



Engineering and Design Review

Version 1.0

Technical system: HLRF

Date: 1-3 October 2007
Location: SLAC
Host: Ray Larsen; larsen@slac.stanford.edu
Shigeki Fukuda; shigeki.fukuda@kek.jp
Meeting: HLRF Kick Off Meeting

1 Goals

The goal of the High Level RF (HLRF) Kick Off meeting was to begin planning for the Engineering Design Phase. The agenda included presentations on the High Level RF.

Since this was the first of the EDR Kick Off meetings, a secondary goal was to present and receive critical commentary on the EDR Plan.

2 Review Organisation

2.1 Agenda

The agenda of the review is available from the InDiCo page together with the presentation material.

<http://ilcagenda.linearcollider.org/conferenceDisplay.py?confId=1858>

HLRF Kick-off Meeting - 1-3 October 2007, SLAC.		
Daily Programme: Monday 1 October 2007		
Management Overview of EDR HLRF task	09:00-09:15	YAMAMOTO, Akira
Discussion	09:15-09:20	
Summaries of ongoing HLRF facilities, R&D Activities, Work packages	09:20-11:50	
(1) Status of the XFEL RF System	09:20-09:50	CHOROBA, Stefan
(2) Status of KEK STF-HLRF	09:50-10:20	FUKUDA, Shigeki
(3) ILC Modulator Talk	10:40-11:10	NEZHEVENKO Oleg
(4) SLAC ILC RF System R&D	11:10-11:40	ADOLPHSEN, Chris
Summaries of RDR Base Design, Cost, Methodology	11:50-12:20	LARSEN, Raymond
discussion	12:20-12:30	
lunch	12:30-13:30	
Heat Load Issues, Water System	13:30-14:00	HUEDEM, Emil
Review Exiting EDR Engineering Plans (Specs, Costing, Vendors)	14:00-15:00	
(1) STF Plan Engineering, Industrialization	14:00-14:20	FUKUDA, Shigeki
(2) US ART Work Packages	14:20-14:40	ADOLPHSEN, Chris
(3) EDR management Work Packages (Non R&D)	14:40-15:00	LARSEN, Raymond
Discussion	15:00-17:00	
Daily Programme: Tuesday 2 October 2007		

Review Major R&D Program	09:00-12:30	
(1) SLAC Sheet Beam Klystron	09:00-09:20	JONGEWAARD, Erik
(2) KEK Super MBK	09:20-09:40	YOSHIDA, Mitsuhiro
(3) DESY Power Distribution System	09:40-10:00	KATALEV, Valery
(4) SLAC Power Distribution System	10:20-10:40	NANTISTA, Chris
(5) SLAC Marx DFM Modulator	11:00-11:20	BURKHART, Craig
(6) KEK Bouncer Type Modulator	11:20-11:40	AKEMOTO, Mitsuo
(7) High Availability Charger System Proposal	11:40-12:00	CASSEL, Richard
(8) EDR R&D Work Packages	12:00-12:20	LARSEN, Raymond,
Discussion	12:20-12:30	
lunch	12:30-13:30	
America's Next Year WP	13:30-14:00	ADOLPHSEN, Chris
RF Power Requirements for Cavity Field Regulation(LLRF)	14:00-14:30	MICHIZONO, Shinichiro
break	14:45-15:00	
General Discussions, Q&A, Down Selection	15:00-16:30	
Summary	16:30-17:00	
Daily Programme: Wednesday 3 October 2007		
Project Tour	09:00-11:00	1

2.2 *Host*

Ray Larsen at SLAC.

2.3 *Attendance*

Chris Adolphsen	Mitsuo Akemoto	Wilhelm Bialowons
Craig Burkhardt	Richard Cassel	John Carwardine
Mark Champion	Stefan Choroba	Shigeki Fukuda

Hitoshi Hayano	Emil Huedem	Erik Yongewaard
Bob Kephart	Vladimir Katalev	Jobe, R. Keith
Ray Larsen	Sergei Nagaitsev	Chris Nantista
Oleg Nezhevenko	Tor Raubenheimer	John Reid
Mark Ross	Tetsuo Shidara	John. C. Sheppard
Nobe Toge	F. Y. Wang	Vladimir Vogel
Akira Yamamoto	Mitsuhiro Yoshida	

2.4 Secretary

These notes were taken by Ray Larsen and S. Fukuda.

