

Mechanical Equipment - Course 430.1

BEARING DESIGN AND INSTALLATION - UNIT 3

OBJECTIVES

Given three bearing installations, the student will correctly title and label each installation.

In this lesson unit, we will look at typical construction and installations of a:

- (1) journal bearing.
- (2) tilting pad thrust bearing.
- (3) ball bearing designed to cope with axial forces.

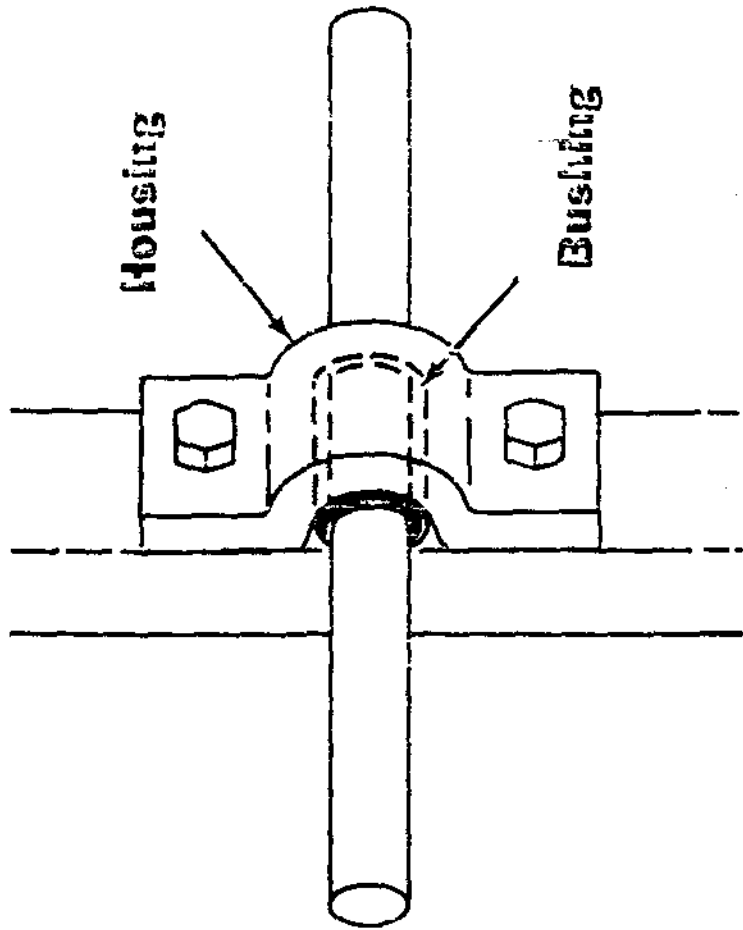
JOURNAL BEARING

As a member of the plain bearing family, a journal bearing supports a shaft by developing a high pressure oil wedge between the shaft and bearing surface.

A common journal bearing has three main parts:

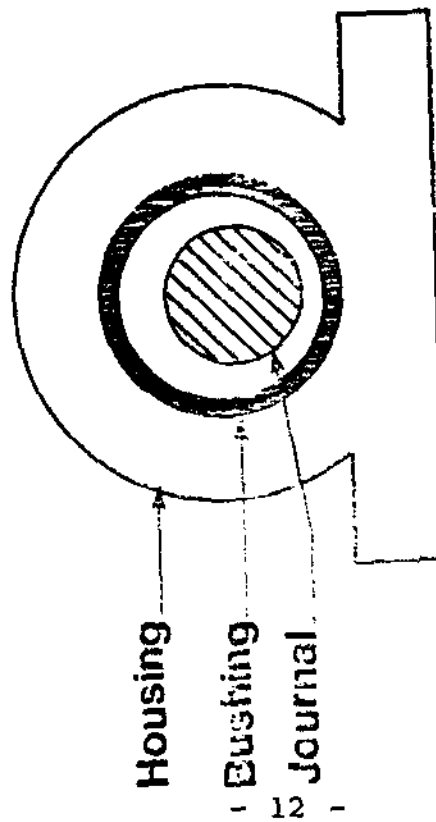
- (1) a housing which holds the bearing.
- (2) a bushing (a soft inner surfaced wrapping) which surrounds.
- (3) the journal or section of shaft surrounded by the bushing.

Figure 1 shows a journal bearing installation.



Journal Bearing - Side View

Figure 1



Journal Bearing - End View

TILTING PAD THRUST BEARING

Sometimes referred to by their brand name Kingsbury or Michell, this bearing specifically handles axial or thrust forces. Like the journal bearing, surfaces are separated by a high pressure oil wedge developed within the bearing.

