

# Collimator Design Meetings

## Minutes of the meeting 35 (15/07/2004)

**Present: Aberle, Assmann, Calatroni, Chiaveri, Kadi, Kershaw, Mayer, Perret, Redaelli (parly)**

Ralph will organize this list on the collimator WEB-page in week 31. No further modifications for the tender can be incorporated after the 30 of July as the drawings need archived in CDD with first and second control and changed to the label "FOR TENDER"

### DESIGN OF RF FINGERS

1. **Model for the measurements – proposal (Manfred):** Manfred proposed to separate the investigation to decrease the resistance of the RF finger contacts by 2 orders of magnitude on a separate model, which gives better flexibility for measurements than on a complete collimator. This proposal was accepted. At least one – better 2 models will be manufactured in order to assess the main parameters (resistance and wear-and-tear on the fingers as well as on the metal components). Due to the low mechanical load, the 300°C bake-out is not an issue, as we can lose 90% of the contact strength at high temperature but  $\sigma_{max}$  must not go beyond elastic limit.
2. **Requirements ( m $\Omega$ , contact pressure, how to measure, bake-out):** Sergio will contact Roger to advise how to build this(these) model(s)
3. **Timescale for RF finger study:** This should start immediately.
4. **Can we implement this into #3 ? (Roger):** #3 is on hold for the moment. Several changes – other than the RF fingers – should as well be implemented. Roger will work on it and release #3 when it corresponds to a realistic series model. End of August (?)
5. **Can we implement this into tender documents (Roger):** NO
6. **Exact geometry of "SPS" fingers to calculate  $\sigma_{max}$  – at 300°C (Roger):** This will be done in connection with the model

### SPS TEST:

1. **What needs still to be done - planning (Oliver)**

Re-measure after welding, bake-out, c

Detailed list of all different types of collimators (with the suggested adjustments and precision if possible) list with numbers - including absorbers (material, length, required number of motors (?), cooling, angles, beam-spacing) Oliver

Ralph will put a complete list on the collimator web-page. This list will cover all collimators as well as the TCDI. It should help to define the total scope of the collimator tender to be covered for phase 1 as well as phase 2.

(see LTC minutes [http://edms.cern.ch/lhc\\_proj/plsql/lhcp.page?p\\_number=7700](http://edms.cern.ch/lhc_proj/plsql/lhcp.page?p_number=7700) "Steve Myers concludes the discussions by recommending that we should plan the LHC startup with the stage 2 collimators in place.")

The TCS prototype "SPS" will be used for the tender to be launched at the end of August. There will be NO market survey for the carbon-carbon jaws as we have to use the material which is used for the SPS tests (from Japan).

There will be a market survey for the motors and the read-out electronic which has to come from the same firm. (**action** Stefano Redaelli) Not to forget Divisional request, To be put on the list of forthcoming tenders.....

Open questions of the revue – implications on the design:

Proposals: see minutes of last week

Motorfailure: what happens if only ONE motor fails ? (Fabrice)

*This will be implemented into the software*

## **REPLACEMENT OF ONE COLLIMATOR DUE TO FAILURE OR CHANGE OF PHASE 1 TO PHASE 2 OF SEVERAL COLLIMATORS - SUGGESTIONS OF REMOTE HANDLING (KEITH)**

1. Keith will study a scenario to understand better what is the best possible way for a change/replacement of a collimator. At the moment it looks difficult to change a collimator where the vacuum tank is not in the central position. Roger will study a device which can either be used in any position (in case of motor failure of the 5th motor) or how to bring the vacuum tank in this central position "by hand".

