Project Managers' Report for September 2008

With this issue of the Technical Design Phase Monthly Report, you will find summary notes for the Group's monthly meetings (Main Linac Technology – Superconducting RF, Conventional Facilities and Siting, and Accelerator Systems), and a report from the Cost and Schedule Group (Peter Garbincius). These meeting notes show progress made and plans for upcoming meetings and work.

This monthly report complements the weekly ILC Newsline. Please see the 'Director's Corner' for important planning and policy communication.

The Project Managers' attention continues to be focused on how to organize the R&D activities during the Technical Design Phase 1, taking into account the available resources. HLRF distribution "RF Clustering" proposal, Plug Compatibility, Single/Shallow tunnel and Minimum Machine are the main issues, and these will be discussed also in the coming Chicago GDE meeting.

Marc Ross, for Project Managers; Nick Walker and Akira Yamamoto
September 2008

Global Design Effort
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Project Manager Report for September, 2008

1) We visited KEK (Sept 4-9) and JLab (Sept 11-12) this month for the purpose of reviewing progress and talking about technical and institutional plans.
2) Both the KEK and JLab visits included discussion of the 'S0' cavity vertical test high gradient development program. On this front, we can report excellent progress at DESY where tests of industrially-processed cavities have proven quite successful. Tests at JLab also show excellent progress and new facilities at ANL and KEK are in the final stages of commissioning and qualification. 'S0' results were presented at the LINAC 08 conference.
3) This fall we expect to achieve critical ILC beam test facility milestones. First, operation of the new ATF2 extraction and beam delivery test line will begin at KEK and second, operation with high intensity pulses will start at FLASH (DESY). In addition, at our third beam test facility (CesrTA), already in operation since early this year, will undergo a major transformation as new diagnostic vacuum chambers are installed. The new year will bring initial results from these facilities.
4) Preparation for the 'LCWS08 / ILC08' GDE meeting (Chicago, Nov 15-20) is now in fully underway. (http://ilcagenda.linearcollider.org/materialDisplay.py?materialId=1&confId=2628). Conveners for the 6 working groups have prepared charges for their group and will post draft agendas by the end of October. Joint working group sessions will cover Minimum Machine configurations and the RF Clustering proposal. This meeting is intended to have broad participation from throughout the community and we would like to encourage you to be involved. A key element of the meeting is to prepare for the Accelerator Advisory Panel Review of the Technical Design Phase to be held April 17-21 at KEK (TILC09).
5) The first project/technical meeting was held with Triad in order to review project milestones together with requirements for the software tools they will develop for managing the RDR and TDR cost estimates.
6) The TESLA Technology Collaboration (TTC) meeting will be held in Delhi, India at the Inter-University Accelerator Complex in late October. http://www.iuac.res.in/~ttc/ . This is the first TTC meeting to be held in India. The meeting includes working groups on low-beta (proton/heavy ion) SRF, high gradient, industrialization (esp. XFEL) and Indian activities.

Marc Ross

Draft: Minutes of ML-SCRF Technology Meeting (081001)

Date & Time:
13:00-14:10 GMT, October 1, 2008, using WebEx.

Participants:
L. Lilje, N. Ohuchi, C. Adolphsen, A. Yamamoto, M. Ross, N. Walker, J. Kerby, E. Paterson, N. Toge, M. Champion, B. Rimmer, T. Shidara

Presentation files are available at the following Indico site;
http://ilcagenda.linearcollider.org/conferenceDisplay.py?confId=3053

1) Report from PMs (A. Yamamoto)

- EC meeting at KEK (September 4 – 6)

Plan for S2 at KEK (STF-2) was discussed. Two-stages may be more realistic to manage "High Pressure Code" constraints in Japan. Plug-compatibility has been further discussed among PMs after EC.

- JLab visit (September 11, 12)

GDE director visited JLab and met the new director, Dr. Montgomery. Further cooperation was discussed; long term basic R&D on such as large grain cavity, ~~,~~ cryogenics and cryomodule design.

