

197th Meeting of the Machine Protection Panel

Injectors topics

November 13th, 2020 via Zoom

Participants:

Andrew Butterworth (BE-RF), Cedric Hernalsteens (TE-MPE), Verena Kain (BE-OP), Christophe Martin (TE-MPE), Bettina Mikulec (BE-OP), David Nisbet (TE-EPC), Jan Uythoven (TE-MPE), Belen Salvachua (BE-BI), Raffaello Secondo (TE-MPE), Matteo Solfaroli (BE-OP), Frank Tecker (BE-OP), Francesco Maria Velotti (TE-ABT), Christoph Wiesner (TE-MPE), Daniel Wollmann (TE-MPE).

The slides of all presentations can be found on the [website of the Machine Protection Panel](#) and on [Indico \(197th meeting\)](#).

Minutes from the 194th MPP meeting (Injectors topics)

- No comment has been received and the minutes are accepted as published.

SPS injection bump for post-LS2 operation (Francesco Velotti)

Francesco first summarized the modifications of the SPS injection for run III. The presentation concerns in particular the removal of the horizontal quadrupole dogleg and the new injection settings that are required. The injection bump for Q20 (26 GeV/c beams - LHC) needs to be adjusted to cope with the missing contribution from the no longer displaced quadrupole. For the 14 GeV/c (fixed target) injected beam the MKP needs a higher voltage (addition of 1.6kV) which is not an issue due to the lower injection energy. No injection bump is foreseen for this beam. The changes are detailed in the [CERN-ACC-NOTE-2019-0015](#).

For the injection of the LHC beam at 26 GeV/c a closed orbit bump of 5 mm was already used before LS2. Due to the missing kick from the missing quadrupole dogleg, the bump to be provided by the orbit correctors is now 13mm (instead of 5mm).

If the bump fails, a large betatronic oscillation will develop around the machine (about 20 mm) but the performed studies showed that no losses are expected due to the large acceptance in the SPS at injection energy. This will be experimentally validated during commissioning. In addition, the injection efficiency will be measured as a function of the injection bump. No specific interlock on the correctors will be put in place for the injection bump.

Question: Jan asked to confirm what would happen in case the bump is not established. No major losses would occur.

Question: Jan asked if the correctors are surveyed in FGC. The orbit correctors in the ring are not monitored. This would be complicated as the same correctors are also used for closed orbit correction.

Conformity of BIS connection (Christophe Martin)

Christophe reported on the status of the CIBU connections for the BIS clients. 450 CIBUs are installed in the accelerator complex, with 498 connections in total (some have connections for two beams). Three types of CIBUs are in use: "simple" CIBU, "double" CIBU (for LHC, both beams), and CIBU-F (optical) for long distance connections. 117 new CIBUs have been installed during LS2, which is an increase of more than 33% of the existing number of CIBUs. The commissioning reports of the connections' conformity state if the connection from the user system to the CIBU is conforming to the specification or not. The presentation does not provide specific details due to the large variety of user systems and connections.

A non-conform connection does not indicate a dangerous situation: in case a clearly unacceptable and dangerous situation exists, the CIBU has not been connected to the BIS at all.

Christophe reviewed the four conformity criteria for the connection: (1) redundancy, (2) adequate voltage provided, (3) adequate current available, (4) user ground provided on the connector. During the first installation of the BIS in 2008, more than 60% of the connections were not conform.

The commissioning test results are as follow:

- L4: 49 CIBUs, 100% tested, 7 non-conform connections;
- PBS: 55 CIBUs, 4 not yet tested, 2 non-conform connections;
- SPS injection: 14 new CIBUs, 7 not yet tested, all tested connections are conform;
- SPS ring: 50 CIBUs, all are tested, 13 are non-conform, 1 is not enabled;
- SPS extraction: 101 CIBUs, all tested, 39 are not conform;
- LHC injection: 36 installed, 1 not tested, 23 conform. TOTEM CIBU-F will be tested before the end of LS2;
- LHC: 150 CIBUs, all tested, 107 are conform, 40 are non-conform, 3 are not enabled.

Christophe concluded on the following points: many of the ABT systems are implemented used secure PLC, tests cannot be easily performed on those systems. In cases, when new electronics has been developed in collaboration by the users with the BIS team, a 100% conformity rate has been achieved; the non-conformity rate has decreased from 60% (initial commissioning of the BIS) down to 25% today.

Question: Bettina asked about the L4 non-conformities and asked who will follow up. Andy replied that he will follow up.

Question: Bettina asked if the PSB MPS is only connected to the external condition and not to the BIS. The connection of the MPS to the BIS is prepared in case POPS-B has an issue. However, the logic in the BIS will need to be adapted. Bettina mentioned that this is not in agreement with the current documentation. The documentation should be updated accordingly so that it is up to date for in case of this happens.

Action: Verify how the connection has been done between MPS and BIS and describe the user input to BIS (F. Boattini, EPC).

Question: Bettina mentioned that at the moment the 4 PSB inputs to the chopper BIC are forced to false. She asked if the jumpers can be removed during the first week of December. Jan replied that if the booster is ready to take beam, then the jumpers can be removed.

Comment: Bettina and David highlighted that the presented overview of the BIS conformities has been very useful and suggested to repeat similar presentations more regularly. Jan commented that the test results and status should be sent to all the equipment responsible.

Action: Circulate the information on the non-conformities to the MPP representatives for the different equipment (D. Wollmann, J. Uythoven)

Comment: David commented that he encountered a 1ms delay issue in the cycle view of the BIS GUI. Bettina suggested to also have a dedicated discussion on the status and possible improvements of the BIS GUI. This can be presented to a targeted audience, separately from the MPP.

Action:

- Solve the 1ms delay issue in the first cycle (in the cycle view) (BIS team)
- Organize a discussion on the BIS GUI for the injectors (J. Uythoven).

Summary of actions

The actions from the meeting are:

- Conformity of BIS connection:
 1. Verify how the connection has been done between MPS and BIS and describe the user input to BIS (F. Boattini, EPC).
 2. Organize a discussion on the BIS GUI for the injectors (J. Uythoven).
 3. Circulate the information on the non-conformities to the MPP representatives for the different equipment (D. Wollmann, J. Uythoven).
 4. Solve the 1ms delay issue in the first cycle (in the cycle view) (BIS team).