

Minutes and Actions of Site Qualification Task Force

Phone Conference – 6th of May 2005

Present: (A. Andreazza), G. Darbo, K. Einsweiler, M. Garcia-Sciveres, P. Gerlach, D. Giugni, (C. Glitza), (V. Kostyukhin), L. Rossi, (M. Zdrazil).

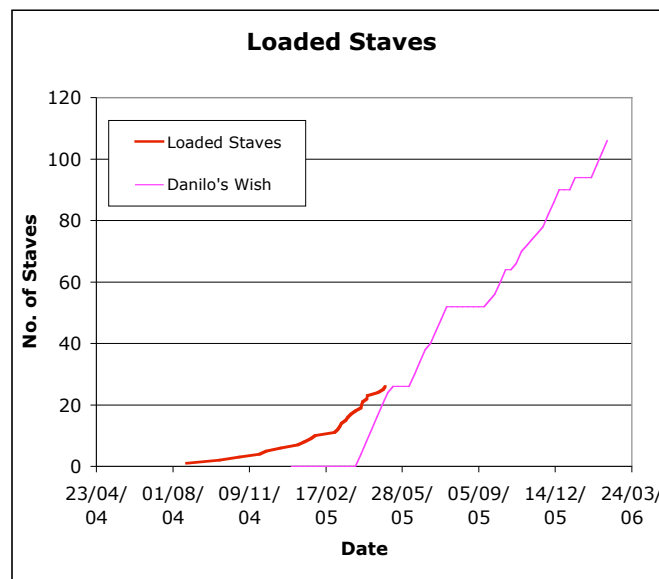
Excused: E. Vigeolas.

Agenda.

1. Status of production and qualification of Staves and Sectors.
2. Module availability for loading.
3. Omega from TMT delamination on staves: What to do? Qualification procedure for already loaded staves, for bare staves and repair.
4. How to treat non conformities: example what we do with staves with single FE dead...
5. Visit at stave loading / testing sites of next week.
6. Shifts at SR building: proposal to make shifts from Monday afternoon to Saturday morning included.
7. SE4445 Glue availability (Jean Claude)
8. Initial production qualification documents.
9. News from SR building (Danilo)

Status of Production and Qualification of Staves and Sectors.

Till today, 26 staves have been loaded in the 3 sites (11 Genova, 8 Marseilles, 7 Wuppertal). The plot below shows the number of loaded staves w.r.t. time (red curve) and the planned need of staves at CERN for loading in the half shell (violet curve).



The status of qualification of each single stave is in:

http://www.ge.infn.it/ATLAS/SQTF/Minutes/Minutes_05-05-06_aux/Summary_050506.xls.

In general only 4 staves from Genova, that have not MCCs potted “a la Bonn” are fully qualified to be loaded on half-shell. All CPPM and Wuppertal loaded staves need re-potting, thermal cycling and fast connectivity test. It was estimated that 2 days/stave is necessary for the re-qualification. CPPM will have 8 staves to re-qualify and Wuppertal/Bonn 7 staves. Bonn will redo the potting of all the Wuppertal staves + the staves from CPPM that are now there: 4042, 4067, 4084 for repair of wire-bonds and 4031, 4015 that were sent to Bonn this week to check missing FE wire-bonds on two modules. The remaining staves from CPPM will be potted at CPPM.

The production of sectors in LBL is going on without serious problems. 24 sectors are ready. The thermal cycle procedure has been modified, implementing now 10 thermal cycles between $\pm 30^{\circ}\text{C}$, from the previous cycling of the sector at -30°C only once for several hours. This is to find possible weakness in MCC wire-bonds.

Module Availability for Loading.

Not discussed, because after next week loading the production will be stopped until stave delamination problem will be under control (see next).

Omega from TMT Delamination on Staves

Today there are two loaded staves (one in Genova: S4030, and one in Wuppertal: S4029) and two bare staves (one in CPPM: 4079, and one in Wuppertal: 4049) that have shown delamination of the omega from the TMT, Charlie has documented with some photos the delamination occurred on the bare stave:

http://www.ge.infn.it/ATLAS/SQTF/Minutes/Minutes_05-05-06_aux/Delam1_Wtal.jpg

http://www.ge.infn.it/ATLAS/SQTF/Minutes/Minutes_05-05-06_aux/Delam2_Wtal.jpg

http://www.ge.infn.it/ATLAS/SQTF/Minutes/Minutes_05-05-06_aux/Delam3_Wtal.jpg

http://www.ge.infn.it/ATLAS/SQTF/Minutes/Minutes_05-05-06_aux/Delam4_Wtal.jpg

Genova also delaminated an old and already broken stave to see what happens:

