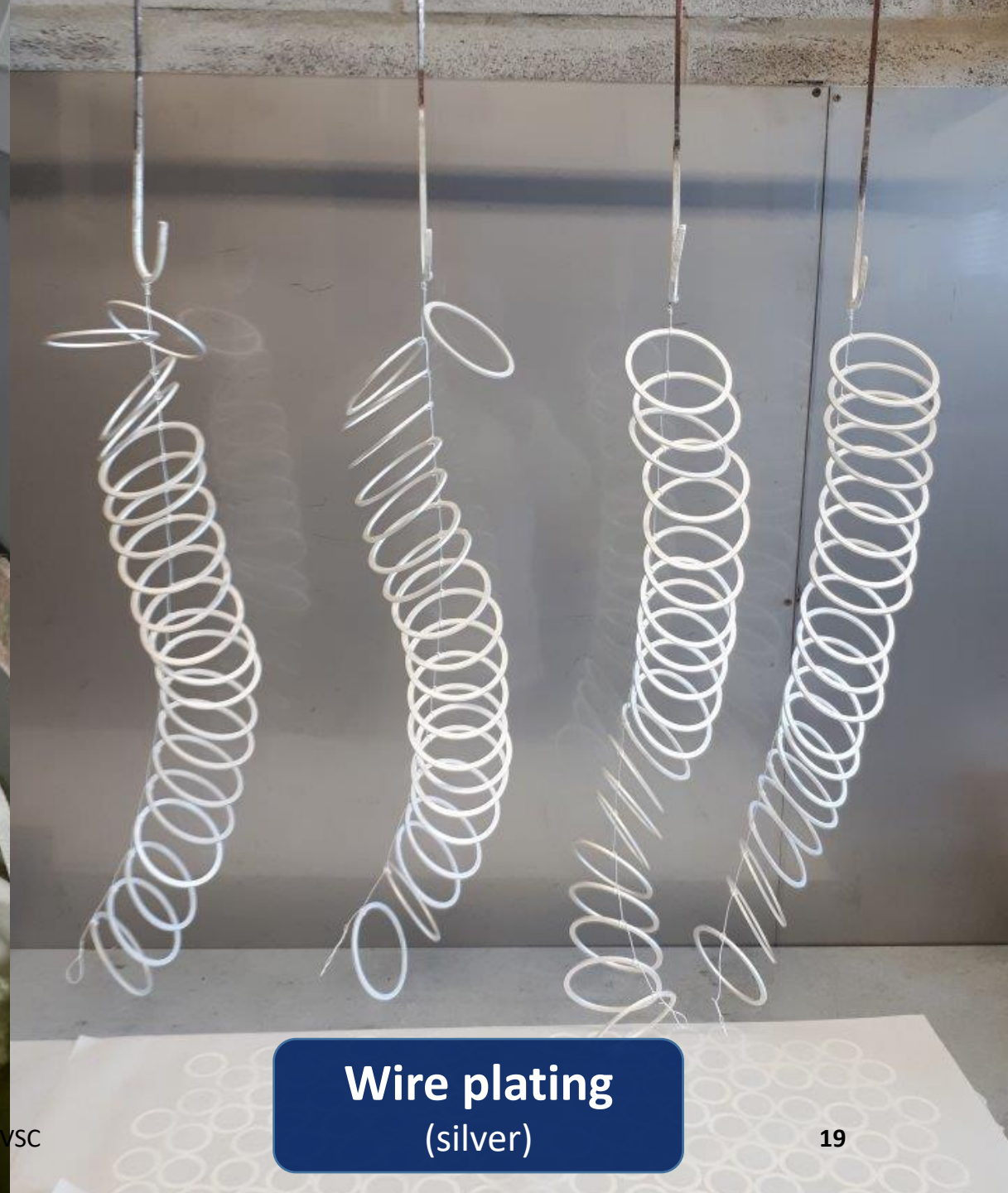
**Barrel plating**  
(silver)

