

LHC-Beam Commissioning Working Group

Notes from the meeting held on
9 June 2009

Present: Reyes Alemany, Gianluigi Arduini, Roger Bailey, Helmut Burkhardt, Andy Butterworth, Pierre Charue, Guy Crockford, Stephane Fartoukh, Massimiliano Ferro-Luzzi, Rossano Giachino, Eliana Gianfelice, Brennan Goddard, Magali Gruwe, Eugenia Hatziangeli, Georges-Henry Hemelsoet, Delphine Jacquet, Lars Jensen, John Jowett, Verena Kain, Mike Lamont (chair), Alick Macpherson, Malika Meddahi, Gabriel Mueller, Mario Pereira, Mirko Pojer, Laurette Ponce, Bruno Puccio, Stefano Redaelli, Frederico Roncarolo. Frank Schmidt, Rüdiger Schmidt, Ron Suykerbuyk, Ezio Todesco, Jan Uythoven, Walter Venturini Delsolaro, Helmut Vincke, Frank Zimmermann.

Excused: Oliver Brüning, Massimo Giovannozzi.

1. Follow-up from the last minutes

RBAC: Reyes Alemany described the LHC operational mode, the piquet roles, the strict mode, and LHC operational mode with CMW ([slides](#)). A 16 bit word is available for the LHC operational mode, the 9th one indicating the operational mode which is the state of the machine –operational or none. The accessibility of the equipment depends of the machine mode. The LHC piquet role is a temporary role, usually empty: only when an expert intervenes, he is prompted in this role to perform the necessary operations. The validity of the token is an issue and currently, the only way out is to close the application when the intervention is complete. Relationship between the LHC operational mode and roles was explained and an example of a device access map given. Concerning the start date for activating the LHC piquet roles, it was said that during the beam commissioning period, flexibility will be required. Therefore, two beam commissioning stages will be differentiated, with safe beam and with unsafe beam. When RBAC in strict mode will be declared, accessing any equipment will require a token, provided by the client application. Differences between, get monitor or set was explained. Finally the RBAC schedule was shown and it was reminded that on 16th June, dry run with HWC, QPS and CRYO will be performed to understand how the strict mode will affect them. It was stressed that if a majority of the equipment applications are going through CMW server, some are not. Ideas are being investigated on how CMW gets the LHC operational mode.

After the mid-July RBAC dry run, if successful, the LHC will go into strict RBAC mode. Pierre Charue reminded that the equipments concerned are all devices which receive the LHC timing.

2. News from LMC - Mike Lamont

The last LMC meeting was an open meeting. The minutes, written by Frank Zimmermann, will be available [here](#). Since then it was decided to warm up sector 4-5.

3. Dry Run news - Verena Kain

No dry run but TI 8 beam tests done (report below).

4. Interleaved beam and hardware commissioning - Gianluigi Arduini

Gianluigi Arduini presented the investigation done on the minimum hardware conditions needed wrt the LHC beam tests and early operation ([slides](#)). Time could be gained by

fractionating the tests on the circuits which are not immediately needed (see detailed list in Gianluigi's slides).

Pros:

- Early verification of the status of the machine with possibility of intervention in the shadow of the remaining HWC activities
- Possibility of profiting of other sources of downtime in other parts of the machine to complete the HWC commissioning

Cons:

- Delay in the complete commissioning of machine protection elements
- Risks related to the cohabitation of overlapping activities during high power tests
- Delay in getting a snapshot of the SC splices in the machine
- Risk of losing focus and concentration in the HW commissioning in particular in Phase 2 (high power!)
- Remnant radioactivity during interventions required for HWC

Proposal:

- Minimum commissioning scenario can be envisaged for injection tests and for machine check with beam at 450 GeV/c (circulating beam and RF capture for both beams) and possibly a mini-ramp to ~1 TeV (?)
- Provided few sectors, 2 or 3, including high luminosity IPs, are fully commissioned to exercise a full-scale powering of a sector through the whole phases of the cycle (pre-cycle, injection, ramp, squeeze, ramp-down)
- After that:
 - Commission the machine to nominal and get precise picture of the splices
 - Final Machine Check-Out
 - Possibility of leaving behind circuits requiring training and low priority circuits.

