MACHINE DESIGN II
MEC 3110

Lecture-4

BY

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Hydrodynamic lubrication

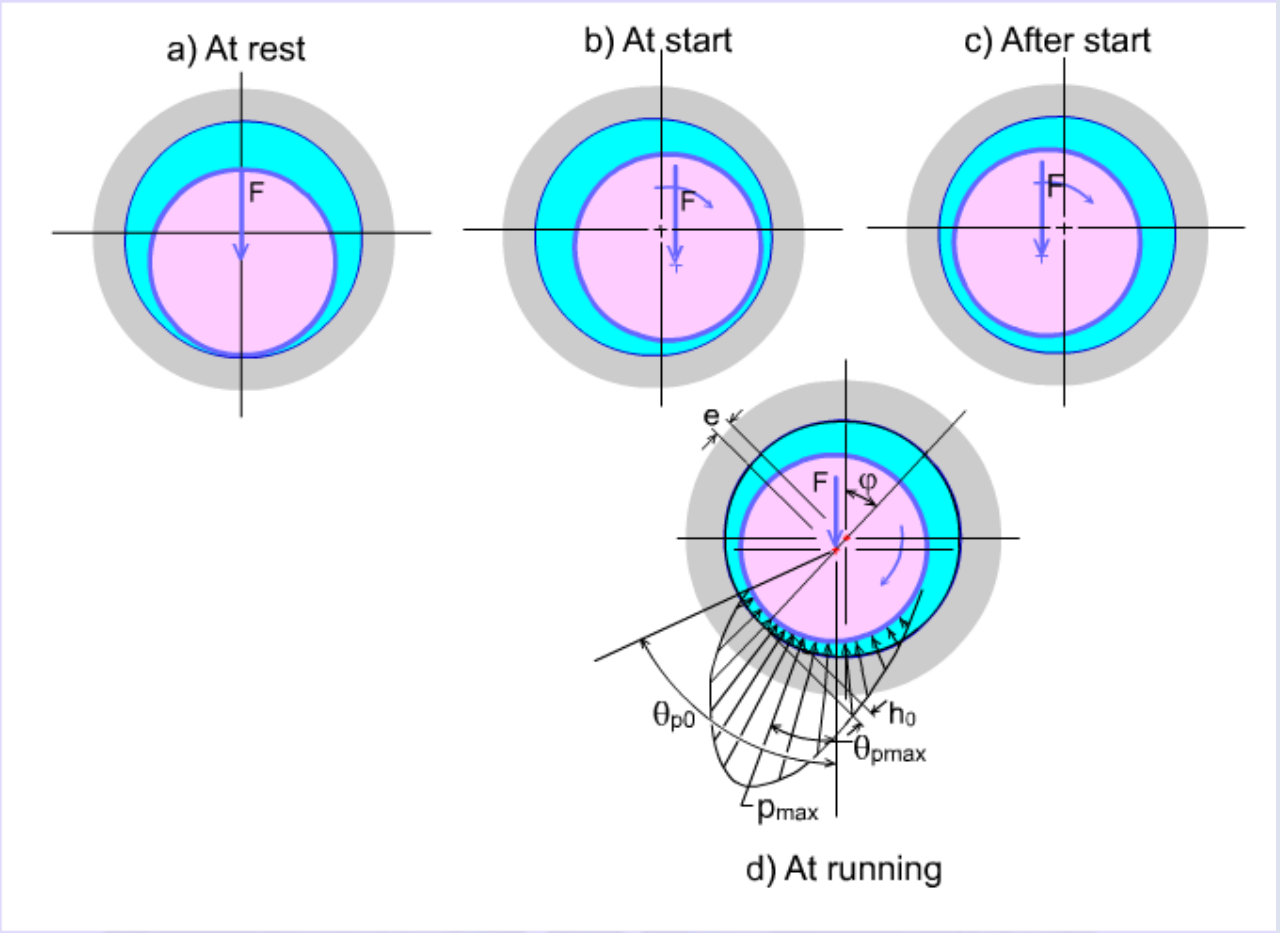

Fig.1.14 Journal position in hydrodynamic lubrication

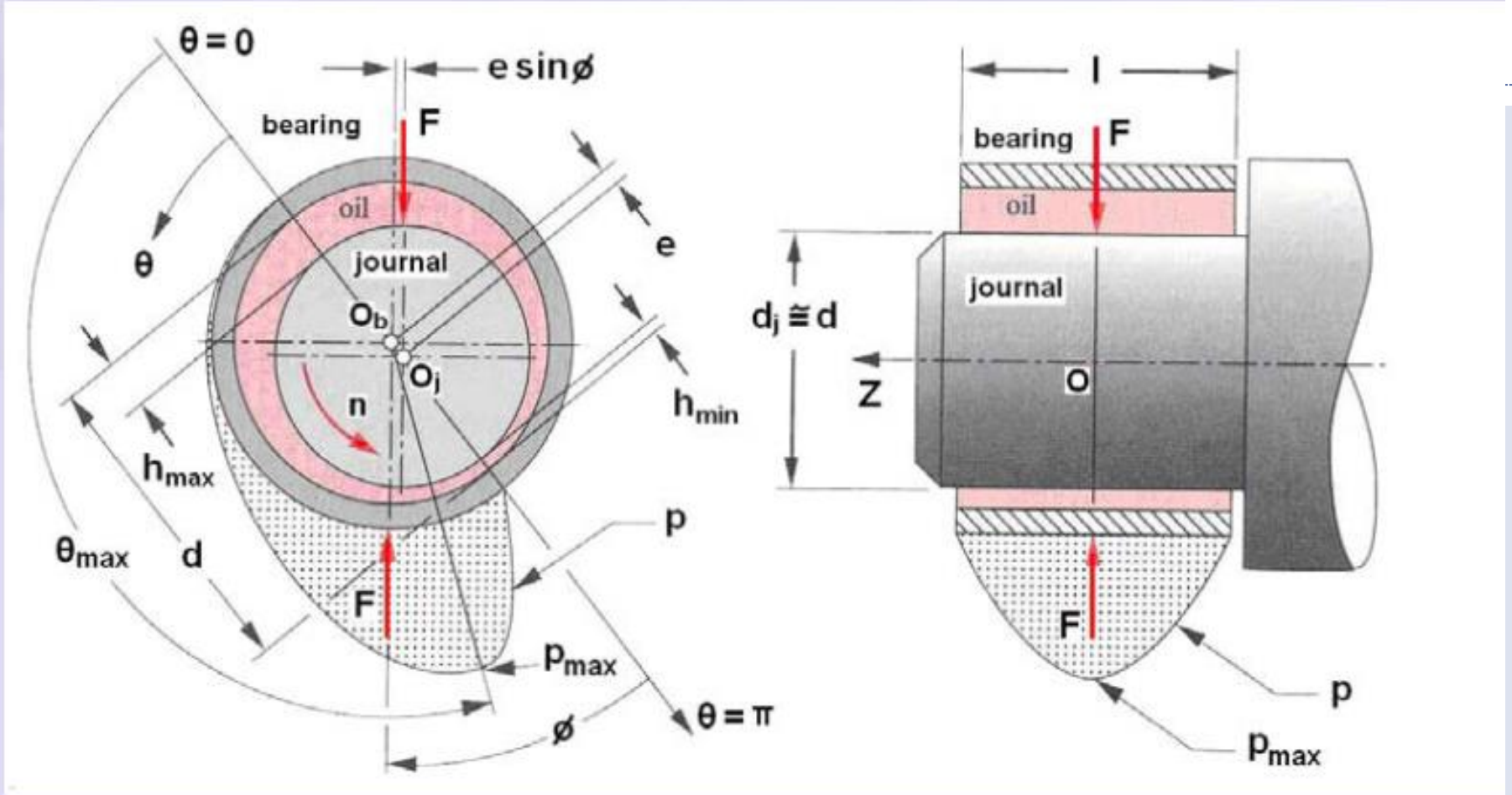

Fig.1.6 Hydrodynamic lubricated bearing

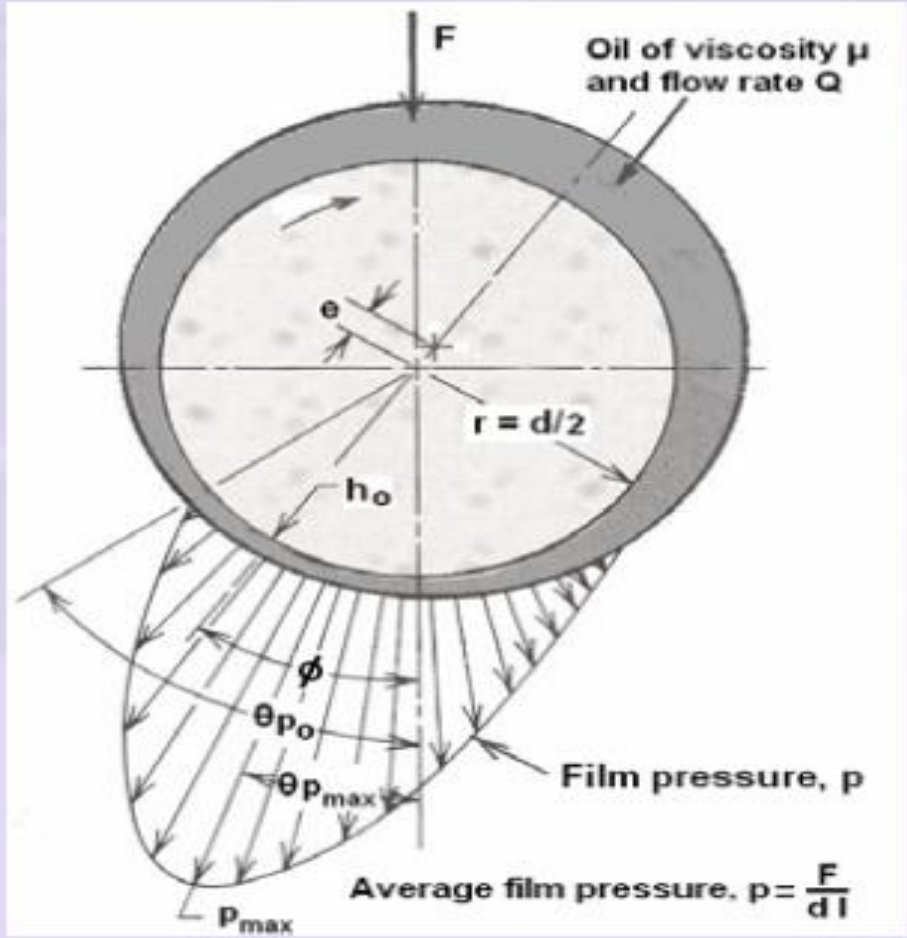

Fig.1.13 Stable hydrodynamic lubrication

1.6.5 LUBRICANT PROPERTIES

Properties of a good lubricant are:

1. It should give rise to low friction.
2. It should adhere to the surface and reduce the wear.
3. It should protect the system from corrosion.
4. It should have good cleaning effect on the surface.
5. It should carry away as much heat from the surface as possible.
6. It should have thermal and oxidative stability.
7. It should have good thermal durability.
8. It should have antifoaming ability.
9. It should be compatible with seal materials.
10. It should be cheap and available in plenty.

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1.7.1 Recommended Lubricants for the Bearing Application

1. SAE 10 – spindle oil for light loaded bearings and high speeds.
2. SAE 20 – 40 – Machine oil for bearings of IC engines, machine tools, turbines etc.
3. SAE40-50 – Machine oil for diesel engines heavy load and medium speeds.
4. SAE 60-70 – machine oil for high temperature, heavy load and low speeds.

1.7.4 ISO Specification of Lubrication oils

Industrial fluid lubricants are commonly specified in terms of international standards, which appear as

1. ASTM D 2422,
2. American National Standard Z11.232,
3. ISO Standard 3448.

METHODS OF LUBRICANT SUPPLY

Lubricant present at the bearing surface gets depleted due to side leakage and to main the hydrodynamic lubrication continuous supply of lubricant must be ensured.

The principal methods of supply of lubricant are:

