

# Minutes and Actions of Site Qualification Task Force

## Phone Conference – 2<sup>nd</sup> of September 2004

*Present:* G. Darbo, (K. Einsweiler), G. Gilchriese, D. Giugni, P. Gerlach, E. Vigeolas.

*Invited:* C. Glitza, V. Kostioukhine.

*Excused:* M. Garcia-Sciveres, F. Huegging, L. Rossi, J.C. Clemens (invited).

### ***Bare and Marseilles Loaded Stave Cross-Survey.***

The cross-survey of the 2 bare staves (S4019 and S4023) and of CPPM loaded stave (S4000) are completed.

#### ***Bare stave S4019, S4023.***

The two bare staves have been surveyed in CPPM, Genova and Wuppertal. The survey is made using a touching tip. The two staves are now back in CPPM. Unfortunately the shipping from Genova to Marseilles has damaged both staves. The results from all the measurements of these two staves in reported in table 1.

Stave	Site	Ruby ball 1		Ruby Ball 2	
		Z (mm)	X (mm)	Z (mm)	X (mm)
4019	CPPM 1	-413.092	-6.036	412.941	-5.635
	CPPM 2	-	-	-	-
	Genova 1	-413.094	-6.039	412.935	-5.633
	Genova 2	-413.093	-6.029	412.924	-5.628
	Wuppertal	-413.077	-5.613	412.931	-5.613
4023	CPPM 1	-413.185	-5.919	412.941	-5.81
	CPPM 2	-413.207	-5.919	413.919	-5.81
	Genova 1	-413.206	-5.913	412.916	-5.798
	Genova 2	-413.209	-5.913	412.913	-5.788
	Wuppertal	(?)-413.309	-5.871	(?) 412.795	-5.759

Table 1. Ruby ball position, in “load reference system” for the two bare staves, as measured by the 3 module loading sites.

From the table 1, it can be seen that we reached an agreement ~20  $\mu\text{m}$  in general between 3 sites (except for one Wuppertal measurement which clearly looks like an error). We think that now the situation with the bare stave measurements/load reference frame construction is clear.

Marseilles will now perform the survey of all the bare staves updating the PDB values. Also the bow of the staves will be measured and put in the PDB. A sample of 10 % of the bare staves will be also surveyed by Genova for cross-check, The raw survey measurements files will be put in the raw data base under .../StaveID/SURVEY/01/ path.

More detailed results of the [www.ge.infn.it/ATLAS/SQTF/Minutes/Minutes\\_04-09-02\\_aux/ComparisonStaves.xls](http://www.ge.infn.it/ATLAS/SQTF/Minutes/Minutes_04-09-02_aux/ComparisonStaves.xls)

**CPPM Loaded stave (S4000)**

The survey of the CPPM loaded stave has been made by CMMs equipped by a TV camera for Z, X, (Y) measurements. Bow measurements have been made by a touching probe at CPPM, while Genova/Wuppertal used the camera. Results coincide for bow, slope, while are in disagreement by ~50 μm in Z (CPPM/Genova/Wuppertal) and by ~40 μm in X between CPPM and Genova/Wuppertal. Results of the cross survey are shown in:

[www.ge.infn.it/ATLAS/SQTF/Minutes/Minutes\\_04-09-02\\_aux/CPPMStaveRes.xls](http://www.ge.infn.it/ATLAS/SQTF/Minutes/Minutes_04-09-02_aux/CPPMStaveRes.xls)

and in:

[www.ge.infn.it/ATLAS/SQTF/Minutes/Minutes\\_04-09-02\\_aux/Survey\\_S4000\\_Wup\\_GE\\_CPPM.xls](http://www.ge.infn.it/ATLAS/SQTF/Minutes/Minutes_04-09-02_aux/Survey_S4000_Wup_GE_CPPM.xls).

The main results are shown in the figs.1-4.

