

SCRIET(MECHANICAL DEPARTMENT),CCSU MEERUT MACHINE DESIGN(ROLLING CONTACT BEARING LECTURE 4)

DIFFERENT LIFE OF BEARING

- Life of a Bearing:** The life of an individual ball (or roller) bearing may be defined as the number of revolutions (or hours at some given constant speed) which the bearing runs before the first evidence of fatigue develops in the material of one of the rings or any of the rolling elements.
- Rating life of bearing:** The rating life of a group of apparently identical ball or roller bearings is defined as the number of revolutions (or hours at some given constant speed) that 90 per cent of a group of bearings will complete or exceed before the first evidence of fatigue develops (i.e. only 10 per cent of a group of bearings fail due to fatigue).
- Minimum life:** The term minimum life is also used to denote the rating life. It has been found that the life which 50 per cent of a group of bearings will complete or exceed is approximately 5 times the life which 90 per cent of the bearings will complete or exceed. In other words, we may say that the average life of a bearing is 5 times the rating life (or minimum life). It may be noted that the longest life of a single bearing is seldom longer than the 4 times the average life and the maximum life of a single bearing is about 30 to 50 times the minimum life.

Reliability of a Bearing

The reliability (R) is defined as the ratio of the number of bearings which have successfully completed L million revolutions to the total number of bearings under test. Sometimes, it becomes necessary to select a bearing having a reliability of more than 90%

$$\frac{L}{L_{90}} = \left[\frac{\log_e (1/R)}{\log_e (1/R_{90})} \right]^{1/b} = 6.85 [\log_e (1/R)]^{1/1.17}$$

Materials and Manufacture of Ball and Roller Bearings

- Rolling elements(balls or roller) and the races are subjected to high stresses of varying magnitude therefore the material of the rolling element should be of high quality.
- The balls are generally made of high carbon chromium steel(Chromium is used as alloying agent because it has corrosion resistance).
- The material of both the balls and races are heat treated to give extra hardness and toughness.

Lubrication of Ball and Roller Bearings

The ball and roller bearings are lubricated for the following purposes :

1. To reduce friction and wear between the sliding parts of the bearing,
2. To prevent rusting or corrosion of the bearing surfaces,
3. To protect the bearing surfaces from water, dirt etc., and
4. To dissipate the heat.

NOTE: THEORY RELATED TO THIS CHAPTER HAS BEEN DISCUSSED, ONLY NUMERICALS ARE LEFT WHICH REQUIRE DATABOOK)

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