Notes on KEK / FNAL S1 Global Cavity Discussions

J. Kerby (scribe)

Three meetings were held on 15 July 2009 at Fermilab to discuss the cavities to be delivered by FNAL to KEK for inclusion in the S1 Global cryomodule currently planned for testing at KEK in 2010. The following meeting summary was reported to the ILC-GDE EC (on July 15) and to the Americas Regional Director, Mike Harrison (on July 17).

Meetings:

10h00: Bob Kephart, Jim Kerby, Marc Ross, Akira Yamamoto

14h00: Tug Arkan, Chuck Grimm, Jim Kerby, Don Mitchell, Marc Ross, Akira Yamamoto, Harry Carter, Mark Champion, Carlo Pagani

18h00: (via Webex) Tug Arkan, Hitoshi Hayano, Bob Kephart, Jim Kerby, Don Mitchell, Shekhar Mishra, Norihito Ohuchi, Nobu Toge, Akira Yamamoto, Kaoru Yokoya

Attachments:
(note I propose to put these on the webex site)

DRAFT FNAL-KEK Memorandum of Understanding (Word document)
Bob Kephart's slides from the 10AM meeting (Powerpoint slides)
Don Mitchell's slides from the 7 July S1 Global Webex (Powerpoint slides)
Norihito Ohuchi's S1 Global schedule (excel spreadsheet)
Norihito Ohuchi's S1 Global parts list (excel spreadsheet)
America's 9-cell ILC S0 Cavity Web Page:
http://tdserver1.fnal.gov/project/ILC/S0/S0_coord.html

The following is the status at the end of all three of the meetings.

1. Per the MOU, Fermilab will supply 2 dressed cavities to KEK by the end of December 2009 for assembly into the S1 Global cryomodule. In discussion, Cavities known at FNAL as A6, A7, A8, AES4, ACCEL11 and ACCEL13 were discussed as possible candidates. There is a preference based on similarity to the DESY S1 supplied cavities and the resulting interconnect spacing (and required parts) FNAL's plan is that two of cavities A6, A7, A8 and AES4 will be selected and dressed for S1 global.
2. Cavities chosen for S1 were requested to have reached 31.5MV/m in vertical test, with the nine cells pre-tuned and the HOM coupler and RF monitor tuned (as described in the item 5),
3. All FNAL cavities will be assembled in a manner consistent with insertion in CM2; the cavity vessel WPM envisioned for the test at KEK will need to be moved or removed because of the interference with the slim blade tuner drive motor used on the FNAL cavities.
4. Based on the current expected schedule for VTS and HTS tests at Fermilab, it is expected that the cavities to be delivered will be VTS tested in a dressed state before shipping to KEK. There is agreement that a full HTS test would be preferable, however at this time the schedule does not allow this.

5. As the FNAL cavities are planned to be vertically tested only, the coupler will have been previously been conditioned with high power at SLAC, but the main coupler cannot be conditioned after installation as there is not enough RF power in the VTS test stand to do this. Moreover, the main coupler will likely not even be installed for this test. The current plan is the cold end of the main coupler will be attached to the cavity after VTS test. The warm parts and waveguide would be shipped separately and will need to be assembled to the cavity at KEK. The conditioning / status of the coupler will need to be known by KEK personnel in advance such that plans are made for further conditioning as required.
6. The choice of cavities to be delivered will be revisited in September, at ALCPG09 at the latest.
7. Since the FNAL and DESY cavities both use the DESY coupler design, it was suggested that DESY personnel do the coupler installation on all 4 cavities (Akira to further investigate)
8. A means to complete the coverage of the magnetic shielding between the FNAL and DESY cavities at the end of the FNAL cavities needs to be designed. Don Mitchell will look at the mechanical layout of the shielding on the two types of cavities; Mark Champion will see if there are FNAL personnel available to do the magnetic analysis needed before the shielding design is complete. If appropriate, simply field-fitting the parts in place (or some equivalent) may be tried.
9. The bellows between the FNAL and DESY cavities will be supplied by FNAL. It will not have a copper coating.
10. The tooling to support the dressed cavity during string assembly needs to be studied by KEK. Drawings will be supplied to KEK as needed by Tug Arkan. The contact points are known, but the integration of the contact tooling with the KEK rail system needs to be understood and this is best done by KEK. Supply of the tooling seems most direct from KEK as well, but this will be confirmed after the technical study is complete.
11. After completion of HTS testing, FNAL may offer AES1 for shipment to KEK as a mockup to check the KEK tooling integration.
12. Acceptance tests, shipping requirements, accelerometers, and documentation requirements all need to be developed. It is expected that these will be similar to those used by DESY when shipping dressed cavities to FNAL, for instance. AES1 may be an appropriate means to test some of these criteria as well.
13. A complete list of technical data (for example test results, field flatness, Qext, etc) needs to be developed and agreed upon by FNAL and KEK personnel. Again the data supplied by DESY when delivering a cavity may serve as a useful guideline.
14. The FNAL two-phase pipe is 2.875" diameter; the standard DESY pipe is 3" diameter. FNAL is responsible for developing an adapter such that the FNAL supplied components of the two phase pipe can be welded to the DESY pipe; KEK will handle the downstream adaptation of the FNAL pipe to KEK components.
15. Thermal straps for the coupler thermal intercepts will be supplied by INFN.

16. FNAL will prepare the internal cables, controller wires, and instrumentation wiring and associated feed-throughs, in a manner consistent with the cavity being installed in CM2. KEK has responsibility for wiring and controllers external to the cryomodule.
17. INFN will deliver the "T-shape pipe for tuner and RF monitor cables" that the feed-through flanges attach to as part of the vacuum-vessel/cryomodule deliverable directly from INFN to KEK.
18. KEK is responsible for the Gate Valve at the end of the string. The connection of the Gate Valve to the string must be confirmed so the proper hardware is delivered.
19. FNAL will update the solid model so the studs are proper shown and accounted for (as opposed to the bolts currently in the model). The MKS unit is applied for the dimensions and the metric standard is applied for the metric studs/nuts and other components.
20. FNAL invites KEK personnel to attend the HTS testing of cavities AES1 and AES4 (planned for August & September 2009) to get a better understanding of the blade tuner drive system and parameters. It is understood that KEK personnel are very busy so that only short visits are possible. FNAL will provide updates to KEK on the HTS testing schedule.
21. Discussions were held on KEK participation in CM2 assembly and FNAL participation and consultation in S1 Global string assembly. It is understood that FNAL personnel are also very busy and that only short visits of FNAL personnel to KEK can be expected. To satisfy DOE travel rules these visits will have to be arranged well in advance. The S1 Global schedule currently shows this work starting in February 2010; exact dates and participation will be further discussed in the future.
22. FNAL (Don Mitchell) is supplying solid model files to KEK (Norihito Ohuchi) for an exact description of what FNAL is supplying. This is cross checked with the Excel spreadsheet Bill of Materials generated by KEK and discussed at the S1 Global Webex meetings.

In a separate discussion, Jim Kerby and Akira Yamamoto proposed that Jim would be the FNAL S1 Global contact person in the MOU (currently listed as TBD). This is to be confirmed by FNAL management, or a suitable replacement should be found.

Norihito Ohuchi is the primary contact person for S1-Global integration work at KEK and for anyone needing to coordinate a visit to KEK, and Eiji Kako should be the contact for assembling the S1- Global cavity strings including specific assembly tools and fixtures.

The S1-global test plan after the integration shall be discussed further between FNAL, DESY, and KEK, and Hitoshi Hayano will provide a proposal to be reviewed and discussed, hopefully using the occasion of ALCPG.