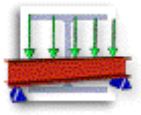
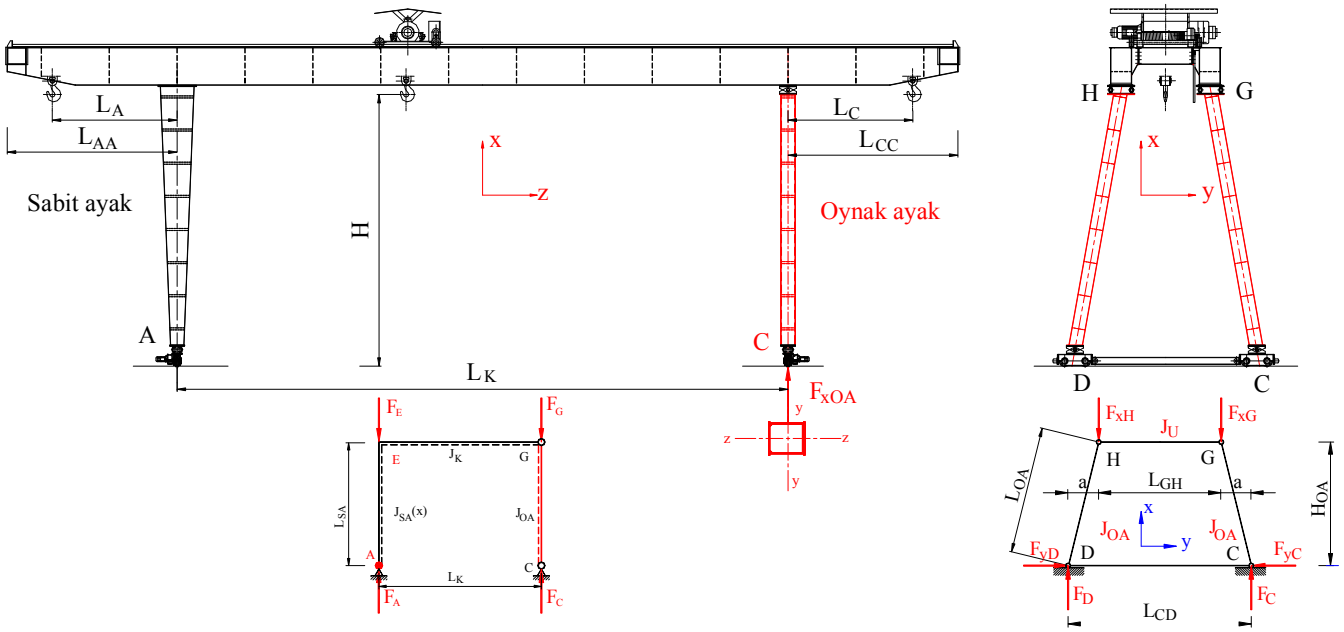


Portal vinç kiriş altı oynak ayak

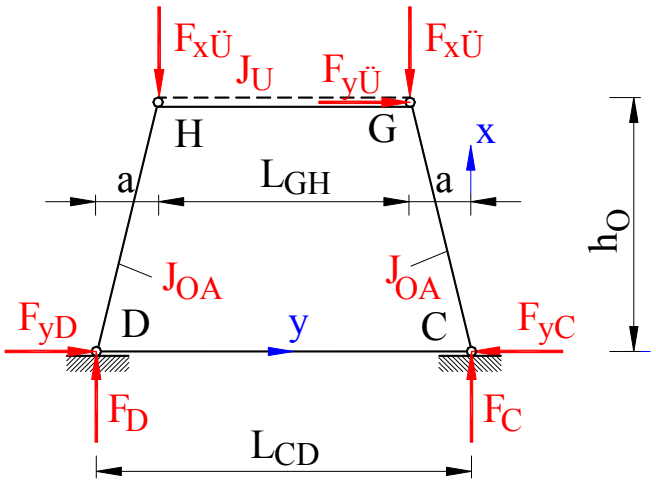
- Reference:C:\0\43_01_01_PV_320kN_18m_00_Giris.xmcd
- Reference:C:\0\43_01_01_PV_320kN_18m_01_Kiris_ve_UB_Genel.xmcd
- Reference:C:\0\43_01_01_PV_320kN_18m_02_0_Ayak_Ondegerleri.xmcd

