

دانشگاه صنعتی اصفهان

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$$H = 40 \text{ kW}$$

مسئله حل از نمودار

$$n = 1000 \text{ rpm}$$

$$\text{نسبت سرعت} = \frac{10}{3}$$

$$\phi = 20^\circ$$

$$\text{مطابق: } S_{ut} = 1390 \text{ MPa}, S_y = 1270 \text{ MPa}$$

$$B_{hn} = 420$$

$$\frac{w_p}{w_g} = \frac{10}{3} \rightarrow N_p = 18 T \rightarrow N_g = \frac{10}{3} (18) = 60$$

$$\tan \gamma_p = \frac{N_p}{N_g} = 0.3 \Rightarrow \gamma_p = 16.7^\circ \rightarrow \gamma_g = 73.3^\circ$$

$$F = \frac{W_t K_o K_m K_v}{\sigma_{all} m J} = 10 \text{ m} \quad F = \frac{l}{3}$$

$$m^3 = \frac{6 H K_o K_m K_v}{\mu N_p n_p J \sigma_{all}}$$

ضریب تنش

$$K_o = 1.75, K_m = 1.1, K_v = 2$$

$$S_e = K_a K_b K_c K_d K_g S_e / K_f = \frac{(0.63) K_b (0.868) (1) (1.33) (0.504) (1390)}{1}$$

$$\rightarrow S_e = 491.2 (K_b) \text{ MPa}$$

$$\sigma_{all} = \frac{S_e}{2} = 245.6 K_b \text{ (MPa)}$$

$$m^3 = \frac{6 (40000) (1.7) (1.1) (2)}{\mu (18) (1000) (0.25) (245.6 \times 10^6) K_b}$$

$$m = 6 \text{ mm}$$

$$K_b = 0.894$$

$$\sigma_{all} = 219.5 \text{ MPa}$$

$$d_p = m N_p = 6 (18) = 108 \text{ mm}$$

$$v = \frac{\mu d_p n_p}{60} = \frac{\mu (0.108) (1000)}{60} = 5.65 \text{ m/s}$$

$$K_v = \frac{6 + v}{6} = \frac{6 + 5.65}{6} = 1.94$$

$$W_t = \frac{H}{v} = \frac{40000}{5.65} = 6722 \text{ N}$$

$$F = \frac{W_t K_o K_m K_v}{\sigma_{all} m J} = \frac{6722 (1.75) (1.1) (1.94)^1}{10^6 \times 219.5 (0.006) (0.25)} = 0.076 \text{ m} > 10 \text{ m} \times$$

$$\text{مطابق: } m = 7$$

$$K_b = 0.881$$

$$\sigma_{all} = 216.53 \text{ MPa}$$

$$d_p = 126 \text{ mm}$$

$$K_v = \frac{b + 6.59}{b} = 2.1$$

$$w_t = \frac{H}{v} = 6069 \text{ N}$$

$$F = \frac{6069 (1.75) (1.1) (2.1)}{(216.53 \times 10^6) (0.007) (0.25)} = 0.064 \text{ m}$$

$$F < 10 \text{ m} = 70 \checkmark$$

$$L = \frac{m}{2} \sqrt{N_p^2 + N_g^2} = \frac{7}{2} \sqrt{18^2 + 60^2} = 219.2 \text{ mm}$$

$$F \leq \frac{L}{3} = 73.1 \text{ mm} \checkmark$$

$$\sigma_{\text{man}} = 1.23 C_p \sqrt{\frac{w_t k_o k_m k_v}{F d_p Z}} = 1.23 (191) \sqrt{\frac{6069 (1.75) (1.1) (2.1)}{(64) (126) (0.083)}} = 1422 \text{ MPa}$$

$$S'_H = 2.76 (420) - 70 = 1089 \text{ MPa}$$

$$S_H = \frac{C_L C_H}{C_T C_R} S'_H = \frac{(1)(1)}{(1)(0.8)} (1089) = 1361 \text{ MPa}$$

$$n_H = \frac{S_H}{\sigma_{\text{man}}} = \frac{1361}{1422} \approx 0.95 < 1$$

$F = 70 \text{ mm} \leftarrow F$ اتراس

$$\sigma_{\text{man}} = 1359 \text{ MPa}$$

$$n_H = \frac{1361}{1359} = 1.01 \checkmark$$