

LUBRICATION SYSTEM OF I.C. ENGINE

Purpose of lubrication

1. Reducing frictional effect
2. Cooling effect
3. Sealing effect and
4. cleaning effect
5. Absorbing shocks reducing noise and extending engine life.

The system which maintains supply of lubricating oil to the rubbing surface of an engine at correct pressure and temp. is known as lubricating system.

A good lubricant should have the following qualities:

- (i) It should have sufficient viscosity to keep the rubbing surfaces apart.
- (ii) It should remain stable under changing temperatures.
- (iii) It should keep lubricated parts clean.
- (iv) It should not corrode metallic surfaces.

The parts which require lubrication are:

1. Cylinder walls and piston
2. Piston pin
3. Crankshaft and connecting rod bearings
4. Camshaft bearings
5. Valve operating mechanism
6. Cooling fan
7. Water pump
8. Ignition mechanism.

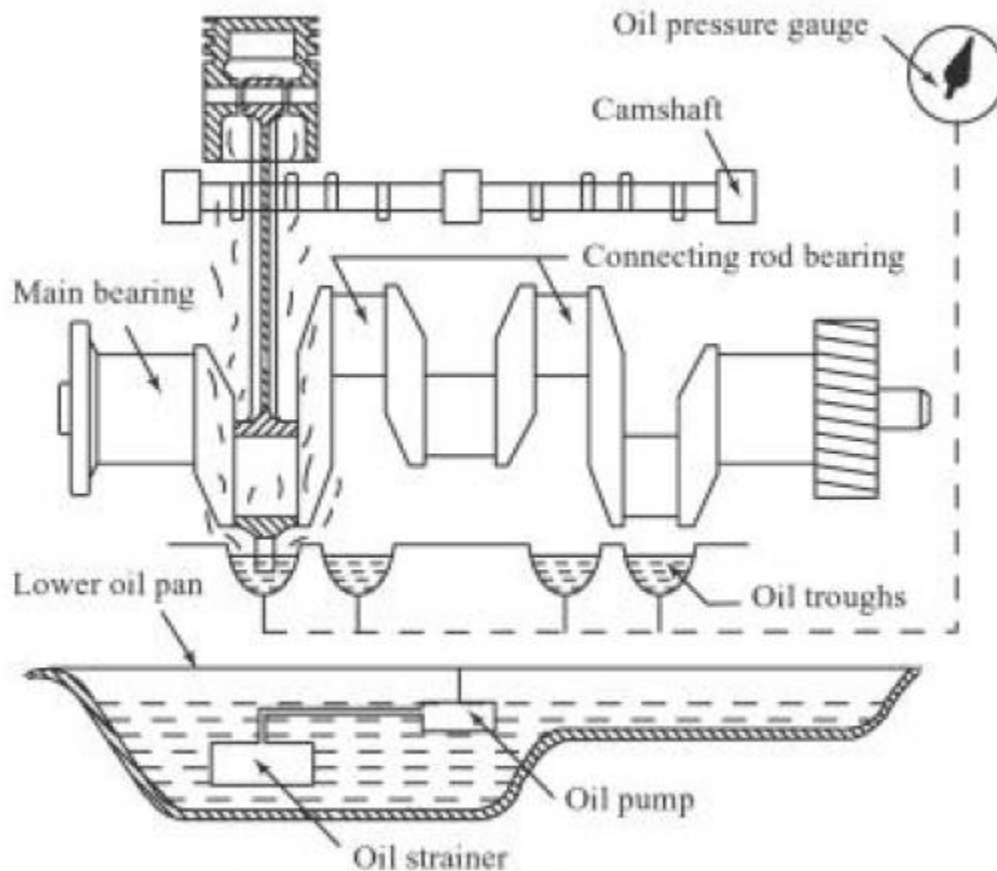
Common systems of Lubrications:-

1. Splash system.
2. Forced feed system.
3. Combination of splash and force feed system.

Main parts of The Lubricating system:

