EXTRUSION OF 7075-O ALUMINUM AND AISI 4340 STEEL T-SECTIONS

Castor Oil
Single-Angle, 45-Deg

Extrusion Pressure, 1000 psi				Length of Extrusion, in.	Comments
Breakthrough		Runout			
Stem	Fluid	Stem	Fluid		
151	135	114	101	20	High P_b peak followed by severe stick-slip
154	142	116	103	14	High P_b peak followed by severe stick-slip
135	126	118	104	11	Moderate P_b peak followed by uniform runout; die cracked
284	244	--	--	--	P_b not reached; stopped at pressure indicated; die cracked

Data from Trial 391 and from previous trials were used to establish the curves in Figure 3. Although the data are concerned with two different lubricants, L17 and L48, past results indicate that pressures required were similar. Again, two curves are shown for tubing, one indicating fluid pressure and the other billet-end pressure. The difference between the billet-end pressure for tubing and the fluid pressure for solid rounds largely represents the friction between the tube and mandrel.

In re-extrusion of AISI 4340 tubing, a 4-3/4-inch length of 0.063-inch-wall tubing (Trial 390) was produced at a ratio of 3.2:1, which represents a cumulative reduction of 92 percent. These results indicate that very-thin-walled steel tubing can be produced successfully by hydrostatic extrusion.

COLD HYDROSTATIC EXTRUSION OF 7075-0 ALUMINUM AND AISI 4340 STEEL T-SECTIONS

The study of the effect of critical variables in hydrostatic extrusion of 7075-0 aluminum T-sections was continued. Stem speed, billet surface finish, and die design were investigated. The data for these trials are given in Table 4. Sufficient information is now available from these and previous trials to evaluate the above variables. In particular, a comparison may be made of the effect of the single-angle 45-degree die and the compound-angle die (45-degree angle leading into a 160-degree angle) described in Interim Report V. The comparison of data is given in Table 5.

TABLE 5. EFFECT OF T-DIE PROFILES ON FLUID PRESSURES FOR 7075-0 ALUMINUM

Fluid: castor oil
Billet lubricant: L17
Extrusion ratio = 7.3:1

Trial	Stem Speed, ipm	Billet Surface Finish (Axial), μin, rms	Fluid Pressure, 1000 psi	
			Breakthrough	Runout
		Single-Angle Die		
381	6	300	135	101
382	20	400	141	103
383	80	Grit	125	104
		Compound-Angle Die		
320	6	200	118	106
321	6	Grit	122	110
325	20	Grit	115	109
326	80	130	119	104