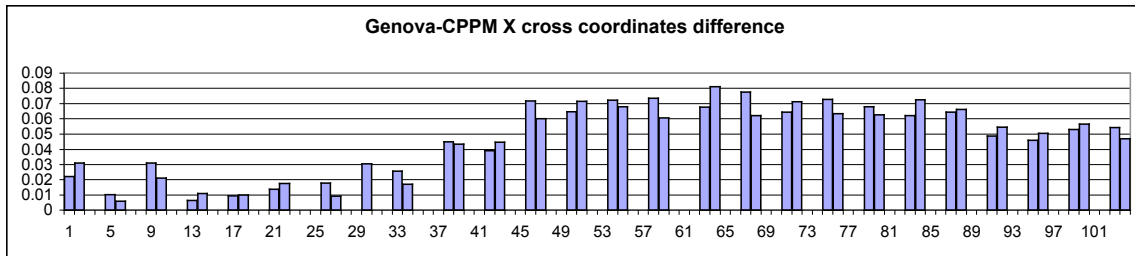


Fig.1: difference between X of the sensor fiducial measured by Genova and CPPM.

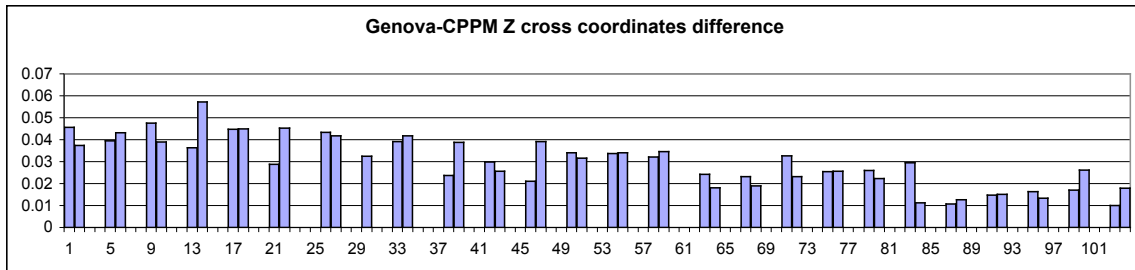


Fig.2: difference between Z of sensor fiducials measured by Genova and CPPM.

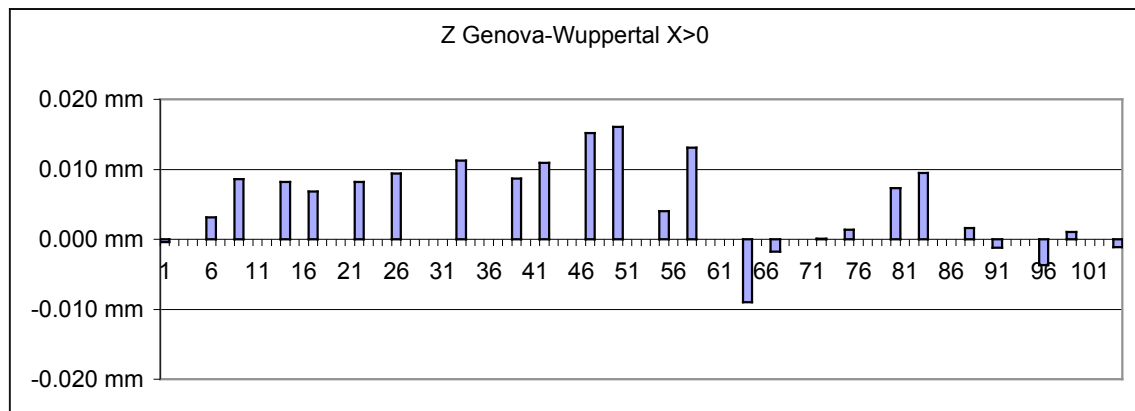


Fig.3: difference between Z of sensor fiducials measured by Genova and Wuppertal. Only fiducials at X>0 are in the plot. Error is very small.

