

# Minutes and Actions of Site Qualification Task Force

## Phone Conference – 16<sup>th</sup> of September 2004

*Present:* G. Darbo, (G. Gilchriese), M. Garcia-Sciveres, D. Giugni. P. Gerlach, F. Huegging, E. Vigeolas.

*Invited:* V. Kostioukhine.

*Excused:* L. Rossi.

### ***Loaded Stave Cross-Survey.***

Vadim reported on the cross-survey analysis of S4000 CPPM stave with the new Wuppertal measurements. Wuppertal made a second survey of the stave. Comparison of the measurements amongst CPPM/Genova/Wuppertal are in the logsheet:

[www.ge.infn.it/ATLAS/SQTF/Minutes/Minutes\\_04-09-16\\_aux/Survey\\_S4000\\_Wup\\_Ge\\_CPPM.xls](http://www.ge.infn.it/ATLAS/SQTF/Minutes/Minutes_04-09-16_aux/Survey_S4000_Wup_Ge_CPPM.xls)

Considerations on the results:

- Z: the new Wuppertal data are in better agreement with Genova showing a ~10µm difference (mainly a constant offset), while the comparison with CPPM shows an offset having a linear trend between 10 µm and 40 µm.
- X: in this case the major effect is the variation of stave bow that produces a difference up to 80÷100 µm in the centre of the stave.

Vadim, who presented the results, has the feeling that the major source for errors is the error in the optical survey of the ruby ball centers.

The stave S4000 is going back to CPPM (should be already there). Eric will make further survey measurements on S4000 using both optical camera and touching probe.

### ***CPPM: Change of Loading Procedure & Qualification***

Eric explained the reason of the error in the module positioning on the S4012 stave (see minutes of previous meeting:

[http://www.ge.infn.it/ATLAS/SQTF/Minutes/Minutes\\_04-09-16.doc](http://www.ge.infn.it/ATLAS/SQTF/Minutes/Minutes_04-09-16.doc)) and the test he did to check that now the robot is well aligned (see appendix). The SQTF thinks that the CPPM explanations and the changes in the procedure that they want to implement should avoid the happening of errors in positioning: *CPPM is qualified for preproduction and use of FE-I3 modules*. Eric asked to have, as soon as possible, 15 FE-I3 modules. Maurice presented a table with ranked modules including the 15 modules for CPPM (6 Bonn, 6 Genova, 3 Dortmund) (see:

[www.ge.infn.it/ATLAS/SQTF/Minutes/Minutes\\_04-09-16\\_aux/barrel-ranked-available.xls](http://www.ge.infn.it/ATLAS/SQTF/Minutes/Minutes_04-09-16_aux/barrel-ranked-available.xls)).

The modules will be sent next days pending the final agreement of the Module TF.

### **Genova: Measurements on the FE-I3 stave (S4004).**

Genova, since the last SQTf meeting, has made thermal and electrical test. Giovanni showed and commented the results in the “Data Summary Table” (see:

[http://www.ge.infn.it/ATLAS/SQTf/DataSummaryTables/initial-qualification/S4004\\_InitQualifGenova.xls](http://www.ge.infn.it/ATLAS/SQTf/DataSummaryTables/initial-qualification/S4004_InitQualifGenova.xls)):

- Thermal measurements give a value of the thermal resistance (DT/W) of 1.27°C/W at T=17°C and of 1.52°C/W at t=-17°C.
- It was observed that a reduction of the chiller pump (flux) level has the effect of increasing the value of DT/W. This is probably explained by fluid regime being turbulent or laminar. The Genova group wants to try to increase turbulence in the cooling pipe to verify if this has the supposed effect.
- Electrical test has been performed only at room temperature (~17°C) and compared with the equivalent test after module burn-in. No effect of loading damage is visible (see BURN/LOAD results in the table).
- 10 Thermal cycles have been performed between -18°C and +30 °C. No results at low temperature have been shown, being they not completed yet (FLEX/STAVE test). The reason of the delay was an intermittent fault of the TPLL that implied the redoing of several module tests.

There is no news on the survey of the stave and on the comprehension of the origin of the misplacement in Z of the modules. It is planned to do some test and modification of the loading procedure next week, when Mauro and the technician (Franco Vernocchi) who made the Robot will be both back from holiday.

### **Wuppertal: Result from the 4-module FE-I3 stave.**

Peter commented the “Data Summary Table”:

[http://www.ge.infn.it/ATLAS/SQTf/DataSummaryTables/pre-qualification/S4020\\_StavePrequalWtal.xls](http://www.ge.infn.it/ATLAS/SQTf/DataSummaryTables/pre-qualification/S4020_StavePrequalWtal.xls).

