

SP04 Production Status

Lev Uvarov
Video Conference
March 10, 2005



Production Plans Overview

- Sep 5, 2004 – SP04 Schematic ready done Sep 6
- Sep 12, 2004 – SP04 Placement ready done Sep 10
- Sep 26, 2004 – SP04 Layout ready (Conquest) done Nov 22
- Oct 24, 2004 – SP04 pilot bare boards ready done Dec 8
 - Components shipped to assemble 2 boards done Dec 13
- Nov 14, 2004 – pilot samples of all boards stuffed done Jan 26
 - shipped back for reworking done Jan 28
 - received after 1st reworking done Feb 18
 - received after 2nd reworking plan Mar 14
- Dec 5, 2004 – SP04 pilot boards tested, start mass production in progress
- Jan 15, 2005 – all boards ready for testing
- Mar 1, 2005 – all boards tested and ready for installation in CERN

- Sep 26, 2004 – SP04 Mezzanine Card Layout ready done Sep 21
- Oct 24, 2004 – SP04_MC bare boards ready done Jan 18
 - Components shipped to assemble 16 boards done Jan 19

- Oct 10, 2004 – SP04 QPLL DB Layout ready done Oct 13
- Oct 24, 2004 – SP04_DB bare boards ready done Dec 15



SP04 Production Status 1

Used same company as for SP02 (Conquest) to route, manufacture and assemble SP04 boards, but got unexpectedly huge routing lead time and very poor assembly quality:

- ✓ Routing – plan/fact – 2/10 weeks

Assigned expert did many stupid routing mistakes, was very hard to work with. To finish the job finally requested the same expert, who did the SP02 routing.

- ✓ Bare boards – plan/fact – 2/2 weeks

Assembly – plan/fact – 2/5 weeks

SP02 boards stayed flat after assembly, SP04 boards get warped

Visual test revealed about 30 problems on 2 assembled boards, like:

- Backplane press-fit connectors soldered while not fully inserted
- Found chip LED under the BGA package!
- Multiple misplaced components
- Multiple solder bridges
- Multiple dry pads
- Missing components



SP04 Production Status 2

✓ Reworking – plan/fact – 0/5 weeks

1st reworking of 2 boards took another 3 weeks,
2nd reworking of SP04 #5 is underway.

- after 1st reworking of SP04 #5 found short between 3.3V power and GND that traced to the reworked BGA. Conquest claimed BGA X-raying had been done, which “showed good quality of BGA assembly”
- Independent company made X-ray pictures and found multiple shorts under 2 BGAs.
- Reworking of 2 Front FPGAs is in progress at another company. Also found few oxidized BGA pads.

✓ Testing of pilot boards – plan/fact – 3/3+?? weeks

- Only one board SP04 # 4 is available for testing so far, 75% tested
- Developing of the testing software continuous, with a goal to test every connection on board.
- Found 3 Front FPGAs (F2, F3 and F4) having several missing contacts to pads => require reworking !!



SP04_MC Production Status

Submitting for production delayed until SP04 was fully routed

✓ **Bare boards** – plan/fact – 2/2 weeks

18 SP04_MC bare boards manufactured

✓ **Assembly** – plan/fact – 2/?? weeks

Conquest reported insertion problems because of allegedly bend pins of high pitch Samtec connectors

Requested both boards and connectors back for inspection

Found most Samtec connectors having slightly non-colinear pins, which makes it difficult to insert

Since connectors were shipped to Conquest in Samtec tube containers w/o unpacking, it is unclear if they were originally defective or pins lost colinearity thereafter.

Looking for solutions.

Current status – assembly on hold => critical path ?



SP04_DB Production Status

Submitting for production delayed until SP04 was fully routed

- ✓ **Bare boards – plan/fact – 2/2 weeks**

18 SP04_DB bare boards manufactured

Then on Dec 7 we learned about problems with QPLL2 and changed routing requirements.

It turned out the problem had been reported to ATLAS collaboration as early as in August 2004, but QPLL web site was updated only in December 2004

- ✓ **Assembly – plan/fact – 2/”on hold” weeks**

Only 2 SP04_DB were assembled in house to provide for SP04 main board testing

Found 1 out of 2 QPLL2 chips not working

One SP04_DB tested with SP04 motherboard

QPLL locks to our adjustable test oscillator

Monitored locked status over weekend => never lost lock.

Updated SP04_DB design completed, rerouting completed, ready for production.



Summary Production Status

SP04 – 2/2 pilot boards

- ✓ Pcb quality – fair
- ✓ Assembly quality (except BGAs) – good
- ✓ BGA assembly quality – could not be worse
- ✓ #4 75% tested, #5 not received yet

SP04_MC – 18/16 boards – becomes a critical path

- ✓ Pcb quality – good
- ✓ Assembly quality – partially assembled (problems with Samtec connectors)
- ✓ BGA assembly quality – not tested yet

SP04_DB – 18/2 boards

- ✓ Pcb quality – good
- ✓ One board tested – OK
- ✓ Design/Layout changed per latest CERN requirements