bination of high sensitivity and high pressure capability it is still not without operational difficulties. The variation of load cell zero out-put level with pressure is one already described in detail. Its form, showing large variation at low pressure and smaller variation at high pressure suggests that the effect may be due to small differences in the linear compressibility of the load cell construction materials. Hysteresis effects which may be related to those observed in the load cell behavior have also been encountered in the compression of similar material[18].

The change in load cell sensitivity with pressure is also of importance. The reason for this variation is not understood but is probably caused by changes in the electrical and magnetic properties of the core alloy, Fe -50 pct Ni; changes in magnetic permeability of this alloy with pressure have been reported[21]. Choice of other materials for the core could probably eliminate the sensitivity change with pressure.

The above difficulties are minor inconveniences which have been resolved by computer corrections to load-extension data. Only little additional effort was required since load-extension curves were already being converted with computer aid to shear stress-shear strain curves, resolved along the glide plane in the glide direction.

Another potential problem which may be encountered is due to frictional effects. Friction between the sliding members of the tensile yoke and between the yoke and inner

walls of the chamber may give rise to innaccurate load-extension curves. Such frictional effects often arise from innaccurate alignment or oxide or dirt on the sliding surfaces and they may be eliminated by correcting these difficiences. The absence of gross frictional effects can be confirmed by comparing the 1 atm. load-extension curves of the spring tensile sample during loading and unloading. If frictional effects are absent these curves should be identical. Unfortunately there is no easy check for friction at high pressure since the values of displacement on unloading are innaccurate.

The heart of the apparatus, the load cell, can of course be used in measuring loads in other types of mechanical tests such as compression, bending or hardness. The sensing element in this device, the LVDT modified for high pressure operation also lends itself for use in equipment in which linear motion is to be measured at high pressure. Such measurements include compressibility,thermal expansion, dilatometry etc.

Summary

Apparatus has been described which allows the tensile testing of soft materials at pressures which are currently limited by the solidification of the pressure medium, ~ 30 kbar. The apparatus makes use of a convenient tensile yoke and a load cell having an LVDT modified for high pressure operation as a sensing element. The effect of pressure on the operation of this equipment has been discussed.