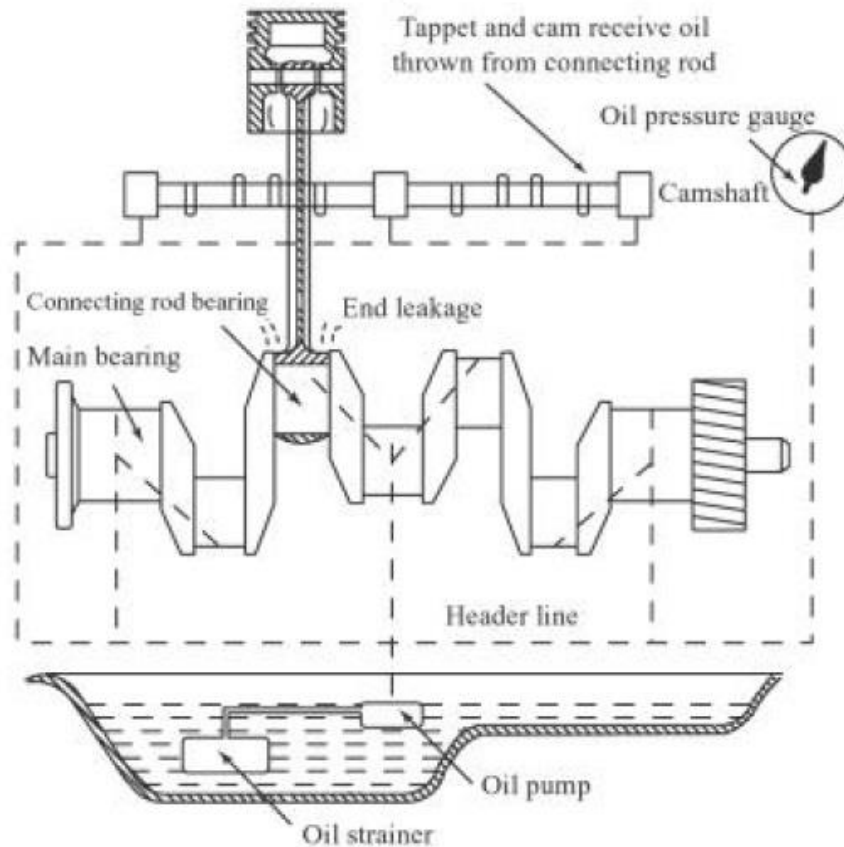
- ① Oil Sump or Oil Pan
- ② Oil Pump → Geartype, Rotor pump
- ③ Oil pressure relief valve.
- ④ Oil filter → Full flow filter, Bypass filter
- ⑤ Oil pressure gauge
- ⑥ Oil level dipstick

Splash lubrication system is used on small, stationary four-stroke engines. In this system, the cap of the big end bearing on the connecting rod is provided with a scoop which strikes and dips into the oil-filled through at every revolution of the crank shaft and oil is splashed all over the interior of crank case into the piston and over the exposed portion of the cylinder is shown in the figure below.