## **DRILLING HOLES IN CONCRETE – HOW CRITICAL IS THAT ?**

1. It is proposed to install 2 metal grooves ( type Halven) in the floor to fix all collimators and to allow for future changes and modifications without drilling new holes. This will have to be requested urgently as the tunnel is still "empty". Will this be acceptable for all other equipment in this zone ??(action Oliver)

## **CAN WE KEEP THE BOTTOM SUPPORT FROM PHASE 1 TO PHASE 2 ? (ROGER)**

1. This is planned. The support should consist of 2 parts. One standard and identical for most of the collimators, on top of this one will be a frame which takes into account the position (V, H, tilt)

## **OTHER POINTS ? GENERAL COMMENTS ?**

1. The heat-radiation load on the springs of the clamping system must be simulated by Vasilis and analyzed more in detail. (action Ralph, Vasilis)

## **SPS TEST:**

### **What needs still to be done - planning (Oliver)**

1. The first tank was welded on Monday 19.07 test follow ( Stefano, Fabrice)
2. The second tank will be measured Tuesday 20.07 welding still in week 30

## **TEST OF MOVING MECHANISM, COMPRESSION SPRING WHERE ARE WE (FABRICE – ROGER)**

1. The stronger spring does not deviate anymore – problem solved

## **DETAILED PLANNING OF INSTALLATION SCENARIO AND “ DRY-RUN “ (OLIVER)**

1. Oliver showed a first draft to be completed for next week

## **AOB**

### **Contact fingers for RF**

1. The electrical resistance (measured by Sergio) between the Cu-Be fingers and the C-C jaw is at the moment 2 orders of magnitude too high.
2. For the SPS test this should not be a problem, y the C-C "SPS" is not metal coated and therefore the resistivity is naturally much higher.
3. For the LHC we have to think about a new design
4. Roger will make some proposals taking into account as well that the distance of the metal fingers to the beam is critical.
5. It would be nice to be able to try this new design on the 3rd collimator. However, the available space at the end of the vacuum tank is very restricted and would need to be enlarged. (Where are we with the preparation of the vacuum tank #3??)
6. It might be necessary to make a special model to allow more precise measurements and with better access for Sergio.
7. There is at the moment a play of 10 to 40  $\mu\text{m}$  between the motor spindle position and the jaw position. One can only assume that this comes from the wedge. This needs to be improved (action Roger).

## **COLLIMATOR REMOTE HANDLING**

**(K.Kershaw proposals 15 July 2004)**

### **A) BUILD UP UNDERSTANDING OF THE REQUIREMENTS**

Find out what needs to be done with the collimators.

Note: handling and remote handling solutions may have implications for the design of support and lifting points etc.

(Here is my understanding so far:

- 1) Define method to transport and install collimators: in LHC under non-radioactive conditions. Note: supports designed by R Perret.
- 2) Define method to remove radioactive collimators: from installed position and transport along LHC tunnel, up to the surface and then to ???
- 3) Define method to install new collimators under radioactive conditions: transport along LHC to point of installation and install.
- 4) Possibly define method to repair by replacement of motors /sensors/switches -this could be in the tunnel or in a facility on the surface or in a UX cavern.
- 5) Equipment procurement, trials, operation.)

### **B) BUILD UP UNDERSTANDING OF THE SITUATION/CONSTRAINTS**

- 1) Collimator design: Discussions with R Perret about the design + visit workshop to see the hardware - get drawings.
- 2) Surroundings: See Catherine Magnier for latest information on the integration of the collimators in the tunnel to see how much space is available - get drawings.
- 3) Radiation Protection and restrictions: Contact D Forkel Wirth/ R Roesler to understand restrictions imposed - get documents.
- 4) Full list and drawings of all types and their positions: List already requested by Manfred Mayer - get list and drawings as available.
- 5) Schedule restrictions: identify key milestones and design hold points etc.

### **C) INVESTIGATE PREVIOUS PRACTICE/SOLUTIONS AT CERN (+ Perhaps elsewhere)**

Names of useful contacts for input on requirements and points to note???

### **D) RECORD AND AGREE REQUIREMENTS, CONSTRAINTS, RESPONSIBILITIES, SCHEDULE, RESOURCES.**

Record in TS "Work Package"

### **E) PROPOSE, AGREE, DEFINE SOLUTIONS**

### **F) PROCURE/MANUFACTURE EQUIPMENT, TEST, OPERATE.**