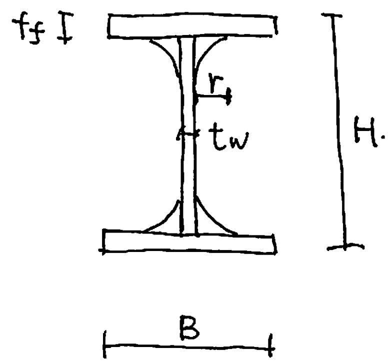
○ 強軸 断面2次モーメント.

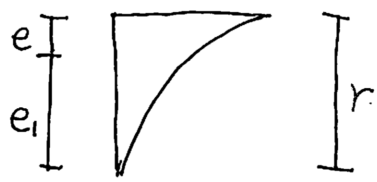


$$A = 2\cdot B\cdot t_f + (H-2\cdot t_f)\cdot t_w + 4\cdot rA$$

$$I_{fx} = B\cdot t_f^3/12 + B\cdot t_f\cdot\left[(H-t_f)/2\right]^2$$

$$I_{wx} = t_w\cdot(H-2\cdot t_f)^3/12$$

公式



$$e = 0.2234r = r\left(1-\frac{2}{3}\cdot\frac{1}{(4-\pi)}\right).$$

$$e_1 = 0.7766r = r/\left[6\left(1-\frac{\pi}{4}\right)\right]$$

$$rA = 0.2146r^2 = \left(1-\frac{\pi}{4}\right)r^2$$

$$rI = 0.0075r^4 = \left\{\frac{1}{3}-\frac{\pi}{16}-\frac{1}{9}\cdot\frac{1}{(4-\pi)}\right\}r^4$$

$$\therefore I_{rx} = rI + rA\cdot\left(\frac{H}{2}-t_f-e\right)^2$$

中立軸からの の断面2次モーメント.

$$\therefore I_x = 2\cdot I_{fx} + I_{wx} + 4\cdot I_{rx}$$

○ ウェブを考慮しないとき.

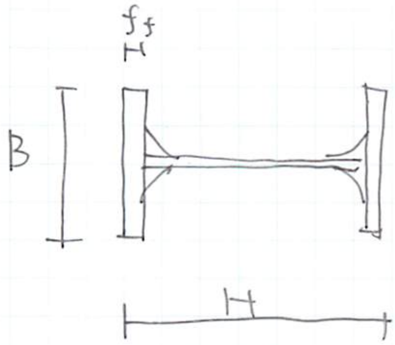
$$\rightarrow I_x = 2\cdot I_{fx}.$$

○ スカラップ 35mm.

$$\rightarrow I_x = 2\cdot I_{fx} + t_w(H-2\cdot t_f-35\cdot 2)^3/12.$$

$$Z_x = I_x/(H/2)$$

◦ 弱軸断面2次モーメント.

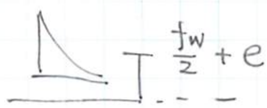


$$I_{fy} = t_f \cdot B^3/12$$

$$I_{wy} = t_w^3 \cdot (H - 2 \cdot t_f)/12$$

$$I_{ry} = \overset{r_I = 0.0075r^4}{rI} + \overset{r_A = 0.2146r^2}{rA} \cdot \left(\frac{t_w}{2} + 0.2234r\right)^2$$

$$I_y = 2 \cdot I_{fy} + I_{wy} + 4 I_{ry}$$

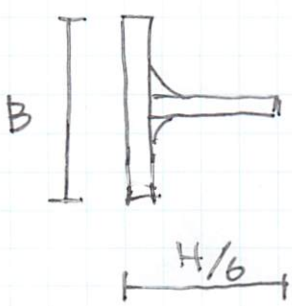


$$Z_y = I_y/(B/2)$$

◦ ibの計算.

圧縮フランジと梁せいの1/6とからなる

T形断面のウェブ軸まわりの断面2次半径.



$$I = B^3 \cdot t_f/12 + (H/6 - t_f) \cdot t_w^3/12 + 2 I_{ry}$$

$$A = B \cdot t_f + (H/6 - t_f) \cdot t_w + 2 \cdot rA$$

$$i_b = \sqrt{I/A}$$

◦ ηの計算

$$\eta = \frac{i_b \cdot H}{A_f} = \frac{i_b \cdot H}{B \cdot t_f}$$

・計算例

H−294×200×8×12×13.

$rA = 0.2146\,r^2 = 0.2146\cdot 13^2 = 36.2676\ mm^2$

$rI = 0.0075\,r^4 = 0.0075\cdot 13^4 = 214.2075\ mm^4$

・断面積 $A = 2\cdot B\cdot t_f + (H-2\cdot t_f)\cdot t_w + 4\cdot rA$

$= 2\cdot 200\cdot 12 + (294-2\cdot 12)\cdot 8 + 4\cdot 36.2676$

$= 7105 \rightarrow \underline{71.05\ cm^2}$

断面2次モーメント $I_x = 2\cdot I_{fx} + I_{wx} + 4\cdot I_{rx}$

$I_{fx} = B\cdot t_f^3/12 + B\cdot t_f\cdot[(H-t_f)/2]^2$

$= 200\cdot 12^3/12 + 200\cdot 12\cdot[(294-12)/2]^2 = 4774.3\times 10^4$

$I_{wx} = t_w\cdot(H-2t_f)^3/12$

$= 8\cdot(294-2\cdot 12)^3/12 = 1312\times 10^4$

$I_{rx} = rI + rA\cdot(\frac{H}{2}-t_f-e)^2$

$= 214.2 + 36.2676\cdot(\frac{294}{2}-12-0.2234\cdot 13)^2$

$= 63.3\times 10^4$

$\therefore\ I_x = 2\cdot 4774.3 + 1312 + 63.3\times 4\ \underline{= 11113.8\ cm^4}$

断面2次モーメント $I_y = 2\cdot I_{fy} + I_{wy} + 4 I_{ry}$

$I_{fy} = t_f\cdot B^3/12 = 12\cdot 200^3/12 = 800.0\times 10^4$

$I_{wy} = t_w^3\cdot(H-2\cdot t_f)/12 = 8^3\cdot(294-2\cdot 12)/12 = 1.152\times 10^4$

$I_{ry} = 0.0075\,r^4 + rA\cdot(\frac{t_w}{2}+0.2234\,r)^2$

$= 0.0075\cdot 13^4 + 36.2676\cdot(\frac{8}{2}+0.2234\cdot 13)^2$

$= 1943 = 0.1943\times 10^4$

$\therefore\ I_y = 2\cdot 800.0 + 1.152 + 0.1943\cdot 4$

$= 1601.9\ cm^4$

$\underline{ib} = \sqrt{I/A}$

$$I = B^3 t_f/12 + (H/6 - t_f) \cdot t_w^3/12 + 2\,I_{ry}$$

$$= 200^3 \cdot 12/12 + (294/6 - 12) \cdot 8^3/12 + 2 \cdot 1943$$

$$= 800.546 \times 10^4$$

$$A = B \cdot t_f + (H/6 + t_f) \cdot t_w + 2\,rA$$

$$= 200 \cdot 12 + (294/6 - 12) \cdot 8 + 2 \cdot 36.26$$

$$= 2768.5 \text{ mm}^2$$

$$ib = \sqrt{800.546 \times 10^4 / 2768.5} = 53.77 \rightarrow 5.377 \text{ cm}$$

$$\underline{\eta} = \frac{ib \cdot H}{A_f} = 5.377 \times 10 \cdot 294 / (12 \cdot 200)$$

$$= 6.586$$