

Summary of the technical meeting at Amsterdam tuesday 20.04

participants: Antonio Pellegrino, Jan Spelt, Marek Szekowski, Frans Mul (part time), Niels Tuning, Thomas Bauer (part time), Gras v. Appeldoorn (part time), Franz Eisele

1. Straw cutting machine:

F. Eisele reports that the modifications of the machine at Heidelberg are done and tested. The results are rather satisfactory. Minor modifications are done to improve speed, reliability and reduce the danger to damage the straws. These include channels which guide the straws gently to the cutting tools, a easy way to move the twisters over the first few cm etc. HD also cuts now straw tounges

of 15 mm and punches two holes simultaneously into the tounges.

The mechanics of the crimping tools for the twisters was newly buildt.

The new mechanics is mechanically more robust and it uses a pressure point near to the crimping tips (4 tips/twister). The construction drawings were given to NIKHEF. ** 22.4: J. Spelt informs that NIKHEF will build its own mechanics starting from the HD modifications.

The crimping temperature measured at the tips was 230 degrees applied for 5 seconds. This resulted in very solid crimping of the twisters. The twisters needed forces of typically 800 to 1000 g to be moved.

******* 22.4: the crimping tests had been done with twisters from the preseries. The attempt to produce straws on 21.04 with new twisters at HD led to a**

surprise: the crimping force is much smaller despite the same temperature and pressure!! According to HENk also the material is unchanged ==> to be explored.

Jan Spelt reports from NIKHEF that the crimping force varies too strongly (somewhere between 100 g and 400 g) and that he is not satisfied. He uses already twisters from the final batch.

****** In conclusions therefore: crimping of twisters at present is not yet satisfying, improvements are necessary.**

2. Crimping of tounges instead of soldering: NIKHEF has a crimping head in operation which crimps short tounges outside of the endblock. The experience with crimping is ok. It needs presently also US soldering on the Al side.

The injection molde of the endblock is presently modified. Next batch (10000) endblocks modified are promised for end may. This will then allow crimping also in the region of the endblock and needs no more soldering. Three crimping tools for this scenario have been ordered for the three production places.

3. Glueing straws to panels: we have to overcome the problem that sometimes the straws are not glued to the panel because of bendt panels.

Result of the discussion:

a) Jurek made tests at reduced glueing temperature (25, 30 degrees and 35 degrees). The average bending across the panel is indeed reduced to below 100 micron and something of 50 micron in average. Nevertheless bending cannot be avoided completely.

****21.4.: Jurek will change the temperature to 35 degrees to reduce average**

bending. he cannot go lower because then there is the danger that the glue does not fully polymerize and also curing time would be too long for production.

There are other origins of a gap between panel and straws: Warsaw reports that their template is bent across by 150 micron. The specification is +/- 100 micron. Spacers may not be exact etc.

=====> conclusion: we will get no solution where the gap between straws and panel is always smaller than 100 micron. We therefore have to change the glueing technique in such a way that gaps up to 300 micron can be safely bridged. Jurek has proposed a solution where the glue is mixed with silica colloids which according to him allow to make stable strips of glue across the panel of 400 micron if needed. This idea was found most appealing. Both NIKHEF and Heidelberg will order this silica colloids and try it out. NIKHEF will provide the material to Warsaw. If the tests are successful then we will apply this technique in future.

=====> we have to measure also the bending across the panel in 4 places for an F-panel. =====> this should be added to the test measurements to be done at Crakow and added to the panel sheet ==> Leszek/Jurek please act accordingly.

4. side strip glueing: NIKHEF had problems to seal the last box because they used additional grounding strips for the sidewalls. The groups will use different techniques to close the faraday box for their next modules. We want to decide afterwards which technique is best and finally decide on the height of the side strips.

5. Test result updates:

a) Wire tension, HV and dark current tests.

New results were presented by Niels and Gras and also by Marek.

Wire tension: the results (homogeneity of tensions etc.) have improved with time. Occasionally twistors have moved resulting in asymmetric readings of the tensionmeter. There were also examples shown where the twistor was put on a wrong place during straw preparation.

F.E. reported that HD has buildt a test module where 4 groups of 8 wires each were strung with 40,50,60 AND 70 grams. HV test are under

way to see HV stability of these wires which are supported over the nominal twistor distance. Results will come in latest two weeks. This should allow to put lower limits on the acceptable wire tension.