1. Oil Ring lubrication
2. Oil collar lubrication
3. Splash lubrication
4. Oil bath lubrication
5. Oil pump lubrication

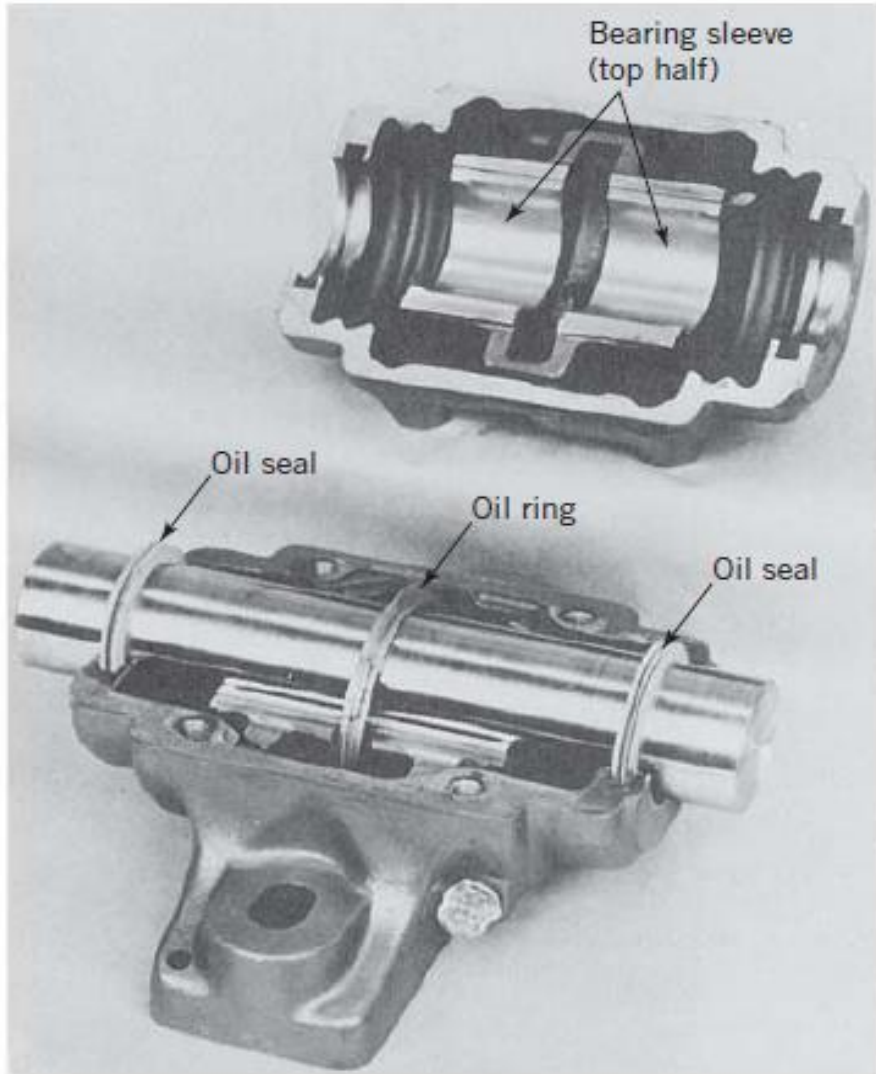
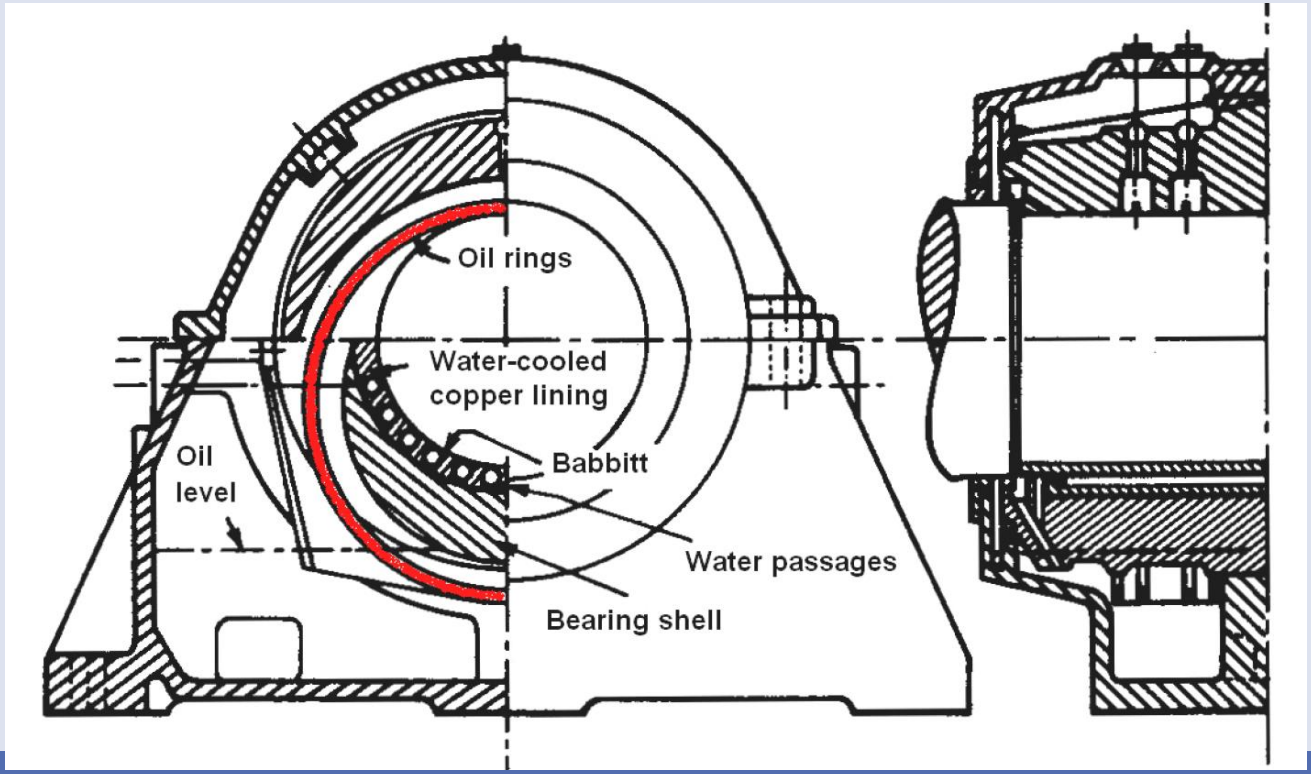


