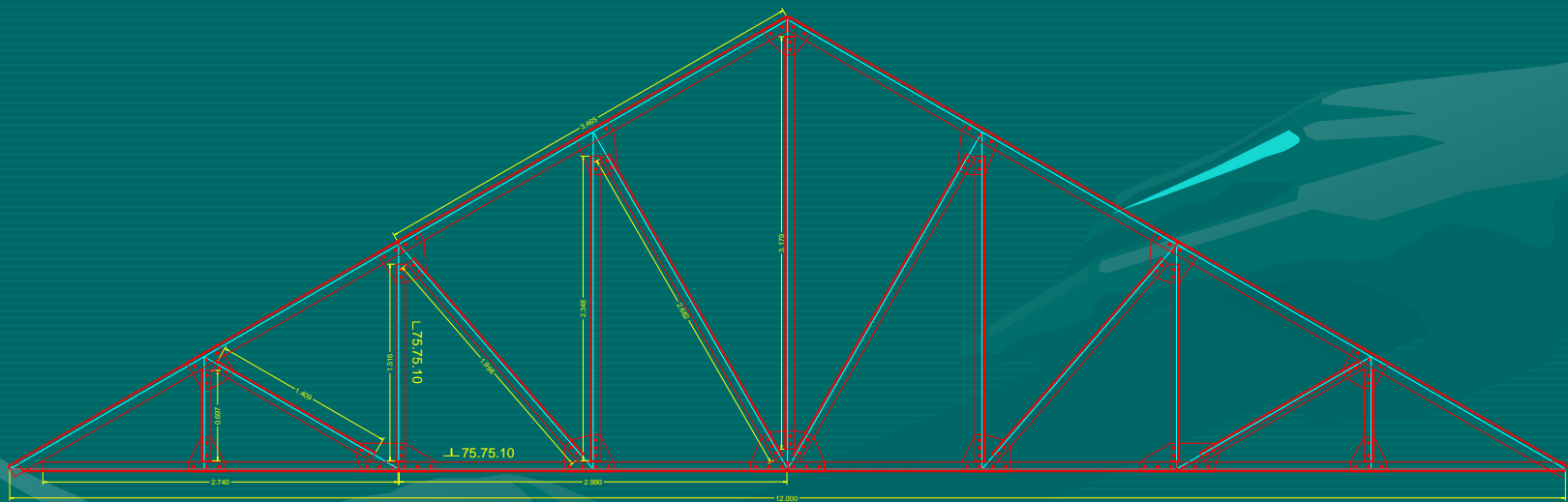


Kuda-kuda Rangka Baja



Tahapan Perencanaan

1. Perhitungan dimensi gording.
2. Perhitungan dimensi batang tarik
3. Perhitungan dimensi ikatan angin
4. Perhitungan dimensi kuda-kuda
5. Perhitungan konstruksi perletakan
6. penggambaran

1. Perhitungan dimensi gording

Gording diletakkan di atas beberapa kuda-kuda dan tegak lurus thd bidang atap.

