

Availability meeting Notes – August 4 / August 5, 2009

Marc Ross, Chair

This summary was written by Marc and lists his conclusions.

Attendees: Carwardine, Himel, Ross, Shidara, Toge, Yamamoto, Yokoya

Presentation material by Tom Himel.

Indico meeting location: <http://ilcagenda.linearcollider.org/conferenceDisplay.py?confId=4098>

Note that the Availability Task Force has a dedicated area with ILC-EDMS where all material is posted in addition to the indico site.

**NEXT Availability meeting: August 11 (2100 SLAC, 2300 Fermilab)/August 12 (0600 DESY, 1300 KEK) 2009.**

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The meeting consisted of a report on simulation results

**Review:**

The goal of the availability task force is to provide viable availability models for SB2009. These are to be presented at the upcoming GDE meeting "ALCPG09", Sept 29 - Oct 3, 2009 for review and comment by the GDE community at large. The models (possibly revised) will be submitted to the Project Director by the end of 2009 along with the recommendation that they become part of the ILC TDP2 baseline. It is important to note that the components of SB2009 which most strongly impact ILC availability are the ML single tunnel, the low power option and the two HLRF options (KCS and DRFS) and the task force work will be limited to these dominantly ML issues. *Work on combinations of SB2009 components and Reference Design – RDR - components, (for example a single tunnel high power configuration), will be very limited.*

**Summary:**

(What follows is perhaps more a set of highlights than a summary and reflects Marc's conclusions.)

Tom reported first results from 'availsim – SB2009' (Marc's nomenclature). Modifications made to 'availsim – RDR' include:

- DRs in single tunnel near the IP
- transport lines from DRs through part of BDS, all of linac to turnaround and then into a single stage bunch compressor.
- RTML updated
- fewer PPS zones than RDR due to the transport lines. For example, can no longer have people in linac or BDS when beam is in compressor.
- E+ source is now at 250 GeV point. Reduced magnet count of high emittance e+ transport which now only goes to near IP instead to low energy end of e+ linac (300->100)
- Have slightly more 'tunetimefraction' because of extra beamlines
- Run 5 months then 1 month shutdown – updated Operations and Maintenance Model

The most important modification, perhaps, is the development of a 'region configuration definition', (Tom's slide 5), which tells the simulation if a given beamline has the possibility of accessible support equipment. In SB2009, based on Working Assumptions developed in late May, the main linac and the sections of the RTML housed in the main linac do not have nearby accessible support equipment.

Tom talked about the impact of adopting Operations and Maintenance Model 3, (2 x 1 month down, one down day every two operations weeks, no 'opportunistic repairs').

His results – slide 8 – are very preliminary. It is important to note that these results do not reflect the SB2009 HLRF schemes.

One important result, not really a surprise given earlier presentations, is shown in the last row of the table on slide 8. It shows the enormous impact of 'tuning time'. This is the time needed to restore operation after all fixes have been made and includes (I don't know exactly in which proportion): 1) time for personnel to evacuate the tunnels (searching etc), 2) time for restoring nominal component settings, and 3) time to restore full luminosity operation (beam-based feedback, optimization and tuning procedures). Tom pointed out that our effort to improve availability should include an analysis of the time needed for this process.

## **Discussion:**

(Key Q/A raised).

Q: Tom questioned how we should model availability performance of the cryomodule. (Note that this has little directly to do with the one vs two tunnel difference). Also, note that tuner motor, piezo tuner and power coupler performance studies are an important part of our ongoing cryomodule R & D program. The simulation assumes one million hour MTBF for the tuner and 500000 hours for the piezo tuner.

A: Akira said that Tom's proposed warm up / cool down cycle frequency was too pessimistic. He will comment on this at our next meeting.

Q: How much repair / replacement work can be done on DRFS equipment in the nominal one day shutdowns?

A: I believe Shigeki has outlined this. (Nobu will check directly). Here is Shigeki's comment from our July 22 meeting (slide 6):

One day maintenance:

For one day maintenance, if we put a few supervisors in every shaft, they can control 2-3 crews (a pair of the person) to replace the failure components. From this system, we can count how many components to be replaced in a day.

On slide 20 (July 8) he shows 14 days for two people to replace 48 DRFS klystrons. We can interpret this as ~ four per day. He also shows the durations required for the two DRFS power supply systems.

### **Task force planning and homework:**

**This is Tom's last (or next-to-last) slide listing outstanding questions. We tried to answer these or to assign homework.**

Should opportunistic repairs be done? - no

Do we want to have scheduled maintenance days? -yes

Should we repair things on those days? -yes Including klystrons? – TBD by Ross, Nobu, Fukuda (see above)

Correct to assume running 5 months followed by 1 month downtime (including recovery)? - yes

How should cryogenic repairs be handled? – Akira (August 12 meeting)

Are there MTBF changes I should make in advance (e.g ignore flow switches, circuit breakers and what else)? – John (August 12 meeting)

**At the next meeting we will have a report from subgroup 2 (Carwardine) on MTBF for 'off the shelf' items and items with a substantial experience base. His presentation will include input from ANL.**

I believe two face-face meetings (~1 1/2 day elapsed time) would be useful during this initial phase (up to ALCPG09) of the task force:

1) At Slac - with a focus on initial Availsim output and analysis. Not yet scheduled. Week of Sept 14 is a possibility.

2) At kek - with a focus on Hlrf and subgroup 3 activities. This meeting is tentatively scheduled in the window 1330 – 1730 Aug 27 KEK, JST (2130 – 0130 Aug 26 / 27 SLAC, 0630 – 1130 Aug 27 DESY). Because of this, the meeting nominally scheduled for August 25/26 will not be held.

I met with Tom at SLAC on August 7 and will report on our discussion. We talked briefly about how to involve the LHC operations team experience in the task force.