# Activities



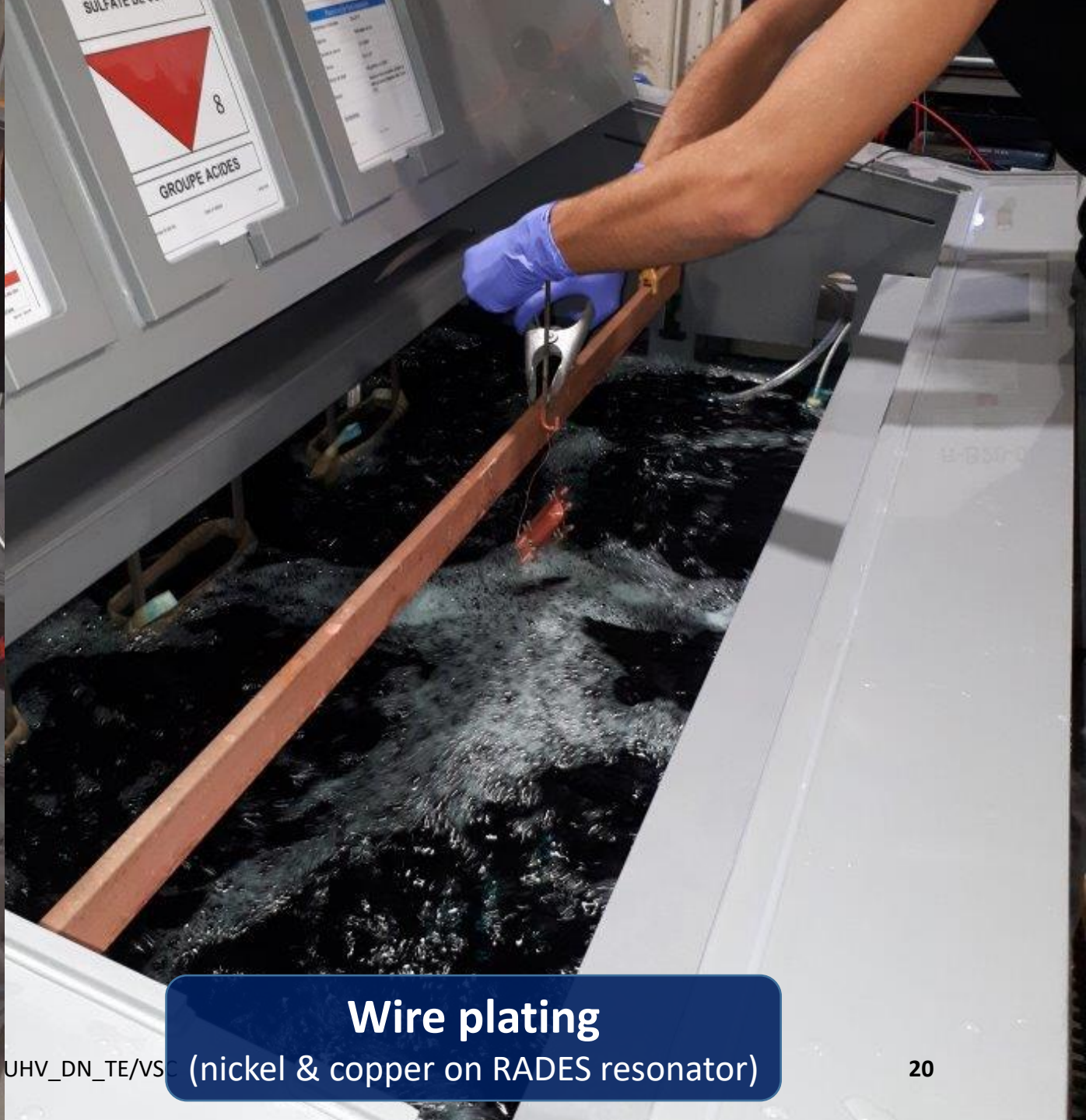
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**Wire plating**  
(silver)