Biasanya gording menggunakan profil [, I, C

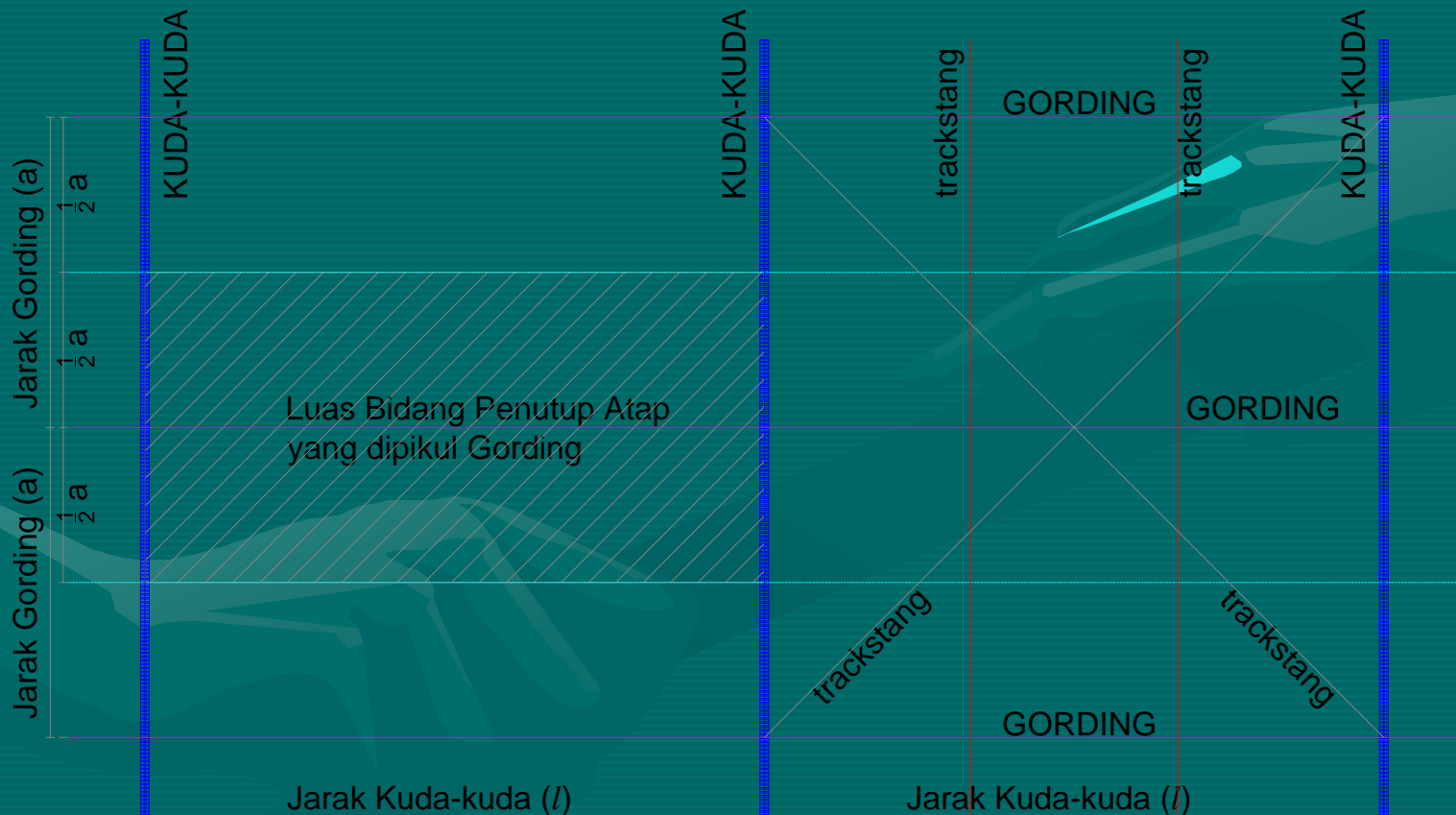
Pembebanan:

1. Beban mati (B.S. gording + penutup atap)
2. Beban berguna/hidup
3. Beban angin

1. Beban mati

a. Penutup atap

$$g_1 = a \times \text{berat penutup atap per m}^2 \text{ [kg/m}^2\text{]}$$

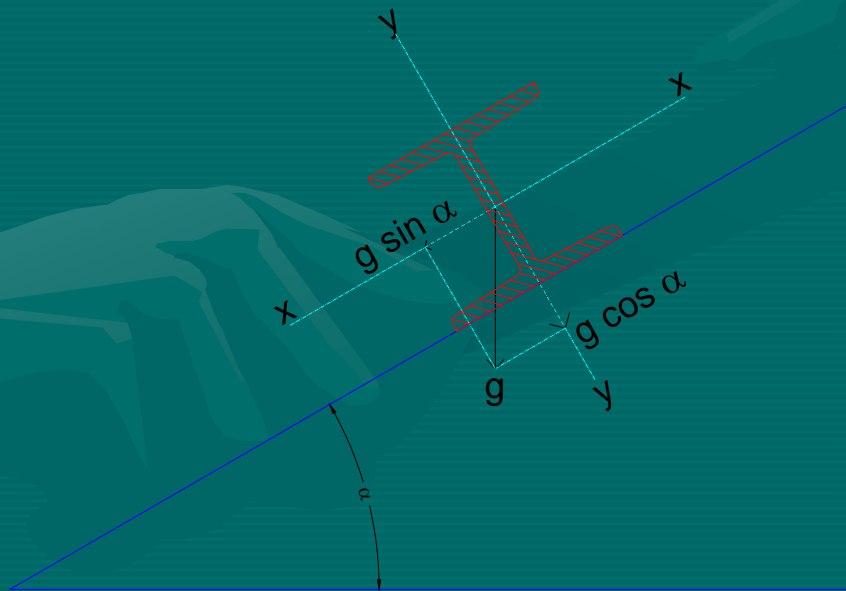


- b. BS. Gording (diperoleh dgn menaksir dahulu dimensi gording - dari tabel profil didapat berat per m' gording.

