

ASSUME A CANTILEVERED BEAM

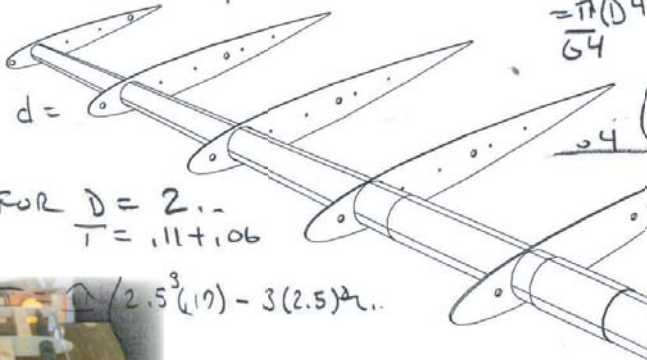


- PURE BENDING
- NO TORSION



$$I = \frac{\pi}{64} (D^4 - d^4)$$

$$= \frac{\pi}{64} (D^4 - (D-2t)^4)$$



FOR $D = 2.5$
 $I = .114106$

$$= \frac{\pi}{64} (2.5^3 (1.9) - 3(2.5)^2 t)$$

$$= .49 \text{ in}^4$$

IF $T =$
 IF $T =$



TABLE MOMENT BEFORE YIELD

$$\frac{\pi D^3}{2} = \frac{I}{D}$$

$$= \frac{2(42 \times 10^3 \text{ lb/in}^2)(.849 \text{ in}^4)}{2.5 \text{ in}}$$

$$= 28,526 \text{ in} \cdot \text{lbs}$$

$$= 2,377 \text{ ft} \cdot \text{lbs}$$

THIN WALLED TUBE

$$I = \frac{\pi D^3 t}{8}$$

$$= \frac{\pi (2.5^3)(.17)}{8}$$

$$= 1.0431 \text{ in}^4$$

FOR $T = .25$ $M = 3,169 \text{ ft} \cdot \text{lbs}$ OR 33% STRONGER
 FOR $T = .2$ $M = 2,695 \text{ ft} \cdot \text{lbs}$ OR 13% STRONGER

.010 = .0614
 .060 = .0602

Client: **Sting**
 Project: **Rudder Design**

Notes: