Subject: **Cooling Meeting Minutes - January 29th**
Date: Wed, 30 Jan 2002 17:11:37 -0800
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Here they are:

Previous Agenda

1. New fittings have arrived. We will look at them and talk about plans for what to laser weld and when.

2. Cleaning methods: Jon W. And Tom J. have worked out a manifolded flow-through cleaning design for tubes (we mentioned this this morning). Recap - plans.

3. U-tubes: update on annealing and progress of making a measurement setup for stiffness and force to bend to plastic yield.

4. Plans for sector welding, when do we make the "carriers" that the tubes and fittings are mounted to and shipped with? When do we need parts to be done, when can they be done? You get the idea.

Minutes

1. Fittings: Fittings have arrived and look good. They mate together well, and diameters seem to be good. The only problem is that a cursory inspection of a couple of luer fittings suggests that they may mate up with different lengths (due to tolerances on the taper) by maybe 1 mm. This means that we may have to "match" the fittings that go on the u-tube. Of course, this still leaves the sector side fitting un-matched, since we never know which two sectors will sit adjacently at the u-tube points. I don't think this will be a major problem, but it may take a little thought if we see the luer tolerances vary over more samples.

Weld extension pieces are in the shop, but they can't find 1060 aluminum, so I am looking for it. I haven't received any leads yet, so we may need to go with 3003 instead. I will send 6' tubes, u-tubes, and fittings to the welder as soon as the fittings are cleaned and ready to go, and I will send weld extensions and more fittings (for the test pieces) when these are done (hopefully within 2 weeks).

The estimated fitting test schedule is as follows: weld extensions made in two weeks, fittings welded by end of february, testing done by mid april, sector drawings and tooling updated for validated fitting by may.

2. Cleaning: We have agreed that we should seperate the cleaning and measurement processes for the capillary (and other tubing). This may mean flowing liquid flourocarbon through the tubes for cleaning, and then using vapor C3F8 to do pressure drop and diameter verifications. These approaches may change after we do some calculations of pressure drops and develop possible designs for these cleaning or measurement apparati. Jon and Tom J. have also finished their cleaning manifold for un-bent sector tubing (which attaches with flexible tubing to the swaged ends of the tube) - this is for flowing nitric and other cleaning baths through the tubes during the first cleaning process.

3. U-tubes: 6 have been made. 4 have been annealed. Tom J. has made some nice measurements of the force

to bend to different displacements. It turns out that the "yield strength" (~.2% offset) for the bent tubes (not annealed) is about 25 ounces at 1 mm. This means that in this state, we expect to see easily up to 25 ounces of load if we need to move the tube up to 1 mm. After this point, we get some stress relief from permanently setting the aluminum, but up to here we get none. Since I can't imagine much more than 1 mm of misalignment, we will probably see no effect from annealing the u-tubes (these results might just remove this issue altogether right now). Nevertheless, we'll see how the annealed measurements go. The raw data is on my website on the u-tube page.

4. Sectors: There are 12 un-bent tubes ready for bending right now. Jon thinks that 6 tubes can be bent and bonded to strain reliefs by Feb. 22. However, to design and make carriers for these six will probably take until the beginning of March. Jon and Tom J. will work with this goal in mind. The carrier will have two protectionary posts for the out-of-plane bends, two fitting "clips", two pins for the strain reliefs, and three holes for alignment with pins on a master baseplate, which will allow the carrier to be aligned to either of the two tube ends.

5. In deposition: Pat is having trouble getting the indium to stick to the copper foil. He thinks it might be a cleaning problem, and will investigate this. His opinion is that 25 microns is too much indium to vapor deposit. However, simple logic suggests that since the surface finish of the fittings is on the order of a micron overall roughness, that we should not need more than a few microns of indium on the copper foil. If Pat can achieve a few microns, he will continue working; if not, he will give up. However, in the meantime, we will investigate solder dipping and other crazy indium spewing ideas.

Thanks for all the hard work!
Neal