Berat sendiri gording = g_2 [kg/m']

Beban mati = beban penutup ata + bs. gording

$$\Rightarrow g = g_1 + g_2 \text{ kg/m'}$$



Gording merupakan balok menerus di atas beberapa tumpuan.

Untuk memudahkan perhitungan dapat dianggap sbg balok di atas dua tumpuan (statis tertentu) dengan mereduksi momen lentur (sebesar 20 %)

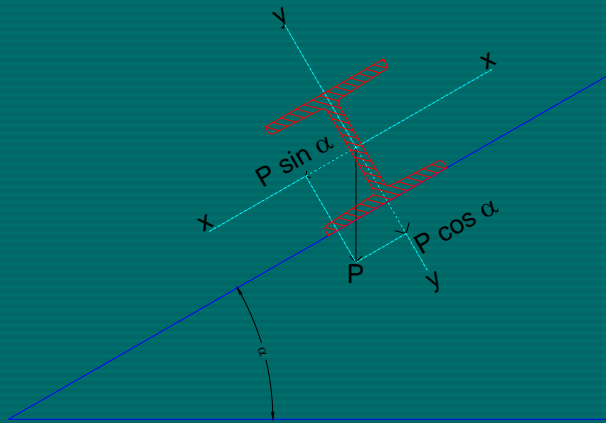
$$\text{Jadi } M_{\text{maks}} = 0,80 \left(\frac{1}{8} g.l^2 \right)$$

$$\text{akibat } g_x \Rightarrow M_{x1} = 0,80 \cdot \frac{1}{8} \cdot g \cdot \sin \alpha \cdot l^2$$

$$\text{akibat } g_y \Rightarrow M_{y1} = 0,80 \cdot \frac{1}{8} \cdot g \cdot \cos \alpha \cdot l^2$$

2. Akibat Beban Berguna

Beban berguna (P) bekerja di tengah-tengah bentang gording



$$M_{maks} = 0,80 (1/4 P.l)$$

$$\text{akibat } P_x \Rightarrow M_{x2} = 0,80 .1/4. P.\sin \alpha./$$

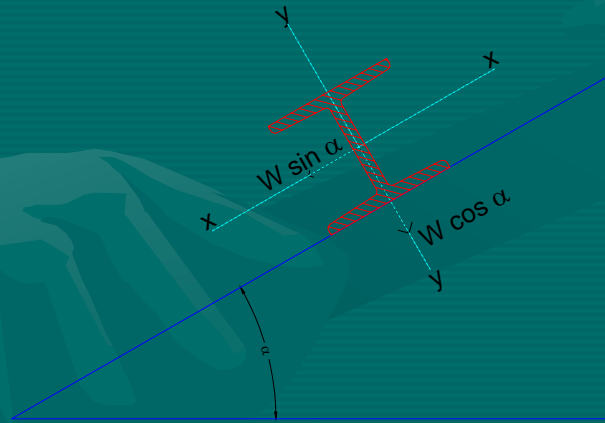
$$\text{akibat } P_y \Rightarrow M_{y2} = 0,80 .1/4. P.\cos \alpha./$$

2. Akibat Beban Angin

Beban angin dianggap bekerja tegak lurus bidang atap.

Beban angin yang ditahan gording:

$W = a \cdot \text{Tekanan angin per m}^2 \text{ [kg/m}^2\text{]}$



$$M_{maks} = 0,80 (1/8 W.l^2)$$

$$\text{akibat } W_x \Rightarrow M_{x3} = 0,80 .1/8. W.\sin \alpha.l^2 = 0$$

$$\text{akibat } W_y \Rightarrow M_{y3} = 0,80 .1/8. W.\cos \alpha.l^2$$

Kombinasi Pembebanan:

I Beban mati + beban berguna

$$M_{x \text{ total}} = M_{x1} + M_{x2}$$

$$M_{y \text{ total}} = M_{y1} + M_{y2}$$

II Beban mati + beban berguna + beban angin

$$M_{x \text{ total}} = M_{x1} + M_{x2}$$

$$M_{y \text{ total}} = M_{y1} + M_{y2} + M_{y3}$$

Kontrol Tegangan

Kombinasi I:

$$\sigma = \frac{M_{x \text{ total}}}{W_y} + \frac{M_{y \text{ total}}}{W_x} \leq \bar{\sigma}$$

