

# Minutes and Actions of Site Qualification Task Force (SQTF)

## Phone Conference – 2<sup>nd</sup> of February 2006

(Continued on 6<sup>th</sup> and 7<sup>th</sup> of February)

*Present (02/02/2006):* J.C. Clemens, G. Darbo, F. Djama, K. Einsweiler, M. Gilchriese, D. Giugni, C. Glitza, M. Garcia-Sciveres, N. Hartman, V. Kostyukhin, R. Madaras, E. Vigeolas, (+ somebody joining later, – somebody leaving earlier)

*Present (06/02/2006):* J.C. Clemens, M. Cristinziani, G. Darbo, W. Dietsche, K. Einsweiler, M. Garcia-Sciveres, P. Gerlach, D. Giugni, V. Kostyukhin, G. Lenzen, W. Ockenfels, A. Rozanov, E. Vigeolas, F. Zetti (+ somebody not announcing himself)

### **Agenda**

1. Results from CPPM loaded stave after long shutdown;
2. Results from Genova loaded stave after long shutdown;
3. Availability of staves for loading;
4. Bare Stave acceptance document for loading (ATL-IP-ES-0119);
5. Updated version of the "Data Summary Tables" template;
6. Actions from Site Visit no.2;
7. MCC repair on loaded stave.

### **1. Results from CPPM loaded stave after long shutdown.**

CPPM has completed the loading of stave S4111. The stave is under electrical test. After thermal cycles the stave developed an electrical short ( $\sim 3 \text{ k}\Omega$ ) between pipe and TMT (23/1/2006). Module bow is still an issue. Jean Claude presented the measurement of bow for the modules loaded on the stave before and after cutting from frame and after loading on stave. Each operation increases the bow of the modules. In average the bow after cutting from frame increases of  $10 \mu\text{m}$ ; while after loading it adds up other  $17 \mu\text{m}$ . More details in the email of Jean Claude:

[http://www.ge.infn.it/ATLAS/SQTF/Minutes/Minutes\\_06-01-19\\_aux/JCC\\_bow\\_of\\_modules.rtf](http://www.ge.infn.it/ATLAS/SQTF/Minutes/Minutes_06-01-19_aux/JCC_bow_of_modules.rtf). Jean Claude also updated on the thermal measurement made on stave S4045 that had a D-shaped tube inserted. This stave was equipped with 13 silicon heaters and thermal performance was measured before pipe insertion, after pipe insertion and after 30 thermal cycles between  $\pm 30^\circ\text{C}$ . The pipe insertion degraded the  $dT/W$  by 8.5% in average, and no worsening was observed after cycling. More explanation in the email of Jean Claude:

[http://www.ge.infn.it/ATLAS/SQTF/Minutes/Minutes\\_06-01-19\\_aux/JCC\\_dTW\\_S4045.rtf](http://www.ge.infn.it/ATLAS/SQTF/Minutes/Minutes_06-01-19_aux/JCC_dTW_S4045.rtf)

and in the associated tables and plots:

[http://www.ge.infn.it/ATLAS/SQTF/Minutes/Minutes\\_06-01-19\\_aux/S4045\\_kaptonHeaters.xls](http://www.ge.infn.it/ATLAS/SQTF/Minutes/Minutes_06-01-19_aux/S4045_kaptonHeaters.xls)

## **2. Results from Genova loaded stave after long shutdown**

Vadim reported on the stave S4108 loaded with modules last week. It is not surveyed and tested yet. Vadim said that he tested the SE4445 glue polymerization after 1 hour at 27°C and he found that it is still very liquid. For last 5÷6 modules he prepared the glue ½ hour before using, and he found that this technique works and can reduce the loading time per module from 2 to 1 ½ hours. Genova for the moment thinks to increase the loading hours/days to fulfil the production rate.

