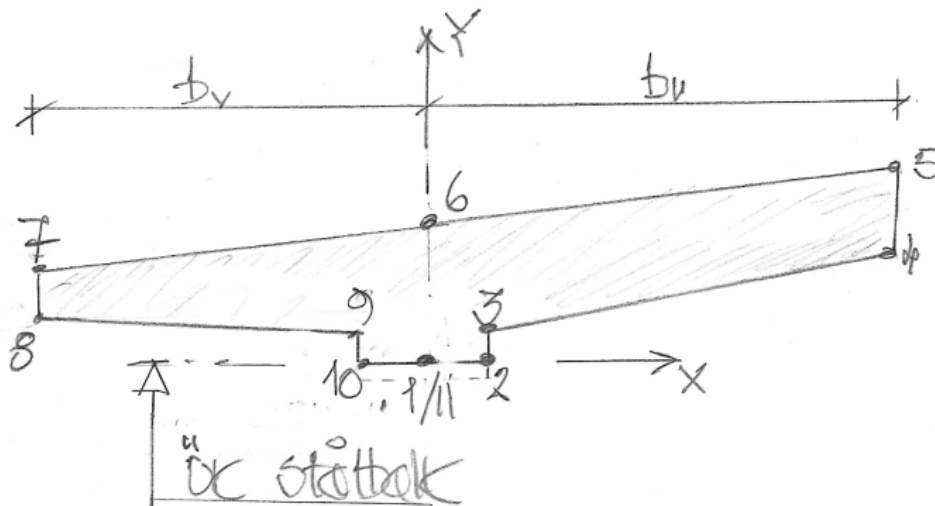


Objekt: Farbana

PRINCIPFIGUR

Verkligt tvärsnitt :

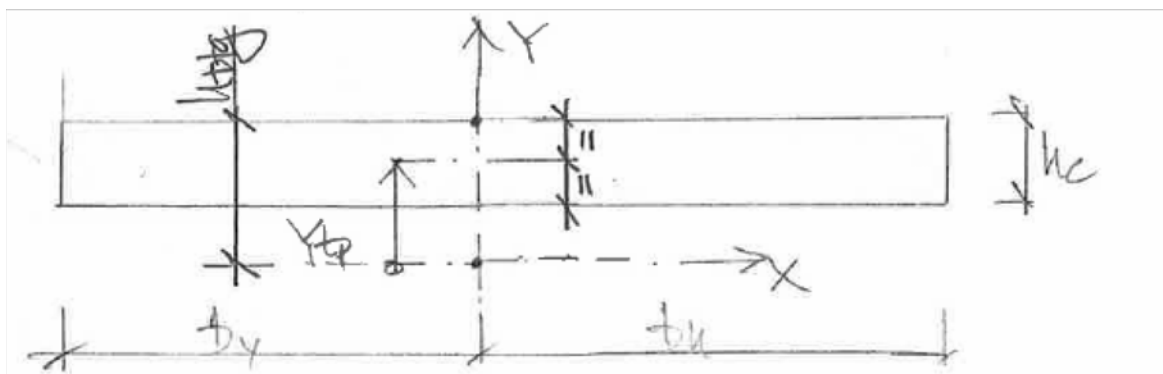


Antalet hörn : $n_p = 10$ st

Antalet punkter (= $n_p + 1$ ty 1:a och sista punkt skall sammanfalla) :

$N_p = n_p + 1 = 11$ ·st

Ekvivalent tvärsnitt :



INDATA

Ange antalet snitt som studeras : $N_s := 2st$

Koordinater (punkter skall anges "moturs") :

	Enhet	Snitt 1	Snitt 2
X_{P1}	[m]	0	0
y_{P1}	[m]	0	0
X_{P2}	[m]	0.200	0.200
y_{P2}	[m]	0	0
X_{P3}	[m]	0.200	0.200
y_{P3}	[m]	0.020	0.020
X_{P4}	[m]	1.000	1.000
y_{P4}	[m]	0.020	0.020
X_{P5}	[m]	1.000	1.000
y_{P5}	[m]	0.270	0.270
X_{P6}	[m]	0	0
y_{P6}	[m]	0.265	0.265
X_{P7}	[m]	-0.950	-0.950
y_{P7}	[m]	0.260	0.260
X_{P8}	[m]	-0.950	-0.950
y_{P8}	[m]	0.020	0.020
X_{P9}	[m]	-0.200	-0.200
y_{P9}	[m]	0.020	0.020
X_{P10}	[m]	-0.200	-0.200
y_{P10}	[m]	0	0
X_{P11}	[m]	0	0
y_{P11}	[m]	0	0

