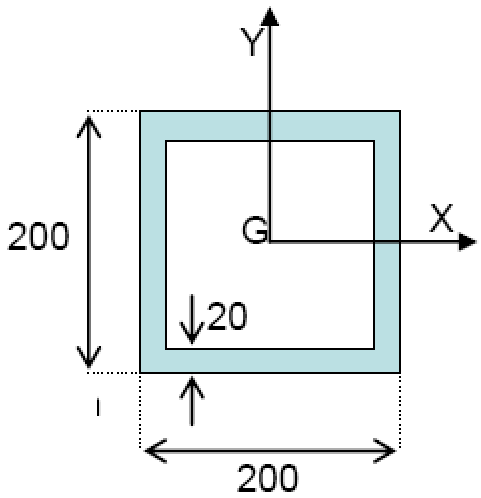
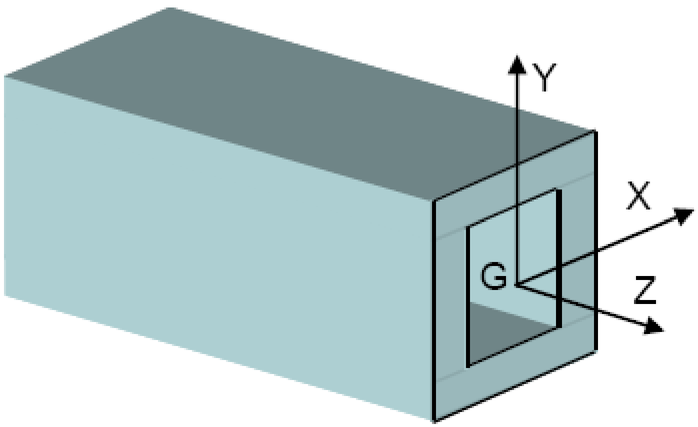
Normal stresses calculation



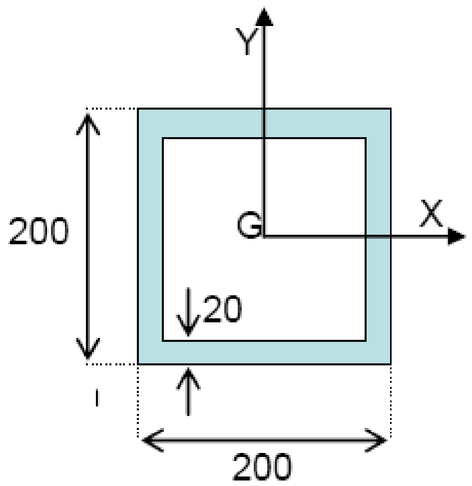


N= 2670 kN (T)

Mx= -240 kN.m

$$\sigma_z(y) = \frac{M_x \cdot y}{I_G} + \frac{N}{A}$$

Normal stresses calculation



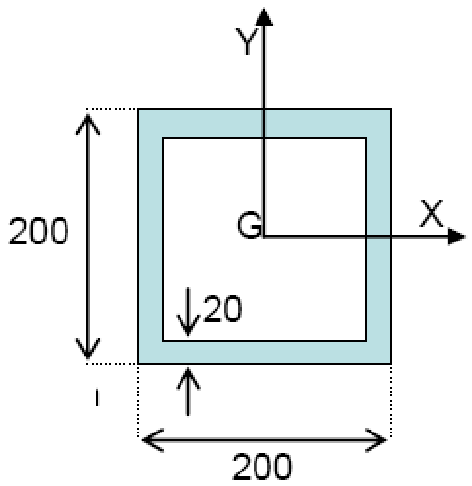
$$y_G = 100\ mm$$

Inertia calculation using additive properties

$$A = 200^2 mm^2 - 160^2 mm^2 = 0{,}0144 m^2$$

$$I_X = \frac{1}{12} 200.200^3 - \frac{1}{12} 160.160^3 = 78{,}7.10^{-6}\ m^4$$

Normal stresses calculation



$$\sigma_z(y) = \frac{M_x \cdot y}{I_G} + \frac{N}{A}$$

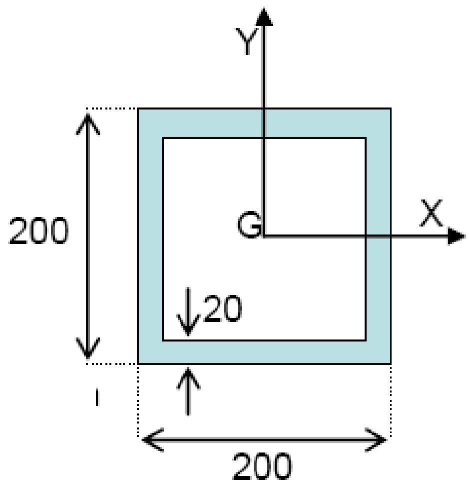
N= 2670 kN (T)