- Project Advisory Committee (PAC) under ILCSC in Paris (October 19 and 20)

Project management will be reviewed. SCRF R&D progress and plan will be presented by A. Yamamoto.
Prior to this meeting, PMs need to have discussions with Accelerator Advisory Panel (AAP), especially on "Plug-compatibility", as well as "High gradient (S0)" and Acc system test plan (S2).

- Need to prepare for the LCWS Chicago meeting (November 17-20)

2) Brief Report from GLs

- Cavity (L. Lilje)

Regional update for Europe, US and Asia (by N. Toge) was presented. Combined data of temperature mapping and optical inspection have revealed defects in all cases. TTC Meeting will be used for compiling all available data; Exact quench location (weld, heat-affected zone or else, stiffening rings), Size of defect.

- Cryomodule (N. Ohuchi)

The S1-Global cryomodule design is in progress including interface area. The general design (3D - data) has been sent to INFN. The contact persons for this project should be nominated. (Assigned as FNAL - M. Champion, DESY - L. Lilje, and KEK - N. Ohuchi)

3) Discussions on plug-compatibility

- SCRF Plug-Compatibility- focusing on cavity package – (A. Yamamoto)

- We need flexibility to continue and encourage R&D efforts in order to improve the "cavity gradient" performance in the extended R&D phase. The plug-compatible conditions are inevitably required for various efforts to be productive and to be combined. We are aiming for global cooperation of the ILC SCRF technology with this plug-compatibility, and scoping smooth extension to the ILC construction/production phase, keeping in mind multiple participation and industrial competition.
- Although the cryomodule R&D status might be ready for "system engineering", we need to establish unified interface conditions; intending a nearly identical engineering design, but adapting each regional industrial constraints, taking into account the study of " High Pressure Code".
- Boundary Conditions of cavity plug-compatibility: One cavity-package is replaceable with other cavity even in one cryomodule. Cavity package design needs to be optimized for easiest, best reliable assembly process during the installation into the cryomodule. The cavity-package (which comprises 9-cell cavity, end-structure (coupler, HOM, etc), He-vessel, tuner, and interface to cryogenics line) is defined by the unit to be sealed-off in delivery to the site of ILC cryomodule assembly.
- This plug-compatibility issue will be discussed with AAP and reviewed by PAC in October, and the consensus will be established during the Chicago LCWS08 meeting in November.

- Cavity Plug Compatibility (J. Kerby)

- We are technically looking at the possibility of defining a common set of interfaces to be used on cavities during the development phase, which allows for technical variants in designs with minimal disruption of other components. Rev 0 draft document has been circulated previously, but it is just a starting point since there are multiple differences for the moment and there is much work to do to make this converge.

- Issues (further work needed): Cavity mounting point location (vertical /longitudinal), tuner motors, using a LS (long structure) in a cryomodule set up for SS (short structure) type cavities, helium return pipe (included or not), and antenna (needs to be included).

4) Discussions on ILC Chicago meeting agenda (C. Adolphsen and H. Hayano)

- WG Charge – 21 hours in total

Review current status of global ILC R&D, future plans and activities of test facilities. Identify and prioritize critical R&D milestones for TDP-1 and beyond. Promote and improve collaboration between groups working on ILC related R&D.

- ML Topics (1) – 9 hours

Progress on achieving gradient (S0), Status of Facilities and Horiz/CM testing (S1/S2), Toward Plug Compatibility, Cryomodule Design.

- ML Topics (2) - HLRF/LLRF – 6 hours

XFEL HLRF test results, Status of alternatives (Marx, SBK, PDS), Klystron Cluster Concept, LLRF measurements at FLASH, Discussion with CFS on water cooling and cluster approach.

- ML Topics (3) – 4 hours

Quad Package, Beam Dynamics and Wakefields, RTML.

- ML Topics (4)– 2 hours

Preparation for AAP, Preparation for ILC08 closeout / overflow.

