Subject: **Cooling Minutes from 11 DEC 01**
Date: Thu, 13 Dec 2001 13:04:58 -0800
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Hi All,

Reprinted Agenda

1. U-tube design. See the drawing at http://www-eng.lbl.gov/~hartman/pixel/cooling/proposed_utube_10DEC01.pdf . Also, Fred, can you bring a length of the 4 mm tubing for us to look at, and for Jon to take with him for testing?

2. Capillaries - sizes, possible backups, available material..... And any updates from Tom W.

3. Fred's much anticipated Luer and Indium drawings. These are done!! so we must look at them and make sure everything is hunky dory before we place an order.

Minutes

1. There seem to be no general disagreements about the u-tube shape. There are implications on frame length that need discussing, but this will happen later (i.e. u-tube doesn't fit for disk three, as now deisgned). Jon W. and Tom J. are making a prototype tube, and Jon has informed me since the meeting that he has no problems bending the 4 mm ID tubing to radii of 8 mm (centerline), which is smaller than I had requested in the drawing. He will try to fabricate a prototype u-tube to show at next week's cooling meeting.

2. Capillary sizes need to be investigated. I have been looking at Capillary pressure drops and sizes in light of past work with the cooling system (measurements of other tubing) and need to find out why my current analysis varies somewhat from analysis done at CERN and from measurements there (10-20%). I will be in touch with Vic V. and Greg H. to discuss these issues. In the meantime, I have found that K&S can make 3/64" tubing, which is .047 OD x .019, slightly under 0.5 mm ID. It appears that tubing at or very near to this size may be workable for the sector, but since pressure drop is very sensitive to diameter, we may need to custom fabricate some capillaries. I have found a vendor that is willing to quote aluminum tubes of this size range, and he claims there is no die charge, as well. As soon as I have a candidate capillary size in mind, I will request a quote for a minimum production run.

3. Fred's drawings are completed, but there is one outstanding issue that we can't answer right now - capillary size to drill the capillary fittings to. We decided to pilot drill the capillaries to 1/32" (~0.8 mm) which should be smaller than any capillary we can conceive of. We will then drill the fittings out for whatever size capillary we choose. We also have decided to make some blank fittings for capping off u-tubes and sectors, to faciltitate in testing. These fittings will also allow us to drill them out to other sizes that we may need as our work progresses. I have attached a copy of the final tally of all fittings to be made, which Fred is ordering now.

4. While the current fitting order will cover all connections that are welded to sector, capillary, or type 0

tubing, they will not cover the 8 mm ID size for use as type 1. To some extent, the final dimensions of this tubing will not be known until we have a good solution for the PP1 region, so we have decided to wait on designing any luer type fittings of 8 mm size until the PP1 connections are better understood. What this means immediately is that we have to try to swage 8 mm ID (~8.8 mm OD) tubing to an OD of 10 mm, and then see if this is compatible with 10 mm OD aluminum swage lock parts, which are a possible candidate for use at PP1. Fred and Jon W. are working on doing some tests of this technique.

Thanks once again for all of the good work,
Neal

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