Figure 2 and Figure 3 show the general construction of the bearing which consists of:

- (1) a fixed collar attached to a shaft with,
- (2) a concentric row of individual pivoted pads located on each side of the collar. The pivot allows each pad to tilt with respect to the collar surface to create a wedge shape gap. In turn, each pad's backplate attaches to,
- (3) a bearing housing.

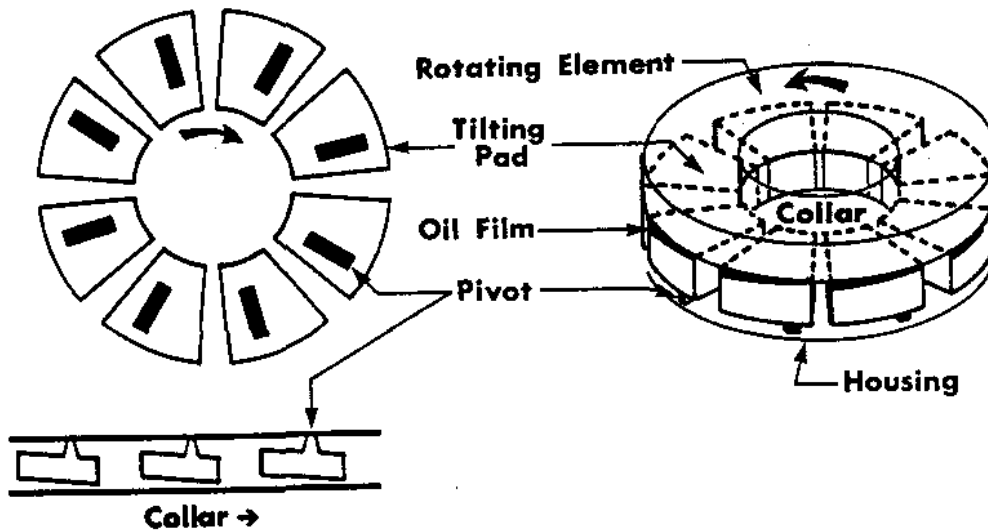


Figure 2

Figure 3

Tilting Pad Thrust Bearing

ROLLING ELEMENTBall Bearing (angular contact type)

Since the roller bearing does not significantly vary in design from a ball bearing, only the ball bearing will be discussed.

Each bearing (Figure 4) consists of:

- (1) two hardened steel rings called "races".
- (2) hardened steel balls which roll between the races.
- (3) optional **separators** or **cages** which space the rolling elements around the races.

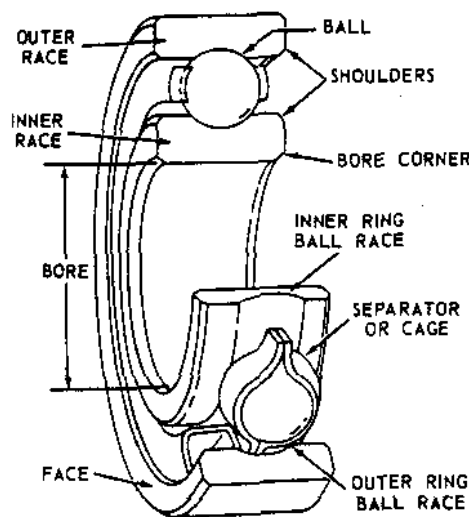
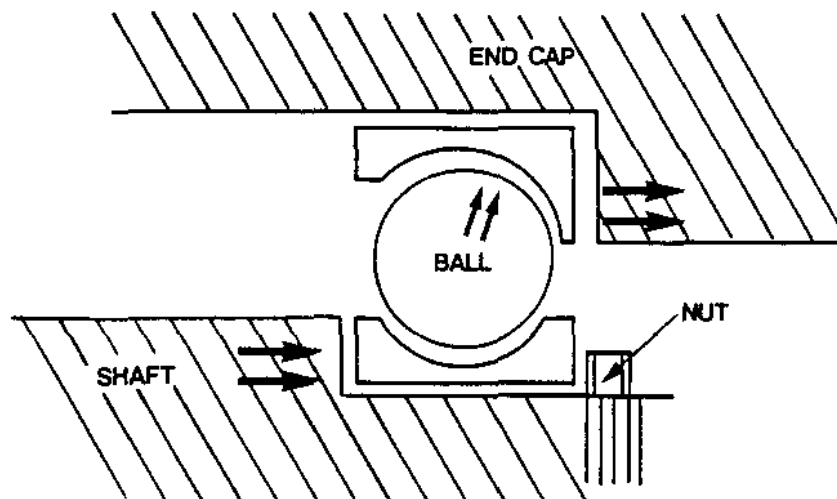


Figure 4

The angular contact ball bearing shown in Figure 5 is used to handle thrust (axial) loads. As the diagram indicates, forces are transmitted:

- (a) from the shaft to the inner race of the bearing which butts against the shaft shoulder then.
- (b) from the inner race to the balls and finally.
- (c) from the balls to the outer race which contacts the bearing cover or end cap. To handle the large axial loads, the outer race of the bearing which contacts the bearing cover is deeper than the other lip which does not make any contact.



