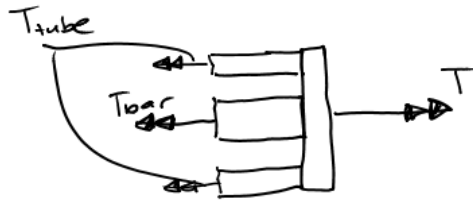
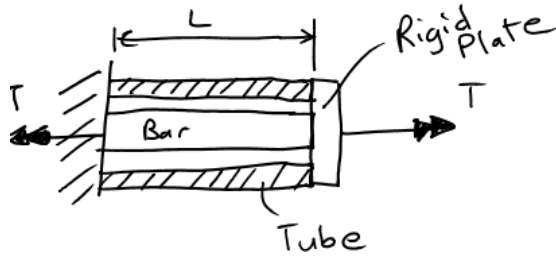


ENGR 2243 – Mechanics of Materials
Torsion – Statically Indeterminate Structures

Statically Indeterminate Structures

- Internal torques or support reactions can't be determined using equilibrium alone
- Need to look at deformations (Compatibility)



$$T = T_{\text{bar}} + T_{\text{tube}}$$

Compatibility

$$\phi_{\text{bar}} = \phi_{\text{tube}}$$

$$\frac{T_{\text{bar}}}{G_{\text{bar}} I_{P_{\text{bar}}}} = \frac{T_{\text{tube}}}{G_{\text{tube}} I_{P_{\text{tube}}}}$$

$$T_{\text{bar}} = \left(\frac{G_{\text{bar}} I_{P_{\text{bar}}}}{G_{\text{tube}} I_{P_{\text{tube}}}} \right) T_{\text{tube}}$$

$$T = T_{\text{bar}} + T_{\text{tube}}$$