

# HL-LHC Collimators: Design, Engineering and Prototyping #25 Minutes

Thursday, 30<sup>th</sup> August 2018

376-1-020

Attendees: C. Accettura (CA), C. Adorisio (CA), A. Bertarelli (AB), E. Berthome (EB), F. Carra (FC), G. Cattenoz (GC), L. Gentini (LG), J. Guardia (JG), I. Lamas (IL), A. Lechner (AL), E. Rigutto (ER).

## AGENDA:

- Approval of minutes from previous meeting and review of action list
- Design of TCAPMs passive absorbers updated according to latest stakeholders comments (E. Berthome)
- Taskforce on leadscrews (L. Gentini)
- SEM comparison of Mo coating on different substrates: effect on the resistivity (J. Guardia)
- Topics for next HiColDEMs (F. Carra)
- AOB

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

As M. Pasquali is away, the approval of the minutes will take place at the next meeting.

### 2) *Update on TCAPM design*

EB presented the latest status of the TCAPM design. Several aspects of assembling, alignment and handling were discussed offline prior to the meeting. One of the points remaining for discussion was the protective measure for the steel against corrosion. The main options are zinc, nickel, cadmium and chrome coatings. The options were discussed together with EN-STI and HSE. As an outcome of the offline discussions, and of the debate at the HiColDEM, the attendees approved the zinc coating solution. For that, a special tool is needed to ensure a good coating between the lamellae.

IL suggested to write an assembling and installation procedure for the TCAPM; FC agreed, and added that it should be a word document summarizing the steps already well explained by EB in his presentation (**action Berthomé**). FC also commented that, typically, EN-HE requires a calculation note documenting the structural behaviour of the component during lifting. Usually, the EN-13155 Standard is taken as a reference. FC pointed out that the engineering unit in MME can take care of these checks and produce a note, which can be either included in the assembling procedure, or referenced in it and

uploaded as a standalone document (**action Berthome to check with EN-HE if such a note is required, action Carra to take responsibility of the analysis within the MME eng. unit**).

AB asked if new FLUKA analyses are necessary, and AL replied that it is not the case, as the changes with respect to the calculations already performed are minor (the absorber is 480 mm longitudinally far from the magnet flange instead of 400 mm; the vertical eccentricity of the vacuum chamber with respect to the housing is 1 mm, but the beam is in any case aligned with respect to the absorber walls and the chamber position with respect to it is not much relevant). AL added that, in any case, the model will be updated, but likely without re-running calculations.

IL informed the attendees that the dates foreseen for installation are April 2020 for the R7 absorber, and June 2020 for L7.

FC concluded the discussion pointing out that the TCAPM ECR is drafted, but not on EDMS yet; its approval will be launched after a final discussion at the CoIUSM this Friday.

3) *Leadscrews taskforce*

LG updated the attendees on the latest tests done on a Rollvis roller screw. The screw is unlubricated, and survived after the first 10k cycles performed in the test bench. This is the first time that a similar result is achieved on an unlubricated screw. 20k more tests are foreseen, and will be starting in two weeks. Three additional screws are also available, and will be tested to verify the repeatability of the results. Microscope observations on the thread are also planned, to verify if there is wear on the component.

4) *Influence of the substrate on the electrical conductivity of Mo-coated samples*

JG presented his SEM observations on Mo-coated samples, with the use of different substrates: glass, alumina, MoGr and CFC. The parameters of the coating were the same for all the samples, with a 6 micron coating thickness achieved (specification for TCSPM collimators is at least 5 microns).

The interesting conclusion is that, while for adhesion you need a surface with a roughness of at least 1 micron, in terms of electrical conductivity a range should be specified instead: too smooth surfaces lead to small coating grains, which lower the conductivity; similarly, a too high roughness, such in the case of CFC, lead to conductivities similar to that of the bulk. The range specified for MoGr in the drawings (Ra between 1 and 2 microns) seems to be the best compromise to optimize the electrical conductivity of a metallic coating. In fact, the best results with Mo coating were obtained on MoGr.

5) *Future HiColDEMs*

FC explained that, together with M. Pasquali, he is organizing the agendas for the next meetings, and invited the attendees to signal topics of interest. One of the next meeting



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will be dedicated to the improved design of TCSPM for LS3 production (for a minimization of the thermally induced sagitta).

## **ACTIONS**

- Prepare an assembling procedure for the TCAPM (**action E. Berthomé**);
- Verify if EN-HE requires a technical note with the calculation of TCAPM lifting according to the international standards (**action E. Berthomé**); perform the analysis if necessary (**action F. Carra and Eng. Unit**).