

LKv1

$$P = 196 \text{ W}, \quad n = 100 \frac{1}{\text{min}} = 1,667 \frac{1}{\text{s}}$$

$$a) \quad M_t = \frac{P}{\omega} = \frac{P}{2\pi n} = 1814,004 \text{ Nm}$$

$$b) \quad M_t = F_N \cdot \frac{d}{2} \cdot n$$

$$\Rightarrow F_N = \frac{2M_t}{d \cdot n} = 9070,02 \text{ N}$$

$$c) \quad p_{\text{zul}} = \frac{F_N}{d_1 \cdot s_{\text{min}} \cdot n} \quad (\Rightarrow) \quad d_1 = \frac{F_N}{p_{\text{zul}} \cdot s_{\text{min}} \cdot n}$$

$$\Rightarrow d_1 = 2,061 \text{ mm} //$$

$$\tau_{\text{zul}} = \frac{4F}{\pi \cdot d_1^2 \cdot n \cdot \mu} \cdot 4$$

$$\Rightarrow d_1 = \sqrt{\frac{4F \cdot 4}{\pi \cdot \tau_{\text{zul}} \cdot n \cdot \mu}} = 9,426 \text{ mm} //$$

$$d) \quad \tau_{\text{zul}} = \frac{F_N \cdot 4}{\pi \cdot (d_a^2 - d_i^2)} = \frac{8M_t}{d \cdot \pi \cdot (d_a^2 - d_i^2)}$$

$$\Rightarrow \tau_{\text{zul}} = \frac{F_N \cdot 4}{A_S} \quad \Rightarrow \quad A_S = \frac{4F_N}{\tau_{\text{zul}}} = 1209,336 \text{ mm}^2 \cdot 4$$

$$= 4837,344 \text{ mm}^2$$

$$e) \quad A_{\text{Nhr}} = \frac{A_S}{2} = 2418,672 \text{ mm}^2$$

$$A_{\text{Nhr}} = \frac{\pi}{4} \cdot (d_a^2 - d_i^2) \quad \Rightarrow \quad d_a^2 - d_i^2 = 4 A_{\text{Nhr}} \cdot \frac{1}{\pi}$$

$$\left. \begin{array}{l} a_1 = d_a - d_m \\ a_2 = d_m - d_i \end{array} \right\} a_1 = a_2 \quad \Rightarrow \quad d_a - d_m = d_m - d_i$$

$$\Rightarrow d_a = 2d_m - d_i$$

$$A_{Nhl} = \frac{\pi}{4} ((2d_m - d_i)^2 - d_i^2)$$

$$= \frac{\pi}{4} \cdot (4d_m^2 - 4d_m \cdot d_i + \cancel{d_i^2} - \cancel{d_i^2})$$

$$\Leftrightarrow \frac{4 A_{Nhl}}{\pi} = 4d_m^2 - 4d_m \cdot d_i \Rightarrow d_i = \frac{4d_m^2 - \frac{4 A_{Nhl}}{\pi}}{4d_m}$$

$$\Rightarrow d_i = d_m - \frac{A_{Nhl}}{\pi \cdot d_m} = 92,301 \text{ mm}$$

$$\Rightarrow d_a = 2d_m - d_i = 107,699 \text{ mm}$$