3 Summary of Discussion, Findings and Recommendation

The review of the discussion are displayed below and followed by the conclusion or recommendation. The factual basis is given.

3.1 *Topic 1: Management Review of EDR HLRF task*

3.1.1 HLRF design parameter table

Akira Yamamoto showed in his summary that the basic design parameter and interface are verified. And then he requested to fill the table of ML (SCRF) technology design parameters. Due to the independent nature of the HLRF device from the viewpoint of plug compatibility, the items of the HLRF tables are blank. How to specify the items for the parameters strongly depends on how to think the plug compatibility for the each HLRF device.

Recommendation for topic 3.1.1

Since the HLRF subsystem is all independent devices such as modulator, klystron, power distribution system and so on, it is rather easy to specify the items and parameters. On the other hand, since work packages and bid units are also related to the items of this table, suitable definition for the work packages and bid units are necessary to complete this table. It is required to fill this table in the first trial form.

3.2 *Topic 2: Defining EDR Engineering/R&D Work packages*

3.2.1 Presentations about on-going HLRF R&D Activities, WP, Facilities

- Four presentations from 4 institutes were performed: Status of the XFEL RF System (S. Choroba, DESY), Status of KEK STF-HLRF (S. Fukuda, KEK), ILC Modulator Talk (O. Nezhevenko, FNAL) and SLAC ILC RF System R&D (C. Adolphsen, SLAC). Summary of RDR Base Design, Cost, Methodology was presented by R. Larsen. In successive session of review existing EDR engineering plans (specs, costing, vendors), three talks, STF plan engineering, industrialization (S. Fukuda, KEK), US ART work packages (C. Adolphsen, SLAC) and EDR management work packages (Non R&D) (R. Larsen, SLAC), were presented. Each area's work packages and resources are introduced and discussed.

Findings for topic 3.2.1

Present activities for HLRF in the three regions were shown. Latest BCD klystron status in XFEL indicated the establishment of the BCD MBK. Encouraging result of ACD Marx modulator was shown.

3.2.2 Presentations about reviewing major R&D programs.

Seven technological talks reviewing major R&D programs (modulator, klystron, power distribution system and charger system) are performed. Overall talk of HLRF EDR R&D work packages is presented by R. Larsen.

Findings for topic 3.2.2

Detailed status of the BCD and R&D for HLRF were shown. Power distribution system in XFEL was progressed on the basis of different scheme from BCD PDS. Successful result of Marx modulator and new PDS employing the VTO to aim for the circulator-less system were introduced from SLAC.

3.2.3 Heat load issues, water system

Emil Hueden had a report about the water cooling issues and asked HLRF group to update or get more information on the water cooled components to evaluate LCW water system delta T. For the evaluation of cooling system, setting the heat table filled will be helpful, but as minimum, the combination of either one of the load/flow or load/delta T or flow/delta T, maximum allowable temperature and pressure drop, are needed.

Recommendation for topic 3.2.3

HLRF group will at least fill the heat table or update the data up to FNAL GDE WS. C. Jensen, S. Fukuda, C. Nantista and R. Cassel are responsible for modulator, klystron, PDS and charger system, respectively.

3.2.4 RF Power Requirements for Cavity Field Regulation from the LLRF group

Shin Michizono presented the talk about the rf power requirements for cavity field regulation since the rf overhead decreased from the initial BCD. He recommended the following items: better defined modulator regulation (more tighten-up), motorized VTO for the cavity power couplers and power splitters if the cavities are used at different gradient, continued R&D effort into the control of LFD and microphonics, study of minimum control overhead and so on.

Recommendation for topic 3.2.4

HLRF and MLI group will be responsible to discuss these items with LLRF group. It is desirable that session to discuss these items will be held at FNAL GDE meeting.

3.3 Topic 3: Examine proposed Work Packages and comment on how they support the EDR goals

3.3.1 Management structure of EDR

Regional activities of ongoing engineering and R&D plan were presented. Regional work packages were also shown. So the next important step is to summarize work packages of HLRF for all regional activities, and then to generate EOI's (Expression of Interest) for HLRF Work Packages. For the acceptance of the EOI's or collaborative work for the same categories of work packages, resources and exchange of the manpower and information are an important management task. These are performed under the global MOU's controlled by the GDE. Project managers play an important role to promote this process.

