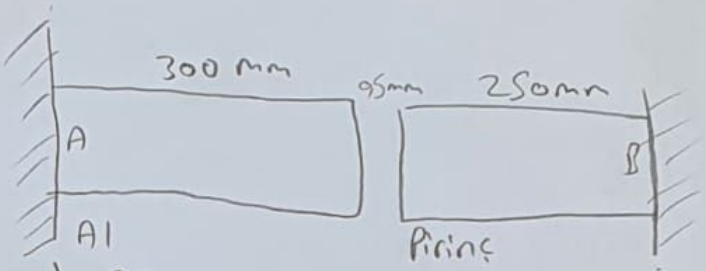
BATUHAN
ÖKMEN
181270904g
Mekatronik müh.

1.Sf

① Soru



$T_1 = 15 \quad T_2 = 85$

$d = 75mm$
$E = 70GPa$
$\alpha = 23 \times 10^{-6}\ 1/C$

$d = 50mm$
$E = 105GPa$
$\alpha = 21 \times 10^{-6}\ 1/C$

Cevap

$$\delta_{Al} = \alpha \Delta t \, l$$
$$= 23 \times 10^{-6} \times (85-15) \cdot 300 = 0,483\ mm$$

$$\delta_{Pirinç} = \alpha \Delta t \, l$$
$$= 21 \times 10^{-6} \times (85-15) \times 250$$
$$= 0.3675mm$$

Al

$$A_{Al} = \frac{\pi}{4}(15)^2 = 441.5.62\ mm^2$$

$$A_{Pirinç} = \frac{\pi}{4}(50)^2 = 1562.5mm^2$$

$$\delta_{toplam} = 0,8505mm$$

$$\delta_{diğer} = 0,8505 - 0,5 = 0,3505mm$$

$$\delta_{diğer} = \left(\frac{Pl}{AE}\right)_{Al} + \left(\frac{Pl}{AE}\right)_{Pirinç}$$

$$0.3505 = \frac{P \times 300}{441.5.62 \times 70 \times 1000} + \frac{P \times 250}{1562.5 \times 105 \times 1000}$$

$$0.3505 = \frac{P}{1030311.33} + \frac{P}{824250} \quad P = 160.493kN$$

$$\sigma_{Al} = \frac{P}{A_{Al}} = \frac{160.493 \times 1000}{441.5.62} = 36.34mPa$$

$$\sigma_{Pirinç} = \frac{P}{A_{Pirinç}} = \frac{160.493 \times 1000}{1562.5} = 81.78mPa$$

Devamı var

1. Soru devam

2. 5f

$$\delta_{Al} = (\alpha \Delta T \ell) - \left(\frac{P\ell}{AE}\right) =$$

$$= 0.483 - \left\{\frac{160.493 \times 1000 \times 300}{4415.62 \times 70 \times 1000}\right\} = 0.483 - 0.155$$

$$= 0.327 \text{ mm} //$$

$$\delta_{Piring} = (\alpha \Delta T \ell) - \left(\frac{P\ell}{AE}\right) =$$

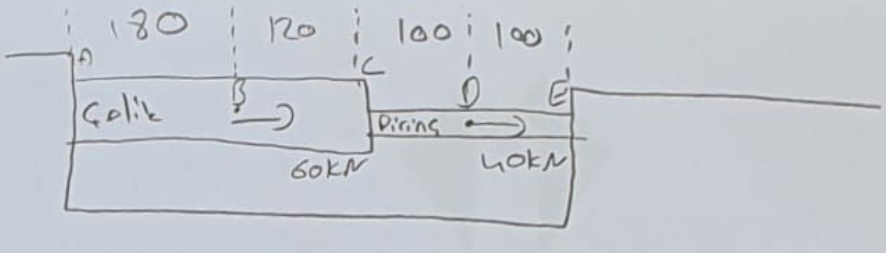
$$= 0.3675 - \left\{\frac{160.493 \times 1000 \times 250}{7962.5 \times 185 \times 1000}\right\} = 0.3675 - 0.1947$$

$$= 0.1727 \text{ mm} //$$

Bitti

2. Soru

3.Sf



$d_S = 40mm$

$d_B = 30mm$

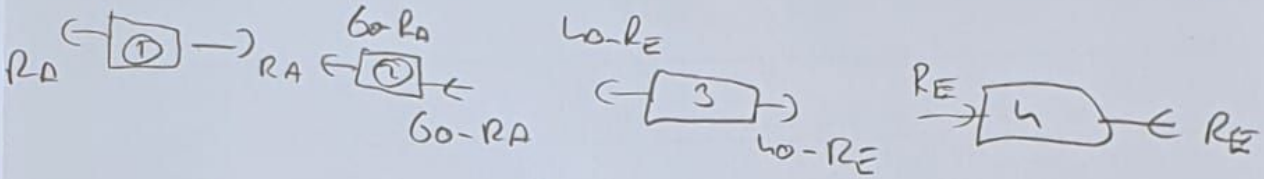
$E_S = 200 \times 10^3 \frac{N}{mm^2}$

$E_B = 105 \times 10^3 \frac{N}{mm^2}$

$\Sigma F_y = 0 \Rightarrow R_A + R_E = 100\ kN$ — (1)