BERÄKNING

Area :

$$A = \left| \begin{array}{l} \text{for } j \in 1..N_s \\ x \leftarrow (x_{P1_j} \ x_{P2_j} \ x_{P3_j} \ x_{P4_j} \ x_{P5_j} \ x_{P6_j} \ x_{P7_j} \ x_{P8_j} \ x_{P9_j} \ x_{P10_j} \ x_{P11_j}) \\ y \leftarrow (y_{P1_j} \ y_{P2_j} \ y_{P3_j} \ y_{P4_j} \ y_{P5_j} \ y_{P6_j} \ y_{P7_j} \ y_{P8_j} \ y_{P9_j} \ y_{P10_j} \ y_{P11_j}) \\ \sum_{i=1}^{n_p} \frac{[(y_{i+1} - y_i) \cdot (x_{i+1} + x_i)]}{2} \end{array} \right|$$

Statiskt moment S_x :

$$S_x = \left| \begin{array}{l} \text{for } j \in 1..N_s \\ x \leftarrow (x_{P1_j} \ x_{P2_j} \ x_{P3_j} \ x_{P4_j} \ x_{P5_j} \ x_{P6_j} \ x_{P7_j} \ x_{P8_j} \ x_{P9_j} \ x_{P10_j} \ x_{P11_j}) \\ y \leftarrow (y_{P1_j} \ y_{P2_j} \ y_{P3_j} \ y_{P4_j} \ y_{P5_j} \ y_{P6_j} \ y_{P7_j} \ y_{P8_j} \ y_{P9_j} \ y_{P10_j} \ y_{P11_j}) \\ \sum_{i=1}^{n_p} \left[(y_{i+1} - y_i) \cdot \left[\frac{(x_{i+1} - x_i) \cdot (y_{i+1} - y_i)}{3} + \frac{[y_i \cdot (x_{i+1} - x_i)] + [x_i \cdot (y_{i+1} - y_i)] + 2 \cdot x_i \cdot y_i}{2} \right] \right] \end{array} \right|$$

Statiskt moment S_y:

$$S_y = \left| \begin{array}{l} \text{for } j \in 1..N_s \\ x \leftarrow (x_{P1_j} \ x_{P2_j} \ x_{P3_j} \ x_{P4_j} \ x_{P5_j} \ x_{P6_j} \ x_{P7_j} \ x_{P8_j} \ x_{P9_j} \ x_{P10_j} \ x_{P11_j}) \\ y \leftarrow (y_{P1_j} \ y_{P2_j} \ y_{P3_j} \ y_{P4_j} \ y_{P5_j} \ y_{P6_j} \ y_{P7_j} \ y_{P8_j} \ y_{P9_j} \ y_{P10_j} \ y_{P11_j}) \\ \sum_{i=1}^{n_p} \left[\left(\frac{y_{i+1} - y_i}{2} \right) \cdot \left[\frac{(x_{i+1} - x_i)^2}{3} + x_i \cdot x_{i+1} \right] \right] \end{array} \right|$$

Tyngdpunktslägen:

$$x_{tp} = \frac{S_y}{A}$$

$$y_{tp} = \frac{S_x}{A}$$

Funktion - tröghetsmoment :

$$fI_x(x, y) = \sum_{i=1}^{n_p} \left[(y_{i+1} - y_i) \cdot \left[\frac{(x_{i+1} - x_i)}{4} \cdot (y_{i+1} - y_i)^2 + 2 \cdot \frac{y_i}{3} \cdot (x_{i+1} - x_i) \cdot (y_{i+1} - y_i) + (x_{i+1} - x_i) \cdot \left[\frac{(y_i)^2}{2} \right] \dots \right] \right. \\ \left. + x_i \cdot \left[\frac{(y_{i+1} - y_i)^2}{3} \right] + y_{i+1} \cdot y_i \right]$$

$$fI_y(x, y) = \sum_{i=1}^{n_p} \left[\left[\frac{(y_{i+1} - y_i)}{3} \right] \cdot \left[\frac{(x_{i+1} - x_i)^3}{4} + x_i \cdot (x_{i+1} - x_i)^2 + 1.5 \cdot (x_i)^2 \cdot (x_{i+1} - x_i) + (x_i)^3 \right] \right]$$

Tröghetsmoment map origo :

$$I_x = \left| \begin{array}{l} \text{for } j \in 1 \dots N_s \\ x \leftarrow (x_{P1_j} \ x_{P2_j} \ x_{P3_j} \ x_{P4_j} \ x_{P5_j} \ x_{P6_j} \ x_{P7_j} \ x_{P8_j} \ x_{P9_j} \ x_{P10_j} \ x_{P11_j}) \\ y \leftarrow (y_{P1_j} \ y_{P2_j} \ y_{P3_j} \ y_{P4_j} \ y_{P5_j} \ y_{P6_j} \ y_{P7_j} \ y_{P8_j} \ y_{P9_j} \ y_{P10_j} \ y_{P11_j}) \\ fI_x(x, y) \end{array} \right|$$

$$I_y = \left| \begin{array}{l} \text{for } j \in 1 \dots N_s \\ x \leftarrow (x_{P1_j} \ x_{P2_j} \ x_{P3_j} \ x_{P4_j} \ x_{P5_j} \ x_{P6_j} \ x_{P7_j} \ x_{P8_j} \ x_{P9_j} \ x_{P10_j} \ x_{P11_j}) \\ y \leftarrow (y_{P1_j} \ y_{P2_j} \ y_{P3_j} \ y_{P4_j} \ y_{P5_j} \ y_{P6_j} \ y_{P7_j} \ y_{P8_j} \ y_{P9_j} \ y_{P10_j} \ y_{P11_j}) \\ fI_y(x, y) \end{array} \right|$$

