

Availability Meeting Notes – August 11 / August 12, 2009

Marc Ross, Chair

This summary was written by Marc and lists his conclusions.

Attendees: Adolphsen, Elsen, Himel, Michizono, Paterson, Ross, Shidara, Toge, Yamamoto

Presentation material by Akira Yamamoto and Tom Himel.

Indico meeting location: <http://ilcagenda.linearcollider.org/conferenceDisplay.py?confId=4106>

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 18 (2100 SLAC, 2300 Fermilab)/August 19 (0600 DESY, 1300 KEK) 2009.

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The meeting consisted of a report on managing cryomodule availability and the first iteration of the HLRF (KCS and DRFS) Availsim input decks.

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.)

- 1) It was suggested and agreed to adopt a model in which each cryomodule is serviced (warm up / cool down) once every 5 years on average. The thermal cycle time is about one week. The cavity tuner and piezo-tuner MTBF used in Availsim is 1M hours and 0.5 M hours, respectively. Since there are ~15400 cavities in the main linac system, we may expect to require additional overhead simply to offset lost energy due only to tuner failures (perhaps more than 1%). The Availsim model includes the assumption that the full nominal cavity energy contribution is lost when a cavity tuner fails (31.14 MV) and that a small fraction is lost when a piezo-tuner fails (5MV).
- 2) Tom has generated initial simulation input 'decks' for the two proposed HLRF schemes, klystron cluster and distributed RF. These should be checked carefully before we begin to run and study the simulation output. The test decks (low power, 12 cryomodule section only) are posted on the meeting indico site and in EDMS.

Discussion:

(Key Q/A raised).

Q: Keeping Track. The multi-pronged nature of the design effort may lead to unrealistic availability models. This can happen, for example, if the availability task force chooses a certain redundancy scheme or high performance component without ensuring that selection is reflected in the sub-system design.

A: We decided to keep track of exceptions and assumptions in the usual way – through notes to presentations and comments in the primary simulation input decks.

Q: The simulation input decks effectively group components by 'failure effects'. Lacking detailed design descriptions, this is the most practical approach. However, lacking these details, we have to assume the top level components, (for example, control system nodes), are specifically included or made redundant.

A: This is most important for support infrastructure: water, electrical, controls and timing, etc. We will assume that the system will be reviewed for simple common-mode-failure generating components.

Q: For DRFS, Shigeki has provided power supply reliability estimates of 70K hours MTBF. This is a lot less than that used for other, lower voltage, power supplies. Why?

A: We will ask Shigeki to review his recommendations with us.

Q: What is the basis for the KCS waveguide tap off/tap in wrap-around coupler failure model? What about the 1% assumption?

A: This is based, in part on experience with X-band RF distribution components. We expect the KCS R & D program to provide some failure mode information.

Task force planning and homework:

At the next meeting August 18 / 19 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.

Chris offered to provide a refined LLRF 'failure-mode' block diagram that will allow us to separate LLRF-related failure modes with respect to cavity, RF unit (klystron) and full-cluster operation

At our next meeting, we will review plans for the ALCPG09 Availability Task Force presentation.

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.