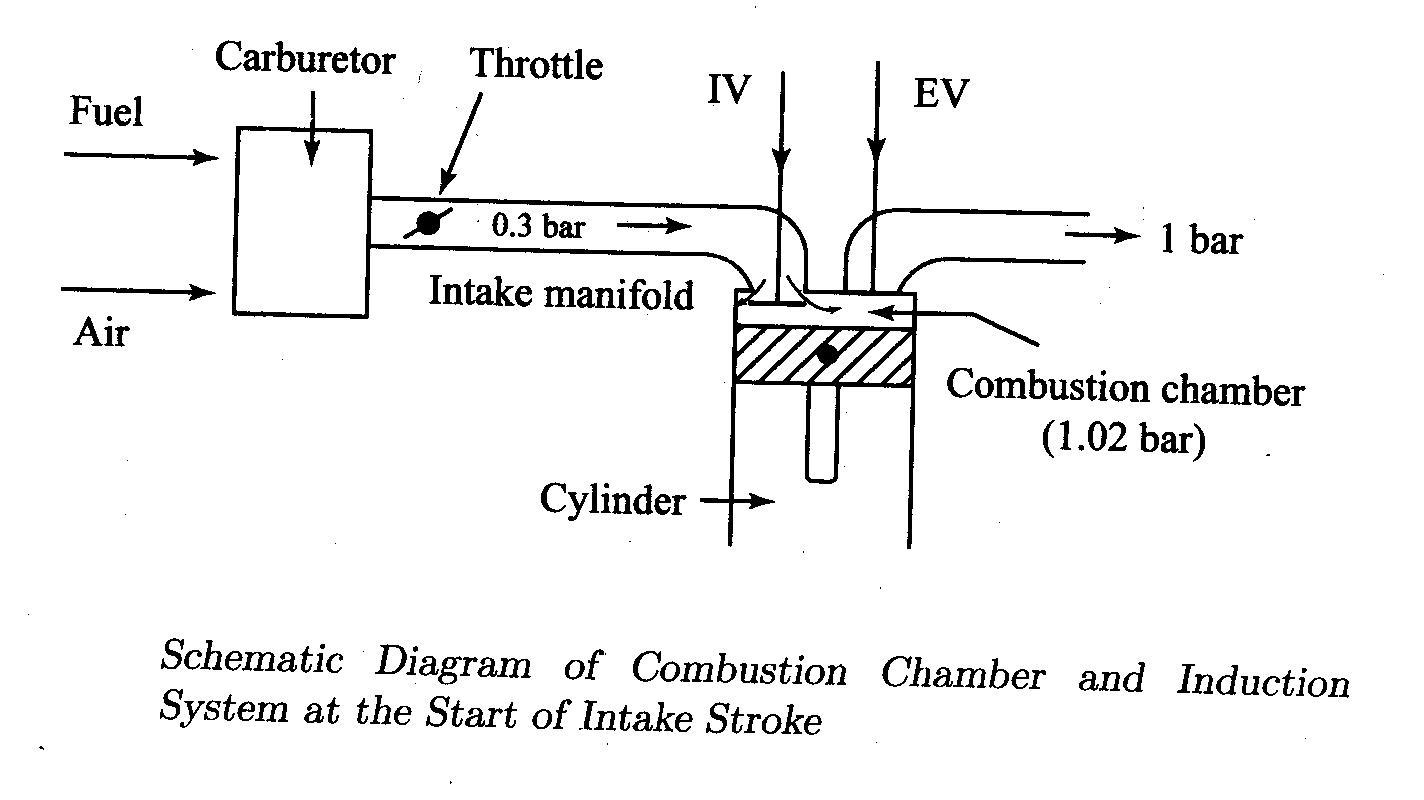
**Experiment No 2**

***Study Of Engine Systems- Air Intake, Exhaust, Cooling, Lubrication Systems.***

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**Aim- Study of Engine systems: Air intake, Exhaust, Cooling, Lubrication Systems**

**INTAKE SYSTEM**

The fuel system of an internal combustion Engine is intended to produce a combustible mixture composed of the fuel stored in the fuel tank and atmospheric air, and then deliver both to the cylinders. Petrol engine use light grade gasoline fuel while the Diesel Engines utilize heavy diesel fuel, therefore fuel supply systems and their differ greatly in petrol and diesel engine.