Tröghetsmoment map TP:

$$I_{x,tp} = \left| \begin{array}{l} \text{for } j \in 1..N_s \\ x \leftarrow (xp1_j, xp2_j, xp3_j, xp4_j, xp5_j, xp6_j, xp7_j, xp8_j, xp9_j, xp10_j, xp11_j) \\ y \leftarrow (yp1_j, yp2_j, yp3_j, yp4_j, yp5_j, yp6_j, yp7_j, yp8_j, yp9_j, yp10_j, yp11_j) \\ x0 \leftarrow x - x_{tp_j} \\ y0 \leftarrow y - y_{tp_j} \\ flx(x0, y0) \end{array} \right|$$

$$I_{y,tp} = \left| \begin{array}{l} \text{for } j \in 1..N_s \\ x \leftarrow (xp1_j, xp2_j, xp3_j, xp4_j, xp5_j, xp6_j, xp7_j, xp8_j, xp9_j, xp10_j, xp11_j) \\ y \leftarrow (yp1_j, yp2_j, yp3_j, yp4_j, yp5_j, yp6_j, yp7_j, yp8_j, yp9_j, yp10_j, yp11_j) \\ x0 \leftarrow x - x_{tp_j} \\ y0 \leftarrow y - y_{tp_j} \\ fly(x0, y0) \end{array} \right|$$

Ekvivalent bredd

$$b_v := \left| \begin{array}{l} \text{for } j \in 1..N_s \\ x \leftarrow (xp1_j, xp2_j, xp3_j, xp4_j, xp5_j, xp6_j, xp7_j, xp8_j, xp9_j, xp10_j, xp11_j) \\ -\min(x) \end{array} \right|$$

$$b_h := \left| \begin{array}{l} \text{for } j \in 1..N_s \\ x \leftarrow (xp1_j, xp2_j, xp3_j, xp4_j, xp5_j, xp6_j, xp7_j, xp8_j, xp9_j, xp10_j, xp11_j) \\ \max(x) \end{array} \right|$$

Ekvivalent höjd

$$h_c := \frac{A}{b_v + b_h} \quad h_{btg} := y_{tp} + 0.5h_c$$

RESULTAT

Area :

$$A = (0.486 \quad 0.486) \text{ m}^2$$

Tvärsnittskonstanter kring x-x axel :

$$S_x = (0.068 \quad 0.068) \text{ m}^3$$

$$10^3 I_x = (12.105 \quad 12.105) \text{ m}^4$$

Tvärsnittskonstanter kring y-y axel :

$$S_y = (0.015 \quad 0.015) \text{ m}^3$$

$$I_y = (0.152 \quad 0.152) \text{ m}^4$$

Koordinat tyngdpunkt :

$$x_{tp} = (0.031 \quad 0.031) \text{ m}$$

$$y_{tp} = (0.140 \quad 0.140) \text{ m}$$

Tröghetsmoment kring tyngdpunktslägen :

$$10^3 I_{x,tp} = (2.532 \quad 2.532) \text{ m}^4$$

$$I_{y,tp} = (0.152 \quad 0.152) \text{ m}^4$$

Ekivalent tvärsnitt :

$$b_v = (0.950 \quad 0.950) \text{ m}$$

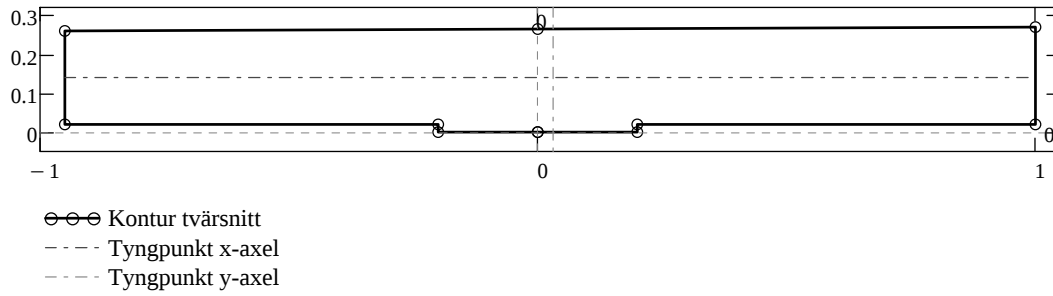
$$b_h = (1.000 \quad 1.000) \text{ m}$$

$$h_c = (249 \quad 249) \cdot \text{mm}$$

$$h_{btg} = (265 \quad 265) \cdot \text{mm}$$

Grafisk redovisning :

Snitt_j := 1_:



Snitt_j := 2_:

