

substantially in ductility.

#### Low-carbon Martensitic Steels

The effect of various amounts of cold reduction by hydrostatic fluid extrusion on AISI 4320 and 4340 steels in the quenched and untempered condition are shown in Figures 14 and 15, respectively. As can be seen, the strength increased with little or no loss of ductility. A post-extrusion tempering treatment at 400°F had a negligible effect upon the mechanical properties.

#### CONCLUSIONS

In general, it can be concluded that the enhancement in ductility due to superposed pressure can be utilized to cold reduce many materials by hydrostatic fluid extrusion that cannot be cold worked by conventional techniques. The mechanical properties of the extruded products invariably show an increase in strength due to strain hardening and in cases enhanced secondary precipitation. With the exception of Udimet 630 alloy which exhibited a severe degradation in ductility and as-cast INCO 713LC which exhibited a large increase in ductility, the ductility remained essentially constant with increasing amounts of cold reduction and associated increase in strength.

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