FIGURE 13.22
Ring-oiled bearing. (Courtesy Reliance Electric Company)

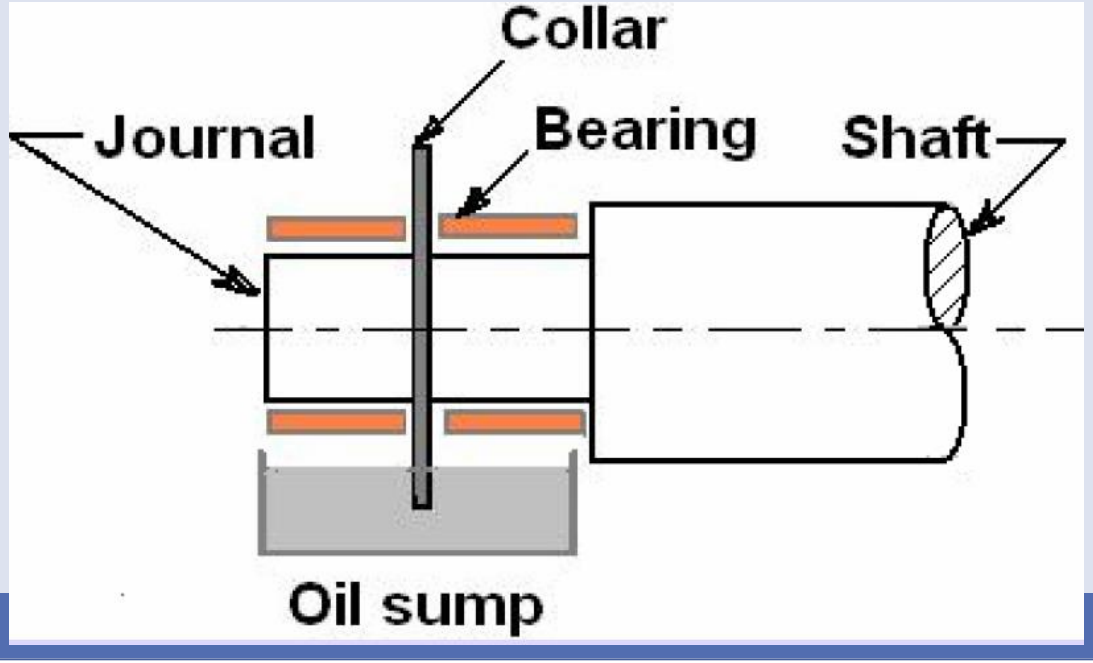
Oil Ring Lubrication

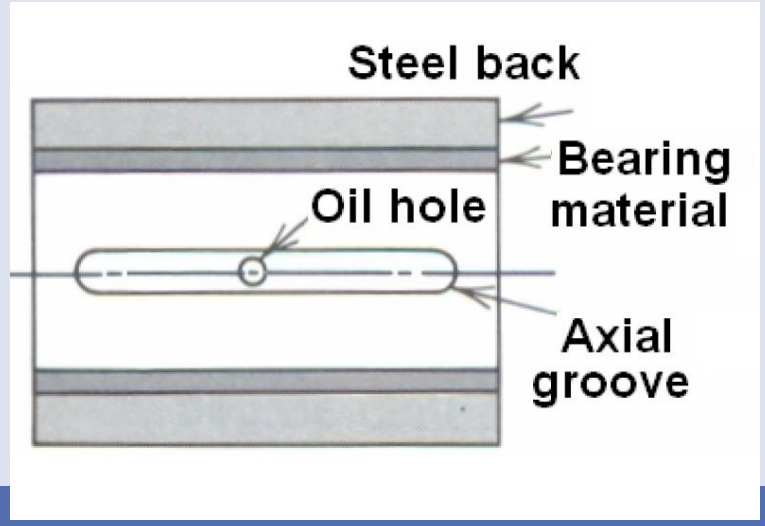
- The ring is of 1.5 to 2 times the diameter of the shaft.
- It hangs loosely on journal and rotates with the journal.
- As the ring rotates it lifts oil to the top.
- The bearing sleeve is slotted to accommodate the ring and bear against the journal.



