

Minutes and Actions of Site Qualification Task Force

Phone Conference – 21st of October 2004

Present: G. Darbo, (G. Gilchriese), M. Garcia-Sciveres, (V. Kostioukhine), L. Rossi, E. Vigeolas.

Excused: D. Giugni, P. Gerlach, F. Huegging,

LBL: Status of pre-production & initial production.

Gil presented the status of production going on at LBL (see:

http://www.ge.infn.it/ATLAS/SQTF/Minutes/Minutes_04-10-21_aux/TaskForceOct212004.ppt). Two preproduction sectors (S9006 & S9007) and two sector of initial-production (S9008 & S9009) are in progress. More in details:

- 9006 – Pre-production sector # 1
 - Assembly and survey completed on September 24. OK
 - Waiting for test system to be completed.
- 9007 – Pre-production sector # 2
 - Assembly and survey completed September 30. OK
 - Thermal test at room temperature so far. OK
 - Room temperature electrical test complete. OK
- 9008 – Initial-production sector # 1
 - Two modules loaded. One was not fully tested: picked up wrong module in cleanroom (procedure now fixed). The module resulted production quality and the sector will be completed as production sector.
 - Room temperature test on module OK, in burn-in.
- 9009 – Initial-production sector # 2
 - Assembly and survey completed on October 19. OK
 - Waiting for test system to be completed.

The status of production chain is the following:

- Room temperature, single module testing, slow source testing is in place and working
- Box for cold testing, cycling and fast source test will just be completed by today.
- Burn-in boards are ready
- Thermal camera/imaging is working
- Will do low temperature soak in an environmental chamber separately to save time.
- There were found contaminants in the heat exchanger (for C6F14) cooling system. The origin is not understood. It is decided to implement a second clean system from scratch with careful attention to cleanliness and leaks. Have also ordered FC-77 to try this route (ala Genoa) if necessary.
- In general, still at least a week, maybe more, from having complete production-quality testing validated.
- No more assembly until full testing system up and working reliably.

The site has to provide as soon as possible a document with the survey, thermal, electrical characterization for the 2 pre-production sectors as it has been decided in the quality procedure for site qualification (ATL-IP-QA-0023). It was accepted that the LBL site goes ahead with the initial production sectors even if the full qualification of the 2 pre-production sectors is not completed to stay on schedule.

The LBL sites can increase the sector assembly rate by 25% respect to the planned one, if needed. This could happen if testing does not get moving.

CPPM: survey results on the FE-I3 stave.

Eric reported that the first pre-production stave (S4013) loading is completed. Survey of the stave showed that modules are positioned in $\pm 40 \mu\text{m}$ in Z from nominal, but 5 modules were displaced $> 50 \mu\text{m}$ (3 modules $\sim 150 \mu\text{m}$). The error in X was due to an operator error. The load position in the loading table has been mistyped. A document will be prepared by CPPM reporting the errors made, the survey results and the procedure change to avoid it in the future.

It has been observed that the long slide (Z movement) of the robot has a rotation of 0.4 mrad when moving along Z. This has implication in X precision of positioning. Eric will investigate if this is in the limit of accuracy of the slide or it is a defective part.

Genova: Report on investigation of placement error in S4008.

At last phone conference, Eric said that he found a placement error due to the slipping of a module while held turned by 90° during glue deposition. A test have been performed at Genova by executing the whole procedure: module pick up, move to stave for tilt angle search, turn by 90° and simulation of glue deposition on stave, back in garage position. The position of the module, in 4 simulated depositions, remained unvaried ($< 30 \mu\text{m}$) after the complete procedure cycle.

To verify a possible source of errors due to sensor or FE chip precision of the cut, 3 modules have been measured. The measurements were done respect to the sensor fiducials for the sensor, and respect to the bonding pad for the FE. The results show a maximum difference of $21 \mu\text{m}$ for the sensor and $12 \mu\text{m}$ for the FE.

All the test and measurements made in the last few weeks did not identified an unique cause for the misplacement of the modules in Z of stave S4008. It has been decided to go ahead with a new stave loading. To improve the precision of the placement the following actions will be taken:

1. The loading will happen for all the modules at the same temperature ($\pm 1^\circ$).
2. The module position in the garage will be checked with the microscope using a reference pattern glued near FE chip #8.
3. A “symmetrization” procedure of module/step distances to find $Z=0$.

A lot of 13 modules are needed for the new stave at the beginning of next week.

Survey: what and how to perform survey.

Vadim told that the detector alignment group considers assigning to a Pixel module 6 parameters (X, Y, Z and 3 angles). This is in the assumption of a pixel module being a straight plane. This is not true in particular for the stave modules where even bow and

twist are not enough to define its surface. Probably other 3 parameters, in addition to the 6 of the alignment group, are necessary (“bow”, “bow variation”, “twist”). In conclusion, the survey must be able to perform a measurement of such 9 parameters. This can be achieved using a 3D measure of several points per module (FE pads). LBL has a smart scope that does such a 3D survey, for the stave the situation is more complicated: optical survey is rather poor in vertical direction whereas touching the back of FE chips is risky. 2D survey in 3 positions of the stave (azimuthally, $\pm 90^\circ$) can be made optically and possibly enough constraints are obtained combining the 3 projections for a 3D module survey.

More study is needed: maybe we can find a new kind of optical probe (for CMM) to make 3D surveys with comparable precision on the 3 axis.

A.o.B.

Cooling: CPPM is planning to use evaporative cooling. They want to find a C_xF_x fluid that can be used as bi-phase coolant at room temperature. This test is meant to verify that it will be possible to use evaporative cooling at room temperature for the half-shell test at CERN. For stave test at CPPM an alternative is the use of alcohol, even if there are some safety concerns.

Genova has its chiller on repair. They added a second chiller to cool down the cold box. The primary chiller will be used only in the stave circuit.

LBL has found contaminants in the C_6F_{14} circuit; they have ordered C_8F_{18} (FC-77) to eventually use in place of the C_6F_{14} .

Alignment: It is considered important to understand better what are the limits in the precision of the module deposition: detector acceptance, module overlap needed for alignment with particles, etc. This is important, not to relax the tolerances in the placement, but to deal with non-conformities: what to do if a module is found exceeding the specification limits.

Next phone conference: Thursday 28th of October 2004 at 17:30

Draft Agenda of next meeting:

1. CPPM: survey results on the FE-I3 stave (document and results from Eric).
2. LBL: report document on 2 pre-production staves (9006 & 9007)
3. Genova: going activities
4. Wuppertal: going on activities.
5. Data summary tables for electrical test: proposal from Module Meeting
6. Stave & Sector info into PDB.

