ME 360 21.10.06

$$S_{UT} = A d^{b}$$ Eq 14.3

A and b from Table 14.4

$$S_{US} = 0.67\, S_{UT}$$ Eq 14.4

$$\tau = \frac{Tc}{J}$$

$$T = F\frac{D}{2}$$

$$c = d/2$$

$$J = \frac{\pi d^4}{32}$$

$$\tau \approx \frac{8FD}{\pi d^3}$$

$$\tau_{MAX} = K_s \frac{8FD}{\pi d^3} \qquad K_s = 1 + \frac{0.5}{C}$$ Eq 14.8b

$$C = D/d$$ Eq 14.5

K_s static Wahl factor

$$\tau_{MAX} = K_w \frac{8FD}{\pi d^3} \qquad K_w = \frac{4C-1}{4C-4} + \frac{0.615}{C}$$ Eq 14.9a

K_w dynamic Wahl factor tension + compression

$$k = \frac{F}{y} = \frac{d^4 G}{8 D^3 N_a}$$

y = deflection

d = wire DIA $\qquad$ N_a = # active coils

D = coil DIA $\qquad$ L_s = free length

N_a precision $\sim \frac{1}{4}$ coil

compare τ_{MAX} to S_{ys}

$S_{ys} = 0.45\, S_{UT}$ $\qquad$ A227, A228

$S_{ys} = 0.50\, S_{UT}$ $\qquad$ A229, A230, A232, A401

Torsion springs

N_e = equivalent # of coils to due leg

$$N_e = \frac{L_1 + L_2}{3\pi D} \qquad \text{Eq 14.27a}$$