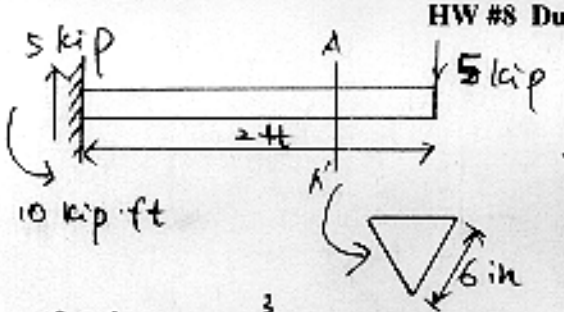
HW #8 Due: 11/02/2000

6-82

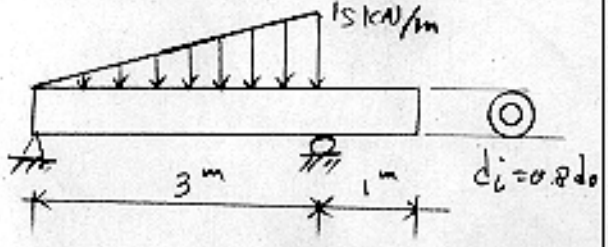


$$I = \frac{1}{36}(6)(6\sin 60)^3 = 23.383 \text{ in}^4$$

$$\sigma_{max} = \frac{My}{I} = \frac{10.0(12)\left[\frac{2}{3}(6.\sin 60)\right]}{23.383}$$

$$= \underline{17.8 \text{ ksi}}$$

6-85



$$I = \frac{\pi}{4}\left[\left(\frac{d_o}{2}\right)^4 - \left(\frac{d_i}{2}\right)^4\right] = \frac{\pi}{4}\left[\frac{d_o^4}{16} - \left(\frac{0.8 d_o}{2}\right)^4\right]$$

$$= 0.009225\pi d_o^4$$

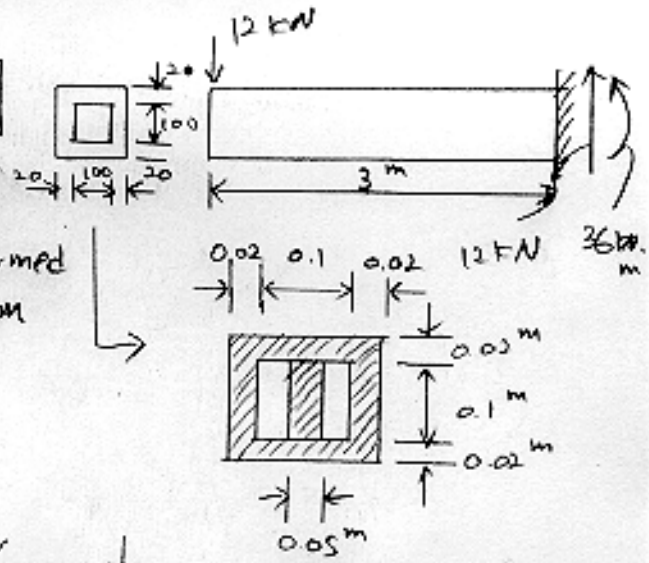
$$\sigma_{max} = \sigma_{allow} = \frac{Max.\, c}{I};$$

$$155(10^6) = \frac{60(10^3)\left(\frac{d_o}{2}\right)}{0.009225\pi d_o^4}$$

$$d_o = 0.1883 \text{ m} = \underline{188 \text{ mm}}$$

$$d_i = 0.8 d_o = \underline{151 \text{ mm}}$$

6-116



$$b_{st}/b_{br} = \frac{1}{E_{st}}\Big/\frac{1}{E_{br}} \rightarrow b_{st} = \frac{100}{200}(0.1)$$

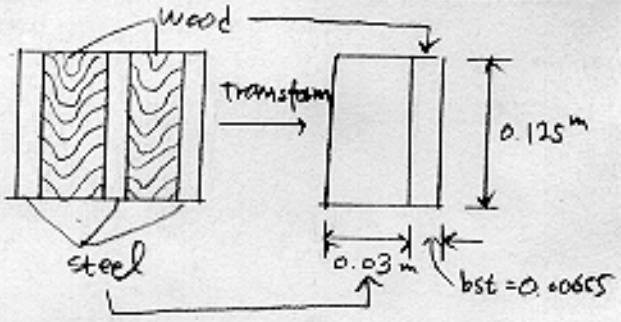
$$= 0.05 \text{ (m)}$$

$$I = \frac{1}{12}(0.14)(0.14^3) - \frac{1}{12}(0.05)(0.1^3)$$

$$= 27.8467(10^{-6}) \text{ m}^4$$

$$\sigma_{max} = \frac{Mc}{I} = \frac{36.0(10^3)(0.07)}{27.8467(10^{-6})} = \underline{90.5 \text{ MPa}}$$

6-120



$$n = \frac{E_w}{E_{st}} = \frac{13.1(10^9)}{200(10^9)} = 0.0655$$

$$b_{st} = n\, b_w = 0.0655(0.1) = 0.00655 \text{ (m)}$$

$$I = \frac{1}{12}(0.03)(0.125^3) + \frac{1}{12}(0.00655)(0.125^3)$$

$$= 5.9489(10^{-6}) \text{ m}^4$$

i) Assume failure of steel

$$(\sigma_{allow})_{st} = \frac{Mc}{I}$$