Fuel Pump is used to supply petrol from the petrol Tank to the Carburetor. The fuel pump may be of mechanical or electrical type. If mechanical fuel pump is employed, it has to be placed on the engine since it is driven by the engine camshaft through an eccentric. However, the electrically operated fuel pump may be placed anywhere on the vehicle.

When the engine is cranked (started), vacuum is produced inside the cylinder. The atmospheric air rushes in to the vacuum through the air cleaner.

Carburetor is the main device in this system. It vaporizes the petrol and mixes it with air in desired proportions depending upon the requirements of operating conditions. The charge (Air + fuel mixture) now flows into the inlet valve opens. It is ignited by spark that occurs due to an ignition system.

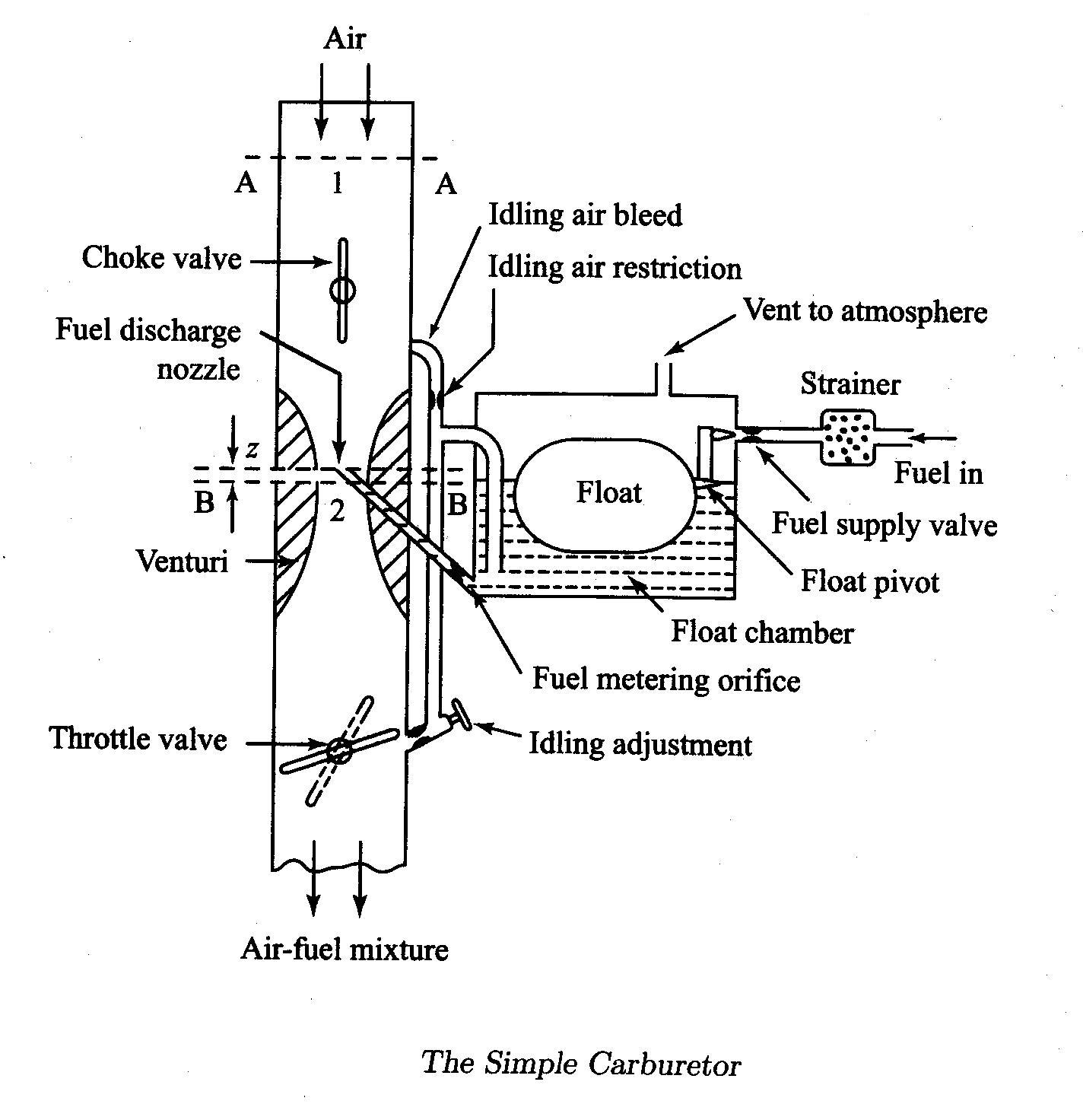
**Main parts of the Fuel Supply System of Petrol Engine:**

