

ILC R&D Board Task Force on High Gradients (S0/S1)

R&D Program Discussion with TTC

28.9.2006

KEK

Participants:

TTC: Maury Tigner, Peter Kneisel
S0/S1 Taskforce

In the meeting more details related to the single-cell R&D were discussed. After the proposal on the single-cell R&D to optimise the electropolishing process made by P. Kneisel during the TTC Meeting a more detailed discussion on the implementation of this program was done.

R&D Program for Rinsing Processes

Sample Studies

Jlab:

At JLab witness samples will be used throughout the process. These will be analyzed for their field emission properties to allow a quality control of the cavity preparation processes.

A detailed surface analysis using more sophisticated mechanisms (e.g. chemical composition via XPS) has not yet been planned for. Facilities would be available but funding has not been planned for in FY07. This program should be included in the FY08/09 proposal. The surface analysis facilities are used for other projects as well, thus there might arise resource conflicts.

Cornell:

Cornell will propose a program of sample studies on the rinsing processes. This can make use of an EP cell to prepare samples.

DESY

At DESY some witness samples from the EP are studied for their field emission properties at Wuppertal University. This effort does not go as far as the JLab proposal.

Single-cell tests

For the single-cells the goal should be the BCD parameters. This means cavities should achieve 35 MV/m at a Q_0 of 10^{10} . To make results comparable, the more relevant parameters single-cell parameters i.e. B_{peak} and E_{peak} should be cited together with accelerating gradient.

KEK

KEK proposes to implement a thermometry system for single-cells as soon as possible. A joint order together with FNAL should be pursued. The design of the JLab system will be made available. Still, this diagnostic system will not be available for the first tests.

KEK proposes to take over a large part of the single-cell program with 6 cavities: First results on the 'fresh acid recipe'¹ have been shown to reduce the spread of the cavity performance already. The proposal by KEK is to do EP and then try out other of the rinsing sequences (HF, H₂O₂, ethanol). A detailed proposal will be made available soon. This will go in parallel with further re-tests on the existing multi-cells at KEK (see below).

JLab

To support the KEK program possibilities at Jlab are under investigation. Especially, the availability of a thermometry system is a big asset.

Multi-cell

The cavities being send to anther region are expected to be send back to its home region. All laboratories should verify their performance in the HPR systems. Repeated dedicated tests on the HPR process are necessary to ensure repeatability.

On the multi-cells the labs will continue work on their current 'best' processes:

- JLab: Ultrasound treatment after EP and before HPR
- DESY: Further tests on ethanol rinse and short etch will be conducted
- KEK: Will implement the fresh acid recipe on Ichiro-nine-cells

For the tight-loop exchange a rough schedule is being developed:

- JLab will perform the first tight-loops on the long TESLA cavities A6 and A7. These could be sent to KEK provided the performance is sufficient by March 2007.
- DESY will work on getting cavities being send to KEK by May. It is yet to be decided on whether these will have had their tight-loop already.

¹ In this process the cavities after their nominal EP treatment are subjected to a low-pressure water rinse and a 3 um EP with fresh acid from a separate tank.

Hydrogen contamination

The recommendation of the TTC to test all cavities for Q-disease was discussed. This poses an additional load on the test sequence. Nonetheless, the effort of getting more data on the potential existence of Q-disease is urgently needed. Therefore all nine-cells should be tested for Q-disease. A minimum test of every fifth single-cell cavity is needed. At KEK this corresponds to roughly one test for Q-disease per week.

A detailed single-cell program should not be pursued before the end of the rinsing studies or when unexpectedly Q-disease re-appears.

Investigations on homogenous material removal

For the homogenous material removal no detailed program was developed at this point in time. Further simulation studies are encouraged.

Tests on how much material really needs to be removed after the forming process are desirable.

Investigations on the baking time

The baking time needs to be reduced to a minimum time. JLab has had success with a bakeout of 12 hours instead of 48. This would reduce the time for the overall cycle significantly. Tests before the start of the preparation cycles would be desirable.

It will be checked what could be the participation of JLab and DESY in these programs.

Action items

- Write up a S0S1 requirements document for DESY (L. Lilje)
 - Nine-cells for tight-loop
 - Bakeout parameters experiments
- Write up a single-cell test program for KEK following discussion above (K. Saito, H. Hayano, T. Higo)
- Investigate possibilities for single-cells work at JLab (P. Kneisel, J. Mammosser, M. Ross)
- Investigate possibilities for sample studies at JLab (P. Kneisel, J. Mammosser, M. Ross)
- Sample study program at Cornell (H. Padamsee)

To be discussed in the next meetings

- Provide clarification for Helen's question from TTC
- KEK Program Review discussion
- Document preparation for next generation cavity preparation facility
- Prepare S1 document

Next Meeting 10.10.2006 12:00 GMT (14:00 DESY etc.)