xc: C.E. Ritchie
J. Martin

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TO: Fred Martin

FROM: E.W. Yeffer

Subject: Preliminary results of test # 831531: Determine strength of M700 .458 cal. barrel bracket.

-Strain Gages were placed on either side of the barrel bracket on the front surface. Strains of 1700 μin/in and 2400 μin/in were measured on the right and left gage respectively. The difference between the gage readings is caused by miscut stock inleting.

Two calculations were made; one to determine the yeild strain of the material and one to determine the effect of stress on thickening the part. The assumption was made that the heat treatment of the part will not affect the yeild strength (a good assumption with case hardening). For 4130 steel the yeild point is 80,000 psi stress. A modulus of 29.5×10^6 gives a yeild strain of 2700 μin/in. The strain measured is about 90% of this value.

Next the affect of thickening the material was determined.

The formula for stress in a bending beam is:

$$\sigma = \frac{Mc}{I}$$ where: $c = \frac{1}{2}$ thickness

M = bending moment

I = Moment of inertia

and: $c = h/2$ h = part thickness

$I = bh^3/12$ b = part width

w = load

$M = -\frac{wl^2}{2}$ l = part length

so:

$$\sigma = \frac{\left(-\frac{wl^2}{2}\right)\left(\frac{h}{2}\right)}{\frac{bh^3}{12}}$$

which reduces to:

$$\sigma = \frac{3wl^2}{bh^2}$$

since h is squared and on the bottom the affect of thickness on stress can be determined by squaring the present thickness and the proposed thickness and taking a ratio. For a proposed thickness of .250 inches: $\frac{.185^2}{.250^2} = .55 \times 100 = 55\%$ reduction

Further testing includes tensile testing of 4130 steel with various heat treatments.