1. Fuel Tank
2. Fuel Pump
3. Carburetor
4. Fuel Filter

**Fuel Tank:** The Fuel Tank used in a 4 Wheeler is different from that of a 2 Wheeler in location, construction and control of fuel flow. A 4 Wheeler is not provided with a fuel tap whereas it is invariably used 2 Wheeler. Details of Fuel Tank in common use, is given below. We shall study fuel tanks for both categories of vehicles.

The Fuel Tank is fabricated from sheet metal of steel or aluminum alloy. Use of aluminum alloy tank is advantageous due to its lightweight and good resistance to corrosion.

The Fuel is filled in through a filler tube, which can be closed by a filler cap. Provision of Lock is generally made on this cap. Provision of lock is generally made on this cap. A number of baffles (plate) are fitted inside to help in preventing the violent fuel surging during acceleration, cornering and braking. The bottom surface of the tank is made sloppy so that even the last drop of fuel may collect here for pumping. For periodic removal of the sediment, a screwed drain plug is provided at bottom f the tank. A vent hole is provided in the filler tube or the filler cap through which the air enters into the tank and occupies the space left vacant by the pumped fuel.



**Fuel Filters:** The Fuel is filtered at different stages in a fuel supply system. Therefore, many fuel filters are used in the fuel circuit. The fuel filters serve the purpose of filtration in the delivery system by preventing foreign particles from entering into the fuel pump and the carburetor. The modern filtration practice employs a combination of coarse and fine filters. These Filters are generally located at the following positions.

1. Coarse filter (or gauge filter) incorporated within the fuel tank.
2. Medium coarse filter outside the fuel tank and on the inlet side of the pump.
3. Fine filter of built in surface type at inlet of fuel pump’s pumping chamber.
4. Fine filter in pipeline between fuel pump and the carburettor.

**Fuel Pump:**A Fuel Pump is used to deliver fuel from the Fuel Tank to the float chamber of Carburetor. It is generally mounted on the side of engine block near the eccentric end of the camshaft. In V-type engines, it may be mounted between the two rows of the cylinders. Main types of Fuel Pumps commonly used in auto vehicles are given as follows.

