

64th Meeting of the Machine Protection Panel

Participants:

T. Baer, A. Di Mauro, E. B. Holzer, R. Jacobsson, E. Nebot del Busto, E. Ravaioli, B. Salvachua, R. Schmidt, J. Steckert, D. Wollmann, M. Zerlauth

1 Presentations

The slides of all presentations can be found on the website of the LHC and SPS Machine Protection Panel:

<http://lhc-mpwg.web.cern.ch/lhc-mpwg/>

1.1 Pspice analysis and follow-up of converter trip of RTQX2.L2 – (E. Ravaioli)

- The results of a PSpice simulation of the converter trip of RTQX2.L2, which appeared on 15.06.2012, are presented. The system tripped due to voltage oscillations in the three nested converters caused by an internal problem with one of the diodes. The change in the current during the event caused the observed orbit excursions and eventually dumped the beams by the beam loss system (BLM).
- Due to several parallel branches in the circuit it is not directly possible to reconstruct the exact currents in the magnets during the failure from the three measured currents
- A PSpice model of the circuit was developed, based on a previous model of the circuit from Scott Rowan.
- The simulation nicely reproduced the measured currents. This is not the case for the voltages, as the sampling rate of the real power converters is much slower than in the simulation. PSpice is adjusting the voltages in the power converters too fast.
- The change in the current during this event as expected from the simulations is about 0.5% for Q1 and less than 0.1% for Q2 and Q3.

Discussion:

- Ruediger comments that one should be able with three measurement points to reconstruct three parameters, if the measurement points are

correctly chosen. Markus responds that these measurements are normally used to control the power converter outputs. During normal operation these measurement points are sufficient to know the current in the circuit. In the failure case this becomes more complicated, due to the parallel branches.

- Ruediger comments that these results seem to be compatible to the finding of Jorg (~1%), who independently calculated the change in magnet current based on the orbit excursion observed in the arc.
- **Action:** Markus adds that it would be good to correlate the current change and the orbit change. Markus will show Emmanuelle how to do this with the orbit data from the post mortem.
- **Action:** Ruediger proposes to discuss possibilities to improve the circuit current supervision in the triplet, to be able to understand these types of events better. The presented results should be discussed with Hugues and Valerie.

1.2 BLM threshold changes to be implemented in IR3, IR6 and IR7 (E. Nebot del Busto)

- Recent fills have been dumped due to losses in IR6 and IR7. These dumps were caused by losses in Q4L6 and in one MQW in IR7. Following the earlier increase of the BLM thresholds in 9 families (TCPs, TCSGs, TCLAs) the bottleneck seems to have shifted to other elements. Analyses of several fills have shown that the concerned monitors are Q4L6 (MQY) and the Q5R7 (MQW). For these monitors there is a margin to increase the threshold by a factor 5-10, via the monitor factor.
- Eduardo proposes to increase the monitor factors for the MQY (Q4L6) from 0.1 to 0.5. The change will also be performed symmetrically in Q4R6. For the MQW the monitor factors should be increased from 0.5 to 1.
- Eduardo comments that since the beginning of the year the thresholds in the MQWs and the MQYs were already increased by a factor 2.

Discussion:

- MPP agrees to implement the proposed BLM threshold changes as soon as operation can provide a corresponding time slot.

- **Action:** Estimate (and monitor) the increase in integrated dose on the MQWs due to the change in the BLM thresholds, to ensure that the lifetime of the magnets is not reduced by this change. Discuss with Ezio.
- **Action:** Ruediger proposes to ask Ezio to give a presentation on the expected lifetime of the warm magnets in IR7 due to constant beam losses. What are the worries, what are the results of the resent radiation dose measurements?

1.3 Miscellaneous

- Follow-up on actions from last week (for details see last week's minutes):
 - Eva – BPM: Cabling issues of BPMs were resolved, new firmware version has been tested.
 - Anton: Cross check of temperature increase on XRP pending
 - Study of UPS failure modes (EN-EL and TE-MPE) still pending.
 - TE-MPE agrees to relax the constraints on the proprietary use of the F4 line by QPS, and allow other machine protection systems to use this line for a truly independent UPS feed after LS1 (layout and connection tbd with MPE prior to the connection).
 - RTQX2: Simulations have been performed and limits of I_POS and I_ERR have been adjusted (link to [ECR](#)).
- **The next meeting is planned in 2 weeks (27th of July).**