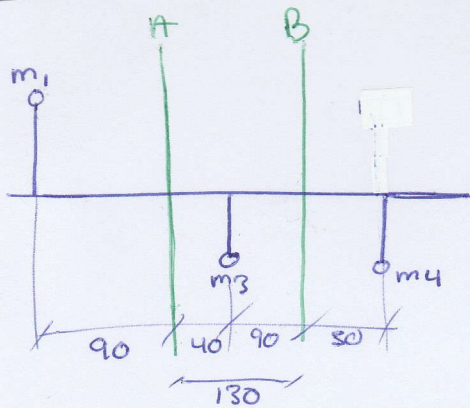


# Elementu Mekanikoak Azterketa

1



$$m_1 = 50 \text{ gr}$$

$$\phi_1 = 60^\circ$$

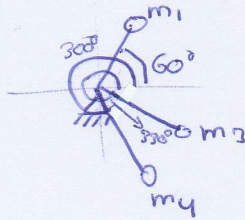
$$m_3 = 40 \text{ gr}$$

$$\phi_3 = 330^\circ$$

$$m_4 = 30 \text{ gr}$$

$$\phi_4 = 300^\circ$$

$$r = 20 \text{ mm}$$



~~EMERITA: Emeko guztiak~~

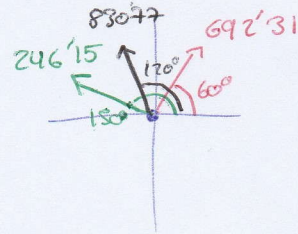
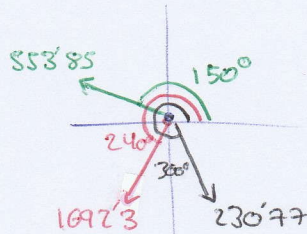
2]  $m_1 \cdot r_1 = 1000$

$m_2 \cdot r_2 = 800$

$m_3 \cdot r_3 = 600$

A planoan

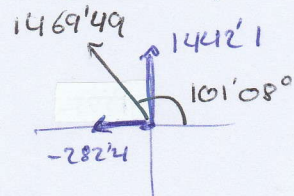
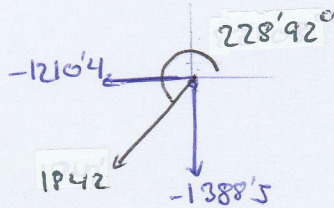
B planoan



Erresultanteak

A planoan

B planoan



$$m_A \cdot r_A = 1842$$

$$\phi_A = 228'92^\circ$$

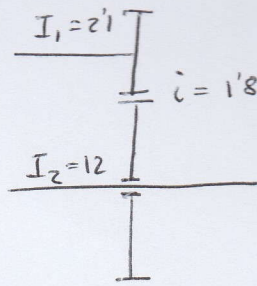
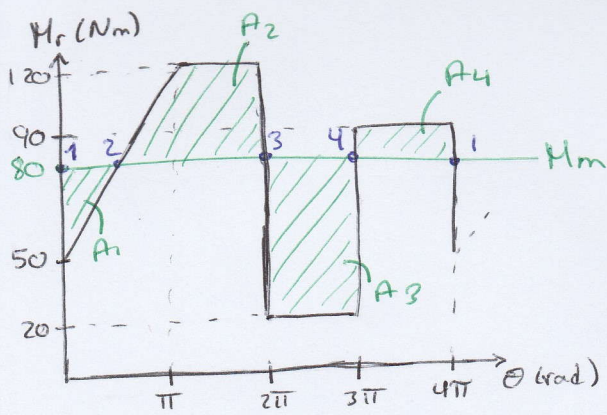
$$m_B \cdot r_B = 1469'49$$

$$\phi_B = 101'08^\circ$$



# Elementu Mekaniikkaak. Asterketa

2



$n_{max} = 92 \text{ rpm}$   
 $n_{min} = 88 \text{ rpm}$   
 $n_{2max} ?$   
 $n_{2min} ?$

$$\omega_m = \frac{\omega_{max} + \omega_{min}}{2}$$

$$j = \frac{\omega_{max} - \omega_{min}}{\omega_m} = \frac{n_{max} - n_{min}}{n_m}$$

$$I_b = (I_1 + I') \cdot i^2 + I_2$$

$$I_b = \frac{\Delta E}{j(\omega_m)^2}$$

$$\Delta M = \pi \cdot 50 + \pi \cdot \frac{80}{2} + \pi \cdot 120 + \pi \cdot 20 + \pi \cdot 90 = 320\pi$$