There was a discussion about the issues for ILC management; how we evolve from existing obsolete BCD used for current cost base line, to a new baseline in support of EDR at time of report. For the HLRF, in order to reduce the total cost, main activities are to develop the ACD technologies. Even in XFEL, current BCD for the HLRF is obsolete, and accepting the new technology. These issues were discussed and we should change this situation in a flexible manner.

Recommendation for topic 3.3.1

Summarizing the work packages and generating the EOI's should be conducted soon. Global MOU's for suitable work packages are to be discussed and executed under the administrative work by the project manager.

For the obsolete BCD, proposal for the new configuration among the current ACD will be discussed. Under the agreement of HLRF group, proposals will be sent to CCB to change to the new baseline.

3.3.2 ACD's Work Packages: Adoption Time Scale, Cost-benefit and Documentation

Relating to the obsolete baseline, many R&D items are considered and proposed as the ACD. Most developed ACD is the Marx modulator and in this case, next important process is showing the reliability test to allow decision. For the other ACD's, tightness of the schedule was pointed out by the participants of HLRF KOM. Budget limitation and triage are involved at the same time. All ACD's, require a more detailed description: Status of development, qualification, and cost-benefit justification. These points are to be developed as new documents for EDR.

Recommendation for topic 3.3.2

Concerning about this topics, action items are set and should be performed..

3.3.3 Work Packages

Main work packages are comprised of 6 categories: modulator, klystron, power distribution system, HV AC and control & interlocks. Each category includes baseline work package, test facility, and ACD's. Some work packages have a tight schedule to show the feasibility of the technology and it is required to develop the long-range plan through EDR. Most important work packages are picked up from many items as follows; (1) it is encouraged to develop the modulator with the cost benefit such as the Marx modulator; (2) evaluation of the ACD klystrons are continued; (3) accumulation of the klystron running data with cavity load and without cavity load respectively and more than 2000 hours running data are necessary; (4) comparison and scoring the possible PDS and making clear the differences among candidates of PDS. Especially it is important to make a model of ACD PDS (for the circulator-less system) including all possible coupling effects of reflected power into all cavities.

Recommendation for topic 3.3.3

Concerning about this topics, action items are set and should be performed.

4 Action List

Action list as derived from the recommendations

Reference	Responsible	Action
Topic 3.1.1 (HLRF parameter table)	HLRF Team Leader	Fill in HLRF specifications templates for A. Yamamoto
Topic 3.2.3 (Heat Load issues, water system)	Responsible person for mod., klystron, PDS and charger.	Respond to Emil Heudem's table for cooling water flows, pressure drops
Topic 3.2.4 (RF power requirement from LLRF)	MLINS Team Leader	Respond to LLRF list of questions (Shin) to HLRF regarding klystron available overhead.
Topic 3.3.1 (management structure of EDR)	HLRF Team Leader	Generate EOI's (Expressions of Interest) for HLRF Work Packages
Topic 3.3.1 (management structure of EDR)	Project Management Office	Global MOU's: Develop collaborations to get additional required resources for management, R&D WP's
Topic 3.3.2 (ACD's work packages)	HLRF Team Leader	Develop HLRF long-range plan through EDR, down-select strategies, into construction phase.
Topic 3.2.3 (ACD's work packages)	HLRF Team Leader and responsible person of PDS	ACD's: Show all plans for development, qualification, configuration change of baseline (Modulator, Klystron, PDS, HV AC (6-Pack), controls & interlocks.
Topic 3.3.3 (work packages)	HLRF Team Leader	Summarize work packages for HLRF for all Regional activities.
Topic 3.3.3 (work packages)	HLRF Team Leader	Model ACD PDS system (circulator-less) including all possible coupling effects of reflected power into all cavities.
Topic 3.3.3 (work packages)	HLRF Team Leader	Develop new documents showing cost-benefits of all ACD's underway and proposed.

5 Summary of Meeting

[The Action List above does not specify individual's names. Further, there are only three 'Responsible Parties' listed, the MLINS Team Leader, the HLRF Team Leader (+ responsible person for the work package category) and the Project Management Office. For the purpose of this report, these are Shigeki Fukuda and Ray Larsen.]