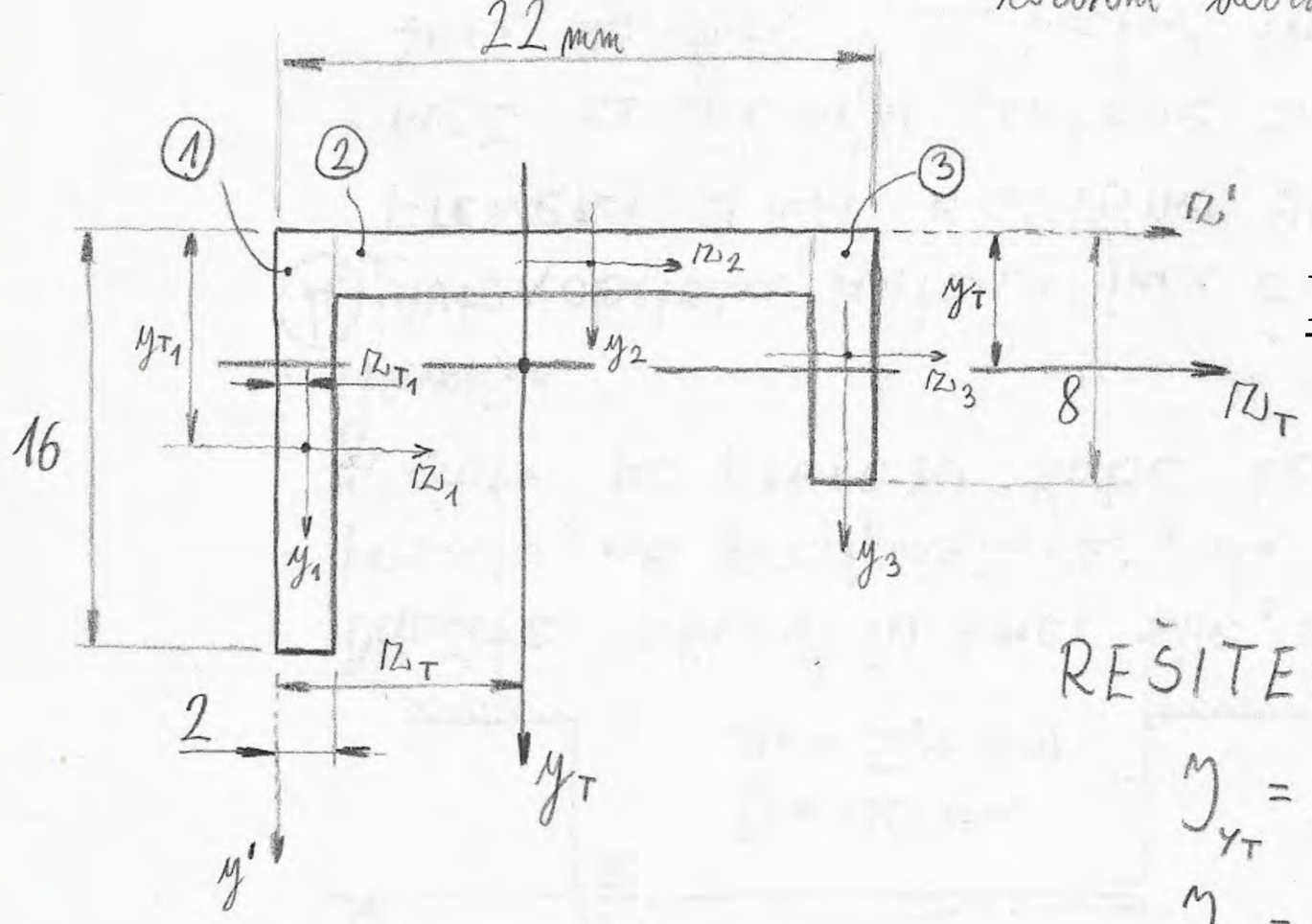
Za narisani nesimetrični U prerez izračunajte težiščna vztrajnostna momenta $\mathcal{J}_{y_T}$, $\mathcal{J}_{z_T}$ ter težiščni deviacijski moment $\mathcal{J}_{y_T z_T}$.



Izračun geometrijskih karakteristik prereza nosilca iz 10. vaje

REŠITEV:

$\mathcal{J}_{y_T} = 5483{,}238\ mm^4$

$\mathcal{J}_{z_T} = 1611{,}238\ mm^4$

$\mathcal{J}_{y_T z_T} = -1241{,}904\ mm^4$

lik (i)	y_{T_i}	z_{T_i}	A_i	$\mathcal{J}_{y_i}$	$\mathcal{J}_{z_i}$	$\mathcal{J}_{y_i z_i}$	$(z_{T_i}-z_T)^2 A_i$	$(y_{T_i}-y_T)^2 A_i$	$(y_{T_i}-y_T)(z_{T_i}-z_T)A_i$
1	8	1	32	$\frac{32}{3}$	$\frac{2048}{3}$	0	2097,052	452,862	-974,512
2	1	11	36	972	12	0	130,612	377,469	-222,041
3	4	21	16	$\frac{16}{3}$	$\frac{256}{3}$	0	2267,574	0,907	-45,351
	4,2381	9,0952							

$y_T = \frac{8\cdot 32 + 1\cdot 36 + 4\cdot 16}{32+36+16} = \frac{89}{21}\ mm \approx 4{,}2381\ mm$

$z_T = \frac{1\cdot 32 + 11\cdot 36 + 21\cdot 16}{32+36+16} = \frac{191}{21}\ mm \approx 9{,}0952\ mm$

$\mathcal{J}_{y_1} = \frac{16\cdot 2^3}{12} = \frac{32}{3}\ mm^4$

$\mathcal{J}_{z_1} = \frac{2\cdot 16^3}{12} = \frac{2048}{3}\ mm^4$

$\mathcal{J}_{y_2} = \frac{2\cdot 18^3}{12} = 972\ mm^4$

$\mathcal{J}_{z_2} = \frac{18\cdot 2^3}{12} = 12\ mm^4$

$\mathcal{J}_{y_3} = \frac{8\cdot 2^3}{12} = \frac{16}{3}\ mm^4$

$\mathcal{J}_{z_3} = \frac{2\cdot 8^3}{12} = \frac{256}{3}\ mm^4$

$(z_{T_1} - z_T)^2 A_1 = (1 - \frac{191}{21})^2 \cdot 32 = 2097{,}052\ mm^4$

$(z_{T_2} - z_T)^2 A_2 = (11 - \frac{191}{21})^2 \cdot 36 = 130{,}612\ mm^4$

$(z_{T_3} - z_T)^2 A_3 = (21 - \frac{191}{21})^2 \cdot 16 = 2267{,}574\ mm^4$

itd.

$\mathcal{J}_{y_T} = \frac{32}{3} + 972 + \frac{16}{3} + 2097{,}052 + 130{,}612 + 2267{,}574 = \underline{5483{,}238\ mm^4}$

$\mathcal{J}_{z_T} = \frac{2048}{3} + 12 + \frac{256}{3} + 452{,}862 + 377{,}469 + 0{,}907 = \underline{1611{,}238\ mm^4}$

$\mathcal{J}_{y_T z_T} = 0 + 0 + 0 - 974{,}512 - 222{,}041 - 45{,}351 = \underline{-1241{,}904\ mm^4}$