

TDIS Internal Review December 1st 2016

- Stress relieving treatments for different materials are recommended
- Difference in vacuum behavior between point 2 and 8 due to different coating of Al frame (Ti and Cu)? Possible create gas traps?
- E-cloud could explain the observed vacuum spikes but not the runaway which caused several times a dump for Beam 2. The different coatings of the frame could have a different conditioning time.
- ALICE requirements: $<5e-9$ mbar and TDI acceptance for ZDC of 166 mm in H and 110 mm in V.
- To be noticed that in Run II we never injected such high intensities as in Run I.
- Beam based alignment of the third block: need to insure retraction with an ad hoc validation procedure and possibly additional interlocks.
- Reconsider the option of adding BPMs (45 deg?)
- Longitudinal RF fingers: not clear if they were not included in the present design on purpose to dissipate some transverse modes in the tank and not having them trapped inside the tank or if it was just not physically possible.
- Possible replacing the Al block with Ti? In this case no coating would be needed. Ti is worse from the impedance point of view → to be checked.
- Cu coating: improved impedance (mainly heating, not instability) but non negligible chance of destroying the coating in case of a grazing impact. Possible increase of UFOs production. Graphite without copper coating is better from the e-cloud point of view.
- Need to assess power deposition in the water → shock waves induced by instantaneous pressure rise?
- Recommended to increase the thickness of the absorber block to limit the deformation of the aluminum back stiffener. This would also reduce the energy deposition induced by electromagnetic showers.
- Using shielding temperature probes to avoid EM coupling. These sensors should be reliable enough to be used for interlocks.
- Evaluate the possibility of adding accelerometers to insure that the jaws are not “shaken” during the transport to the tunnel.
- Tests to be performed on the prototype: check all the mechanical aspects including moving the jaws for several cycles to evaluate the lifetime of the RF fingers. Vacuum tests and impedance measurements with the wire.
- Do we want to keep the possibility of going back to the old design? This implies modifying the interconnects and vacuum valves (possible keeping the valves and adding vacuum chambers?)
- Perform the alignment of the jaws wrt the mechanical switches in vertical (operational) position
- Need to assess the plastic deformation of the cooling pipes and the back stiffener also taking into account accumulated effects.
- Need to evaluate the absolute power deposition on the jaws during the scrubbing run (~2 weeks). Evaluate the effect in case the cooling system does not work → simulations!

- Calculate heating for the most critical modes and define most sensitive components.
- Impedance: recommended to keep RF fingers everywhere (lateral and longitudinal), use coating and tapering (marginal effect only on imaginary part).
- HOM independent from coating and apparently not an issue.
- E-cloud: clear contribution coming from the presence of both beams in the chamber. Calculations were only done for the TDIS but should be repeated for the present HW to check if we could find an explanation for the vacuum spikes (scratches on the Al block could explain the large spikes seen in IP8). Need to consider the possibility of conditioning the TDI during the scrubbing run (keep it at injection settings) provided that we are confident enough that it will not be damaged.
- Graphite seems to be better than 3D CC from impedance and outgassing point of view. Still, possible to compensate with pumping if major robustness issues in graphite are found during the HiRadMat tests.
- Graphite seems to withstand a grazing impact but no margin is left for further increase in beam intensity. Still the TDI has stringent requirements from the point of view of impedance and vacuum.
- Need to understand reproducibility of material behavior over several samples for graphite and 3D CC.
- Possible adding ferrite after impedance measurements on prototype.