3 0

Oynak Ayak



xz ekseninde oynak ayak konstrüksiyonu ve hesabı:



$h_O := 7850 \cdot mm$ $\alpha_O := 10 \cdot deg$

$L_{GH} := 2620 \cdot mm$

$a_O := h_O \cdot \tan(\alpha_O)$ $a_O = 1384 \cdot mm$

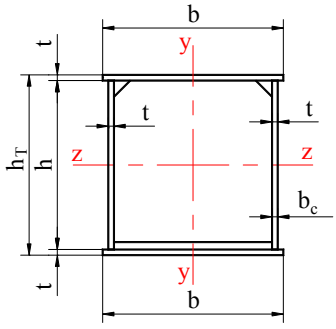
$L_{CD} := L_{GH} + 2 \cdot a_O$ $L_{CD} = 5388 \cdot mm$

$F_{xAlt} := F_{xÜ} + F_{yÜ} \cdot \frac{h_O}{L_{CD}}$ $F_{xAlt} = 335.3 \cdot kN$

$F_{yAlt} := F_{xÜ} \cdot \frac{a_O}{h_O} + F_{yÜ}$ $F_{yAlt} = 66.1 \cdot kN$

Bilinen değerler:

$b_{OA} := 300 \cdot mm$ $h_{OA} := 300 \cdot mm$ $t_{OA} := 6 \cdot mm$ $b_{çOA} := 10 \cdot mm$ $\alpha_{OA} := 10 \cdot deg$

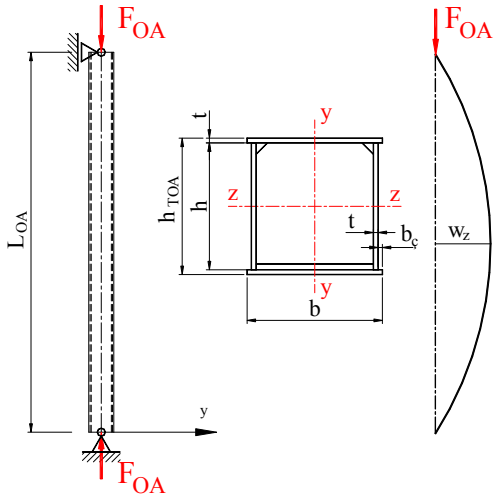


$y_{OA} := 0.5 \cdot (h_{OA} + t_{OA})$ $y_{OA} = 153 \cdot mm$

$J_{zOA} := 2 \cdot \frac{b_{OA} \cdot t_{OA}^3}{12} + 2 \cdot \frac{t_{OA} \cdot h_{OA}^3}{12} + 2 \cdot t_{OA} \cdot b_{OA} \cdot y_{OA}^2$ $J_{zOA} = 111 \cdot 10^6 \cdot mm^4$

$h_{TOA} := h_{OA} + 2 \cdot t_{OA}$ $h_{TOA} = 312 \cdot mm$ $W_{zOA} := \frac{2 \cdot J_{zOA}}{h_{TOA}}$ $W_{zOA} = 713 \cdot 10^3 \cdot mm^3$

$A_{OA} := 2 \cdot t_{OA} \cdot (b_{OA} + h_{OA})$ $A_{OA} = 7200 \cdot mm^2$



$$z_{OA} := 0.5\cdot\left(b_{OA} - t_{OA}\right) - b_{çOA} \qquad z_{OA} = 137\cdot mm$$

$$J_{yOA} := 2\cdot\frac{{b_{OA}}^3\cdot t_{OA}}{12} + 2\cdot\frac{{t_{OA}}^3\cdot h_{OA}}{12} + 2\cdot t_{OA}\cdot h_{OA}\cdot {z_{OA}}^2$$

$$J_{yOA} = 94.6\cdot 10^6\cdot mm^4$$

$$W_{yOA} := \frac{2\cdot J_{yOA}}{b_{OA}} \qquad W_{yOA} = 630.5\cdot 10^3\cdot mm^3$$

Yatay kuvvet etkisi y ekseninden ve z ekseninde oynak olduğundan burkulma ve mukavemet hesabı z eksenine göre yapılır.