# Activities



## Wire plating

(nickel & copper on RADES resonator)

# Activities



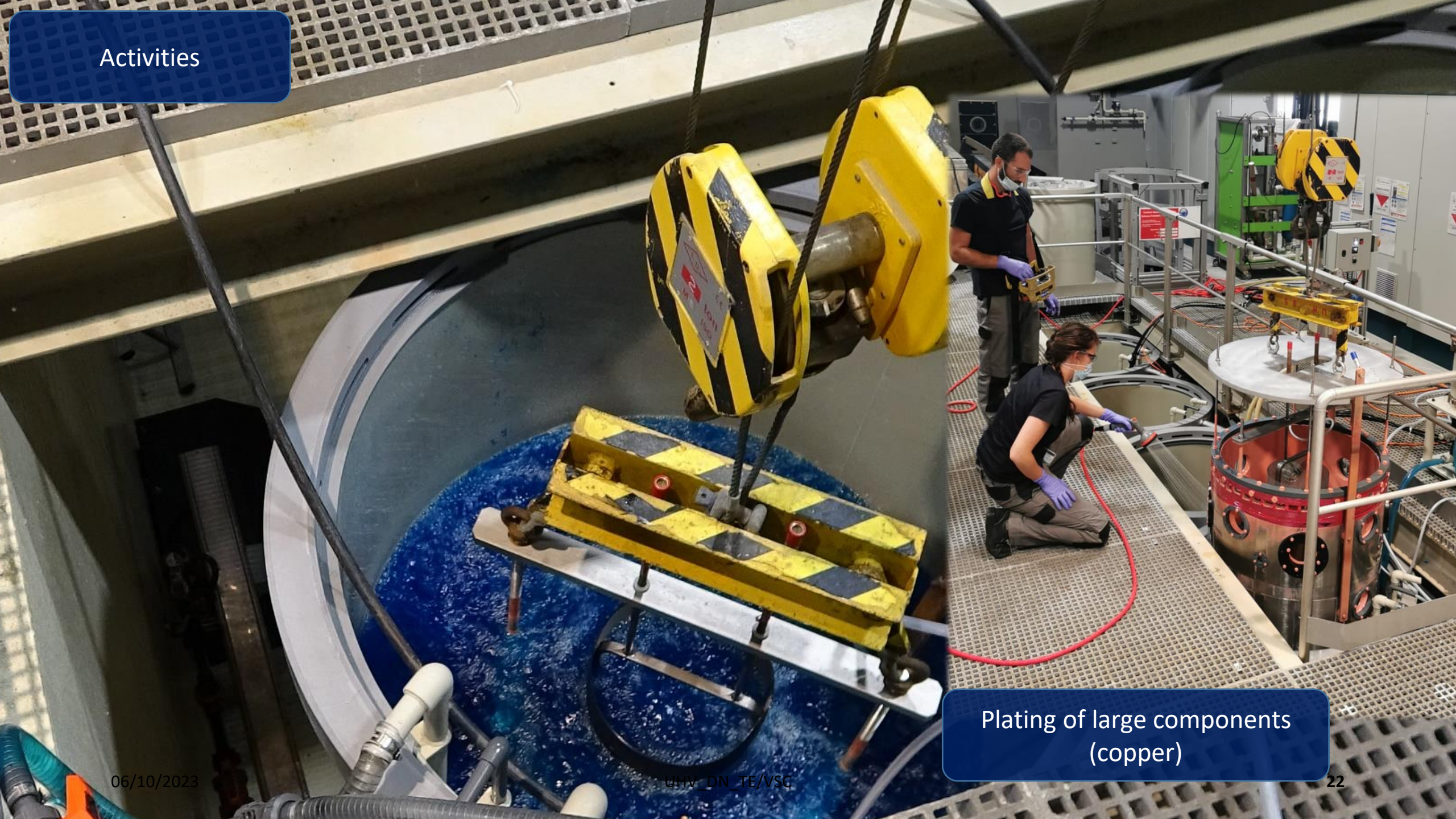
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Plating of large components

