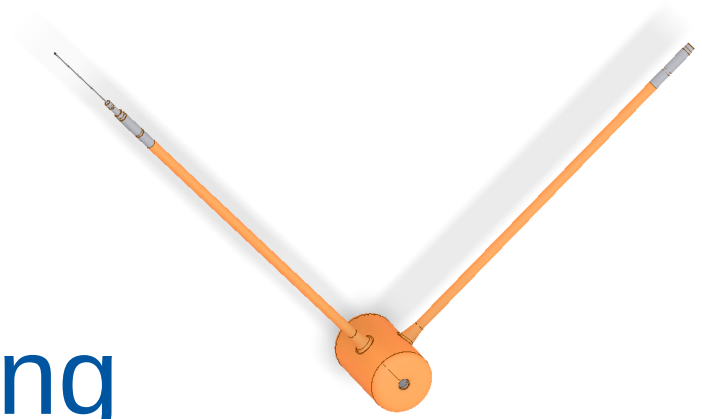
EDMS 3082599



UNILAC Copper Plating

KR5656 Status April 2024

Outline

- Scope
- Component
- Activities
- Timeline

Scope

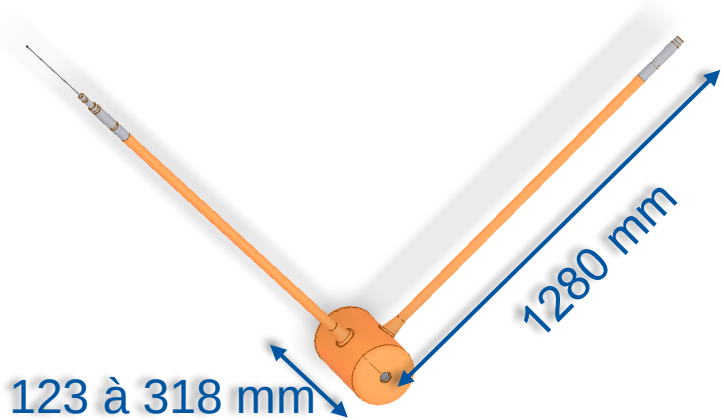
Merge GSI and CERN expertise in the field of electroplating of complex accelerator components to cope with:

- Small market;
- Rare expertise;
- Need of costly infrastructure.

Component

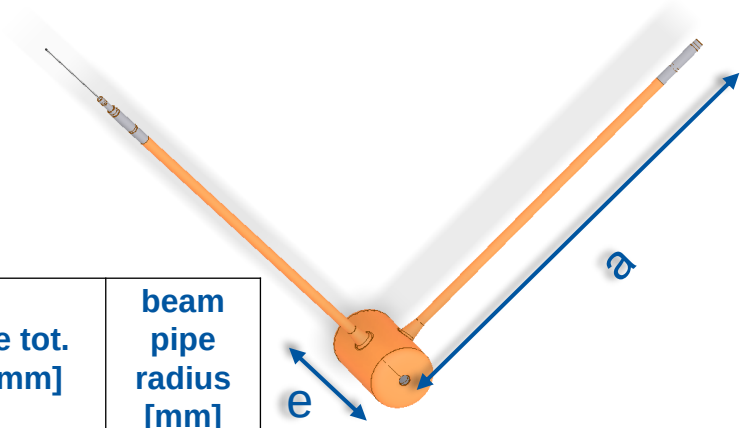
The agreement covers the copper plating of 177 drift tubes with stems and the free exchange of information covering the whole process.

Drift tube:



Component

Table of geometries:



Cavity	# stems	stem tot. length [mm] w/o current leads	stem plated length [mm]	drift tube outer radius [mm]	drift tube tot. length [mm]	beam pipe radius [mm]
		a	b	c	e	f
A-I	52	1280.1	1121.6	89.76	123,11 - 178,55	15
A-IIa	40	1280.1	1121.6	94.64	186,95 - 226,44	17.5
A-IIb	32	1280.1	1121.6	94.64	235,04 - 266,26	17.5
A-III	28	1280.1	1121.6	94.64	268,22 - 294,76	17.5
A-IV	25	1280.1	1121.6	94.64	296,63 - 318,41	17.5
		meas. from beam axis	meas. from beam axis	prior to plating		

Activities

	Activities and detailed tasks	Location(s)	Duration
WP 1 ✓	Design of copper electroplating line and related tools	CERN	5 Months
WP 2 ✓	Purchasing of electroplating line and related tools	CERN	21 Months
WP 3.0 ✓	Recruitment of CERN Graduate (ORIGIN)	CERN	10 Months
WP 3.1	Copper electroplating of stem & DTs (AI)	CERN	8 Months
WP 3.2	Copper electroplating of stem & DTs (AIIa-AIIb)	CERN	11 Months
WP 3.3	Copper electroplating of stem & DTs (AIII-AIV)	CERN	8 Months

