test-piece neck was measured with a dial-gauge indicator with an accuracy of up to 0.02 mm.

Fig.1, shows the tensile test diagrams for St.50 test-pieces. The total true strain is plotted along the abscissae and the true stress (in kg/mm^2) along the ordinate axis. As can be seen in Fig.1, after St.50 had been cold-worked under a pressure of 3500 atm, no notable change could be detected in the mechanical properties of the material. Analogous results were obtained for copper, cold-worked under pressure up to 2,500 atm.

In the case of beryllium bronze, as the degree of cold-work is increased, the capacity for concentrated plastic deformation increases notably, and the rupture strength is also raised. After cold-working specimens by 44 per cent under a pressure of 3200 atm, the rupture strength increased by 15 per cent, whilst the true reduction of area increased by 21 per cent. In normal conditions, beryllium bronze can only be cold-worked by elongation up to 80 per cent (according to our results) after which the test-piece ruptures. However, under a pressure of 3000 atm, we were able to cold-work beryllium bronze to 96 per cent in the neck; tensile testing following upon this showed that the limiting true strain in the test-pieces reached 120 per cent.

According to the results of X-ray structural analysis [3], cold-working of beryllium bronze under pressure is accompanied by a somewhat larger increase in the crystal lattice parameter than after normal cold-working by elongation. It would appear possible to conclude that the increased mechanical properties of quenched beryllium bronze after cold-working under pressure are associated with additional precipitation of the hardening gamma-phase. However, according to the Le Chatelier principle, an increase in hydrostatic pressure must retard a transformation which involves an increase in volume. Thus the marked change in the mechanical properties of the bronze after cold-working under pressure must apparently be associated not with the metastable nature of the alloy, but with anisotropy and residual stresses set up during working [4].

As for our tests on St.50 and copper it should be noted that preliminary cold-working in the range of hydrostatic pressures from 2000 to 3000 atm, produces no permanent changes whatever in the mechanical properties of the metals.

Translated by E. Bishop

REFERENCES

1. N.N. Davidenkov, *Vestn. ingenera i tekhnika*, No.4, 121 (1947).
2. V.A. Gladkovskii and M.I. Oleinik, *Fiz. met. metalloved.*, 4, 531 (1957).
3. S.I. Ratner, Collection of papers entitled "*Povyshenie dolgovechnosti mashin*" *(Increasing the service life of machines)* Mashgiz (1956).
4. A.M. Zhukov, *Izv. Akad. Nauk SSSR, Otd., tekhn. nauk.*, No.6, 61 (1954).