## **3. Availability of staves for loading.**

Giovanni and Vadim reported in the Integration phone-conference that all the staves repaired have shown electrical short between pipe and TMT. In some case the shorts appeared and disappeared afterwards. All the staves that did not show electrical short initially, when cycled at low temperature shown shorts (in some case they disappear when temperature rises again). Sasha questioned if electrical isolation of a few kΩ would be enough and we could accept in this situation of the project. We agreed to do a test with the insertion of a fishing wire of 75µm every 5 cm transversal to the stave. These wire segments should keep the pipe separated from the TMT avoiding electrical shorts. A report on the obtained results will be given in a special phone conference on Monday 30<sup>th</sup> of January. If this works, stave repair will start at full speed. For the time being no staves will be loaded.

## **4. Bare Stave acceptance document for loading**

Giovanni informed that a new procedure have been set up for accepting bare stave before loading. The new procedure: ATL-IP-ES-0119, is on EDMS (<https://edms.cern.ch/document/694067>). The file to be printed and filled for each stave has been put on the "Templates" page of the SQTF WEB page: <http://www.ge.infn.it/ATLAS/SQTF/>

## **5. Updated version of the "Data Summary Tables" template**

Giovanni said that he has updated the "Data Summary Table" template. The new version (v.2.2) has been put on the SQTF template page.

## **6. Actions from Site Visit No.2.**

Maurice went through the action list from the second Site Visit. Only Genova and CPPM were available to comment on the status. The updated lists of actions with their completion status are available:

- CPPM: [http://../QA\\_Reports/CPMM2-actions-rev3.doc](http://../QA_Reports/CPMM2-actions-rev3.doc) (update 23/1)
- Genova: [http://../QA\\_Reports/Genova2-actions-rev4.doc](http://../QA_Reports/Genova2-actions-rev4.doc) (update 23/1)
- Wupperta; [http://../QA\\_Reports/Wuppertal2-actions-rev2.doc](http://../QA_Reports/Wuppertal2-actions-rev2.doc) (no-update)

It was decided to update the action status at every SQTF phone-conference. The documents from the Site Visit are available in the "Documents" page of the SQTF: [http://www.ge.infn.it/ATLAS/SQTF/home\\_frames/home\\_Documents.html](http://www.ge.infn.it/ATLAS/SQTF/home_frames/home_Documents.html).

## **7. MCC repair on loaded stave.**

Markus reported on the status of MCC repair on loaded staves. A total of 23 staves are in Bonn or were in there for MCC repair. 19 staves have been repaired. For more details see:

[http://www.ge.infn.it/ATLAS/SQTF/Minutes/Minutes\\_06-01-19\\_aux/StaveRepairBonn.xls](http://www.ge.infn.it/ATLAS/SQTF/Minutes/Minutes_06-01-19_aux/StaveRepairBonn.xls).

According to the initial list of MCC that need repair (see: [http://www.ge.infn.it/ATLAS/SQTF/Minutes/Minutes\\_05-10-11\\_aux/MCC\\_encapsulation.xls](http://www.ge.infn.it/ATLAS/SQTF/Minutes/Minutes_05-10-11_aux/MCC_encapsulation.xls)), there are still 8 staves that must be shipped to Bonn:

- CPPM: S4031
- Genova: S4004, S4007, S4021, S4075, S4078
- Wuppertal: S4027, S4055.

Transport of the above staves to Bonn must be organized during the February ID week.

## Phone Conference Continuation – 6<sup>th</sup> of February 2006

*Present (06/02/2006):* J.C. Clemens, M. Cristinziani, G. Darbo, W. Dietsche, K. Einsweiler, M. Garcia-Sciveres, P. Gerlach, D. Giugni, V. Kostyukhin, G. Lenzen, W. Ockenfels, A. Rozanov, E. Vigeolas, F. Zetti (+ somebody not announcing himself)

The main discussion was on the status of repair/new staves and the problems encountered with the electrical shorts between omega/TMT and pipe. Danilo reported that he discussed with S. Sgobba, who pointed out strong concerns of corrosion issues given by the carbon penetrating the parylene and going in contact with the aluminum of the pipe. Carbon is even worse than nickel from the point of view of chemical potentials for corrosion. It is anyhow difficult to to quantify the risk of corrosion in term of time, being necessary the presence of water (or some electrolyte) for corrosion to take part. It is possible to do accelerated test of corrosion with a quantified extrapolation to the situation present in ATLAS, but this is expensive (20÷40 kSFr) and takes rather long time.

