

Design of steel I section beam

According to **Eurocode**: EN 1993-1-1

Dimensions

Section type - IPN 550

$$h = 550 \text{ mm}, \quad t_w = 19 \text{ mm}$$

$$b_{f1} = 200 \text{ mm}, \quad t_{f1} = 30 \text{ mm}$$

$$b_{f2} = 200 \text{ mm}, \quad t_{f2} = 30 \text{ mm}$$

$$r = 19 \text{ mm},$$

$$h_w = h - t_{f1} - t_{f2} = 550 - 30 - 30 = 490 \text{ mm}$$

Section type - Rolled

Steel properties

Yield strength - $f_y = 235 \text{ MPa}$

Tensile strength - $f_u = 360 \text{ MPa}$

Modulus of elasticity - $E = 210000 \text{ MPa}$

Private factors of safety:

$$\gamma_{M0} = 1.05, \quad \gamma_{M2} = 1.25$$

Section properties

$$A = 21619.88505 \text{ mm}^2 \quad y_c = 100 \text{ mm} \quad z_c = 275 \text{ mm}$$

$$I_y = 1016343525 \text{ mm}^4 \quad r_y = 216.81712 \text{ mm}$$

$$W_{el_y} = 3695794.637 \text{ mm}^3 \quad W_{pl_y} = 4335081.688 \text{ mm}^3$$

$$I_z = 40342545.43 \text{ mm}^4 \quad r_z = 43.197136 \text{ mm}$$

$$W_{el_z} = 403425.4543 \text{ mm}^3 \quad W_{pl_z} = 648481.5573 \text{ mm}^3$$

$$I_t = 5216559.421 \text{ mm}^4 \quad I_w = 2704000000000 \text{ mm}^6$$

$$W_t = 98566.08232 \text{ mm}^3$$

