Subject: Cooling Minutes - 28 June 2002
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Hi All,

Since I was grossly delinquent in sending out the minutes from our meeting on June 14th, I will incorporate the most important points in these minutes:

1. Tom Weber informed us that since it's easier than to leave the internal pressure in the test fittings constant while doing cold tests, he runs both the 0 and -35 C tests at 4 bar, rather than just the 0 one. This is more conservative, and we haven't seen failures, so there should be no problem.

2. Fred wanted to extend the ends of the fittings by a couple of mm on either side in order to allow more grip area for his wrench. This doesn't lengthen the junction, but does increase material on the order of 10%. He has drawn up these fittings and Jon Wirth is getting a quote for enough fittings for the full sector production (including the exhaust and inlet fittings attached to the sectors, as well as all u-tubes). We will send our verified 6063 stock to the vendor, and will test their fittings on return in order to verify that the material is correct.

3. Compositional analysis of two different batches of 6063 from two different vendors has shown that the material composition is very repeatable. The maximum element deviation was for silicon, which was .48 and .50 percent for the two batches. Chromium also varied slightly, at .007 and .008 for the two batches.

4. Jim Fox informed us that he is skeptical about his ability to weld the capillaries deep in the female luer fitting. Fred drew up a design that raises the weld somewhat, allowing better laser access. This is the fitting type that I presented at the Pixel mechanics meeting in Marseille. This fitting type has not been tested, but we are ordering a full production run anyway, in the interest of saving time.

5. It has been proposed to use loctite as a "backup" to the laser welds and to increase their toughness. This means that loctite would be applied behind the weld after the fittings are welded and tested. In order to measure the effects of irradiation on this method, 4 samples of fittings were bonded to tubes with loctite ***alone***, and then these were irradiated in C3F8 to 25 Mrad. After this irradiation, the loctite joint was strong enough that the tube bent before the loctite failed mechanically. We are calling this test a success, and it obviously makes a very conservative joint.

6. Four new sector tubes are being sent in the re-worked carriers to EB for welding. The goal for now is to get 2 good sector tubes to put through the entire fitting regimen, but in anticipation of possible weld failures, 4 tubes are being sent. EB is being instructed to weld until 2 good tubes (with 2 welds each) have been made or until they have more than 2 failures in the first 4 welds (meaning some new problem has been encountered). Jon and Tom have preset the fittings to 2-5 mil (50-125 microns) below the tube end, as Jim requested, and the carrier should not be adjusted once it leaves the lab. Jim has also requested that we send some extra fittings and short tube lengths to help him get the proper laser settings before he starts up on the real sector tubes. Jon will also send a new rubber leak check fitting with the tubes. It should be noted that the fittings being welded now are not the newer, lengthened design, but that these fittings could still be used in real sectors.

7. Once the sector tubes come back, we will need to send them through the entire testing regimen (eventually 5 tubes will need to do this, to make up the 10 fittings required for validation). This means modifying the pressure check apparatus to allow putting the entire sector tube and carrier into vacuum. Tom Weber is working

on finding appropriate vacuum components to accomplish this.

8. When the tubes come back from welding, they will need to be cleaned to remove weld residue, and the carriers will need to be cleaned in order to allow them to be placed into vacuum (it is considered too risky to put the bare sector tubes in vacuum, under internal pressure). We will clean the tubes and carriers (still assembled) in an ultrasonic cleaner, using micro-clean (a mild detergent) and will flow micro-clean through the tubes, both forward and reverse. The assemblies will then be rinsed thoroughly and dried in a vacuum oven.

9. We need to test a butt weld type connection in order to see if this can be used at PP0. We will draw and make simple test fittings, with no luer features or threads, and see if this weld geometry works. It is unclear who will do this design and drawing. This type of joint was also discussed at the meeting in Marseille.

10. We have agreed to irradiate in C3F8 three stave sample tubes from CERN, that are metallized and brazed. Since we have no other irradiation work to do at the moment, it may be more than a month before this can be completed.

Well, it's been a long time coming, but it looks like we're finally getting close to sector production! Let's keep our fingers crossed! Thanks for all of your continued effort,

Neal

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