5) SCRF meeting schedule

- Next SCRF WebEx meeting: October 29.
- LCWS-08, GDE meeting in Chicago: November 17 – 21.
- GDE meeting and AAP (interim) review in Tsukuba: April 17 – 21, 2009.

CFS & Global Systems Webex Meeting
10th September, 2008

Agenda
PM Report (J Carwardine on behalf of M Ross)
CFS: Plans for CLIC08 and ILC08 (V. Kuchler, J Osborne, A Enomoto)
Update on collaborations with Dubna JINR/GSPI (W Bialowons)
Engineering units for process cooling water assessments (W Bialowons)

Attendees

E. Paterson	W. Bialowons
J. Osborne	V. Kuchler
P. Garbincius	J. Carwardine
E. Elsen	

Meeting Summary

PM Report

Three initiatives were presented at the EC face-to-face meeting on Sept 4-6, namely the RF Clustering proposal; Minimum Machine studies; and Plug Compatibility. There was generally strong support for all three. The EC meeting also covered the status of key R&D programs.

RF Clustering: the proposal was presented to EC on Sept 5th. Technical challenges exist, but Management believes the anticipated benefit (ability to remove the linac service tunnel) justifies the R&D investment.

Minimum Machine: studies for the Minimum Machine initiative will be defined at ILC08 in November, with the Working Groups expected to address relevant aspects of the Minimum Machine concepts as part of their agenda. Nick and Ewan are preparing a definition document, a draft of which will be released within a few weeks. The definition document will become part of the ILC/GDE R&D Plan when it is revised in December 08.

There is a weblog for discussion of the Minimum Machine at:
http://www.linearcollider.org/weblog/accelerator_design

The CFS team must validate the central premise of the minimum machine concept, namely that reducing underground construction will reduce the cost of the machine. There is strong support for CFS value engineering in the US/DOE and they will fund CFS activities at Fermilab and at SLAC in the BDS/MDI team in USFY09. CFS team members reported that they were not aware of the CFS resources to be funded at SLAC and asked about the scope of the effort. The question was deferred to Marc (who was absent from the meeting). Other resources will come from the EU under FP7 and UK e+/DR efforts and from Asia.

Plug Compatibility: a key item for the AAP review in April 09 will be discussion of 'acquisition models' for high-tech components that will subsequently be reviewed by the funding agencies.

Global Systems: Margaret Votava has unfortunately asked to step away from the role of Technical Area Group Leader for Controls/LLRF.

CFS
The upcoming CLIC'08 workshop will include strong sessions on CFS, including discussions of common CLIC/ILC interest. The CFS sessions will be part of the Working Group on Technical Issues, Integration and Cost. There will presentations on CLIC and ILC tunnel configurations, cooling, and on safety for underground structures.

Planning continues for the CFS Working Group sessions at ILC'08. A joint working group parallel session is being put together on the Minimum Machine configuration for Tuesday afternoon.

Collaborations with Dubna/GSPI
A webex meeting has been set up for September 17 to discuss EU FP7, progress with investigation of the Dubna site by GSPI, and the scope of work document for JINR for the Dubna site.

Wilhelm will give a talk on the status of the ILC at the Russian Particle Accelerator Conference in late September. He plans to meet with Nikolai Delov from GSPI and Serey Kakurin from JINR Dubna.

Engineering units for the process cooling water assessment
Wilhelm presented a recommendation that ISO units (ie Kilogram, Meter, Second, Kelvin etc.) be used for the assessment of cooling water systems and for calculations of dissipated power.

Wilhelm noted that several different power dissipation numbers are being quoted by members of the HLRF group, making it difficult to give a good assessment of the minimum cooling requirements for the main linac. Discrepancies come, for example, from different assumptions about the machine operating states that the cooling system must support. Wilhelm proposed that dissipated RF power be calculated as follows:

The [maximum] dissipated RF power be calculated for nominal RDR parameters with RF on and beam on. For all other operation modes [such as non-beam testing], the rf pulse length or/and the repetition rate has to be reduced)."