Malzeme = "St 37"

Resimden $L_{OA} := 7840mm$

Emniyetli akma mukavemeti $f_{EM} = 213.6\cdot MPa$

$$i_{zOA} := \sqrt{\frac{J_{zOA}}{A_{OA}}} \qquad i_{zOA} = 124.3\cdot mm$$

Akma narinliği $\lambda_E := \pi\cdot\sqrt{\frac{E}{f_y}}$ $\lambda_E = 93.9$

Narinlik $\lambda_{zOA} := \frac{L_{OA}}{i_{zOA}}$ $\lambda_{zOA} = 63.1$

Bağıntılı narinlik $\lambda_{BzOA} := \frac{\lambda_{zOA}}{\lambda_E}$ $\lambda_{BzOA} = 0.671$

Merkez noktası mesafesi $k_{elOA} := \frac{W_{zOA}}{A_{OA}}$ $k_{elOA} = 99.1\cdot mm$

Akma kuvveti $F_{plOA} := A_{OA}\cdot f_{EM}$ $F_{plOA} = 1538.2\cdot kN$

Burkulma parametresi $\alpha_{BOA} := 0.34$ Kaynaklı kutular her eksende.

Max burkulma sehimi $w_{0OAmax} := k_{elOA}\cdot\alpha_{BOA}\cdot\left(\lambda_{BzOA} - 0.2\right)$ $w_{0OAmax} = 15.9\cdot mm$

Burkulma yardımcı faktörü $\varphi_{BzOA} := 0.5\cdot\left[1 + \alpha_{BOA}\cdot\left(\lambda_{BzOA} - 0.2\right) + {\lambda_{BzOA}}^2\right]$ $\varphi_{BzOA} = 0.81$

Azaltma faktörü $\chi_{BzOA} := \frac{1}{\varphi_{BzOA} + \sqrt{{\varphi_{BzOA}}^2 - {\lambda_{BzOA}}^2}}$ $\chi_{BzOA} = 0.800$

Kaba kontrol $F_{kar} := 0.1\cdot\chi_{BzOA}\cdot F_{plOA}$ $F_{kar} = 123\cdot kN$

$$F_{OAeks} := F_{xAlt}\cdot\cos\left(\alpha_O\right) + F_{yAlt}\cdot\sin\left(\alpha_O\right) \qquad F_{OAeks} = 341.7\cdot kN$$

$F_{kar} < F_{OA}$ olduğundan burkulma kontrolü detaylı yapılmalıdır.

DIN 18800-T2 ye göre

Kuvvetin mukavemet emniyeti $S_{FzOA} := \frac{F_{OAeks}}{\chi_{BzOA}\cdot F_{plOA}}$ $S_{FzOA} = 0.278$

Sonuç: Oynak ayakta burkulma tehlikesi yoktur.

Mukavemet hesabı:

Kontrüksiyon simetrik ve kuvvetler eşit olduğundan sistemde dik kuvvetlerden eğilme momenti sıfırdır.
bkz. Teori Şekil 23. Burada yalnız $F_{yÜ}$ yönündeki yatay kuvvet momenti etkilidir.

$M_{plzOA} := f_{EM} \cdot W_{zOA}$ $M_{plzOA} = 152.4 \cdot kN \cdot m$

$M_{bOAvor} := F_{yÜ} \cdot h_O$ $M_{bOAvor} = 73.7 \cdot kN \cdot m$

Tablo 5 den moment faktörü $\beta_{mzOA} := 1$

$S_{MzOA} := \dfrac{\beta_{mzOA} \cdot M_{bOAvor}}{M_{plzOA}}$ $S_{MzOA} = 0.484$

$\Delta n := 0.1$

$S_{HEOA} < 1$ $S_{HEOA} := S_{FzOA} + S_{MzOA} + \Delta n$ $S_{HEOA} = 0.862$

Sonuç: S_{HEOA} değeri 1,0 den küçük olduğundan konstrüksiyon fonksiyonunu yapar.

SON