Oil Collar Lubrication

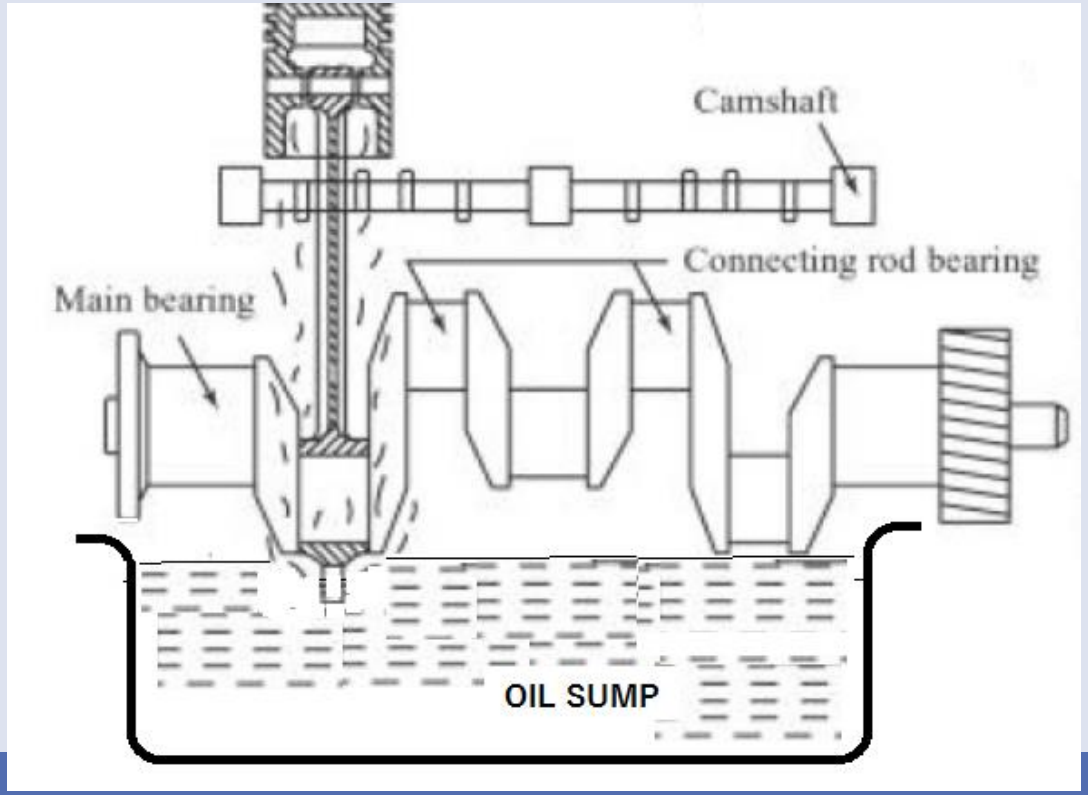
- A rigid collar integral with the journal dips into the reservoir at the bottom.
- A small sump is provided on either side of the collar.
- During rotation the collar carries oil to the top and throws off into the sumps.
- From the sump oil flows by gravity through the oil hole and groove to the bearing surfaces.