This proposal must be deferred to the PMs.

The next CFS & Global Systems meeting will be held on October 10th

John Carwardine

11. Accelerator Systems WebEx Conference
26 September 2008, 13:00 GMT

Minutes (v1.0)

Attending: A. Brachmann, T. Himel, F. Lehner (minutes), K. Oide, T. Omori, E. Paterson, M. Ross, A. Seryi, T. Shidara, N. Solyak, N. Toge, J. Urakawa, N. Walker, A. Wolski, A. Yamamoto

All slides are available on the indico site
http://ilcagenda.linearcollider.org/categoryDisplay.py?categId=161

1. General Announcements
Nick welcomed the attendees. The agenda was concluded. There were no announcements.

2. Short status report by TAGLs

2.1 Electron Source – Axel Brachmann (slides available)
Axel presented a few slides on the status of the electron source. JLAB is developing a 200kV gun for CEBAF. There are good synergies with ILC. An inverted ceramic insulator as used in guns for medical X-ray applications is being developed. Axel presented deliverables according to the EDR planning with a 200kV load locked gun in 2009 and in 2010 the 350kV gun design.
Recent results from photocathode tests were shown and planning for the ILC'08 workshop was reported.
A question on the SLAC laser system specification was raised. Axel promised to circulate information offline.

2.2. Positron Source – Nick on behalf of Jim Clarke (slides available)
Nick showed slides prepared by Jim. The ILC positron source collaboration meeting will take place on 29-31 October 2008 at the Cockcroft Institute to discuss progress with R&D and integration studies. Special consideration will be also given to further design needs in view of the proposed minimum machine concept. Some drawings of an undulator module string and of the positron transport line form the target area were shown indicating that engineering integration work mainly done by Norbert Collomb/Daresbury is progressing.

2.3 Damping Ring – A. Wolski
Progress is continuing with development of an engineering model for one arc cell in the damping rings. Although the focus in the vacuum system, the model includes 'placeholders' for the magnets (dipoles, quadrupoles, sextupoles, skew quadrupoles, orbit correctors) and their supports, and

the bpms. The model was developed initially under the simplifying assumption that both beams would travel in the same direction around the ring; this minimizes the amount of design work since both arc cells are essentially identical, and makes efficient use of space in the tunnel. Work is now progressing on reversing one of the beamlines, to provide a configuration that has greater flexibility in terms of the overall machine layout. The dipole positions in the upper and lower beamlines will be matched, to ensure that both rings have the same geometry. Indications are that with counter-rotating beams, the damping rings tunnel will be less cluttered than initially feared, and it is hoped that this configuration will, after all, prove practical.

Some thought has been given to plans for the technical design phase. Activities will, of course, remain focused on the test facilities, particularly CesrTA and the ATF/ATF2, and with development of fast injection/extraction kickers. Regarding design of the damping rings for ILC per se, and consideration of ('minimum') alternatives, the situation is less clear. The intention is to develop optics for the injection/extraction lines, to connect the rings with the rest of the machine, and to continue development of the engineering model. Both of these activities will provide necessary information for placing the cost estimate on a more secure basis; but overall, the available effort is very limited. Additional studies are needed for optics design, CF&S, magnets and power supplies, and a number of other subsystems. The issues will be discussed at ILC08.

A key issue regarding the minimum machine is the option of damping rings with circumference around 3 km. This is connected with the low-power parameter set for ILC, and provides the largest potential cost saving in the damping rings area system. However, it is still not clear how to address this option properly, or to what level of design the 3 km rings should or can be developed.

