

UNIT-V DESIGN OF BEARINGS

Bearing:-

Bearings are machine element which are used to support a rotating member, a shaft.

Based on type of contact

- i) Sliding contact
- ii) Rolling contact.

$$P_e (X f_r + Y f_a) \leq$$

$$L_{10} = \frac{L_{h10} \alpha \beta \gamma \eta}{10^6}$$

Advantage of sliding contact

The design of the bearing and housing is simple.

They occupy less radial space and are more compact

$$C_r = (L_{10})^{1/3} P_e$$

They cost less

The design of shaft is simple

They operate more silently.

Disadvantage :-

Frictional power loss is more

They required good attention to lubrication

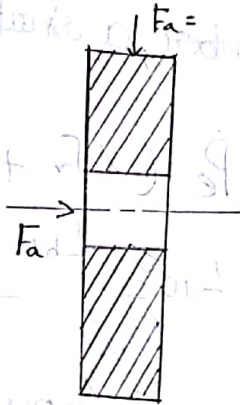
Radial bearings are also called journal (or) sleeve bearings.

$$\frac{1000}{\text{rpm}} = \frac{2\pi}{60}$$

$$111.0 =$$

Selection of Rolling Contact bearings

1. A single row deep groove ball bearings is subjected to radial load of 2500 N and axial thrust of 1500 N . A shaft rotates at 1000 rpm expected life of bearing is $10,400\text{ hrs}$. The minimum accepted dia of shaft is 50 mm . Select the suitable ball bearing for the application.



Solution:-

For diameter 50 mm

(Single deep groove ball bearing)

$$P_{sg} \text{ DB } 4.12$$

SKF 60 series

$$C_0 = 1370 \text{ kgf} = 13439.7 \text{ N}$$

$$C = 1700 \text{ kgf} = 16671 \text{ N}$$

$$P_{sg} \text{ DB } 4.2$$

$$P_e = [X F_r + Y F_a] \cdot S$$

$$C_r = (L_{10})^{1/3} \cdot P_e$$

$$C_r < C$$

$$S = 1.1 [P_{sg} \text{ DB } 4.2]$$

rotary machine with no impact

$$\frac{F_a}{C_0} = \frac{1500}{13439.7}$$

$$= 0.111$$

Prq D B 4.4

$$0.13 \rightarrow 0.31$$

$$\frac{f_o}{f_r} = \frac{15000}{2500} = 0.6$$

$$\frac{f_a}{f_r} \geq e$$

$$x = 0.56 \quad y = 1.4$$

$$P_e = [0.56 \times 2500 + (1.4 \times 1500)] \cdot 1.1$$
$$= (1400 + 2100) \cdot 1.1$$
$$= 3850 \text{ N.}$$

$$L_{10} = \frac{4 \times 10^6 \times 60 \times \pi \times 1.1}{10^6 (1400 + 2100)}$$
$$= \frac{10,400 \times 60 \times 1000}{10^6 (1400 + 2100)}$$

= 624 million / revolution

$$C_r = (L_{10})^{1/3} P_e$$

$$C_r > C$$

$$= 32899.4 \text{ N}$$

$$C_r > C$$

Answer