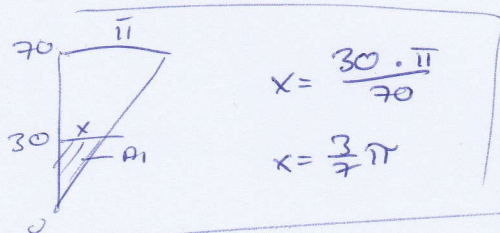
$$M_m = \frac{\Delta M}{2ikloc} = \frac{320\pi}{4\pi} = 80 \text{ Nm}$$

$$\begin{aligned} \omega_1 &< \omega_2 & \omega_{max} &= \omega_4 \\ \omega_2 &> \omega_3 & \omega_{min} &= \omega_3 \\ \omega_3 &< \omega_4 & \Delta E &= A_3 = 60\pi \\ \omega_4 &> \omega_1 & A_1 &= \frac{3}{7}\pi \cdot \frac{30}{2} = \frac{45}{7}\pi \quad (+) \end{aligned}$$

$$A_2 = \frac{4}{7}\pi \cdot \frac{40}{2} + 40\pi = \frac{360}{7}\pi \quad (-)$$

$$A_3 = 60 \cdot \pi = 60\pi \quad (+)$$

$$A_4 = 10 \cdot \pi = 10\pi \quad (-)$$



$$n_m = \frac{92 + 88}{2} \rightarrow n_m = 90 \text{ rpm} \rightarrow \omega_m = 3\pi \text{ rad/s}$$

$$j = \frac{92 - 88}{90} = \frac{4}{90} \rightarrow j = 0.0444$$

$$I_b = \frac{\Delta E}{j(\omega_m)^2} = \frac{60\pi}{0.0444 (3\pi)^2} \rightarrow I_b = 47.75$$

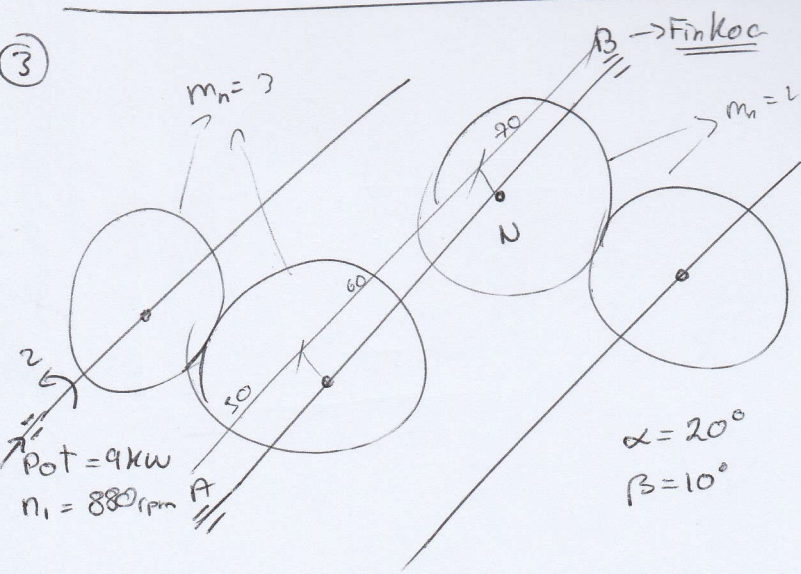
$$I_b = (I_1 + I') \cdot i^2 + I_2$$

$$47.75 = (21 + I') \cdot \frac{1}{8} + 12 \rightarrow \boxed{I' = 8.93 \text{ kg m}^2}$$

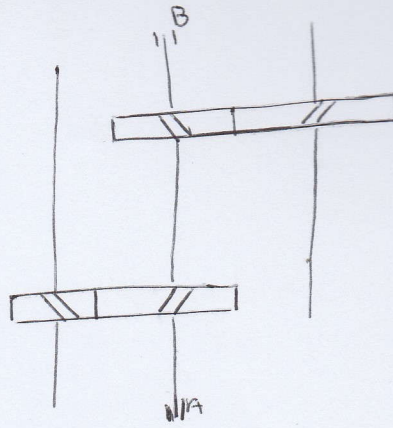


# Elementu Mekanikook. Azterketa

3



$S_2 = 100 \text{ kg/mm}^2$       $K_m = K_t = 2$   
 $S_E = 70 \text{ kg/mm}^2$       $S_H = 2$



- $z_1 = 23$
- $z_2 = 35$
- $z_3 = 21$
- $z_4 = 37$

$\omega_1 = n_1 \cdot \frac{2\pi}{60} = 880 \cdot \frac{2\pi}{60} \rightarrow \omega_1 = 92.15 \text{ rad/s}$