Rüdiger Schmidt emphasised that enough time should be given to analyse all the data taken during HWC, and this favours the staged HWC.

It was not clear that, at the end, the overall commissioning time will gain from this staged schedule. But this is a way to get colliding beams this year, at a reduced energy. It was proposed that information is compiled and the two scenario are developed (hardware commissioning at once OR staged hardware commissioning), including the schedules.

5. [LHC monitoring tool: demonstration](#) - Mario Pereira

Mario Pereira made a demonstration of the offline analysis tool he developed for the BLM and RadMon systems ([introductory slides](#)). The aim was to create a bridge between the two equipment data bases, making it easy to navigate between them and to check and correlate values in periods of time. Collimators and beam intensity information are also provided. Data export command is available for different formats, together with plotting routines.

Getting this application available on line in the CCC is the next step, including other systems, together with a graphical interface (LHC navigator) and a full documentation.

6. [First results from the TI 8 tests](#) – Malika Meddahi

Malika Meddahi went through the beam test programme and highlighted a few preliminary observations ([slides](#)). Without correction in the beam line nor in the extraction channel, the beam went all the way to the downstream TI 8 TED. This reflects the good re-alignment of the TT40 and TI 8 beam lines. The additional BPMs also provided important information on the beam positions. Many data were accumulated during the beam tests and are been analysed by the various teams involved. Rossano Giachino added that during the collimator tests, while checking the beam loss response, a main power supply close to the

collimator tripped. This was traced to a PLC problem in the tunnel and the cause is being investigated.

Massimiliano Ferro-Luzzi added that the weekend was very successful for LHCb and LHCb will most likely not need TED shots in July. LHCb are however, interested in the August injection tests. They succeeded in understanding local as well as global timing of the experiment and succeeded in making a proper timing alignment. Since the LHC got desynchronised with SPS regularly and was resynchronized with a different phase, they also got some training on doing the global timing alignment. They recorded sufficient tracks for space alignment of the silicon trackers. The VELO got in total 30'000 tracks as compared to 2000 last year, largely thanks to the bunch trains. In total, they recorded roughly a 1000 TED shots while LHC and SPS were synchronized including some 200 of the trains, thus mostly during the nights between Saturday-Sunday and Sunday-Monday.

The intensity was fine: LHCb only lowered the HV on the calorimeter for the high intensity bunch trains and switched off the Silicon Tracker only for the run with $12 \times 4.5 \times 10^{10}$.

LHCb had a very nice signal in the Beam Loss Scintillators which allowed recording all shots (LHC synchronized and desynchronized), adjusting the gain, and integrating the "losses" per bunch and measure the peak loss per bunch. This will now be analyzed and compared to simulation. Also LHCb got the prepulse on BST for most of the time and could use that.

To be followed-up:

- synchronisation issue;
- missed the content on the DIP service for the 'intended injected intensity'.

In general, LHCb would like to stress that they very much appreciated the excellent communication with the LHC crew, the flexibility and the fact that the team really worked hard to satisfy LHCb as well.

Rossano Giachino said that the TI 2 power supplies on the SPS side have been tested. Polarity tests are also been performed.

7. MD programme for week 24 and week 26 – Mike Lamont

Mike Lamont presented the [programme](#) for the week 24 and 25, concerning the slots of OP and TI work. In week 25, LHC injection sequencing will be tried, also with high intensity.

Next meeting

IN TWO WEEK TIME: Tuesday **23** June 2009, **15:30**, 874-1-011. Agenda will be sent in due time.

Malika Meddahi