Giovanni corrected himself on the optimistic message he circulated last Friday to the SQTF telling that after few thermal cycle the last two produced staves did not show electrical short. A measurement made after longer temperature cycling (~50 cycles) shows up that both staves have a conductive path (S4034 - 40k $\Omega$ , S4058 - 4M $\Omega$ ). Other measurements done by Danilo and Eric are indicating that the transverse wires used as separator between TMT and pipe would not work.

CPPM did long thermal cycling of the repaired stave (S4022), they received for loading. and after 30 cycles there is no short. This stave used longitudinal 120  $\mu$ m cotton wires as separators.

We had long discussion on possible alternative to avoid the contact of carbon dust to pipe:

1. Pipe anodization. Hard anodization of pipes takes of the order of 1 month and then it is necessary to qualify the procedure. The cost for anodization is 290 SFr/pipe.
2. Insertion of a kapton between pipe and TMT. It is not easy to put a thin kapton (12.5 or 25  $\mu$ m) between two layer of grease (on the side facing pipe and on the one facing TMT). A part from the difficulties in the procedure it is again

necessary to qualify the thermal behavior, that degrade very fast in presence of layers of air.

3. Other option discussed was the gluing the pipe to the TMT. The worry here being the mechanical deformation of the whole structure in case of temperature change.

The general feeling was that the Pixel schedule does not allow the investigation of alternatives that require not negligible manpower, time and resources. The risk of missing the readiness of the detector for the installation is possible bigger than the electrical contact of the carbon dust to the pipe.

After long discussion was decided to proceed in the following way:

1. CPPM and Wuppertal can start loading the two repaired staves that do not show electrical shorts (S4022 and S4102).
2. Giovanni will make a summary of the repaired staves, good from all the aspect but shorts. In the meeting of tomorrow will be discussed if and where to use them for loading
3. Genova will continue to repair staves using  $100\div 120 \mu\text{m}$  monofilament wires longitudinal under the omega wings. It looks the most positive in the result obtained (unfortunately with a single case statistics).

We have also discussed the presentations to the next ID week for the SQTF meeting. Giovanni proposed the following talks:

1. Site visit no.2: results and actions (Giovanni in absence of Maurice)
2. MCC repair on stave (Bonn)
3. An update on tools readiness for qualification (Claudia)

Giovanni asked to CPPM and Wuppertal to propose a couple of additional talks they think are useful for discussion.

For the next future both Integration and SQTF will run weekly. To have them the same day is difficult. It is proposed to have SQTF on Tuesday after the Service Meeting.

### **Phone Conference Continuation - 07/02/2006**

*Present:* M. Cristinziani, G. Darbo, W. Dietsche, K. Einsweiler, C. Glitza, M. Garcia-Sciveres, P. Gerlach, D. Giugni, V. Kostyukhin, G. Lenzen, W. Ockenfels, A. Rozanov, E. Vigeolas, F. Zetti (+ somebody not announcing himself)

The phone conference was called for deciding on the use of already reassembled bare stave made in Genova. Up to day there are 15 bare staves reassembled. The full list being:

[http://www.ge.infn.it/ATLAS/SQTF/home\\_frames/home\\_StaffRepair.html](http://www.ge.infn.it/ATLAS/SQTF/home_frames/home_StaffRepair.html).

As conclusion of the discussion we had in the yesterday phone conference, we do not have a way of avoiding completely electrical shorts between pipe and TMT that can be applied to the current design of the stave. The attempt to keep a controlled grease

thickness, by using transversal wires. with the hope that would prevent shorts was found unsuccessful after thermal cycling of the staves. It seems even more doubtful after analysis of the TMT surface under the effect of friction with sliding parts on it.