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# Activities



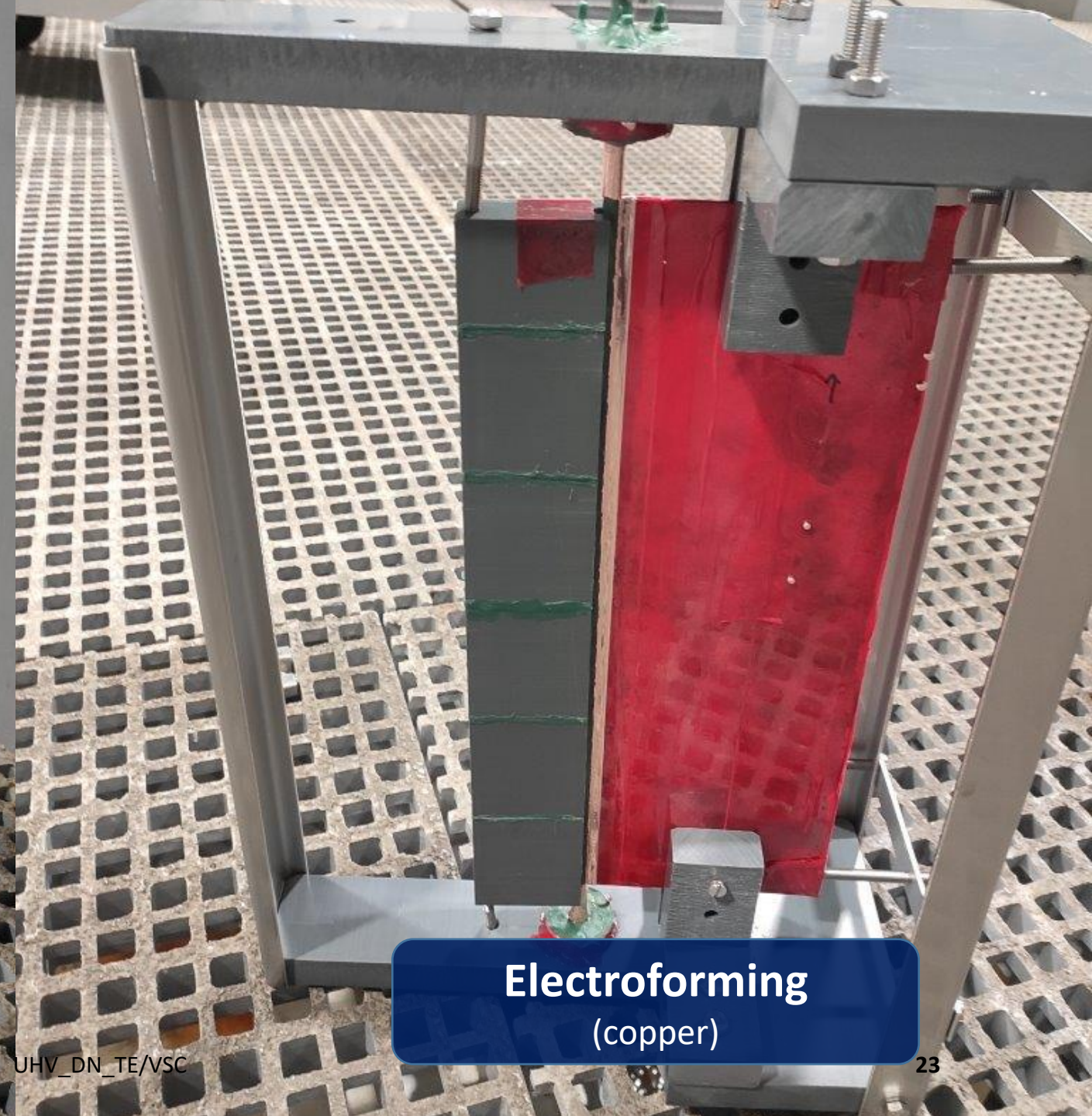
Plating of large components  
(copper)

