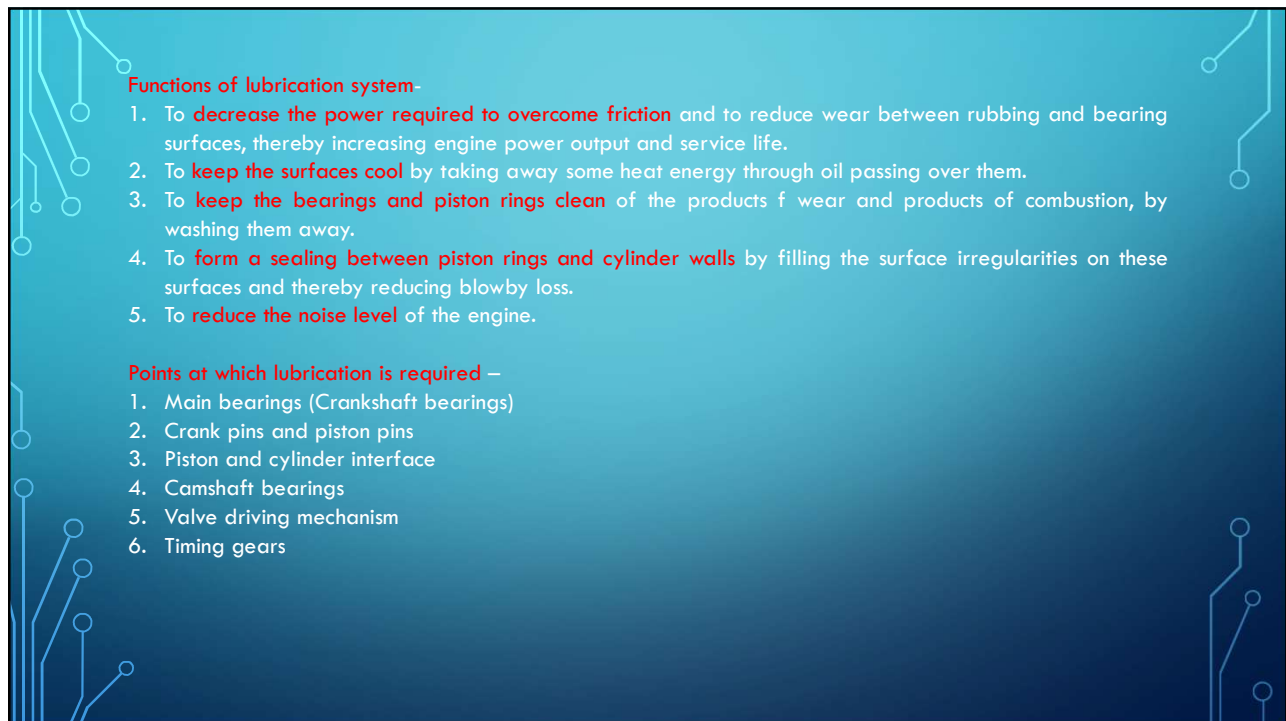


1



2

Lubrication systems used –

1. Mist / Charge lubrication system
2. Wet sump lubrication system
 - a. Splash and circulating pump system
 - b. Splash and pressure system
 - c. Full force feed system
3. Dry sump lubrication system

Mist / Charge lubrication system –

- This is the simplest method, used for 2 stroke SI engines of scooters and motor cycles.
- 2 to 3% lubricating oil is added to petrol tank.
- Fuel and oil mixture is induced in the crankcase together with air, through a carburetor.
- This helps in lubricating the piston and cylinder.
- Most of the oil burns with fuel and is carried away with exhaust gases.
- Advantages – 1. Very simple and economical
2. No risk of failure of lubrication system
- Drawbacks -
 1. Lubricating oil coming in contact with acidic vapours produced during combustion process loses its anti corrosion properties , resulting in corrosion damage to the bearings.
 2. No oil enters the crankcase when the throttle is closed on a descent of a long hill, resulting in oil starvation of the working parts. Prolonged oil starvation may lead to engine overheating and piston seizure.