- Survey results looks very good (all the modules are in the  $\pm 50\mu\text{m}$  from nominal position). It has been requested that Peter sends the survey raw data to Vadim to make independent analysis.
- Bow, tilt and slope angle measurements are missing.
- Thermal resistance is well in the requested limit; only module M6A has a significant higher value, probably due to input heat from thermal contact in the cradle support. Missing thermal resistance at negative temperature.
- Ten thermal cycles made between -17°C and +25 °C.
- Electrical test have been performed for all the modules at room temperature. The comparison with the pre loading results (FLEX) has shown an increase of the “no. of bad bump candidates”. Better understanding is needed. FLEX test is made at negative temperature, while the one called STAVE is at room temperature (it should be called LOAD); results must be compared at similar temperature.

On survey subject, Peter asked Vadim to have his analysis program, Vadim replayed that he has not a program ready for distribution because he has mainly made a set of macros and he still does a lot of manual transformation due to non-uniformly defined input raw data.

It has been decided that the S4020 will be send to CPPM to do a cross-survey.

When measurements will be completed, and there will be no doubt of module damage during loading, Wuppertal will be considered for qualification. This may happen at the time of next Pixel week.

### ***LBL: Non-production FE-I3 Sector results (S9000)***

Gil informed that they have completed yesterday the sector S9000 made by FE-I3 modules of non-production quality. The test of the front side is OK, the backside will be tested soon. The data summary table must be filled too. Gil said that they have a buffer of 50 modules and that they want to start soon production (what is stopping them is old glue). For the first month they foresee one module/week production rate.

### ***Pixel Week talk organization.***

Giovanni informed that 2 hours have been allocated in Bonn (Thursday 30 September) for the “Stave/Sector loading” session. After some discussion the following talks/arguments must go into the Agenda:

1. Module Loading Site Qualification Status (Giovanni)
2. Survey: results, optimal procedures and limits (Vadim)
3. Production test and results organization in the raw data base (Claudia)
4. Stave/Sector production schedule and plans (Maurice)

We also have space for one or two other (short) talks. The problem of where to assemble half shells and bi-staves, addressed in the Marseille’s Workshop for the first time, will be revised in the Bonn Pixel Week. The issues will be discussed in specific talks in the Integration session. Danilo will reserve some space for them in the session.

### ***A.o.B.***

Giovanni has prepared a proposal for the new version of the Data Summary Table (for stave):

[www.ge.infn.it/ATLAS/SQTF/Minutes/Minutes\\_04-09-16\\_aux/StaveInitQualifTemplate.v1.2.xls](http://www.ge.infn.it/ATLAS/SQTF/Minutes/Minutes_04-09-16_aux/StaveInitQualifTemplate.v1.2.xls).

This table will become official, once correction and changes will be implemented from received comments. The equivalent version for sectors will be made by strip down of 7 modules from the table. Once the two tables will be ready they will be used for the next production staves and sectors. It is advisable that in the future analysis programs automatically generate the summary logs.

Next meeting: Thursday 30<sup>th</sup> of September 2004 in Bonn

## **Appendix: Eric email of 10/9/2004**

What follow is the explanation, provided by CPPM, of the error made in the loading of their second FE-I2 stave (S4012). It also includes the modification to the load procedure they want to implement to avoid bad positioning of modules on stave. This was requested by the RPDSG of the 8/9/2003 to qualify CPPM to start FE-I3 pre-production.

We made all the tests to control the modifications we made on our tool to confirm that the troubles we met on the last stave were solved.

1. The first modification was to have on the robot control a load threshold during all the motions made with modules. In the previous software the load threshold was only imposed during the module deposition on the glue. This involved damages risks when the robot picks up the module on the "garage" position if the module envelope is not correct (Flex bowing for example) or if the module is not properly placed on it. We have now a direct stop of the robot motors if the load excess 20 gr.
2. The second modification was to route the camera cables properly to avoid any influence on the measurement accuracy. This has been done using the CMM cable path. We controlled also the CMM accuracy over 10 different places under the CMM the maximum error found was  $5 \mu\text{m}$ ; which is acceptable. Right after this control we proceed to the robot realignment under the CMM (the misalignment found was  $>200\mu\text{m}$  over half of the stave length). The robot long axis is not aligned under the CMM with an angle bellow  $0.002^\circ$ .
3. The last operation we made was to align a stave on the robot and to put glue points on a line at X constant in the stave frame. The Axis formed with the 13 points was aligned with the stave Z-axis with an angle below 0.001 degree (limit of our CMM measurement capability).
4. Finally, it was decided to control frequently during a stave assembly phase if the stave remains aligned under the CMM, to avoid any misalignment involved by manipulator mistakes.

I think that we made all the controls and modifications to ameliorate our tool and procedure. I therefore request the CPPM qualification to start the FE-I3 modules assembly preproduction.