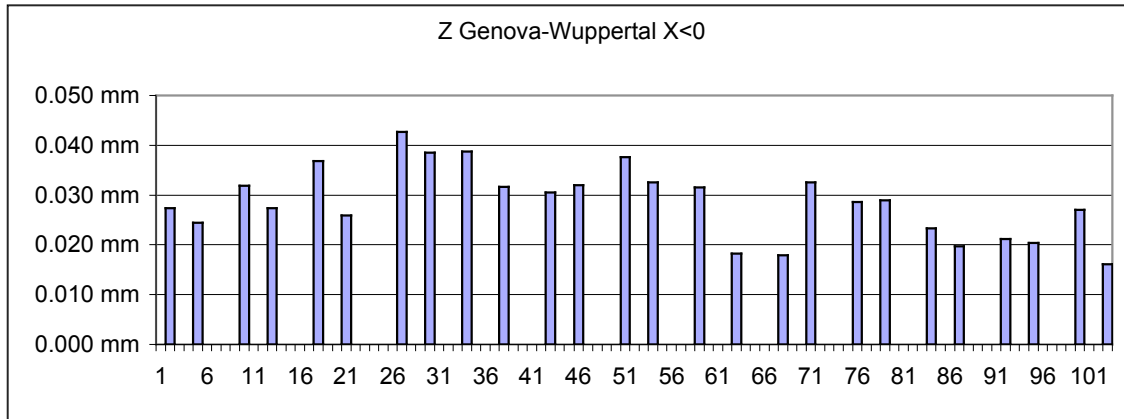


Fig.4: difference between Z of sensor fiducials measured by Genova and Wuppertal. Only fiducials at X<0 are in the plot. Error is larger.

In the above plots there are some not understood results:

- The difference in X can be due to a bow of the stave, but the error should be minimum at the extremities and this is not the case of fig.1.
- The difference between CPPM and Genova in Z has a slope with a value going from  $\sim 50 \mu\text{m}$  to  $\sim 10 \mu\text{m}$  from one side of the stave to the opposite. (fig.2)
- The difference between Genova and Wuppertal have an other strange behavior: the fiducials at X>0 have a small difference in Z ( $\sim 10 \mu\text{m}$ ) (see fig.3), while on the other side the difference is sensibly higher ( $\sim 30 \div 40 \mu\text{m}$ ) (see fig.4).

### **Results from Genova pre-production stave (S4004).**

Genova has loaded its first FE-I3 stave. Several modifications have been applied to the module loading procedure after the FE-I2 stave (S4008) loaded last spring:

- The parameter giving the nominal distance between module and stave in the robot has been reduced from  $100 \mu\text{m}$  to  $70 \mu\text{m}$ .
- The number of glue drops has been reduced from 18 to 15, because the smaller module/stave distance pushed the glue out of the FE chips.
- The robot head has been modified by the addition of two new legs. They were added to reduce the module induced bow.

Result of the loading is under analysis. The data summary table (today still partially filled) for this stave can be found at:

[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)

Some preliminary considerations of the survey/test done are:

- The X position of the modules is now well under control (of the order of  $\sim 10 \mu\text{m}$  from nominal).
- The Z position is in the specs for the second half of the loaded modules (M1A÷M6A) while the first half have a rather high Z offset ( $70 \div 180 \mu\text{m}$ ). Today there is no comprehension of the reason.
- The tilt angle (Y rotation) is in the range of  $\pm 70 \text{ mdeg}$  ( $\pm 1.2 \text{ mrad}$ )
- The module bow is below  $100 \mu\text{m}$ , with a bigger bow on the +X module side (aspiration head asymmetry).

- The thermal resistance measured at +15 °C is ~1.2 °C/W.
- In conclusion, all the measurements made, except the Z offset, give results in, or at the edge of, the specs. An effort must be done to understand and avoid such Z offset.

### ***CPPM FE-I2 loaded stave (S4000).***

Eric explained what generated the errors in the placement of the modules on the FE-I2 stave loaded by CPPM last July. There were two sources of errors:

- The table used for loading the first half of the modules had wrong values.
- The CMM used in conjunction with the loading robot had a cable coming from the survey camera pulling it (see fig.5). This cable tension affected the measurements of the CMM which produced a miss-alignment of the stave w.r.t the robot.

Eric is now doing some tests, to verify that the problem is solved; he will put a glue drop, with the robot, on every module position and then he will check the actual position with the CMM.