http://www.ge.infn.it/ATLAS/SQTF/Minutes/Minutes_05-05-06_aux/Delam1_GE.jpg

http://www.ge.infn.it/ATLAS/SQTF/Minutes/Minutes_05-05-06_aux/Delam2_GE.jpg

The failure, in some cases, appears to be due to excessive force, causing the TMT to fracture (the glue joint is still OK and bonded to the carbon-carbon). This is the expected failure mode for a properly fabricated stave, and suggests that improved handling rules are required to make sure no excessive displacement forces or torques are applied to the cooling pipe during testing operations. However, it would seem that other cases, such as the recent delamination seen in Wuppertal, might be a failure of the glue bonding. In both cases we need a procedure that test for the weakness in the produced staves and to use handling procedures. Danilo proposes to apply a 2 N load to the Al pipe of all staves with 20 cycles to test the quality of the gluing or weakness of the carbon-carbon of the TMT surface. This procedure favoured by Danilo, does not test the weakness for applied torque that happens during screwing/unscrewing caps or fittings for cooling. It was also felt the need of destructive tests on a few staves to verify the breaking limit for orthogonal forces

to the pipe ends or for torque. We plan to use a couple of already trashed bare staves to do such measurements. Danilo is also in favour of making provisional fittings that are put on the pipes before module loading and they stay attached to it until the stave reach CERN where he claims that the procedure for removing the fittings is well defined and safe. He claims that a drawing of such fittings (made by a 1.5 cm Al part and a 10 cm flexible pipe) exists and Marseille must be in charge to produce them in quantity. There were several objections to this proposal, like the adding of a part exciding by several centimetres the pipe can increase the risk of apply unwanted stress during stave handling. There is also a suspect that the unscrewing aluminium caps from the aluminium pipe, that some times is very difficult, could be the cause of the delamination. In this case we have to use procedures that limit the torque from the beginning when the cup are removed the first time.

In conclusion both destructive (on a sample of staves) and not destructive (on all bare and loaded staves) tests of torque and force must be done. Also tools for reducing the torque in normal operation are necessary and must be qualified. The advantage in the use of semi-permanent fittings is more questionable.

Stave loading will be suspended after next week (loading may still happen next week to permit demonstration of loading to the visiting task force members) until a qualification procedure to test delamination will be set-up. Danilo is in charge to define it.

How to treat non-conformities

Some loaded staves have shown non-conformities: significant module displacement from nominal position ($> 50 \mu\text{m}$), significant bow ($> 100 \mu\text{m}$) and dead FE chips. For the module position and bow we have treated them with penalties, for staves with a single FE not responding it must made investigation and report the kind of problem. If the solution of the problem requires the replacement of the module, it is advisable to live with the dead FE that contributes for 0.5 % of the total number of pixel in the stave. In general non-conformities must be reported and discussed at SQTF meetings.

Visit at stave loading / testing sites

Giovanni informed of the trip plan to CPPM/Bonn/Wuppertal/Genova that he will do together with Maurice the next week. The 4 sites must organize themselves to show all the aspects related to stave activities to the task force representatives.

Shift in SR building

Giovanni presented a request to make the weekly shift in SR building starting the afternoon of Monday and ending Saturday at noon. This make easier for people non-resident at CERN to leave their home institute on Monday morning and be back on Saturday, saving a day.

SE4445 Glue availability

Jean-Claude, excused in the meeting, sent a message informing that he ordered 60 tubes of SE4445 glue having expire date December 2005. Glue should arrive end of May and 20 tubes will be provided to Genova and Wuppertal. He also sent 2 tubes (expire date 10 June) to Genova.

Initial production qualification documents

Still no document, required after the initial stave loading production, has been made available by Genova, CPPM and Wuppertal.

News from SR building (Danilo)

Cabling of staves is made difficult by insertion of Elco connectors on the module pigtailed. This operation is made more critical by the need of higher than normal insertion force in the last received cables. A tool is in preparation to block the pigtail connector, and release the strain applied to the stave by pushing on the connector. Cables for new staves will be not available next week and new bi-stave cannot be assembled. Danilo reported that two Bonn modules on two of the four Marseille staves at CERN have missing wire-bonds on several FE. Giovanni and Kevin said that they could be redundant bonds, like GA, that have not made on purpose or used as additional pull test. Because the visual inspection did not clearly identified the missing wires any more conclusion was difficult to draw. Danilo decided to send the two staves that also need MCC re-potting, to Bonn. The other two Marseille stave must go back to Marseille for same MCC re-potting and new thermal cycling and test.

Next phone-conference: Thursday 19th of May at 17:30.