3

Wet sump lubrication system – Refer Fig. 1

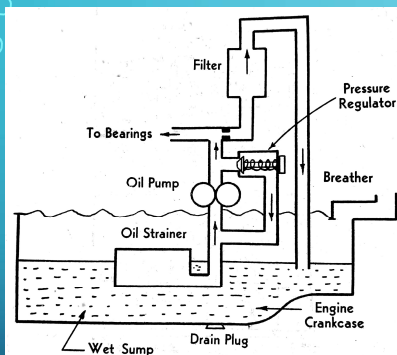


Fig.1 Wet sump lubrication system

- Bottom of the crankcase contains an oil pan or sump that serves as the oil supply or reservoir tank and in most cases it also serves as oil cooler.
- Oil is drawn from the sump through a strainer by a gear or rotor type of oil pump. The strainer is usually a fine mesh screen which prevents foreign matter from entering the oil circulating system. An oil pressure relief valve is provided to prevent the build up of excessive oil pressures.
- Most of the oil from the pump goes directly to the engine and a portion of the oil passes through a cartridge filter which removes the solid particles from the oil. This reduces the contamination from carbon, dust and other impurities present in the oil. Since all oil coming from the pump does not pass directly through the filter, the filtering system is called a by-pass filtering system. Over a period of operation all the oil will eventually pass through the filter. In this filtering system, a clogged filter will not restrict the flow of oil to the engine.
- Oil dripping from the cylinders and bearings flows by gravity back into the wet sump where it is picked up by the oil pump and recirculated through the engine lubricating system.
- A breather allows oil fumes in the crankcase to go out and thus maintains atmospheric pressure over the oil surface in the sump.

4

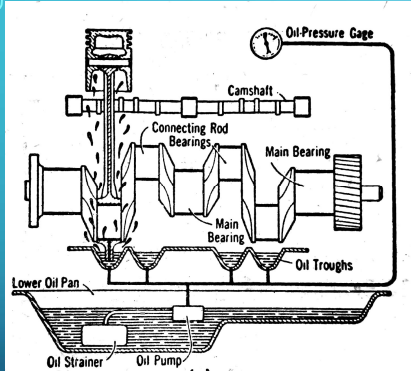


Fig. 2 Splash and circulating pump system

Splash and circulating pump system – Refer Fig. 2

- Oil supply is carried in the engine crankcase at a predetermined level.
- Oil circulating pump delivers oil to the troughs located below the ends of connecting rods. Dippers on the end of connecting rods strike oil in the troughs and splash it over the various parts of the engine.
- Some of the oil collects in cups or pockets on the main and crankshaft bearings and feeds these bearings.
- The crankpin bearings receive oil from the dippers through slots cut in the lower ends of the connecting rods.
- Part of the oil is splashed by the dippers onto the cylinder walls and lubricates the piston skirt and piston rings.
- Oil splashed into the underside of the hollow pistons collects under the piston heads and passes through grooves to lubricate the piston pins.
- The oil dripping from the cylinders and gears, the excess overflow oil from the troughs, collects in the sump tank where it is cooled by the air flowing around the outside of the sump.
- The cooled oil is then recirculated.

5

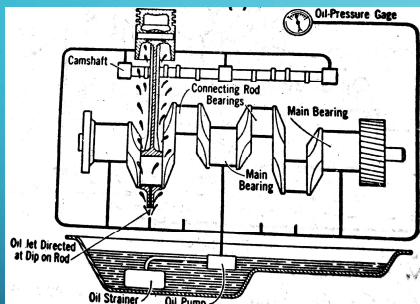


Fig. 3 Splash and pressure system

Splash and pressure system – Refer Fig. 3

- The oil sump supplies oil under pressure to the main and camshaft bearings.
- It also supplies oil under pressure to pipes which direct a stream of oil against the dippers on the connecting rod bearing cups.
- The crankpin bearings receive oil from the dipper through slots cut in the lower ends of the connecting rods.
- The other parts of the engine are lubricated by the splash or spray of oil thrown up by the dipper.

