



$$\sigma_B = \frac{M C_0}{I_{sc}}$$

$$C_0 = \frac{D}{2}$$

$$I_{sc} = \frac{\pi D^4}{64}$$

$$L_1 = 4.72 \text{ in}$$

$$L_2 = 5.78 \text{ in}$$

$$D = .78 \text{ in}$$

$$E = 320,000 \text{ psi}$$

$$b = .97 \text{ in}$$

$$h = 1.635 \text{ in}$$

$$\delta_A = \frac{L_1^3 F}{3EI_{sc}}$$

$$C_D = \frac{b}{2}$$

$$I_{SR} = \frac{b^3 h}{12}$$

$$M = FL$$

$$\sigma_D = \frac{M C_D}{I_{SR}}$$

$$\delta_C = \frac{L_2^3 F}{3EI_{SR}}$$

Original $F = 9 \text{ lbs}$

New $F = 25 \text{ lbs}$

$$M = (9 \text{ lbs})(4.72 \text{ in}) = 42.48 \text{ in-lb}$$

$$M = (25 \text{ lbs})(4.72 \text{ in}) = 118.75 \text{ in-lb}$$

$$C_0 = \frac{(.78 \text{ in})}{2} = .39 \text{ in}$$

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$$I_{sc} = \frac{\pi (.78 \text{ in})^4}{64} = .01817 \text{ in}^4$$

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$$\delta_A = \frac{(4.72 \text{ in})^3 (9 \text{ lbs})}{3(320,000 \text{ psi})(.01817 \text{ in}^4)} = .0543 \text{ in}$$

$$\delta_A = \frac{(4.72 \text{ in})^3 (118.75 \text{ in-lb})}{3(320,000 \text{ psi})(.01817 \text{ in}^4)} = .7159 \text{ in}$$

$$\sigma_B = \frac{(42.48 \text{ in-lb})(.39 \text{ in})}{.01817 \text{ in}^4} = 911.79 \text{ psi}$$

$$\sigma_B = \frac{(118.75 \text{ in-lb})(.39 \text{ in})}{.01817 \text{ in}^4} = 2548.8 \text{ psi}$$

$$I_{SR} = \frac{(.97 \text{ in})^3 (1.635 \text{ in})}{12} = .1244 \text{ in}^4$$

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$$\delta_C = \frac{(5.78 \text{ in})^3 (9 \text{ lbs})}{3(320,000 \text{ psi})(.1244 \text{ in}^4)} = .0146 \text{ in}$$

$$\delta_C = \frac{(5.78 \text{ in})^3 (25 \text{ lbs})}{3(320,000 \text{ psi})(.1244 \text{ in}^4)} = .0404 \text{ in}$$

$$C_D = \frac{.97 \text{ in}}{2} = .485 \text{ in}$$

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$$\sigma_D = \frac{(42.48 \text{ in-lb})(.485 \text{ in})}{.1244 \text{ in}^4} = 165.6 \text{ psi}$$

$$\sigma_D = \frac{(118.75 \text{ in-lb})(.485 \text{ in})}{.1244 \text{ in}^4} = 462.97 \text{ psi}$$