# Activities



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**Electroforming**  
(copper)

# Main issues

Material

Different materials = Different process

Geometry

Simple is better

Contamination

Lubricants are not alike



Material

Different materials = Different process

AISI 316L

Process 1 >

EN AW-5083

Process 2 >

AISI 1020

Process 3 >

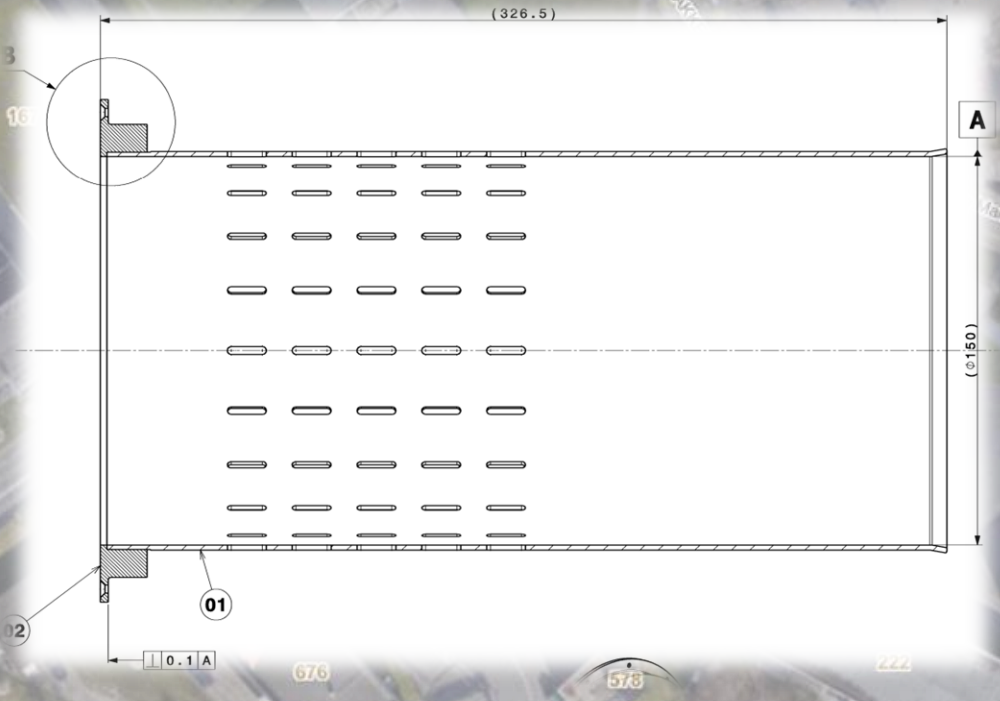
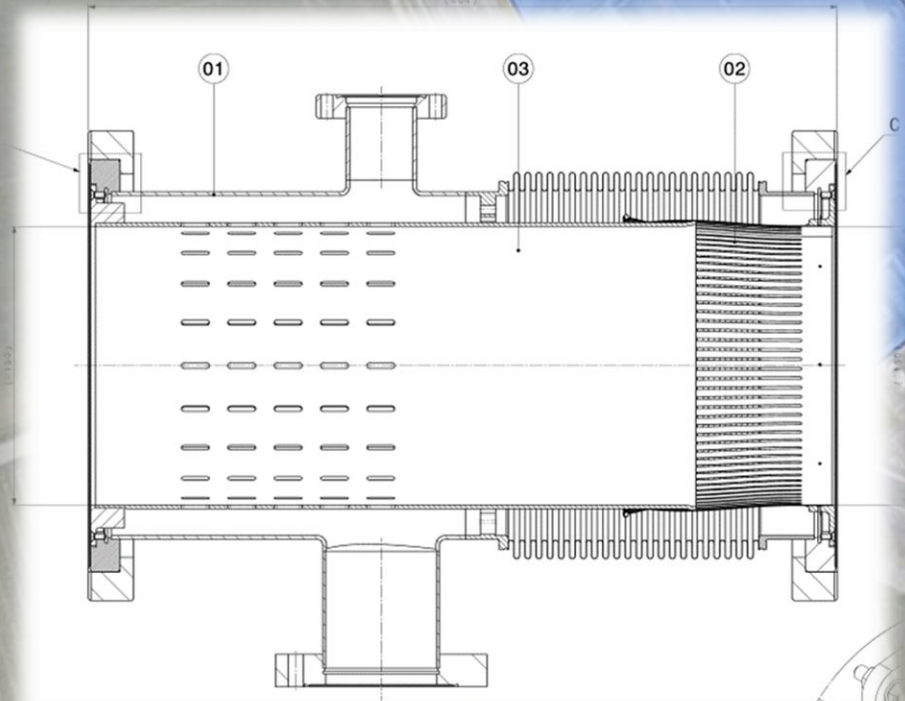
Copper plating

