Vaje

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Nadaljujemo z izračunom zobnika od prejšnje vaje

Krogi za prvi zobnik (n = 15)

$$d_1 = \frac{3 * 15}{\cos 15\,\mathrm{deg}}$$
$$d_1 = 46.58743mm$$

$$d_b = 46.58743 * \cos 20.65\,\mathrm{deg}$$
$$d_b = 43.59428$$

$$d_w = 46.58743 * \frac{\cos 20.65\,\mathrm{deg}}{\cos 21.94577}$$
$$d_w = 47.00000$$

Ponoven izračun profilnih premikov

$$\beta_b = \arcsin \sin 15\,\mathrm{deg} * \cos 20\,\mathrm{deg}$$
$$\beta_b = 14.07609$$
$$z_{n1} = \frac{15}{\cos^2 14.07809 * \cos 15\,\mathrm{deg}} z_{n1} \quad = 16.50546$$
$$z_{n2} = \frac{45}{\cos^2 14.07809 * \cos 15\,\mathrm{deg}}$$
$$z_{n2} = 49.5164$$
$$z_{n1} + z_{n2} = \frac{16.50546 + 495164}{2} = 33.01093$$
$$\frac{x_1 + x_2}{2} = 0.141755$$

Iz tabele odčitamo $x_1 = 0.35$; $x_2 = 0.2835 - 0.35 = -0.06649$.

Nadaljujemo izračun krogov

$$d_f = 46.58743 - 2 * (1.25 * 0.35 + 3)$$
$$d_f = 41.18743$$

$$d_2 = \frac{3 * 45}{\cos 15\,\mathrm{deg}} = 139.7623$$

$$k = a - a_d - mn(x_1 + x_2)$$
$$k = 94mm - \frac{d_1 + d_2}{2} - m_n(x_1 + x_2)$$
$$k = 94 - \frac{46.58743 + 139.7623}{2} - 3 * (0.28351)$$
$$k = -0.025395$$

$$d_a = 46.58743 + (3 + 0.35 * 3 - 0.025395)$$
$$d_a = 50.61203$$

Zaokrožitve

$$\rho_{fp} = \frac{C_p}{1 - \sin\alpha}$$
$$\rho_{fp} = \frac{0.25 * 3}{1 - \sin 20\,\mathrm{deg}}$$
$$\rho_{fp} = 1.1398$$

Krogi za drugi zobnik (n = 45)

$$d = \frac{3 * 45}{\cos 15\,\mathrm{deg}}$$
$$d = 139.7623mm$$

$$d_b = 139.7623 * \cos 20.65\,\text{deg}$$
$$d_b = 130.78286$$

$$d_w = 139.7623 * \frac{\cos 20.65\,\text{deg}}{\cos 21.94577}$$
$$d_w = 140.99999$$

$$d_f = 139.7623 - 2 * (1.25 * 0.35 + 0.06649 * 3)$$
$$d_f = 132.66124$$

$$d_a = 139.7623 + (3 - 0.06649 * 3 - 0.025395)$$
$$d_a = 142.53744$$

Izračun profilne stopnje prekrivanja zob

$$\epsilon_\alpha = \frac{\sqrt{d_{a1}^2 - d_{b1}^2} + \sqrt{d_{a2}^2 - d_{b2}^2} - 2a * \sin \alpha_{wt}}{2m_t\pi \cos \alpha_t}$$
$$\epsilon_\alpha = \frac{\sqrt{50.61241^2 - 43.59428^2} + \sqrt{142.53744^2 - 130.782857^2} - 2 * 94 * \sin 21.94577\,\text{deg}}{2 * \frac{3}{\cos 15\,\text{deg}}\pi \cos 20.65\,\text{deg}}$$
$$\epsilon_\alpha = 0.66444$$

Bočna stopnja prekrivanja

$$\epsilon_\beta = \frac{b_a * \sin \beta}{m_n * \pi}$$
$$\epsilon_\beta = \frac{0.5 * 46.5874 * \sin 15\,\text{deg}}{3 * \pi}$$
$$\epsilon_\beta = 0.63907$$

Skupna stopnja prekrivanja

$$\epsilon = \epsilon_\alpha + \epsilon_\beta = 0.66444 + 0.63907$$
$$\epsilon = 1.3041$$

Za izris zobnikov potrebujemo še širino zob in širino zobne vrzeli

s_t - ločna dolžina

$$s_t = \frac{P_t}{2} + 2 * x * m_n * \tan \alpha = m_t * (\frac{\pi}{2} + 2x * \tan \alpha_n)$$

$$e_t = \frac{P_t}{2} - 2 * x * m_n * \tan \alpha = m_t * (\frac{\pi}{2} - 2 * x * \tan \alpha_n)$$

Drugi zobnik - x je negativen, zato se predznak spremeni v formuli

$$s_t = \frac{3}{\cos 15\,\mathrm{deg}} * (\frac{\pi}{2} - 2 * 0.06649 \tan 20\,\mathrm{deg})$$

$s_t = 4.728299mm$

$e_t = \frac{3}{\cos 15\,\mathrm{deg}} * (\frac{\pi}{2} + 2 * 0.06649 * \tan 20\,\mathrm{deg}) e_t \quad = 5.028998mm$

Preračun gredi in ležajev

Za preračun gredi (notranji moment) in ležajev (reakcije) potrebujemo sile na zobnike

Falijo mi zapiski če če mogoče kdu poslat? :D

Jermenska gonila

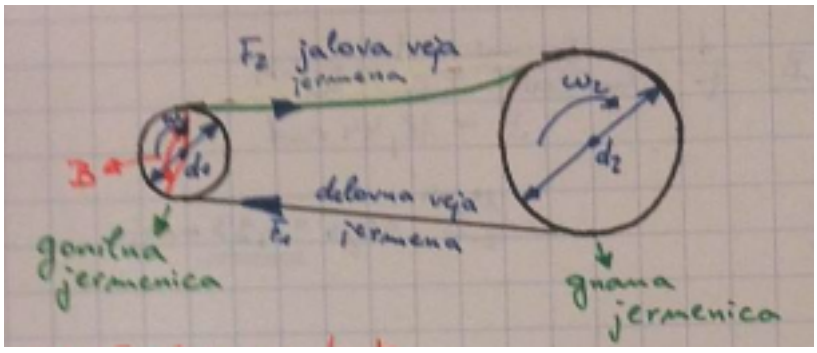

Figure 1: jermenska gonila

B - objemni kot

F_1 - sila v delovni veji

F_2 - sila v jalovi veji

$$i = \frac{d_2}{d_1} = \frac{\omega_1}{\omega_2} = (\frac{z_2}{z_1}) \quad \text{samo pri zobatih jermenih in jermenica}$$

Moment na jermenici:

$$T = \frac{F_1 - F_2}{\frac{d_q}{2}}$$

Razmerje sil na meji zdrsa:

$$m = \frac{F_1}{F_2} = e^{uB}$$

Poglejmo razmerje sil na meji zdrsa jermena: