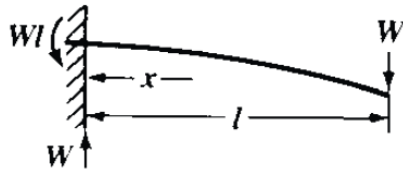


### Case 1: constant drill pipe



Page 262 Machinery's Handbook Guide 28th Edition

Modulus of Elasticity

$$E := 30 \cdot 10^6 \text{ psi}$$

Load

$$W := -1000 \text{ lbf}$$

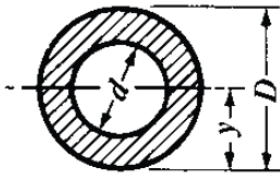
Some distance as indicated

$$x := 100 \text{ ft}$$

Some distance as indicated

$$L := 100 \text{ ft}$$

Finding Moment of Inertia:



Page 238 Machinery's Handbook Guide 28th Edition

Outside Diameter

$$D := \left( 6 + \frac{5}{8} \right) \text{ in}$$

Inside Diameter

$$d := 5.901 \text{ in}$$

Moment of Inertia

$$I := \frac{\pi(D^4 - d^4)}{64} = 35.04 \cdot \text{in}^4$$

section modulus of the cross-section of the beam

$$Z := \pi \frac{(D^4 - d^4)}{32 \cdot D} = 10.578 \cdot \text{in}^3$$

Stress at x

$$s := \frac{W}{Z}(L - x) = 0 \cdot \text{ksi}$$

Stress at mount

$$s := \frac{(W \cdot L)}{Z} = -113.442 \cdot \text{ksi}$$

Deflection

$$y_1 := \frac{W \cdot x^2}{6E \cdot I}(3 \cdot L - x) = -547.945 \cdot \text{in}$$

## Case 2: Stress Pipe hang-off

$$D_w := \left(6 + \frac{5}{8}\right) \cdot \text{in} = 6.625 \text{ in}$$

$$y_2 := \left(\frac{1}{E}\right) \cdot \int_0^x \int_0^x \frac{(W \cdot x)}{\left[\frac{\pi}{64} \cdot \left[\left(D_w - D\right) \cdot \frac{L - x}{L} + D\right]^4 - d^4\right]} dx dx = -274 \cdot \text{in}$$