Note : kalau $\sigma > \bar{\sigma} \Rightarrow$ dimensi gording diperbesar

Kombinasi II:

$$\sigma = \frac{M_{x \text{ total}}}{W_y} + \frac{M_{y \text{ total}}}{W_x} \leq 1,25\bar{\sigma}$$

Note : kalau $\sigma > 1,25\bar{\sigma} \Rightarrow$ dimensi gording diperbesar

Kontrol Lendutan

Akibat beban mati:

$$f_{x1} = \frac{5g_x \cdot l^4}{384EI_y} (cm)$$

$$f_{y1} = \frac{5g_y \cdot l^4}{384EI_x} (cm)$$

Akibat beban berguna:

$$f_{x2} = \frac{P_x \cdot l^3}{48EI_y} (cm)$$

$$f_{y2} = \frac{P_y \cdot l^3}{48EI_x} (cm)$$

Akibat beban angin:

$$f_{x3} = 0$$

$$f_{y1} = \frac{5W_y \cdot l^4}{384EI_x} (cm)$$

Kontrol Lendutan

$$f_{x_{total}} = (f_{x_1} + f_{x_2}) \leq \bar{f}$$

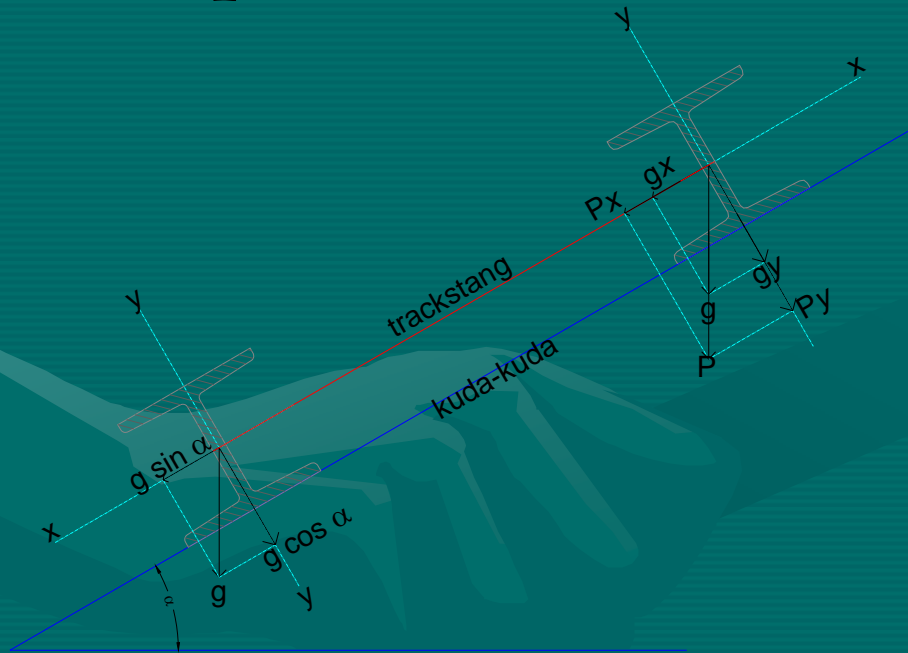
$$f_{y_{total}} = (f_{y_1} + f_{y_2} + f_{y_3}) \leq \bar{f}$$

$$f_i = \sqrt{f_{x_{total}}^2 + f_{y_{total}}^2} \leq \bar{f}$$

Note : kalau $f \leq \bar{f} \Rightarrow$ dimensi gording diperbesar

2. Perhit. Batang Tarik (Trackstang)

Batang tarik berfungsi utk mengurangi lendutan gording pada arah sb-x (miring atap) dan sekaligus utk mengurangi teg. lentur yg timbul pada arah sb-x



Trackstang menahak gaya tarik g_x dan P_x

$$P = g_x + P_x$$

Trackstang dipasang 2 buah.

Jadi gaya P untuk 1 trackstang:

$$P = (g_x + P_x)/2$$

$$\sigma = \frac{P}{F_n} \leq \bar{\sigma} \Rightarrow \text{ambil } \sigma \leq \bar{\sigma}$$

$$F_n = \frac{P}{\bar{\sigma}}$$

$$F_{br} = 1.25 F_n$$

F_n = luas
penampang neto

F_{br} = luas
penampang bruto

$$f_{br} = \frac{1}{4} \pi d^2$$

d = diameter trackstang