Mx= -240 kN.m

$$\sigma_T = \frac{N}{A} - \frac{M_x y}{I_x} = \frac{2670\ kN}{14400\ mm^2} - \frac{-240.10^3\ N.m.y(mm).10^3 m}{78{,}7.10^{-6} m^4}$$

$$\sigma_T = 185\ MPa + 3049{,}1\ \frac{MPa}{m} y$$

Normal stresses calculation



$$\sigma_z(y) = \frac{M_x \cdot y}{I_G} + \frac{N}{A}$$

N= 2670 kN (T)

Mx= -240 kN.m

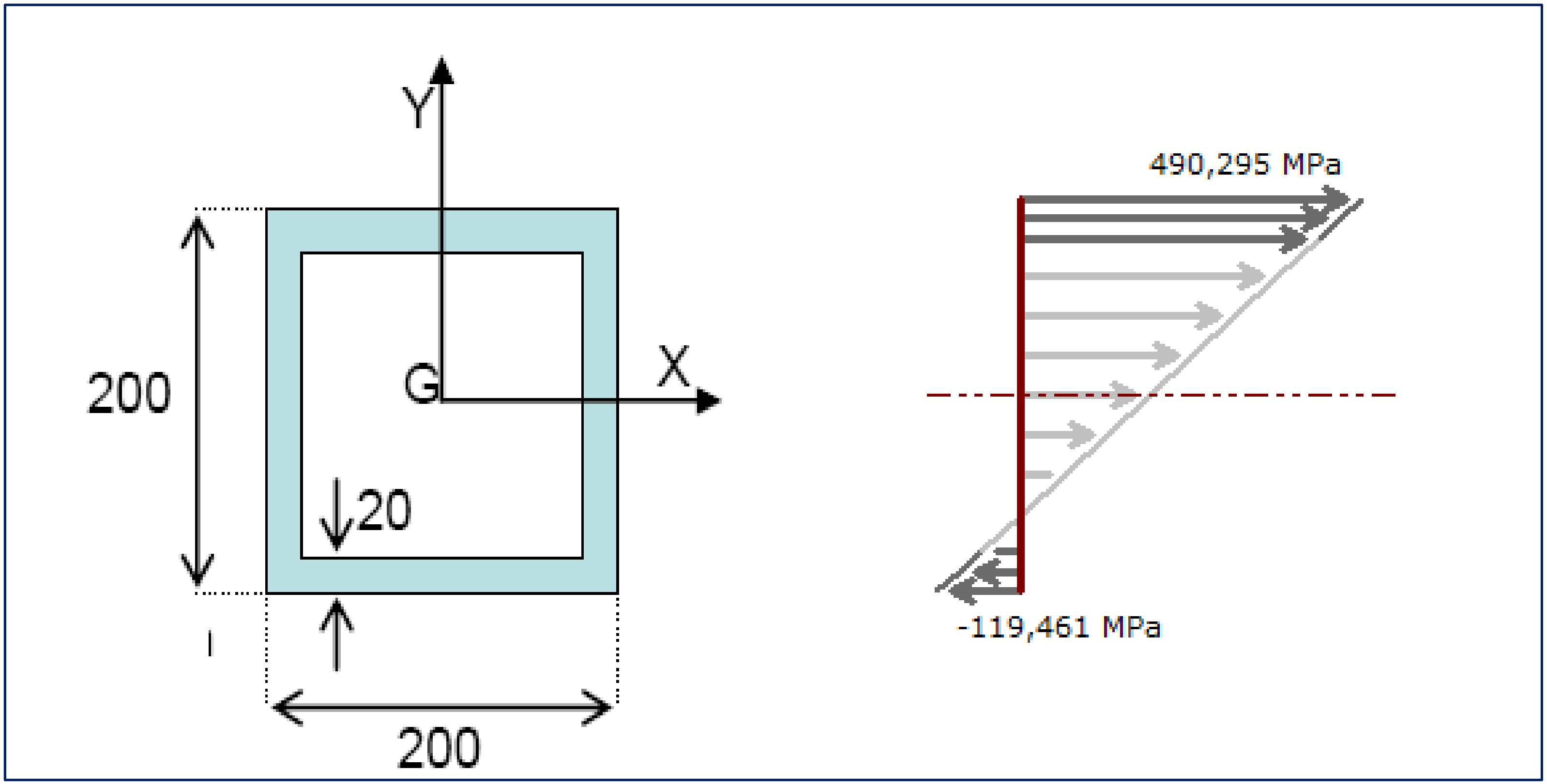
$$\sigma_T = 185\ MPa + 3049{,}1\ \frac{MPa}{m} y$$

$$y = 100\ mm \quad \rightarrow \sigma_T = 490{,}2\ MPa$$

$$y = -100\ mm \rightarrow \sigma_C = 119{,}4\ MPa$$

$$185 + 3049y = 0 \rightarrow y_{fn} = -60mm$$

Calculation of Normal stress



Safety coefficient

Maximum compressive stress = 120 MPa

Maximum tensile stress = 490 MPa

σ_{max} (tensile) = 700 MPa → $C_{S1} = \frac{\sigma_{max}}{\sigma_{service}} = \frac{700}{490} = 1{,}42$

σ_{max} (compressive)= 500 MPa → Cs =4,16

$$C_S = \min(C_{S1}, C_{S2}) = 1{,}42$$