Trial	Extrusion Pressure, 1000 psi						
	Breakt	hrough	Runout				
	Stem	Fluid	Stem	Fluid			
424	220	191	162	137			

The fluid-breakthrough-pressure peak with L52 lubricant was about 5.8 percent higher than that obtained under similar extrusion conditions with L17 lubricant. Also, the extrusion runout was accompanied by severe stick-slip. However, portions of the 75-inch length of extruded rod indicate that sound material with excellent surface finish was obtained. Attempts will be made to modify stearyl stearate lubricant with additions of MoS₂ and/or graphite in order to reduce the breakthrough-pressure peak and to minimize or eliminate stick-slip. As discussed later, extrusion of 7075-0 aluminum tubing with L52 lubricant indicates that further investigation is warranted.

COLD HYDROSTATIC EXTRUSION OF 7075-0 ALUMINUM AND AISI 4340 TUBING

Extrusion data for trials made to produce tubing from 7075-0 aluminum and AISI 4340 steel are given in Table 3.

7075-0 ALUMINUM

The extrusion trials with this high-strength aluminum alloy were directed toward:

- (1) Further evaluation of lubricants
- (2) Re-extrusion of tubing that had been previously hydrostatically extruded with the aim of obtaining thin-wall tubing.

In the lubrication studies, two new lubricants were evaluated: 20 w/o MoS2 in castor wax, plus metallic lead, copper flake, and graphite (L48); and stearyl stearate (L52).

Data obtained with those lubricants, given in Table 3, indicate that they compare favorably in performance with L17 (References 4 and 5) in that they produce an excellent surface finish and that their pressures are of the same order.

In preparation for the re-extrusion trials, 7075-0 aluminum was annealed to about 65 Bhn. The billets were prepared by taking a cleaning cut on the billet surface to remove oxide formed during annealing.

TABLE 3. EXPERIMENTAL DATA FOR COLD HYDROSTATIC

Die Angle:	45 Deg
Fluid:	Castor Oil

and h	a wild hrong	Die Orifice.	Billet Diameter, in,		Extrusion	Wall Thickness	Stem	Billet
Item	Trial	in.	OD	ID	Ratio	in.	ipm	Lubricant
aron e	i lyne 2.30 Inulum Di	1949 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	-spunnel) anisynnel	and the second	and produced and a subset of the second s	aphile in and addressive	ng roʻbal j ndrimini a	<u>7075-0</u>
1	388	1.107	1.750	0.748	3.8	0.180	20	L48
2	425	1.107	1.750	0.748	3.8	0.180	20	L52
3	385(a)	0, 875	1.104	0.748	3.2	0,063	20	L17
4	384(a)	0.782	1.104	0.748	12.9	0.017	20	L17
								AISI
5	389	1.107	1.750	0.748	3.8	0.180	20	L48
6	391	1.001	1.750	0.748	5.7	0.125	6	L48
7	386(b)	0,875	1.106	0.748	3.2	0,063	6	L48
8	390(c)	0.875	1.106	0.748	3.2	0.063	20	L48

(a) Re-extrusion of tubing previously extruded in Trial 351 at a ratio of 3.77:1 and then annealed to 65 Bhn.

(b) Re-extrusion of tubing previously extruded in Trial 355 at a ratio of 3.77:1 and not annealed.

(c) Same as (b), except annealed after extrusion.

- (1) Foother evaluation of instruction
- Re-extracted of tobing that but been previously indecessing an audio with the abit of objection will rubing.

In the indetication studicar, two new indificants agree evaluated: 20 w/s MoSS in castor, war, plus metallic lead, copper Dake, and arophic (EdS) and starry dearning (ESD).

Data obtained with those lithere arts, gives in Table 1, fadmate that they contains favorably in performance with 1.17 (References 4 and 5) in that they pristers on excellent a write thish and that their prevances are of the same order.

In preparation for the re-extension trials, 70,540 aluminant was annealed to about 65 Bhp. The billets were prepared by taking a clausing off on the billet contact a vemove extent formed during arbealing.