Activities _ Preparatory Work

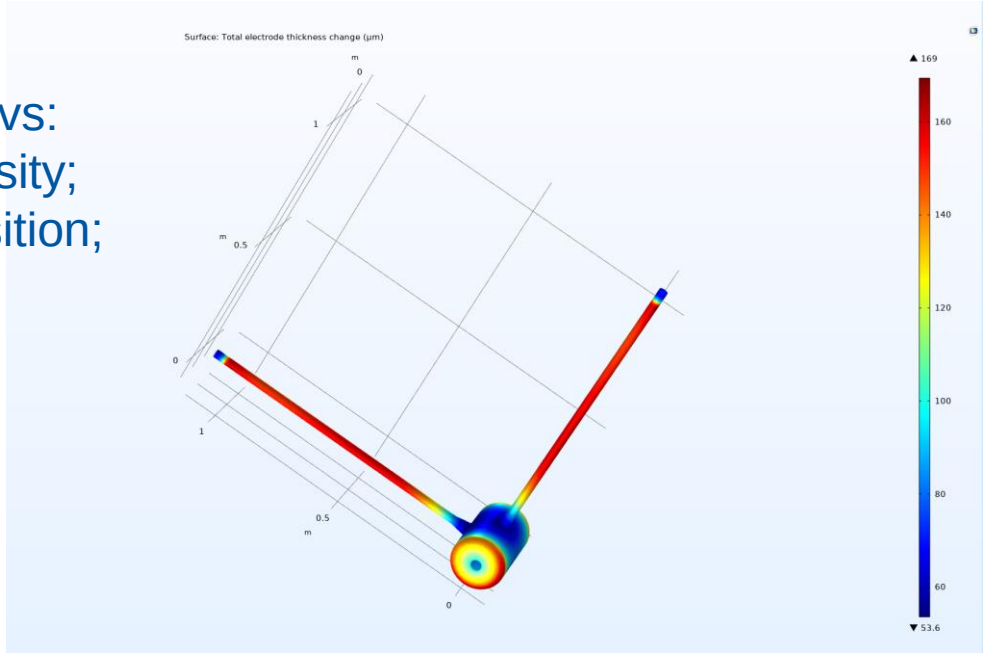
Requirements:

- Copper layer:
  - Conductivity;
  - UHV compatibility;
  - Copper layer thickness… see next slides

Activities _ Preparatory Work

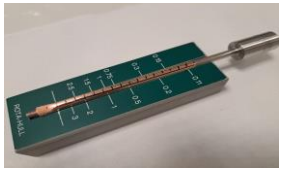
Optimisation of the process:

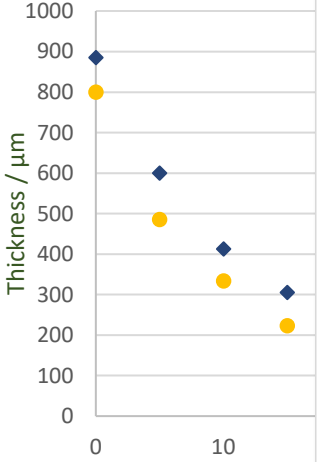
- Copper layer distribution vs:
  - Average current density;
  - Anodes shape & position;
  - Tank dimensions;
  - Bath type;
  - DT dimensions.

