Wire diameter:	
Starting	0.019 inch
Finishing	0.0165 inch
Reduction	24.4 percent
Die angle	45 degrees (included)
Lubricant	L38 (PTFE)
Fluid	Castor oil
Fluid pressure	114,000 psi
Draw stress	2,350 psi

It is seen that the total fluid pressure plus draw stress (P + D) required for wire breakthrough was about 116,000 psi. However, after only a short length was produced, the wire broke on bending through 90 degrees round a three-inch-diameter pulley. The remaining coil of wire in the container continued to freely extrude at 114,000 psi for a short period. In subsequent handling of the extruded product, the wire was found to be extremely brittle (which perhaps explains why it broke initially on bending around the pulley). The wire surface was examined stereoscopically at low power and was found to contain short, periodic, circumferential cracks. The wire will be examined microscopically to obtain more information about the nature of these cracks.

In view of the results obtained at the low reduction of 25 percent, consideration was given to warm extrusion-drawing at a higher reduction. To avoid heating the container, fluid, and wire, a simple technique was utilized. This was to pass a current from a 12-volt battery through the wire and heat it on the exit side of the die by its electrical resistance. By this technique, it was believed that sufficient heat would be conducted to the wire in the area of deformation to reduce its flow strength and perhaps improve its ductility by introducing prismatic slip.

Using this technique a short length of wire produced at 55 percent reduction was obtained. The fluid pressure here was 150,000 psi and the draw stress 10,000 psi. Even after microscopic examination, no evidence of defects due to extrusion could be seen in the product. The temperature of the exit wire during extrusion was not determined because it was difficult to instrument satisfactorily. However, the technique showed promise as a method of heating the wire without heating the whole of the tooling. Other methods of applying heat to the wire will also be considered.

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