

Subject: Applied Technology

Year/Level: 13

Strand: 5	AT 13.5: Machines And Engines
Sub Strand	AT 13.5.1 Motorized Machines And Engines
Content Learning Outcome	AT 13.5.1.2 Demonstrate knowledge And understanding of parts, functions and operation of a four stroke engine.

LESSON NOTES

Chapter 5: Machines and Engines

Continued from week 19 Lesson notes....

The various lubrication systems used for lubricating the various parts of engine are classified as

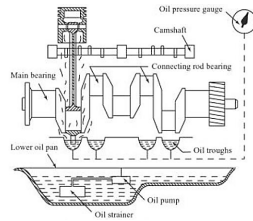
1. Mist lubrication system:

Mist lubrication system is a very simple type of lubrication. In this system, the small quantity of lubricating oil (usually 2 to 3%) is mixed with the fuel (preferably gasoline). The oil and fuel mixture is introduced through the carburetor. The gasoline vaporized and oil in the form of mist enters the cylinder via the crank base. The droplets of oil strike the crank base. The droplets of oil strike the crank base, lubricate the main and connecting rod bearings and the rest of the oil lubricates the piston, piston rings and cylinder. The system is preferred in two stroke engines where crank base lubrication is not required. In a two-stroke engine, the charge is partially compressed in a crank base, so it is not possible to have the oil in the crank base. This system is simple, low cost and maintenance free because it does not require any

oil pump, filter, etc. However, it has certain serious disadvantages. Therefore, it is not popular among the lubrication system. Its disadvantages are the following: 1. During combustion in the engine, some lubricating oil also burnt and it causes heavy exhaust and forms deposits on the piston crown, exhaust port and exhaust system. 2. Since the lubricating oil comes in contact with acidic vapours produced during the combustion, it gets contaminated and may result in the corrosion of the bearing surface. 3. When the vehicle is moving downhill, the throttle is almost closed, and the engine suffers lack of lubrication as supply of fuel is less. It is a very serious drawback of this system. 4. There is no control over the supply of lubricating oil to the engine. In normal operating conditions, the two-stroke engines are always over-oiled. Thus consumption of oil is also more. 5. This system requires thorough mixing of oil and fuel prior to admission into the engine. It requires either separate mixing or use of some additives.

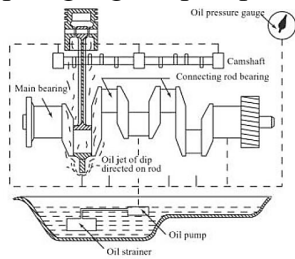
2. Wet-sump lubrication system: - In the wet-sump lubrication system, the bottom of the crank case contains an oil pan or sump that serves as oil supply, oil storage tank and oil cooler. The oil dripping from the cylinders, bearings and other parts, fall under gravity back into the sump, from where it is picked up by pump and recirculates through the engine lubrication system. There are three varieties in wet-sump lubrication system. They are:

2.1 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.

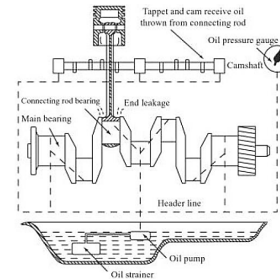


A hole is drilled through the connecting rod cap through which the oil passes to the bearing surface. Oil pockets are provided to catch the splashed oil over all the main bearings and also the cam shaft bearings. From these pockets oil passes to the bearings through drilled hole. The surplus oil dripping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

2.2 Splash and pressure 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.



2.3 Pressurized lubrication 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.



2.4 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.

3. Dry-sump lubrication system: - the oil supply is carried from an external tank. The oil from the sump is pumped by means of a scavenging pump through filters to the external storage tank. The oil from the storage tank is pumped to engine cylinder through and oil cooler. The oil pressure may vary from 3 to 8 bars. The dry-sump lubrication system is generally used for heavy-duty engines

STUDENT ACTIVITY

1. Differentiate mist lubrication system with wet sump lubrication system.

2. Discuss the following:

a) Splash lubrication system

b) Splash and pressure system

c) Pressured lubrication system.

THE END