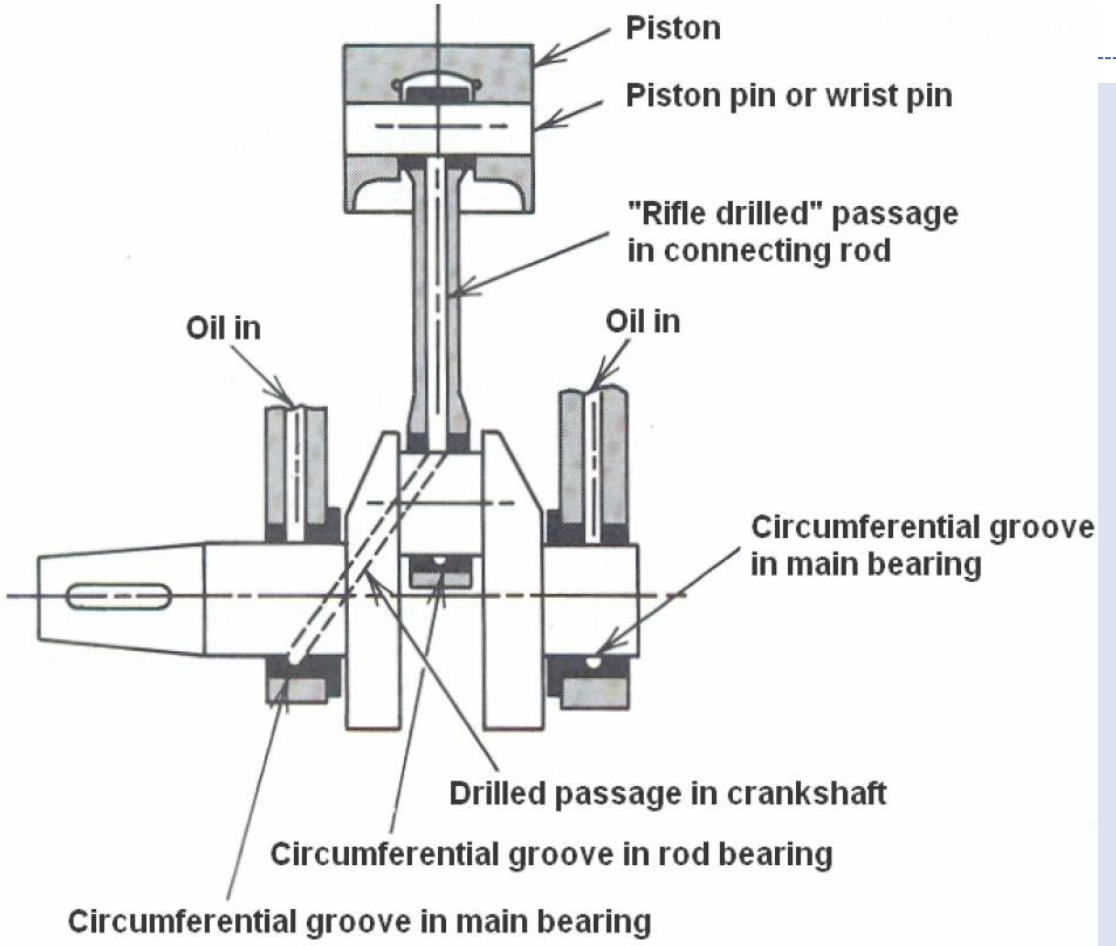
Splash Lubrication

- Oil is channelled to small sumps maintained above the bearings.
- The oil in sumps is splashed by moving parts or small oil scoops.
- The splashed oil is thrown onto the bearings for lubrication.
- Few examples are:
  - automobile engine
  - wrist pin lubrication
  - gearboxes lubrication
  - wherein gears splash
  - the oil into bearings.



Oil Pump Lubrication

- This is a positive means of supplying oil.
- Pumped oil fills the circumferential grooves in the main bearings.
- The holes in crankshaft carry oil to the connecting rod bearings.
- Circumferential groove transmits the oil through riffle drilled holes to the wrist pin bearings.



- **Pressure fed lubrication system of a piston engine or Compressor .**

End of Lecture

Any Questions

INTERACTION IS HIGHLY ENCOURAGED