

# HL-LHC Collimators: Design, Engineering and Prototyping #16 Minutes

Thursday, 9<sup>th</sup> November 2017

112-2-023

Attendees: A. Bertarelli (AB), O. Aberle (OA), F. Carra (FC), L. Gentini (LG), A. Lechner (AL), C. Bahamonde (CB), G. Gobbi (GG), C. Accettura (CA), J. Guardia (JG), M. Pasquali (MP).

## AGENDA:

- Approval of minutes from previous meeting and review of action list;
- Status of TCLDA production and report from brazing task force;
- Update on developments pertaining lead screws;
- Experimental and numerical studies of the BPMs embarked in the HL-LHC collimators;
- Fluka calculations on the passive absorbers in IR7
- AOB.

### 1) *Approval of minutes from previous meeting and review of action list*

Minutes checked and approved.

### 2) *Status of TCLDA production and report from brazing task force*

MP reports updates on the TCLDA status from E. Rigutto who was unable to attend the meeting: the production of the cover is ongoing while the TCLDA is in metrology for adjustment of the mechanical stops. Soldering is foreseen once cover and TCLDA are ready. LG confirms that the TCLDA will be in fact closed the following week. Concerning the TDS tests for the brazing taskforce, LG reports that there is a new person who will be working on the tests. AB requests a full photographic report concerning the TCLDA status (**action L. Gentini**). OA reports that the TCLDA will be placed in a new building at point 4.

### 3) *Update on developments pertaining lead screws*

FC asks which screws worked well so far without lubrication: LG replies that no screw was able to meet the requirements at present. Non-lubricated Kugel motion's screws are

about to be retested with a non-floating but mechanically blocked ball guide. He adds that KSK screws might be working as well: metallographic tests showed the presence of lubrication on the balls event though the screws where supposed to have undergone dry tests. LG says that such screws have been sent back to KSK for cleaning and that we are waiting for to receive them for new dry tests. AB asks LG to ascertain which process KSK is going to implement to make sure the screws are going to be dry (**action L. Gentini**). FC suggests to ask KSK for an additional new screw to disassemble (**action L. Gentini**). FC asks which tests are foreseen to take place in the future: LG replies indicating additional dry tests on KSK and Kugel motion screws, while no test is foreseen for Umbra screws at the moment.

4) *Experimental and numerical studies of the BPMs embarked in the HL-LHC collimators*

MP shows the results of the thermal simulation carried out on the TCSPM BPMs featuring the new design to improve their cooling as well as the outcomes of the experimental tests performed on the BPMs previously embarked on HRMT-23 jaws. Sensible improvements in terms of peak temperature are obtained with the new design: further temperature decrements are reached adopting titanium or aluminium electrodes. The latter option, however, is not compliant with the HL-LHC requirements in terms of SEY and is therefore to be considered not viable at the moment. AB suggests to run new simulations introducing the effect of contact pressure in estimating the thermal conductance between the copper disk and the cooling pipes as well as between the different parts of the BPM (**action M. Pasquali**). The experimental tests carried out by C. Boccard on the HRMT-23 BPMs show that no further damage occurred during the implemented thermal cycles, with the exception of a distorted pin not compromising the operability of the device, thus proving the capability of the BPMs to withstand a max steady temperature of 600C. FC asks to verify with C. Boccard if it is possible to perform capacitive measures on the BPMs at the expected maximum temperature under slow losses, as their behaviour in operation may be different from the calibration performed at room temperature (**action M. Pasquali**).

5) *Fluka calculations on the passive absorbers in IR7*

CB shows the results of the Fluka calculation of the passive absorbers located at the IR7. A maximum exposure of 1.5 MGy is foreseen to take place on the magnets. AB asks LG to provide an alternative design of the absorbers to reduce such value (**action L. Gentini**) while running simulations on the present design to verify peak temperatures and cooling effectiveness (**action M. Pasquali**).

**AOB:**

- Nothing to report.

**ACTIONS**

- Provide full photographic report concerning the TCLDA status (**action L. Gentini**);
- Ascertain how KSK will ensure absence of lubricant on screws (**action L. Gentini**);



ENGINEERING  
DEPARTMENT



- Ask KSK for an additional new screw to be disassembled (**action L. Gentini**);
- Update thermal simulations of BPMs encompassing the effect of contact pressure on the thermal conductance value at the interface between the copper disk and the cooling pipes as well as between the parts of the BPM (**action M. Pasquali**);
- Verify with C. Boccard if it is possible to perform capacitive measures on the BPMs at the expected maximum temperature under slow losses (**action M. Pasquali**);
- Provide an alternative design of the absorbers to improve magnet shielding (**action L. Gentini**);
- Run simulations on the present passive absorbers design to verify peak temperatures and cooling effectiveness (**action M. Pasquali**).