Geometry

Simple is better

Assembled parts

Very hard/Impossible to process

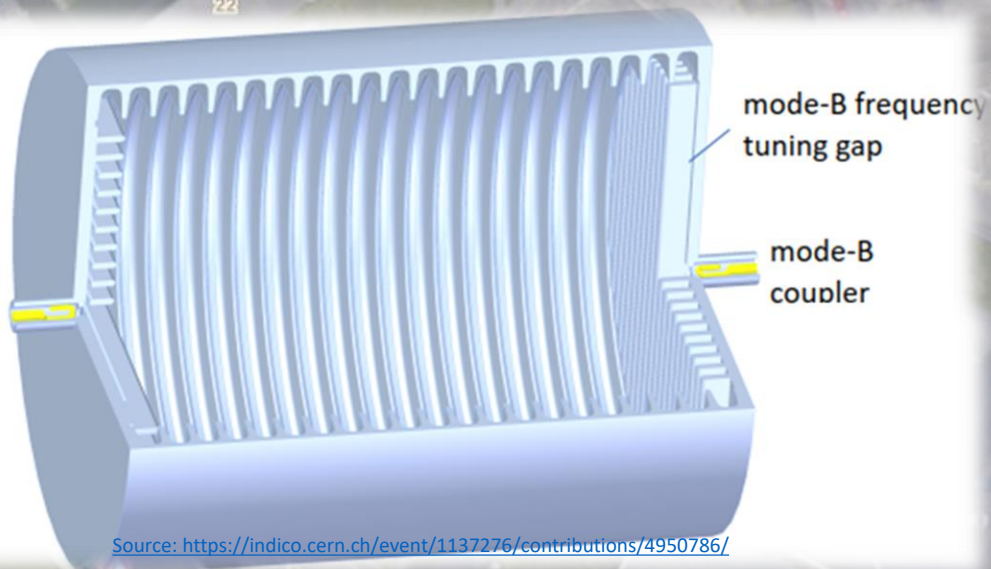
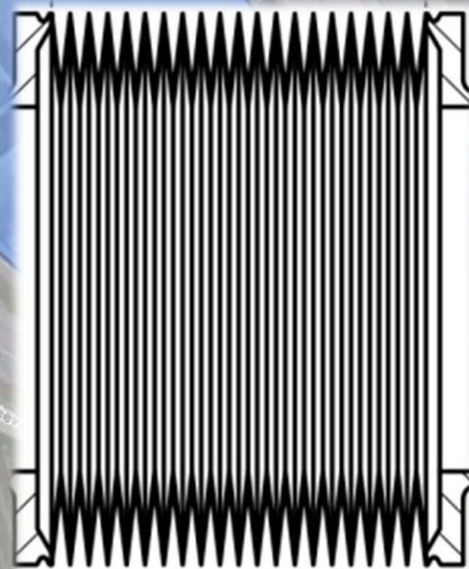


