

Materials and Method of Measurement

Test pieces were machined from rods. The strength property of a material may have small variation because the specimens were not cut from the same rod.

D is approximately 2d. The reason for choosing $D = 2d$ is because it gives best economy (see fig. 6)

The hub length is also approximately 2d. Longer than this cause much out-of-straightness and out-of-roundness effect. Smaller than this may cause warping of specimens when under test.

The hole is reamed finish. The edges were rounded by sand paper to facilitate in measuring and assembling. The internal diameter was measured by an engineering microscope which can be read accurately to

$\frac{4}{10,000}$ inch and can be interpolated by eye to about $\frac{1}{10,000}$ inch.

A vernier micrometer is used to measure the shaft diameter. It can be read accurately to $\frac{1}{10,000}$ inch and can be read on vernier to $\frac{1}{100,000}$ inch.

Surface Finish and Roughness Comparison

Shafts of each series were turned with care to get the surface roughness as closely the same as possible. The surfaces were compared with the Rubert electro-formed roughness comparison specimens by using tactile and visual comparison. The comparison was made by running a fingernail across the standard specimens and the surfaces to be compared and final decision on visual comparison. For reamed hubs, only visual comparison was made.

FIG. 6

EFFECT OF INCREASE IN $\frac{D}{d}$ ratio

$e = 0.0002$ in./in. diameter

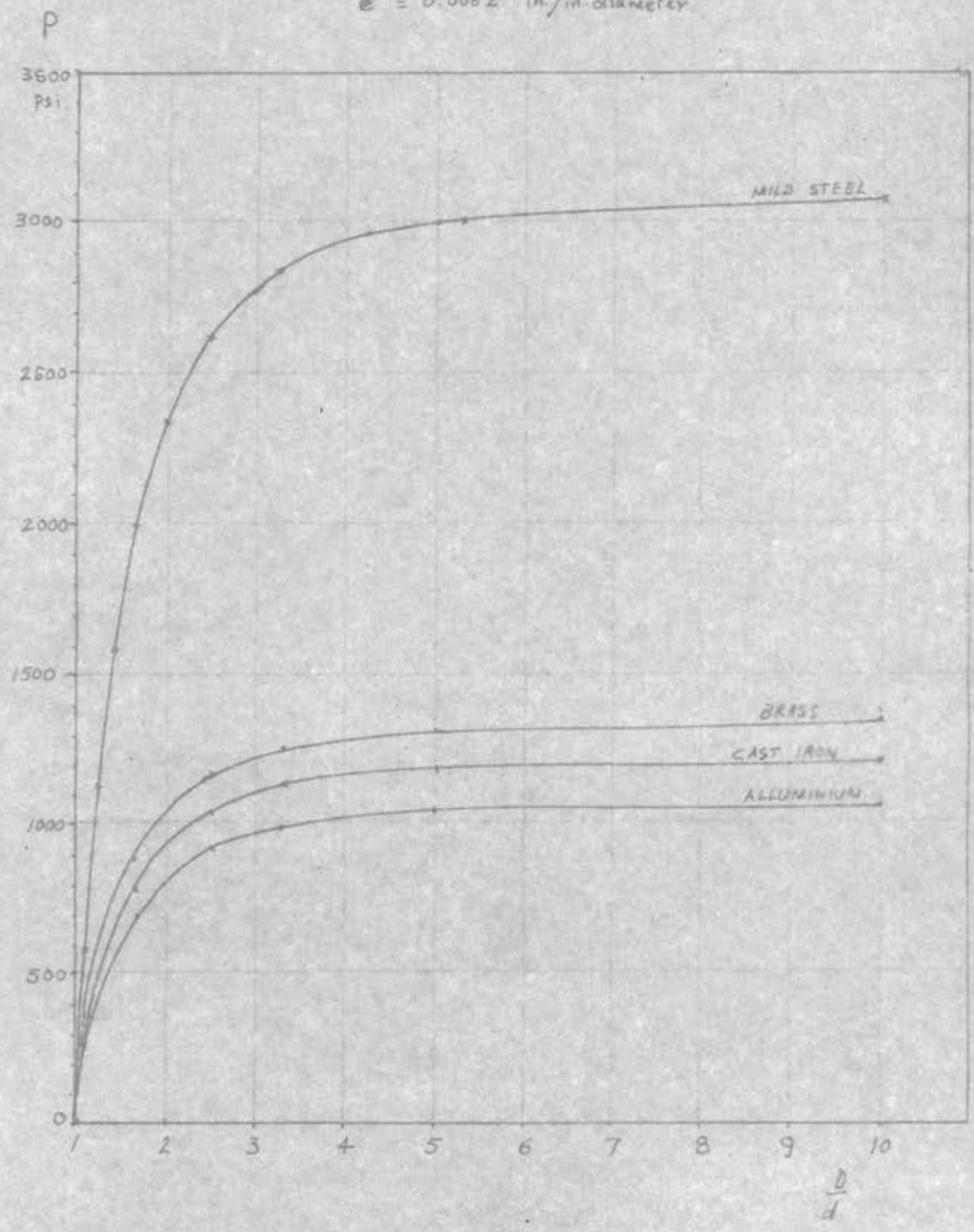


TABLE III
Material Properties

Material	E, 10 ⁶ psi	S _y psi	UTS. psi	S _{us} psi	G, 10 ⁶ psi	μ	Hardness* Rockwell
Brass	14.0	44,000**	61,200	60,000	5.05	0.385	B 54.5
Aluminium	11.0	26,500**	28,600	44,000	3.64	0.50	C 31
Mild Steel	31.2	43,500	62,800	72,000	11.5	0.35	B 76
Cast Iron	12.4	20,000***	33,500	61,800	4.50	0.375	B 93

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* B = 1" ball, 100 kg. load.
 C = 16
 C = 120° diamond cone, 150 kg. load.
 ** Taken at 0.2 % offset.
 ***Elasticlimit.