ANGULAR CONTACT BALL BEARING

Figure 5

EXERCISE

For the following diagrams of typical bearing installations, correctly name and label each one.

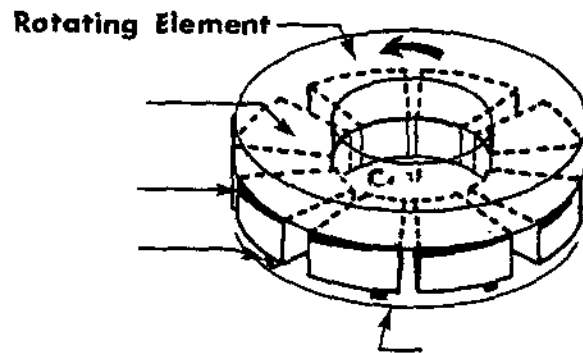


Figure 6

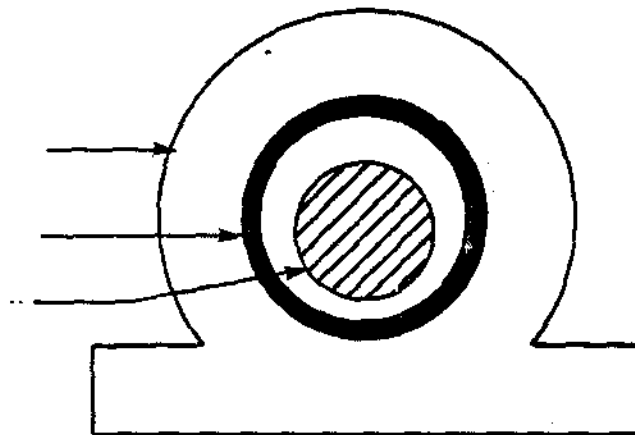


Figure 7

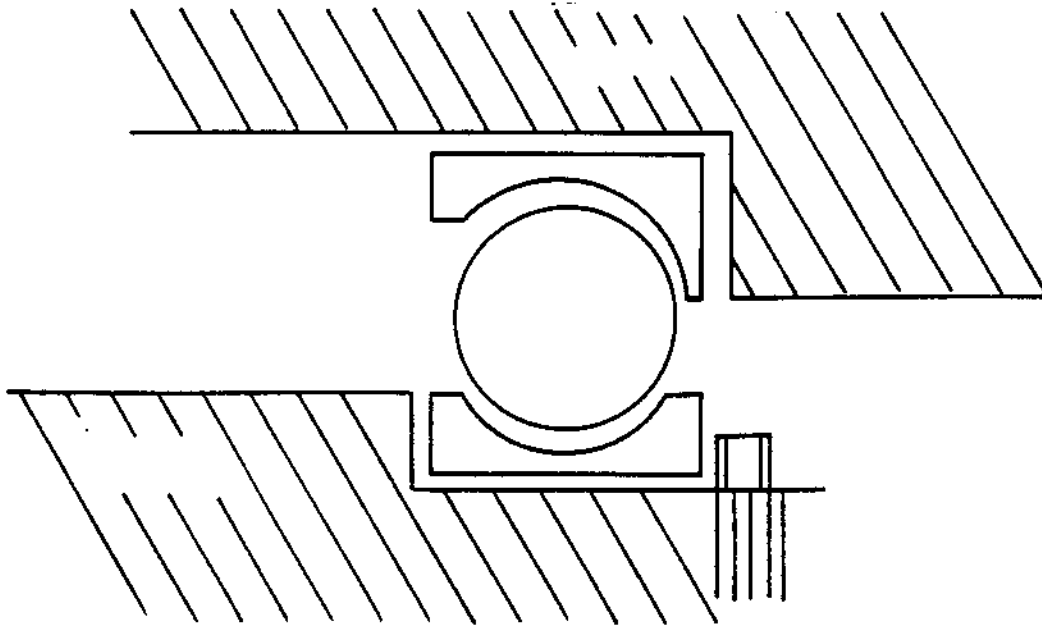


Figure 8

For the solution, check the diagrams which appear in the lesson material.

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