Impedance meeting
6 October 2017

Presents: D.Amorim (DA), S.Antipov (SAnt), N.Biancacci (NB), R.Calaga (RC),
D.Carbejo (DC), F.Caspers (FC), I.L.Garcia (ILG), A.Gilardi (AGil) F.Giordano (FG),
J.Guardia (JG), G.Mazzacano (GM), K.Papke (KP), A.Passarelli (AP), L.Teofili (LT),
D.Ventura (DV), W.Vollenberg (WV)

The slides can be found at https://indico.cern.ch/event/664498/

TDIS design change proposals (DC)

David Carbajo presented the proposed updates of the TDIS design. The TDIS purpose
is to protect downstream equipments from an injection misfire.

In a previous design iteration, the longitudinal RF fingers between the two graphite
sections were removed. This was to avoid scratching the graphite block if the jaws were
moved in different positions. This scratching could lead to UFOs creation.

CST simulations made by GM showed that removing the fingers created numerous
HOMs.

Implementing a software control of the jaws relative position would require a lot of
resources.

To keep the RF fingers, a 0.5 mm thick glassy carbon foil was added to the jaw design.
This material can resist to high energy deposition. However its electrical resistance is
higher than normal graphite.

Another design change would be to keep the TDIS transitions surface in stainless steel
instead of the current copper coated stainless steel. Outgassing issues and deposits of
unknown origin were observed in the past.

NB remarked that some HOMs are present close to the transitions. Copper coating
the transitions could increase their R and Q.

ILG noted that some parts of the TDIS are already ordered. For the graphite jaw, the
casing already includes holes so that the carbon foil can be added. The transitions can
be copper coated afterwards if needed.

Action:

• GM to study the impact of the glassy carbon foil and of the copper coated transi-
tions on the HOMs

Transverse HOM characterization techniques in CST (KP)

Kai Papke presented the implementation of alternative ways to compute the transverse
voltage in CST.

CST can compute the longitudinal voltage in a cavity. With Panofsky-Wenzel theorem
the transverse voltage can be obtained.

First the script computing the longitudinal voltage included in CST was adapted to
directly compute the transverse voltage. It was benchmarked using different crab cavities
designs.
For one of the cavities, the results diverge for finer mesh sizes. RC noted that the evaluation of the electric on the axis might cause this behaviour. NB suggested to look at the electromagnetic field shape on the axis: it was observed that CST can create non-physical fields if the mesh is not fine enough.

The second script performs a multi-polar decomposition of the field. KP highlighted that it can be sometimes difficult to distinguish which components are non-zero. Using different radius for the evaluation can help disentangle the non-zero components from the others.

The last script presented is used to export the field components. It is derived from the 2014 version of CST as this script was modified in more recent versions.

**SEM observation of coatings for TCSPM blocks (JG)**

Jorge Guardia presented the recent observations made with the SEM (Scanning Electron Microscope). A sample of MoGr coated with Mo was analysed.

Protuberances of several µm were observed on the coating. Some of them have a size similar to the coating thickness. For the TiN coating, the surface looks smoother but a measurement of a cut would give more informations.

SAnt asked if the coating on the TCSPM is 5 µm thick. WV replied that it might be thinner and this needs to be checked.

FC remarked that the conductivity could be anisotropic. JG added that the grains grow in a specific direction so this could be the case.

FC suggested to perform a 4 electrodes measurement of Mo coated on a ceramic substrate.

NB asked if the substrate will influence the roughness of the coating. WV answered that a smooth substrate will give a smooth coating. A rough substrate could be used for the resistivity measurement.

FC added that the surface roughness increases the impedance but can also decrease the SEY and be beneficial for e-cloud. SAnt noted that the collimators are field free regions and that e-cloud is not as much of a concern as for the quadrupoles.

WV remarked that polishing the MoGr would make the coating smoother but it would also worsen the coating adherence. He also noted that there is a difference on the surface energy between Mo and TiN caused by the different temperature gradients used.

ILG asked if there is a difference between the MoGr with a lower outgassing rate and the previous samples. WV replied that the new supplier has not been tested yet but a lower outgassing will improve the coating quality but worsen its adhesion.

**Actions:**

- SAnt and WV to check the size of the TCSPM coatings w.r.t the samples
- JG to check the SEY of the Mo coating samples

*Minutes written by: D. Amorim*