6

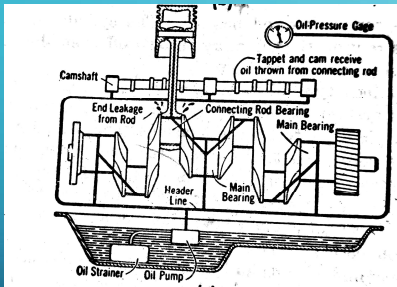


Fig. 4 Full force feed system

Full force feed system – Refer Fig. 4

- Oil under pressure from the pump is forced through drilled passages to all the bearings.
- The drilled holes in the connecting rods permit oil to flow from the connecting rod bearings to the piston pins.
- The cylinder walls, piston and piston rings are lubricated by oil spray from around the piston pins and the main and connecting rod bearings.
- In some engines, holes are drilled in the upper part of the connecting rod bearings so that oil under pressure is sprayed on the cylinder walls and underside of the pistons.

7

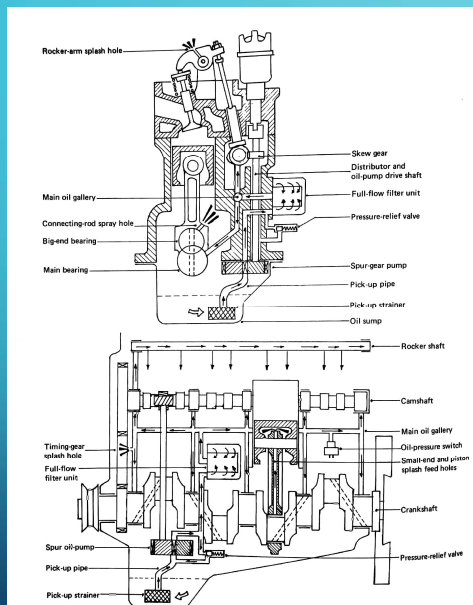


Fig. 5 Wet sump system - Front and side sectional views

Fig. 5 shows the front and side sectional vies of a typical wet sump system.

- This cross section shows how oil is forced by the oil pump via the full flow oil filter to various parts of the engine, such as crankshaft bearings, crank pins, piston pins, camshaft bearings, rocker shaft etc.
- This cross section also shows the small end and piston splash feed holes, timing gear splash hole, connecting rod spray holes and rocker arm splash holes. These holes allow oil to flow through them for lubrication where it is required.

8

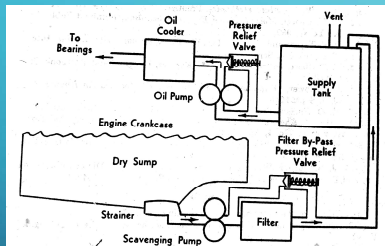


Fig. 6 Dry sump system

Dry sump system – Refer Fig. 6

- The supply of oil is carried in an external tank.
- Oil dripping from the cylinders and bearings into the sump is removed by a scavenging or sump pump, passed through a filter, and returned to the supply tank. Since the capacity of the scavenging pump is greater than that of the oil pump, oil is prevented from accumulating in the base of the engine. Hence the name “Dry sump system.”
- All the oil passing from the engine to the supply tank passes through the filter. Therefore this is a full flow filter system. If the filter becomes clogged, the oil filter pressure relief valve opens, permitting oil to bypass the filter.
- The oil pump draws oil from the supply tank and circulates it under pressure to the engine bearings.
- Majority of engines using dry sump system have a full force feed system.
- A separate oil cooler, either water or air, is usually provided to remove heat from the oil.