# Geometry

Simple is better

# Retentions

To be avoided as much as possible



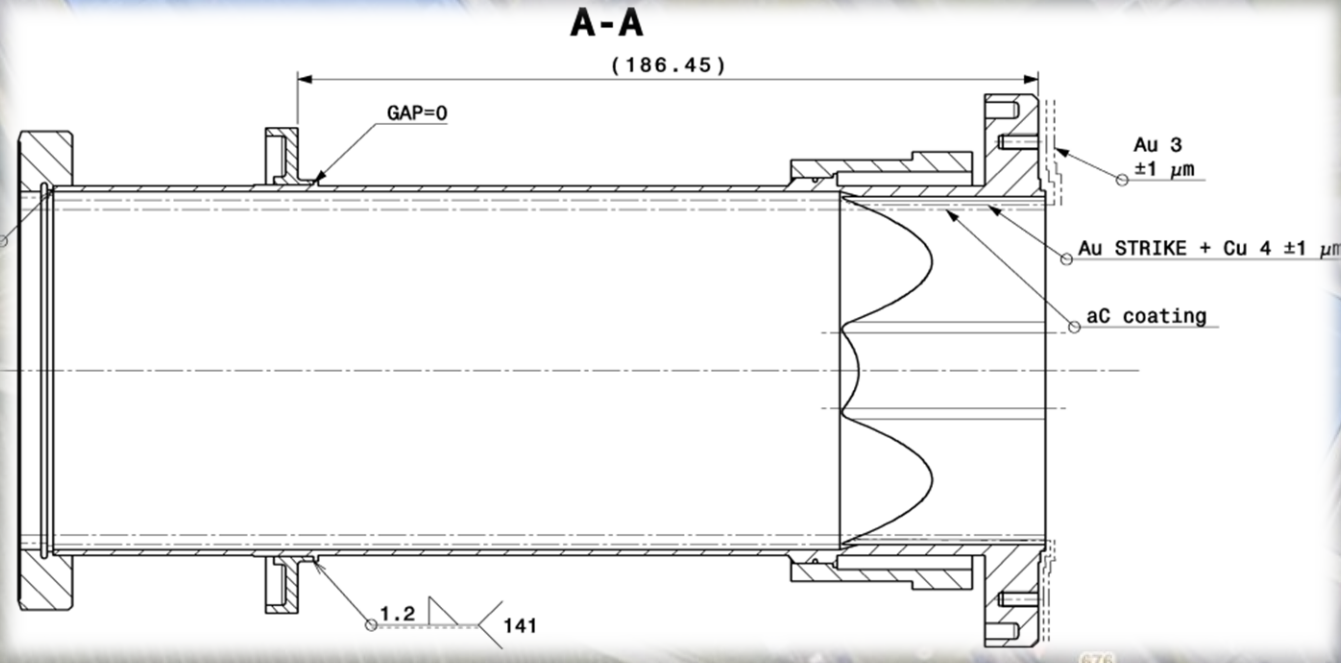
Source: <https://indico.cern.ch/event/1137276/contributions/4950786/>

Geometry

Simple is better

Complex geometry

To be splited



# Contamination

Lubricants are not alike

Halogen based

Corrosion prone

Dry lubricants

Very hard to remove/Cross contamination

Silicon based

Very hard to remove in water-based process/Cross contamination

# Perspectives

Adapt

New requirements / New production processes

Update processes

New technologies / New equipment / New procedures

Process integration

Dry processes & Wet processes



**Questions?**

**Thank you for your  
attention!**