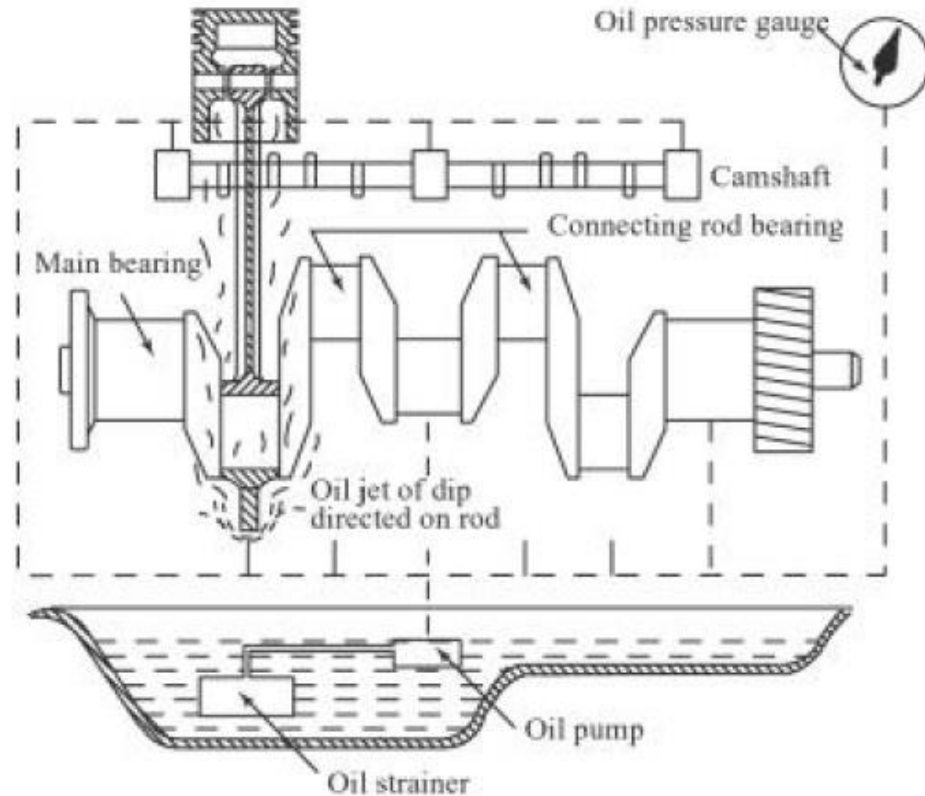
A hole is drilled through the connecting rod cap through which the oil passes to the bearing surface. Oil pockets are provided to catch the splashed oil over all the main bearings and also the cam shaft bearings. From these pockets oil passes to the bearings through drilled hole. The surplus oil dripping from the cylinder flows back to the oil sump in the crank case.

Forced feed system, the lubricating oil is supplied by a pump under pressure to all parts requiring lubrication as shown in below figure. The oil under the pressure is supplied to main bearings of the crank shaft and camshaft. Holes drilled through the main crank shaft bearings journals, communicate oil to big end bearing and small end bearings through the hole drilled in the connecting rod. a pressure gauge is provided to confirm the circulation of oil to various parts.



This system provides sufficient lubrication to all parts and is favoured by most of the engine manufacturers. This is used in most heavy duty and high-speed engines.

Splash and forced feed lubrication system is combination of splash and pressure system as shown in below figure. In this system, the lubricating oil is supplied by a pump under pressure to main and cam shaft bearings. the oil is also directed in the form of spray from nozzle or splashed by a scoop or dipper on the big end to lubricate bearings at the big end of the connecting rod, crank pin, gudgeon pin, piston rings and cylinder.



CLASSIFICATION OF LUBRICANTS

They are classified as follows:

(a) On the Basis of their source: The following the main sources of lubricants:

- (i) Animal oil (Fish oils)
- (ii) Vegetable oils (Linseed, carter oil)
- (iii) Mineral oils (obtained by refining crude patroleum and most popular for engines and machines)

(b) On the basic of fluidity:

- (i) Fluid lubricants (Which include oil)
- (ii) Semi fluid lubricants (Which include grease and heavy)
- (iii) Solid lubricants (Which include graphite, mica etc).

PROPERTIES OF LUBRICANTS

It has following properties,

- (i) it should good sufficient viscosity to keep the rubbing surface apart (i) viscosity
- (ii) It should not corrode metallic surfaces.
- (iii) It should kept lubricated parts clean.
- (iv) It should remain stable under varying temperature.

LUBRICATING OIL TESTS

There are number of tests for lubricating of oil. Some important tests are given as

Viscosity Test

(i) Viscous force and co-efficient of viscosity: It is the most important physical property of the oil. It measures the internal resistance of a fluid as one layer moved, in relation to another layer. The oil should be viscous enough to maintain a fluid film between the moving parts or sliding surface or bearing and its journal?

(iii) Kinematic viscosity (ν): It is defined as the ratio of absolute viscosity to density and is given by following relationship.

Oil used for lubrication purposes are graded as per viscosity in SAE numbers, SAE means society of Automobile Engineer, they have graded the oil as SAE 20, SAE 30, SAE 40 and so on; as the number increases viscosity increases i.e., oil becomes thick.

Carbon Residue Test

Method of finding the amount of carbon residue obtained when a given sample of oil is heated and evaporated under predetermined conditions is called carbon residue test.