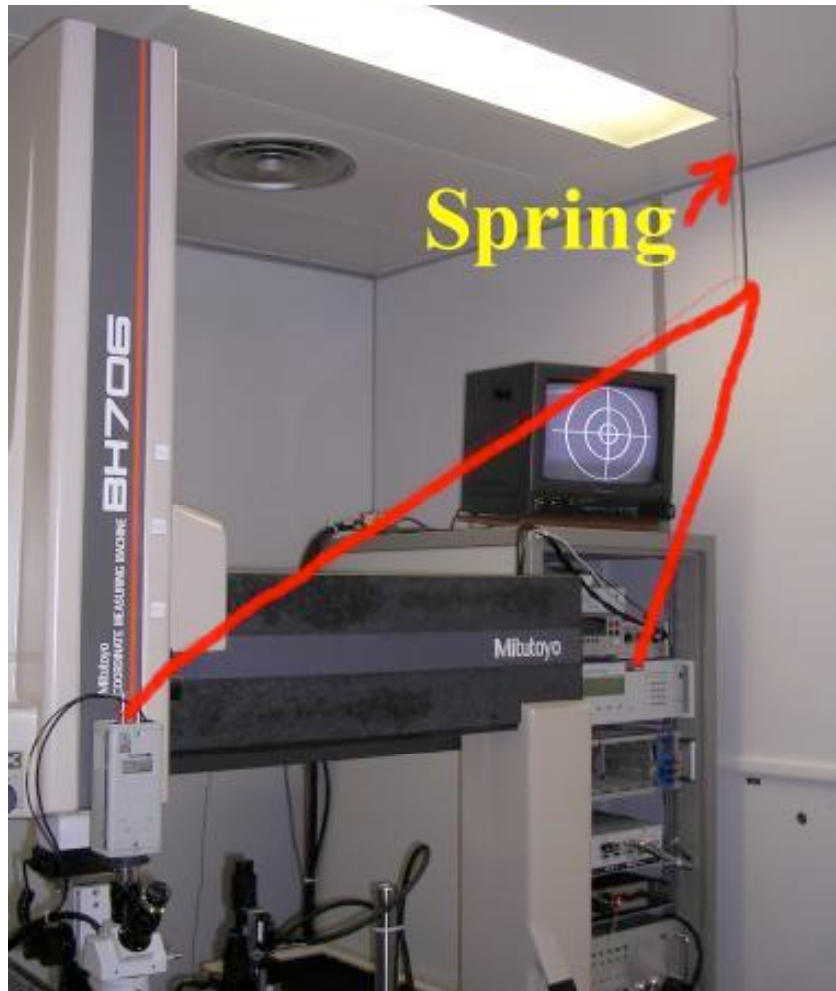


Fig.5: survey camera and cable layout. The cable pulling the camera influenced the position of the camera giving wrong survey measurements.

Eric will report on the results of his tests, but he thinks to be ready soon to start pre-production. He mentioned that he has no FE-I3 available and he asked to receive them as soon as possible. We (SQTF) ask the Module TF to prepare the modules ranking and a list of modules to ship to Marseille for their use in production.

### **Wuppertal 4 module stave**

Wuppertal has started the loading of the first of the four modules that they will load to check the loading procedure. They have in total 4 AMS modules to load on a test stave. Two are the main motivation of the exercise: verify the precision of the loading and check that they do not make any damage in manipulating the more delicate AMS modules.

Wuppertal has still the CPPM S4000 stave in their laboratory. Vadim asked that they repeat the survey of the stave to see if they reproduce the results obtained the first time. Charlie will do it during week 38 (13/09/04), the stave will be then taken to CERN where somebody from Marseilles will fetch it. Peter must organize/find a person for the transport to CERN. He will communicate it as soon as possible.

### **LBL Sector S9005 & S9000**

LBL has completed the measurements on sector S9005 necessary to qualify the site for pre-production. Gil briefly presented the results of sector S9005 that are summarized in the Data Summary Table:

[www.ge.infn.it/ATLAS/SQTF/DataSummaryTables/pre-qualification/S9005\\_PrequalLBL.xls](http://www.ge.infn.it/ATLAS/SQTF/DataSummaryTables/pre-qualification/S9005_PrequalLBL.xls)

There is no evidence of critical points in the loading of the FE-I2 sector from the measurements made, and the *site can be now qualified for preproduction*.

Gil also informed that LBL loaded 3 “non production quality” FE-I3 on sector S9000. and that they intend to continue with the other side of the sector. Giovanni complained that the SQTF was not informed before the use of FE-I3, as it was done up to now by the other loading sites. Gil justified the fact with the need to move ahead faster and he also said that LBL would start soon the sector loading pre-production.

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

Giovanni said that he is preparing a new Data Summary Table to be used for pre-production summary of the measurements.

Next phone: Thursday 16<sup>th</sup> of September 2004