

Monad University, Hapur

Program: - B.Tech (M.E)

Subject:- Machine Design-2

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Topic: - Bearing

Sub Topic: - Sliding Contact Bearing

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Sliding Contact Bearings

Bearing is machine element which is used to support a rotating member viz. a shaft. He transmits the load from rotating members to stationary member known as frame body. They are permits relative motion of between members.

Classification of bearing

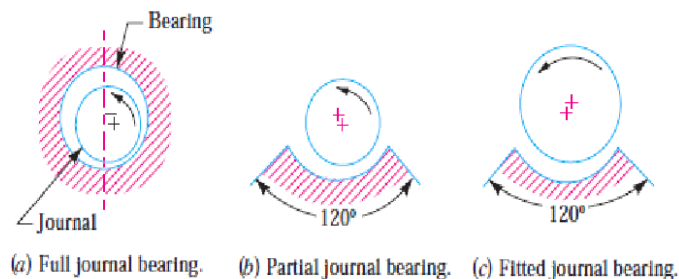
1. According to direction of load\
 - (i) Radial bearing
 - (ii) Thrust bearing

Radial bearing, the load act perpendicular along the axis of rotation in thrust bearing, this load act along the axis of rotation.

2. According to the nature of contact
 - (i) Sliding contact bearing
 - (ii) Rolling contact bearing

Sliding contact bearing: - Classification

- (i) Full journal bearing
- (ii) Partial journal bearing
- (iii) Fitted journal bearing



Some sliding contact bearing based on Lubrication and lubricant.

1. **Thick film bearing:** - The surfaces are separated by thick film of lubricant and there will not be any metal to metal contact.
2. **Thin film bearing:** - The thin film bearing are those in which, although lubricant is present the working surface partially contact each other at least part of the time.
3. **Zero film bearing:** - The zero film bearing are those which operate without any lubricant present.
4. **Boundary Lubrication:** - Boundary lubrication which reduces the friction and wear.

Hydrodynamic Lubricated Bearing:-

1. The flow of a viscous fluid in a converging channel.
2. The friction resistance of a viscous fluid to being squeezed out from between surface.

Material used for sliding contact bearing:-

1. **Babbit metal:-** The tin based and lead base babbits are widely used as bearing material .

Tin base babbits:- Tin 90%, copper- 45%, antimony 5% , lead 0.5%

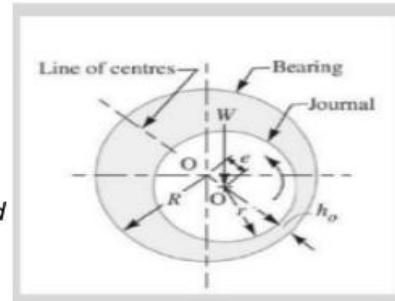
Lead base babbits:- lead 84%, Tin 6%, antimony 9.5%, copper 0.5%

2. **Bronze:** - The bronzes (alloys of copper/tin and zinc) are used in the form of machined element bushed pressed into the shell.
3. **Cast iron:** - The cast iron bearing are generally used with cast steel journals.
4. **Silver:** - The silver and silver lead bearing is generally used in aircraft engine.

Basic Terms used in Hydrodynamic journal bearing:-

TERMS USED IN HYDRODYNAMIC JOURNAL BEARINGS

1. *Diametral clearance (c) = D - d*
2. *Radial clearance (c₁) = R - r = (D - d)/2*
3. *Diametral clearance ratio = c/d = (D - d)/d*



4. *Eccentricity is the radial distance between centre of bearing and displaced centre.*

Some assumption in hydrodynamic lubricated bearing following:-

1. The Lubricant Obey's Newton's law of viscous flow.
2. The pressure is constant throughout the film thickness.
3. The lubricant oil is to be incompressible.
4. The viscosity is to be constant throughout the film layer.

Properties of sliding contact bearing Materials:-

- 1. Compressive strength:** - Compressive strength should be high because bearing pressure is considerably greater than the average pressure obtained by dividing the load by the projected area.
- 2. Bond ability:** - Bond ability of bearing is high. Bonded bearings are made by bonding one or more thin layers of a bearing material to a high strength shell.
- 3. Corrosion resistance:** - The bearing material should not corrode away under the action of lubricating oil. This property is of particular importance in I.C. engines. Where some oils are used to lubricate the cylinder walls and bearings.

Sliding contact bearing: - advantage

1. Design of the sliding contact bearing is easy.
2. The area covered should be less radial space and more compact.
3. Overall should be cost less.
4. The design of sliding shaft is simple.

Sliding contact bearing: - disadvantage

1. The friction power loss should be high.
2. They require high quality lubrication oil.
3. The design of bearing should require special tools.