

WP14 Meeting: TDIS

August 29, 2017, 864-1-B04, 10:30 – 12:00

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Agenda: <https://indico.cern.ch/event/659394/>

Updates on impedance studies for new TDIS design

At injection, the TDI is responsible for a significant part of the overall LHC impedance budget. For the new, segmented jaw, the effect of lateral as well as longitudinal RF fingers have been studied (see Giacomo's slides).

In the new design, the width of the TDIS block was reduced from 80 mm to 62 mm and the block height was increased from 54 mm to 67 mm. The design is now practically finalized. Therefore, a block width of 67 mm (instead of 65 mm) should be used for any future impedance calculations.

The Eigenmode simulations were performed using a maximum filling pattern of 3564 bunches with $N_b = 2.3e11$ and a reduced filling pattern of 2556 bunches with $N_b = 1.1e11$. It was suggested to also simulate the HL-LHC standard beam parameters (2748 bunches and $N_b = 2.3e11$). The cases of 5 mm, 15 mm and 25 mm half-gap were studied. For further studies, the maximum position of 55 mm half-gap should also be included.

The TDIS materials were chosen such that they can sustain high temperature of some hundred degree C, but outgassing could become an issue at these temperatures. The weakest point is probably the copper section in the last jaw, which should not be heated above 400 C because of degrading material properties.

The friction of the longitudinal as well as the lateral RF fingers with the jaw materials, in particular graphite, imply the risk of dust and UFO creation. Using a foil could be an alternative, but is technologically challenging.

Conclusions:

- The use of lateral and longitudinal RF fingers is kept as baseline for the TDIS design.
- The worst case, with all RF fingers missing, has to be studied in order to get the worst-case heat load and temperature distribution due to HOM.
- The cooling performance has to be simulated for the worst case to evaluate the margin that we have.
- In addition, the risk of creating UFOs should be evaluated.
- Depending on the outcome of these studies, we might decide to partially remove the RF fingers, e.g. the ones close to the circulating beam.
- Both the impedance and thermal studies should be finished by spring 2018.

Next Meetings

The next meeting will take place on September, 26th, to discuss the LBDS studies.

The October meeting will be moved to October, 24th, with focus on the MKI.

The updated TDIS studies should then be presented in the November meeting.