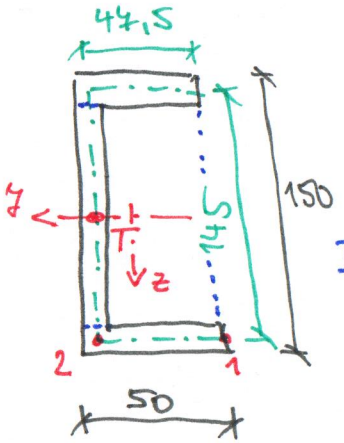


$t = 5\,mm$

$V_z = 10\,kN$

$$I_y = \frac{1}{12}\cdot 50\cdot 150^3 - \frac{1}{12}\cdot 45\cdot 140^3 = 3{,}7725\cdot 10^6\ mm^4$$

$$\tau = \frac{V_z\cdot \bar{S}_y}{I_y\, t}$$

$\tau_{xy1} = 0$

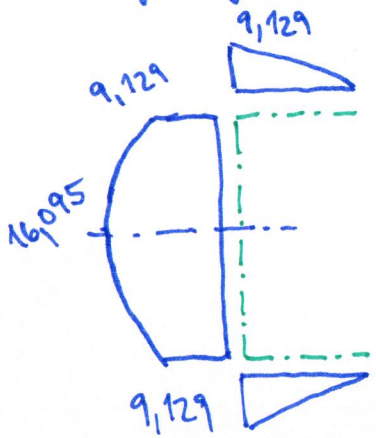
$$\bar{S}_{y2} = 47{,}5\cdot 5\cdot \frac{145}{2} = 17\,218{,}75\ mm^3$$

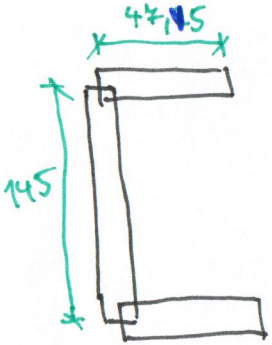
$$\tau_{xy2} = \frac{10\cdot 10^3\cdot 17\,218{,}75}{3{,}7725\cdot 10^6\cdot 5} = \underline{9{,}129\ MPa}$$

$\tau_{xz2} = \tau_{xy2}$

$$\tau_{xzT} = \frac{10\cdot 10^3\cdot 30\,359{,}375}{3{,}7725\cdot 10^6\cdot 5} = \underline{16{,}095\ MPa}$$

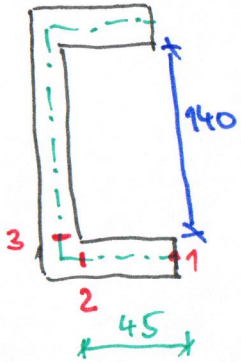
$$\bar{S}_{yT} = \bar{S}_{y2} + 5\cdot \frac{145}{2}\cdot\left(\frac{1}{2}\,\frac{145}{2}\right) = 30\,359{,}375\ mm^3$$





$$I_y = \frac{1}{12}\cdot 5\cdot 145^3 + 2\cdot\left[\frac{1}{12}\,47{,}5\cdot 5^3 + 47{,}5\cdot 5\cdot\left(\frac{145}{2}\right)^2\right] = 3{,}7647969\cdot 10^6\ mm^4$$

$[\tau_{xy2} = \ldots = 9{,}1395\ MPa]$



$$\bar{S}_{y2} = 45\cdot 5\cdot \frac{145}{2} = 16\,312{,}5\ mm^3$$

$$\tau_{xy2} = \frac{10\cdot 10^3\cdot 16\,312{,}5}{3{,}7725\cdot 10^6\cdot 5} = \underline{8{,}648\ MPa}$$

$$\bar{S}_{y3} = 50\cdot 5\cdot \frac{145}{2} = 18125\ mm^3$$

$$\tau_{xz3} = \frac{10\cdot 10^3\cdot 18125}{3{,}7725\cdot 10^6\cdot 5} = \underline{9{,}609\ MPa}$$

$$\bar{S}_{yT} = \bar{S}_{y3} + \frac{140}{2}\cdot 5\cdot\left(\frac{1}{2}\,\frac{140}{2}\right) = 30\,375\ mm^3$$

$$\tau_{xzT} = \frac{10\cdot 10^3\cdot 30375}{3{,}7725\cdot 10^6\cdot 5} = \underline{16{,}103\ MPa}$$