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**Visit to Taber Metals to Inspect
APS Vacuum Chamber Extrusions**

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To: Y. Cho

From: R. Wehrle & R. Nielsen

Subject: Visit to Taber Metals to Inspect APS Vacuum Chamber Extrusions

The recent trip (11/17 thru 11/19) to Taber Metals proved a very useful as well as encouraging experience in spite of the fact that the extrusions were rejected due to their not being within specifications. Seven extrusions of twenty foot lengths were inspected. The steps used in the production of these seven lengths were:

- 1) Extrusion
- 2) Mist spray water cooling
- 3) Stretching (to reduce twist and increase straightness)
- 4) Oven cure at 350 deg. F for 8 hours.

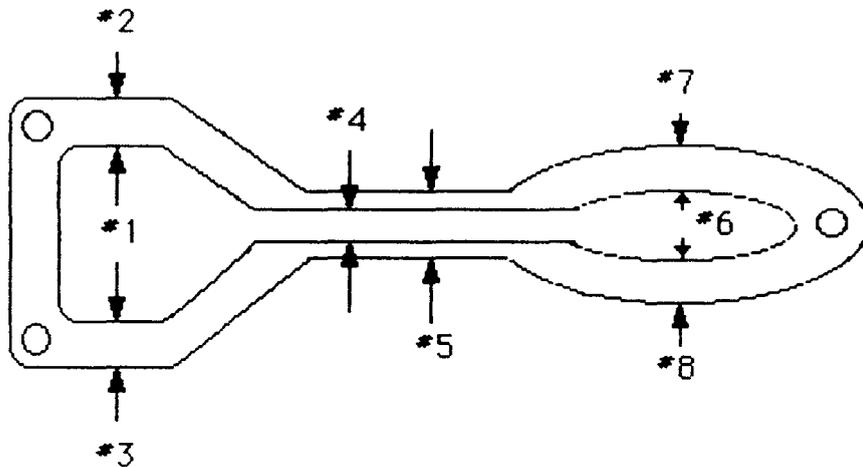
The inspection began by connecting the hydrostatic pressure testor to the water cooling channels and installing a pressure gauge at the opposite end. The water pressure was increased to 250 psi and the chamber was then checked for leaks both inside and outside. No leaks were detected on any of the cooling channels tested.

The next tests were for flatness, bow and twist. For these measurements the extrusions were placed on a 12 foot inspection table whereby calibrated stick wedges could be used to measure the space between the extrusion and the table. When the extrusion was positioned on the antechamber edge, the maximum extrusion to table gap was .004 inches. The extrusion was then positioned on it's side and checked for bow and twist. Bow was measured at a maximum of .012 inches over the 12 foot table length and twist was measured at .004 inches for an 8 inch measured width over the 12 foot table length. This resulted in a twist angle of .002 deg./foot which is well within specifications. The extrusion measured was labeled N-5.

A second extrusion (B-4) was placed on the inspection table to be checked for bow and twist. This extrusion was a "worst case" as indicated

by Taber personnel as it was not stretched as much as the others. The bow was measured at .042 inches and the twist was measured at .192 inches producing a twist angle of .12 deg/foot but 1.44 deg/ 12 feet which is out of the maximum .75 deg./20 feet Argonne specification.

Several measurements were made on all seven extrusions and are listed on the following drawing and table :



Piece #	Meas. #1	Meas. #2	Meas. #3	Meas. #4	Meas. #5	Meas. #6	Meas. #7	Meas. #8
N-5L	2.22	0.615	0.613	0.245	0.726	1.58	0.519	0.514
N-5N	2.215	0.62	0.615	0.292	0.785	1.593	0.518	0.513
B-7L	2.215	0.619	0.616	0.177	0.668	1.578	0.512	0.511
B-7N	2.205	0.615	0.616	0.213	0.692	1.57	0.51	0.513
B-4L	2.223	0.62	0.618	0.31	0.814	1.6	0.52	0.518
B-4N	2.225	0.62	0.615	0.298	0.785	1.565	0.518	0.52
N-7L				0.218		1.58		
N-7N				0.221		1.589		
B-6L				0.21		1.565		
B-6N				0.205		1.585		
N-6L				0.218		1.56		
N-6N				0.268		1.603		
B-5L				0.232		1.58		
B-5N				0.235		1.595		

The specified dimensions for the eight measurements above are:

Meas. # 1 2.204 , +.060 , -.000

Meas. # 2	.603	, +.040	, -.000
Meas. # 3	.603	, +.040	, -.000
Meas. # 4	.394	, +.015	, -.015
Meas. # 5	.874	, +.0675,	-.0275
Meas. # 6	1.642	, +.015	, -.015
Meas. # 7	.500	, +.040	, -.000
Meas. # 8	.500	, +.040	, -.000

From the above measurements one can see that the gap (meas. #4) in the transition between the antechamber and beam chamber was considerably less than specified as was the height of the beam chamber opening (meas. # 6). A short (1 1/2) foot section of extrusion that had not been stretched was measured and found to be well within specifications. The stretching procedure is decreasing the height of these dimensions.

The next step is to modify the extrusion die such that the gap measurements will be oversize after extrusion but will decrease to the specified values during the stretching process. It is projected that this will be attempted during mid- December.

Discussions were also held regarding the use of a 90% argon 10% oxygen mixture to fill the extrusions as they leave the die. Taber personnel now agree this can be done but would require either modification to the present die or construction of a new die. Argonne would also be required to purchase a die holder with a gas feed hole installed. The die holder would cost about \$14,000 and a new die would cost from \$6000 to \$7000. There is a possibility of selling the die holder back to Taber to recover some of these costs.