You find information and results of the investigation made at:

- CPPM:  
[http://www.ge.infn.it/ATLAS/SQTF/Minutes/Minutes\\_06-02-02\\_aux/ParylenFaillure.pdf](http://www.ge.infn.it/ATLAS/SQTF/Minutes/Minutes_06-02-02_aux/ParylenFaillure.pdf)
- IVW/Wuppertal:  
[http://www.ge.infn.it/ATLAS/SQTF/Minutes/Minutes\\_06-02-02\\_aux/insulation%20test.pdf](http://www.ge.infn.it/ATLAS/SQTF/Minutes/Minutes_06-02-02_aux/insulation%20test.pdf)
- Genova (photos of a delaminated stave after thermal cycles, where the grease has made a peel off of TMT surface, i.e. carbon dust):
- <http://www.ge.infn.it/ATLAS/SQTF/StaveRepair/Production/QCsheets/S4071/surface/>

Giovanni summarized the status of reassembled staves. He clearly stated that none of the staves can be considered fully in the specs, but two of them can be accepted for loading (in addition to the one already loaded or in the Sites waiting for). The full list of staves reassembled with a brief history and links to the qualification sheets/plots can be found at:

[http://www.ge.infn.it/ATLAS/SQTF/home\\_frames/home\\_StaveRepair.html](http://www.ge.infn.it/ATLAS/SQTF/home_frames/home_StaveRepair.html)

From that list there are:

- S4051(#1), S4026(#2): that have been made without kapton between omega and pipe. They cannot be used for loading, at least for the moment.
- S4201(#3): stave was non production. Not to be used for loading.
- S4112(#4): pipe is glued to omega. Not to be used for loading.
- S4114(#5): slightly out of limit torsion. It is proposed to be used for loading.
- S4108(#6): Loaded at Genova
- S4111(#7): Loaded at CPPM
- S4109(#8): has large torsion. Not usable for loading.
- S4063(#9): Can be used for loading
- S4022(#10): At CPPM. Never seen shorts. Can be used for loading.
- S4071(#11): destroyed
- S4127(#12): destroyed
- S4102(#13): At Wuppertal. Never seen shorts. Can be used for loading.
- S4034(#14) and S4058(#15): under qualification.

In conclusion the proposal is to load the two staves already in CPPM (S4022) and Wuppertal (S4102), ship S4114 to CPPM and load S4063 in Genova. The attendees to the meeting accepted the proposal.

We have also decided to continue reassembly at full speed in Genova using longitudinal monofilament nylon wires as spacers between omega and TMT.

We next discussed to have a look at pipes from old staves (delaminated in Genova) to see if there is any evidence of corrosion induced by carbon dust on the outer aluminum surface.

### ***Staves for initial test of pipe insertion.***

Giovanni proposed to use S4004 (Genova) or S4031(CPPM) as a first staves to test pipe insertion. The first one is the preproduction stave made in Genova in 2004 and it was

extensively used for System test for about one year. The second one is the stave that has seen ~1000 thermal cycles to investigate the encapsulation problems in the MCC. Because S4031 is delaminated on one side, and this would make less significant the the test of the thermal performance, it was decided to use S4004. Stave S4004 will be tested again in Genova before shipping to CERN. It will be taken to CERN next week.

### ***MCC repair.***

There are still 8 stave that must be sent to Bonn for MCC repair:

- CPPM: S4031
- Genova: S4004, S4007, S4021, S4075, S4078
- Wuppertal: S4027, S4055.

They ones in Genova and CPPM will be transported to CERN during the ID week. Genova will also transport the remaining staves still there.

### ***Presentation at the SQTF meeting in the ID week.***

The list of talks for the SQTF at the ID week is:

1. SQTF Issues and report on Genova Site (Giovanni/Genova)
2. Report on CPPM Site (speaker to be decided/CPPM)
3. Report on Wuppertal Site (speaker to be decided/Wuppertal)
4. Readiness of tooling for Loaded stave qualification (Claudia/Genova)
5. Report on MCC repair (speaker to be decided/Bonn)

On point 1-3 the speaker must also go through the Action list defined after the second "Site Visit". Last version of the action list is available on the "Documents" page of the SQTF WEB page.

### ***SQTF meetings***

It has been discussed to separate the Integration from the SQTF meetings in the future. Both will have a weekly basis until the situation is more stable. We decided to have the SQTF on every Tuesday at 16:30. Next meeting will be held on the 21st of February.

*Next SQTF phone conference will be on Tuesday 21<sup>st</sup> of February 2006.*