$= 100 \times 10^3 P$

Uzunluk değişimi bulacağız



$\Delta L = \Delta L_1 - \Delta L_2 + \Delta L_3 - \Delta L_4 = 0$

$$\Delta L = \frac{R_A (130 \times 10^3)}{\frac{\pi}{4}(40)^2 \times (200 \times 10^3)} - \frac{(60 - R_A)(120 \times 10^3)}{\frac{\pi}{4}(40)^2 \times 200 \times 10^3} +$$

$$\frac{(40 - R_E)(100 \times 10^3)}{\frac{\pi}{4}(30)^2 (105 \times 10^3)} - \frac{R_E (100 \times 10^3)}{\frac{\pi}{4}(30)^2 \times (105 \times 10^3)}$$

$\Delta L = 3.98 \times 10^{-5}(18R_A - 720 + 12R_A) + 1.348 \times 10^{-3}(40 - 2R_E) = 0$

$3.58 \times 10^{-5}(30R_A - 720) + 1.348 \times 10^{-3}(40 - 2R_E) = 0$

$\Rightarrow 1.194 \times 10^{-3} R_A - 0,0286 + 0,05392 - (2.696 \times 10^{-3}) R_E = 0$

$1.194 R_A - 2.696 R_E = -25.32$

$2.896 R_E - 1.194 R_A = 25.32$ — (2)

Devamı var

2. Soru devam

$R_A = 62.8$ kN

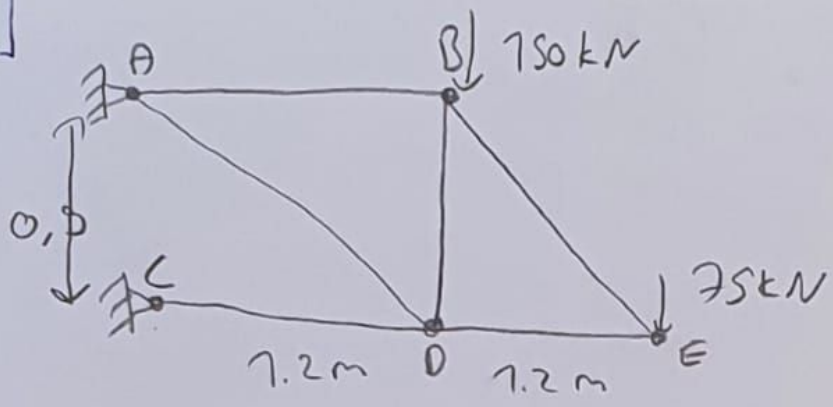
$R_E = 37.2$ kN

maksimum Sorulme Gerilmesi $= \frac{R_A}{\frac{\pi}{4}(40)^2} = \frac{62.8 \times 10^3}{\frac{\pi}{4}(40)^2} = 50 MPa$

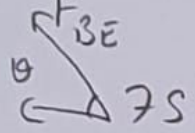
max Sorulme Gerilmesi $= \frac{R_E}{\frac{\pi}{4}(30)^2} = \frac{37.2 \times 10^3}{\frac{\pi}{4}(30)^2} = 52.65 MPa$

Bitti

3. Soru



Enoktası :



$$\theta = \tan^{-1}\left(\frac{0,5}{7.2}\right)$$

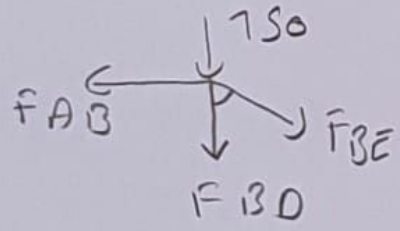
$$\theta = 36.86°$$

$$75 = F_{BE} \sin\theta$$

$$F_{BE} = 125\,kN\ (T) \quad -①$$

↳ gerginlik ön

A + B



$$F_{AB} = F_{BE} \sin(90 - 36.86°)$$

$$F_{AB} = 125 \cos(36.86°) = 100kN$$ ön gerginlik kuvvet

$$AB = \frac{F_{AB}}{A} = \frac{100 \times 10^3}{\frac{\pi}{4} \times 25^2} = 203\,mPa$$

$$BE = \frac{125 \times 10^3}{\frac{\pi}{4} \times 25^2} = 254.64\,mPa$$

Devamı Var

3. Soru devam

6.Sf

$$\delta_{AB} = \frac{PL}{AE} = \frac{100 \times 10^3 \times 1.2}{\frac{\pi}{4} \times 25^2 \times 200 \times 10^3} = 1.222\,mm$$

$$\delta_{BC} = \frac{125 \times 10^3 \times 1.5 \times 10^3}{\frac{\pi}{4} \times 25^2 \times 200 \times 10^3} = 1.909\,mm$$

Bitti