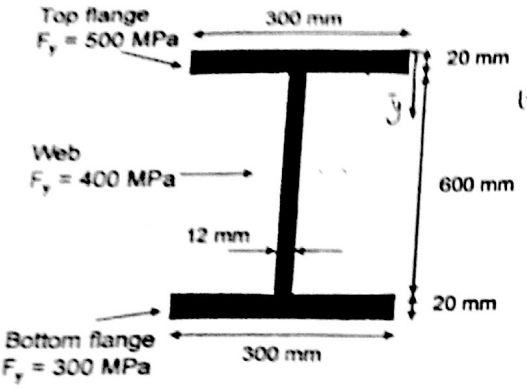
1. For the built-up I-shape shown below determine the yield moment resistance (M_y) and fully plastic moment resistance (M_p) for strong axis bending. Note that the section is made up of plates with different yield strengths.



compactness check

top flange : $\lambda = 7,5 < \lambda_p = 7,6$ ✓

bottom flange : $\lambda = 7,5 > \lambda_p = 5,51$ ✓

web : $\lambda = 50 \quad \lambda_p = 84,1$ ✓

section is compact

$\Sigma F_c = \Sigma F_T$

$(300)(20)(500) + (\bar{y}-20)(12)(400) = (620-\bar{y})(12)(400) + (20)(300)(300)$

$\bar{y} = 135$ mm (from top of the section)

$\bar{y}$: location of the plastic neutral axis

$M_p = (300)(20)(500)(135) + (115)(12)(400)\left(\frac{115}{2}\right) + (425)(12)(400)\left(\frac{425}{2}\right) + (300)(20)(300)(435)$

$M_p = 1125$ kN.m ✓

$I_x = \left[\frac{1}{12}(20)^3(300) + (300)(20)(310)^2\right] \times 2 + \frac{1}{12}(600)^3(12) = 1368,6 \times 10^6$ mm^4

$\sigma = \frac{My}{I} \qquad M_y = \frac{(300)(1368,6 \times 10^6)}{320} = 1284$ kN.m (at the bottom of the section) ✓