

Umfangsfräsen Aufgabe 1

gegeben: C45

$$D = 125 \text{ mm}$$

$$L = 250 \text{ mm}$$

$$B = 50 \text{ mm}$$

$$\kappa = 45^\circ$$

$$v_c = 150 \frac{\text{m}}{\text{min}}; f_z = 0,3 \text{ mm}$$

$$z = 12$$

$$a_e = 4 \text{ mm}$$

$$r = -4^\circ$$

$$l_a/l_v = 1,5 \text{ mm}$$

gesucht: F_{cm} ; P_c ; Q_w

$$a) h_m = f_z \times \sin(\kappa) \times \sqrt{\frac{a_e}{D}} = 0,04 \text{ mm}$$

$$\varphi_s = \arccos\left(1 - \frac{2 \times a_e}{D}\right) = \arccos\left(1 - \frac{2 \times 4 \text{ mm}}{125 \text{ mm}}\right) = 20,6^\circ$$

$$K_{C1.1} = 2220 \frac{\text{N}}{\text{mm}^2}; m_c = 0,14$$

$$z_e = \frac{z \times \varphi_s}{360^\circ} = \frac{12 \times 20,6^\circ}{360^\circ} = 0,69$$

$$K_r = 1 - \frac{r - r_\kappa}{66,7^\circ} = 1 - \frac{-4^\circ - 6^\circ}{66,7^\circ} = 1,15$$

$$(K_{HSS} = 1,15)$$

$$F_{cmz} = k_{C1.1} \times b \times h_m^{1-m_c} \times K_r$$

$$= 2220 \frac{\text{N}}{\text{mm}^2} \times 50 \text{ mm} \times 0,04^{1-0,14} \times 1,15 = 11332 \text{ N}$$

$$F_{cm} = F_{cmz} \times z_e = 11332 \text{ N} \times 0,69 = 7819,1 \text{ N}$$

$$b) P_c = F_{cmz} \times v_c \times z_e = 11332 \text{ N} \times \frac{150 \text{ m}}{60 \text{ s}} \times 0,69 = 18548 \text{ W} = 18,55 \text{ kW}$$

$$c) Q_w = a_e \times a_p \times z \times f_z \times n = a_e \times a_p \times z \times f_z \times \frac{v_c}{\pi \times D}$$

$$= 4 \text{ mm} \times 50 \text{ mm} \times 12 \times 0,3 \text{ mm} \times \frac{150 \times \frac{1000 \text{ mm}}{60 \text{ s}}}{\pi \times 125 \text{ mm}}$$

$$= 4583,7 \frac{\text{mm}^3}{\text{s}}$$