19/06/2020 Lokender

MD-II

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Section-1

Q.2

1. Consider the work cycle acted upon bearing Consist of the number load $W_1, W_2 - - W_n$ and $N_1, N_2 - - - N_n$ be the speed during these load.

2. During the first element the life L_1 Corresponding to load W_1 is given as

$$L_1 = \left(\frac{C}{W_1}\right)^3 \times 10^6 \text{ revolution}$$

3. In one revolution the life consumed is $\frac{1}{L}$

$$\frac{1}{L} = \left(\frac{W_1}{C}\right)^3 \times \frac{1}{10^6}$$

4. Assume the first element Consist of N_1 revolution So life consumed by first element is given as

$$= \frac{N_1 W_1^3}{10^6 C^3}$$

5. Similarly for secton element

$$= \frac{N_2 W_2^3}{10^6 C^3}$$

6. The life consumed by the complete work cycle is given by

$$\frac{N_1 W_1^3}{10^6 C^3} + \frac{N_2 W_2^3}{10^6 C^3} + \cdots \frac{N_n W_n^3}{10^6 C^3} \quad \text{---(1)}$$

(7) If W is the equivalent load for the complete work cycle the life consumed by the work cycle.

$$= \frac{N W^3}{10^6 C^3} \quad \text{---(2)}$$

$$N = N_1 + N_2 + N_3 + \cdots N_n$$

(8) Equating eq (1) & eq (2) we get

$$N_1 W_1^3 + N_2 W_2^3 + \cdots N_n W_n^3 = N W^3$$

$$W = \sqrt[3]{\frac{N_1 W_1^3 + N_2 W_2^3 + \cdots N_n W_n^3}{N}}$$

$$= \sqrt[3]{\frac{N_1 W_1^3 + N_2 W_2^3 + \cdots N_n W_n^3}{N_1 + N_2 + N_3 + \cdots N_n}}$$

$$= \sqrt[3]{\frac{\Sigma N W^3}{\Sigma N}}$$

This equation is used for calculating dynamic load capacity when bearing is subjected to a variable load.

Advantage of Rolling Contact and disadvantage of rolling Contact bearing.

Advantage :-

1. Low starting and running friction except at very high speed.
2. Both radial & thrust load can be carried by these bearings.
3. Ability to withstand momentary shock loads without failure.
4. Accuracy of shaft alignment
5. Easy replacement

dis advantage

1. More Noisy at high speed.
2. Low resistance to shock loading
3. more initial cost
4. Complicated design of bearing housing
5. Sensitive to dirt etc.

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Advantage & disadvantage of Sliding Contact bearing

Advantage :-

1. The design of the bearing and housing is simple
2. They occupy less radial space and are more compact.
3. They operate more silently
4. They have good shock ~~do~~ load capacity
5. They are ideally suited for medium and high speed operation

1. The frictional power loss is more
2. They required good attention to lubrication
3. They are normally designed to carry radial load or axial load only.