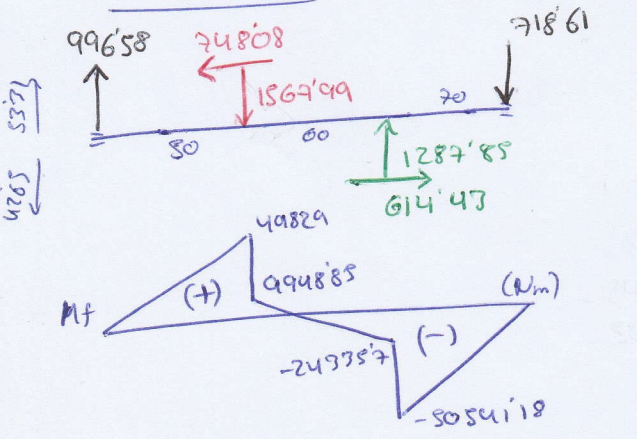
$P = M_t \cdot \omega \rightarrow M_t = \frac{P}{\omega} = \frac{9000}{92.15} \rightarrow M_t = 97663.26 \text{ Nmm}$

$r_p = \frac{m_n \cdot z}{2 \cdot \cos \beta}$   
 $r_{p1} = \frac{3 \cdot 23}{2 \cdot \cos(10^\circ)} = 35.03 \text{ mm}$       $r_{p3} = \frac{4 \cdot 21}{2 \cdot \cos(10^\circ)} = 42.65 \text{ mm}$   
 $r_{p2} = \frac{3 \cdot 35}{2 \cdot \cos(10^\circ)} = 53.21 \text{ mm}$       $r_{p4} = \frac{4 \cdot 37}{2 \cdot \cos(10^\circ)} = 75.14 \text{ mm}$

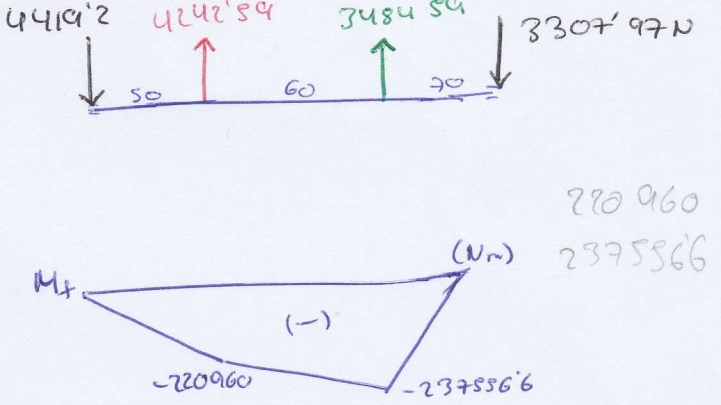
$M_{t1} = 97663.26 \text{ Nmm}$   
 $M_{t2} = M_{t1} \cdot \frac{35}{23} = 148618 \text{ Nmm}$   
 $M_{t3} = M_{t2} \cdot \frac{37}{21} = 261850.77 \text{ Nmm}$

$F_t = \frac{M_t}{r_p}$       $F_r = \frac{F_t \cdot \tan \alpha}{\cos \beta}$       $F_a = F_t \cdot \tan \beta$   
 $F_{t1,2} = 4242.59 \text{ N}$       $F_{t3,4} = 3484.59 \text{ N}$   
 $F_{r1,2} = 1567.99 \text{ N}$       $F_{r3,4} = 1287.85 \text{ N}$   
 $F_{a1,2} = 748.08 \text{ N}$       $F_{a3,4} = 614.43 \text{ N}$

## Horizontala



## Bertikala



$M_{tN} = \sqrt{50541.8^2 + 237556.6^2} = 242873.52 \text{ Nmm}$

$d = \sqrt[3]{\frac{16}{\pi \cdot \frac{S_2}{S_H}} \cdot \sqrt{(2 \cdot 242873.52)^2 + (2 \cdot 148618)^2}} \rightarrow d = 35.262 \text{ mm}$



$\Sigma a?$

$$S_n \cdot 0'18 = 100 \cdot 0'18 = 18$$

$$S_E \cdot 0'3 = 70 \cdot 0'3 = 21$$

$$18 \cdot 0'75 \cdot 0'18 = 132'3 \text{ N/mm}^2$$

$$L = 30000 \text{ ordu}$$

$$L = \frac{10^6}{60 \cdot n} \cdot \left(\frac{C}{P}\right)^{10/3}$$

$$\frac{S_{yosaketa}}{A_{puntuan}} = \frac{F_r}{F_c} \cdot C$$

$$Y_1 = 2'3$$

$$F_r = \sqrt{996'58^2 + 4419'2^2} = 4530'17$$

$$F_c = 133'65$$

$$P = F_r + 2'3 \cdot F_c \rightarrow P = 4837'56$$

$$30000 = \frac{10^6}{60 \cdot 578'28} \left(\frac{C}{4837'56}\right)^{10/3} \rightarrow C = 38891'04$$

$$\boxed{21305 \text{ CC}}$$

$$n_2 = n_1 \cdot \frac{23}{38} = 578'28$$

