Design options for RF aspect

Special ColUSM: Material and design readiness for LS2 productions

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all members of Task Forces
• Longitudinal RF system – installed designs
  o Fingers
  o Ferrite
  o Long fingers
• Transition RF system
  o New TCSPM finger design
• Brazing and leadscrews Task Forces
All fingers are in CuBe with silver coating. They slide on St. steel surfaces.
RF fingers fixed on both sides of the jaws slide on two rails fixed on the top and on the bottom of the vacuum vessel.

Ferrite tiles fixed on one side of the jaws close the area with the RF screens fixed on the other side of the jaws.

RF fingers fixed on one side of the jaws slide on the RF screens fixed on the other side of the jaws.

TCSP, TCT, TCP, ....

TCTP, TCSP

TCPP, TCSPM
RF fingers: silver coated Copper Beryllium C17200
Rail : Stainless steel 304 L
Total sliding distance: (35x4) = 140 mm
SECOND DESIGNS (TCTP, TCSP)

Tiles: Ferrite TT2-111R TRANS-TECH
RF screens: Stainless steel 304 L
No sliding

End RF contacts
RF screens
BPM cables
When both jaws are completely opened (60 mm between them) we have two open areas in front of the axes.
THIRD DESIGNS (TCPOL, TCSPM)

End RF contacts
RF screen
Longer RF fingers to close the gap
RF fingers: silver coated **Copper Beryllium C17410**
RF screens: Stainless steel 304 L
Total sliding distance: \((70 \times 2) = 140\) mm
Theoretical compression:  1.5 mm
Deformation due to the own weight: 0.1 mm
Tolerances:  ± 0.2mm
Contact load per finger:  12 ÷ 18 mN
Max stress:  ~ 39 Mpa
After 4000 hours of bake-out (4 times more then what we expect) we still have 55% of the contact load.

Minimum contact load: ~ 7 ÷ 10 mN

Yield strength: ~ 600 MPa

Due to the big margin on the Yield strength, we can compress the fingers 3 times more to get a minimum contact load of around 21 mN par finger (maximum stress ~ 120 MPa).
Standard transition contacts

- Tapering longer by 50 mm (~150mm) → RF fingers shorter by 50 mm.
- No fix fingers
Welding failure

Strain breaking

Flexible system

Welding reinforcement

Electrical bridge

New design with lyra

Straight RF fingers

TCSPM TRANSITION RF CONTACT

Luca GENTINI EN/MME 02-05-2017
Leader: E. Rigutto (EN-MME)

Deliverables
- Results from the test campaign on different kind of coatings;
- Definition of specific brazing procedure for collimators;

US inspection: Aline-Marie Piguet EN/MME

Metallographic investigations: Mickaël Crouvizier EN/MME
**Prototype brazing procedure**

- Coatings on GLIDCOP: Sulphate copper (5 ÷ 10 µm) + Wood nickel (20 µm)
- Brazing: SCP1 type (68% Ag; 27% Cu, 5% Pd)

**New TCSPM configuration**

- Both sides of the cooling pipes are brazed
- Thicker back plate

**New TCSPM brazing procedure**

- Coatings on GLIDCOP: Cyanided copper (5 ÷ 10 µm) + Watts nickel (20 µm)
- Brazing: SCP1 type (68% Ag; 27% Cu, 5% Pd)
Leader: L. Gentini (EN-MME)

Deliverables
• Validation of UMBRA and others screws for the LHC LS2 collimator production and - onwards plus TDIS;
• Definition of clear and reproducible leadscrew test procedures;
• Results from the test campaign relying on proposed test procedure;
• Guidelines for market survey to increase the possible providers of dry-lubricated lead screw;
• Cycling tests are on going on lubricated and dry leadscrews.
• Contact with new providers like: NSK (DE); KSK (CZ); Kugel Motion (UK)
• Preliminary technical specification for dry screws.

At the moment we have not a dry solution available.
Thank you for your attention