Monthly ILC damping rings WebEx meetings have re-commenced, with a meeting on September 17 addressing kicker R&D. Reports were presented from SLAC (Craig Burkhart and Anatoly Krasnykh), KEK(Naito-san) and INFN-LNF (Fabio Marcellini). It is encouraging that significant progress continues to be made with these critical components, despite the present, extremely difficult, funding situation. Slides from the meeting are posted at:

https://wiki.lepp.cornell.edu/ilc/bin/view/Public/DampingRings/TeleConference

The next meeting will be on October 22, and will focus on vacuum system issues. The monthly damping rings meetings are coordinated with CesrTA and CLIC damping rings meetings."

2.4 RTML – N. Solyak (slides available)
Nikolay presented simulation results of RF kicks due to asymmetric couplers and wakefields in ML and BC1, BC2 for “old”, “new” and “alternate” configurations. Coupler’s RF kick and wakefields kick do not seem to be a problem in BC1, BC2 and in ML in old configuration. Nikolay further reported on the progress of the single-stage compressor design. A conceptual design for return line vacuum system is done. Investigation of wakefields effects in vacuum chamber is in progress.

2.5 Beam Delivery Systems – A. Seryi
Andrei reported on beam dump design an on the optimization work on the water flow, inlet/outlet sizes, fittings etc. using FLUKA and hydrodynamic simulations. The intention is to write up a design study report on this.
As regards ATF2 preparation the hardware installation is still ongoing. Planned ATF2 start is on November 1 with work mainly devoted then to commissioning. Studies on the final focus system are foreseen for February 2009.
Several meetings of the BDS group are planned: one meeting on 1 October and then the ATF2 project meeting in December at KEK. Discussion will follow on low power option and on travelling focus.

3. Updates on Minimum Machine – Nick (slides attached)
Nick presented updates of the minimum machine concept. The minimum machine concept refers now to a set of identified options that need to be studied in 2009 to reduce the cost. A formal review and re-baseline will follow beginning 2010. Elements for the minimum machine to be studied with respect to cost are main linac specific (such as removal of support tunnel, klystron clustering, Marx modulator and process water), central injector specific (damping ring, positron source etc) as well as specific to low beam power parameters. In addition single stage compressor and cost-optimization of TeV upgrade option have to be addressed. Nick presented different classes of minimum machine studies that are expected to be carried out in 2009. These investigations will touch interference/integration, operation, commissioning and availability, as well as hardware R&D and beam dynamics aspects. Nick reported further on the first draft outline of the minimum machine report to be ready for discussion at ILC08.

4. ILC08 planning – Nick (slides attached)
Nick reported on the planning for the ILC08 conference. The attached document describes the charges and guidelines for the working groups. Top-level goals were already distributed on 18 August. A webex meeting in preparation of the workshop will be held on Tuesday, 28 October at 14:00 GMT.

5. PM report – Marc
Marc emphasized the importance of the minimum machine concept for the overall progress of the project. The minimum machine activities must have an

impact. The project management is pushing this technically and politically through FALC. Marc reported shortly on the new FALC chair, Pierre Coulombe from NRC Canada. Ewan, Marc and Barry will meet with him next week at the LINAC '08 conference in Vancouver.
Marc reported that the next FALC meeting is to be held in January 2009. The PMs want to continuously engage FALC presenting this committee their concrete ideas and plans how to put the project forward.

5. A.o.B.

The future scheduled AS-TAGL meetings are:

- Friday, 17 October 2008 13:00 GMT
  - Reports from AS TAG action items, iteration of existing sections
- Friday, 14 November 2008 13:00 GMT
  - Draft – ready for discussions at ILC08
- ILC08 – 17-21 November 2008
- Friday, 12 December 2008 13:00 GMT
  - Final complete draft – submission to EC

Attachments

1. **Slides Axel Brachmann - Electron Source (missing)**
2. **Slides Jim Clarke – Positron Source**
3. **Slides Nikolay Solyak - RMTL Report**
4. **Slides Nick Walker – Minimum Machine**
5. **Slides Nick Walker – ILC08 planning**

http://ilcagenda.linearcollider.org/categoryDisplay.py?categId=161