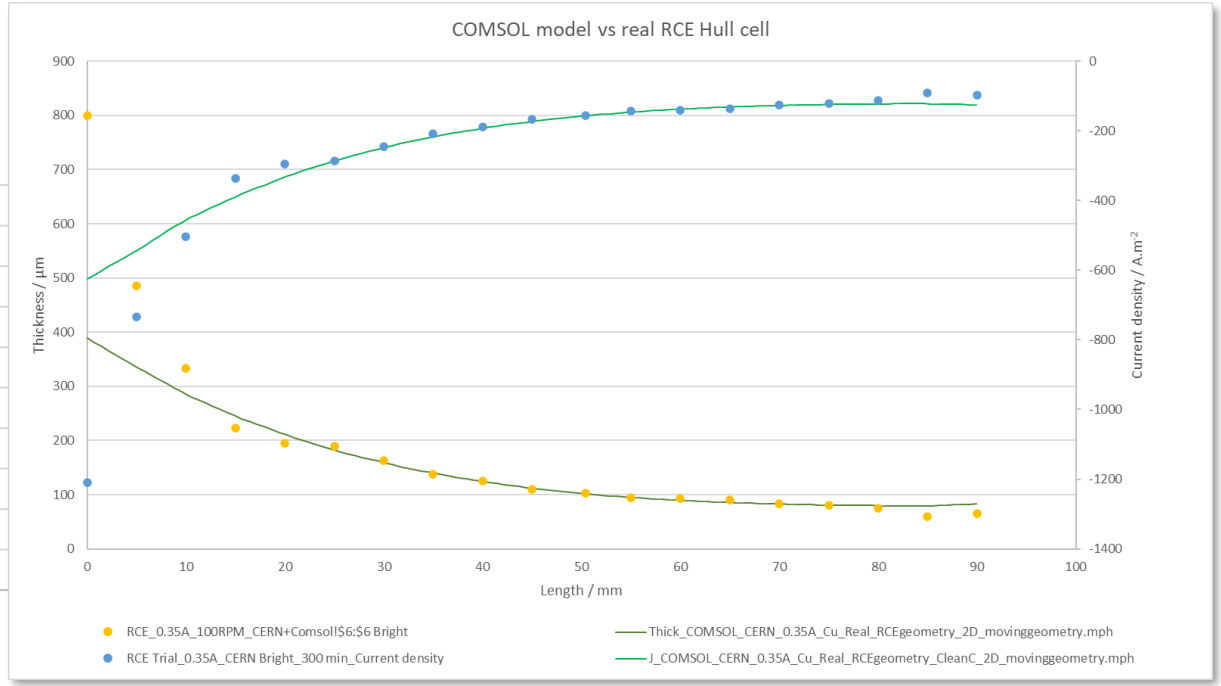


Activities _ Preparatory Work

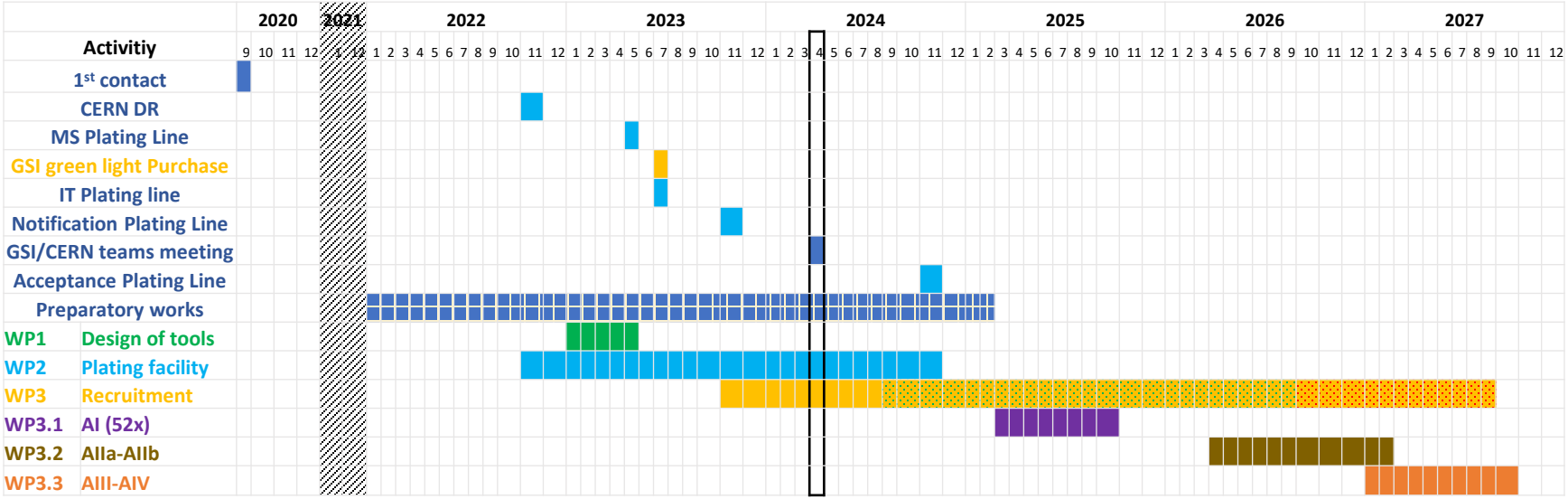
Benchmarking:







Timeline


2020
2021
2022
2023
2024
2025
2026
2027
Activitiy
9 10 11 12 1 12 1 2 3 4 5 6 7 8 9 10 11 12 1 2 3 4 5 6 7 8 9 10 11 12 1 2 3 4 5 6 7 8 9 10 11 12 1 2 3 4 5 6 7 8 9 10 11 12 1 2 3 4 5 6 7 8 9 10 11 12 1 2 3 4 5 6 7 8 9 10 11 12 1 2 3 4 5 6 7 8 9 10 11 12
1st contact
CERN DR
MS Plating Line
GSI green light Purchase
IT Plating line
Notification Plating Line
GSI/CERN teams meeting
Acceptance Plating Line
Preparatory works
WP1 Design of tools
WP2 Plating facility
WP3 Recruitment
WP3.1 AI (52x)
WP3.2 AIIa-AIIb
WP3.3 AIII-AIV

Thank you for your attention