HV and dark current: Warsaw still sees large dark currents on their 2. module at first test in air, with large fluctuations from wire to wire. At NIKHEF this is the same except for the panels of the last module 1. Here most wires have currents below 5 nA, the distribution looks very similar to what was reported by Heidelberg. The only known change is that for these panels HERAB solder was used for the first time at NIKHEF which has little flux resin. This was always used at HD.

Jan reports that the PCBS look much cleaner. Warsaw used still standard solder. So the origin of the dark current problem may have been the solder.

==> HERAB solder will be used in future for all modules at all places. Enough HERAB solder is available for NIKHEF and Warsaw.

Gras reports on first tests with Fe55 source. He reports in average rather homogeneous gas gains and low dark pulse rates except for a few wires. The origin of their problems cannot be traced.

It is agreed that Gras will next test module 1, where the dark current tests are good, The hope is to correlate problems of the module with measurements done during production.

Gras also reports on their machine to test wire positions. In average the position accuracy is satisfactory and has improved with time. It is clear that neither the wire position measurements nor the current source measurements will be done for all modules. These instruments will rather be used to validate our production techniques. We foresee that also series modules from Warsaw and HD could be evaluated at NIKHEF this way.

F.E. reports that test boards for source measurements are buildt at Heidelberg which will allow to connect 64 channels simultaneously. Delivery early June.

The HV tester of Arek is presently tested at NIKHEF and he works on program modifications to improve the emasurements. Testers should be delivered to HD and NIKHEF within 4 to 5 weeks.

6. gas pressure tests:

Two proposals are available how to do these tests.

The following procedure is agreed on:

The modules are filled with Argon and put to an overpressure of 5 ± 1 mb. The pressure drop is measured vs. time. It should not exceed 1 mb over 3 minutes. If it drops more then one has to seek for leaks and repair them. This limit corresponds to a leak rate of about $10^{**}(-5)$ l/hour. Sebastian will modify his instructions accordingly. NIKHEF will/may also do additional tests using gas flow measurements. Heidelberg has ordered gas sniffer and pressure gauge for Warsaw to do these tests.

7. material procurement:

a) panels: the next batch of panels will be delivered end of may. The delivery will include 50 S1U panels and about 120 F-panels. Jurek is willing to also cut the corresponding number of side strips if he gets the agreement before may 15.

b) straws: 5000 straws should arrive any day. As soon as this has happened 2000 straws will be delivered to Heidelberg and 1500 straws to Warsaw to allow them continuous confectioning of straws. Further straw production will require delivery of capton XC. Unfortunately the US policy has changed and delivery of capton XC requires an export licence. Its unknown at present how long this will take.==> we may encounter a shortage of straws!!

c) PCBS middle: the prints of the middle PCBS were not correct -- unequal spacing between pads. New PCBs will be ordered. In the mean time we have to live with the old ones.

d) feedthrough boards:

28U and 28 D are delivered. In week 17 33U and 33D will be

delivered. Next deliveries: week20: 50U+50D. ==> this shortage is cleared. The ground pads will - unfortunately - not be tinned for technical reasons.

e) Al spacers: 24 U+24 D are delivered but have to be flattened by NIKHEF.

3 sets will be delivered to HD, 3 sets to Warsaw as soon as this is done. 250U +250D have been ordered to be delivered within 5 to 6 weeks. It is expected that they will satisfy the tolerances.

f) end blocks: 10000 of each type and 20000 twistors are expected end of may (endblock modified for crimping of tounge). 24000 in addition are then expected in june.

g) wire: 30 rolls are available. Antonio will now order another 60 rolls which then will cover the year 2004 completely.

h) small parts: 10 sets have been produced by the workshop in HD and distributed. The full amount of G10 strips has been also produced. The NORYL parts will be produced by a company at Heidelberg, they are expected within 2 weeks from now.

Summary: material supply looks ok except that we may be in danger of running out of straws.

8) No real progress was achieved to record measurements during production. This will be attacked and will be possible using a PC in about 2 month time. In the meantime recordings should be done on paper.

====> Jan is asked to produce a sheet with the recordings necessary to document a module.

9) instructions to build a module:

The draft of Jan was discussed and some things changed/clarified.

====> Jan will distribute the improved version.

10) we will try to do telephone conferences -- they should be limited to at most 5 people. F.E will distribute tel. number and PIN.

The fixed date forseen is tuesday 11:00.

11) production readiness review: at least one person from each site will be at NIKHEF on may 18.

12) next meeting: there is no urgent need for a next meeting. This will take part somewhere in June once everybody has buildt modules and tested them.