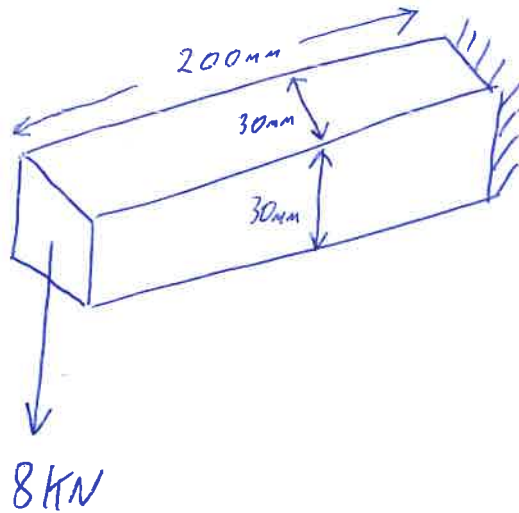


FEA v HAND CALCS

①



$$E_{\text{ALLOY STEEL}} = 210 \text{ GPa}$$

DEFLECTION
FROM SLOPE & DEFLECTIONS OF BEAMS THEORY

$$y_{\text{max}} = \frac{-WL^3}{3EI}$$

FIRST FIND I :

$$I_{\square} = \frac{BO^3}{12} = \frac{0.03 \times 0.03^3}{12} = \underline{\underline{6.75 \times 10^{-8} \text{ m}^4}}$$

$$\begin{aligned} y_{\text{max}} &= \frac{-8000 \times 0.2^3}{3 \times 210 \times 10^9 \times 6.75 \times 10^{-8}} \\ &= \underline{\underline{1.5 \text{ mm}}} \end{aligned}$$

• y_{max} (SOLIDWORKS) = 1.53 mm WITH A 10 mm MESH.

STRESS

FROM SIMPLE THEORY OF ELASTIC BENDING : $\frac{M}{I} = \frac{\sigma}{y} = \frac{E}{R}$

$$\sigma = \frac{My}{I} = \frac{8000 \times 0.2 \times 0.015}{6.75 \times 10^{-8}} = \underline{\underline{355.5 \text{ MPa}}}$$

$$\sigma_{\text{max}} (\text{SOLIDWORKS}) = \underline{\underline{340.4 \text{ MPa}}}$$