1. A.C. Mechanical Pump
2. Diaphragm Type
3. Plunger Type

c. Rotary Type

2. S. U. Electrical Type

3.  Electromagnetic Type

4.  Combined Type

**CARBURETOR:-**

**The carburetor is a complicated, delicate and one of the most important device of a petrol engine**. It is used on both the two-stroke and the four-stroke engines. Its function starts after receiving the fuel (petrol) from the fuel pump and filtered air from the air cleaner. A carburetor vaporizes the petrol and mixes it with the air in such proportion which is in accordance with the weather and the driving conditions. A simple carburetor is unable to meet the widely varying requirement of an engine, therefore commercial carburetor are employed to serve the purposes. They employ various circuits through which petrol flows vivid situations of vehicles speed and traffic conditions. The quality of petrol to be supplied into the engine is controlled by operating throttle valve. This control can be done by automatic means or manually. If done manually, it can be in accomplished by hand control or foot (leg) control. In 2 and 3 wheelers it is generally done by hand and in 4 wheelers the acceleration pedal is actuated by foot.

**Functions of a Carburettor:**

A carburetor is required to perform the following functions.

1. It maintain a small quantity of petrol in the float chamber at constant head (height) to ensure a uninterrupted supply for vaporization.
2. It vaporizes (atomizes) the petrol i.e. converts liquid petrol into vapour from for convenient mixing with the air.
3. It does carburetion i.e. prepares a homogeneous mixture of air and vaporized petrol (air + fuel).
4. It delivers correct air-fuel mixture inside the engine through inlet manifold, under

varying conditions of load and speed of the engine.

**(1)** Float chamber

**(2)** Pipeline from fuel pump

**(3)** Needle valve

**(4)** A hollow float

**(5)** Throttle valve

**(6)** Mixing chamber

**(7)** Venturi or diffusor

**(8)** Fuel nozzle or pulverizer

**(9)** Metering jet or jet tube

**TYPES OF CARBURETTORS**

**1.** **On the basis of number of venturies**

A. Single Venturi carburetor

B. Multi Venturi carburetor

**(a)** Two-Venturi type

**(b)** Three-Venturi type

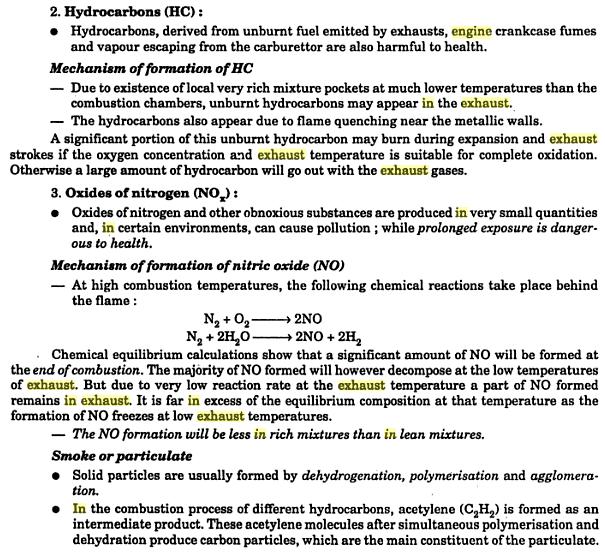
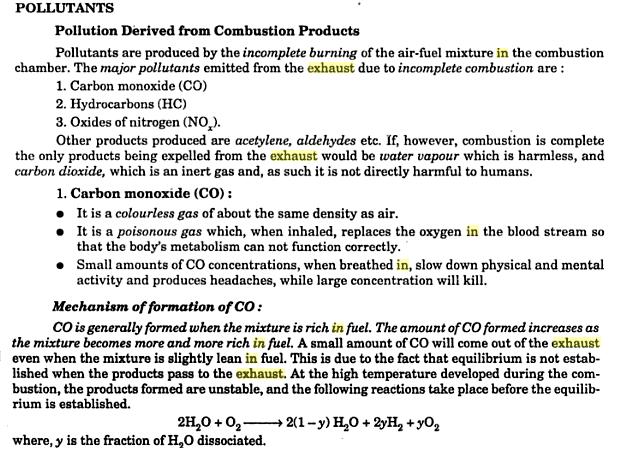
**2.** **On the basis of commercial trade names**

**(1)** Zenith carburetor **(2)** Solex carburetor

**(3)** Carter carburetor **(4)** S.U. carburetor

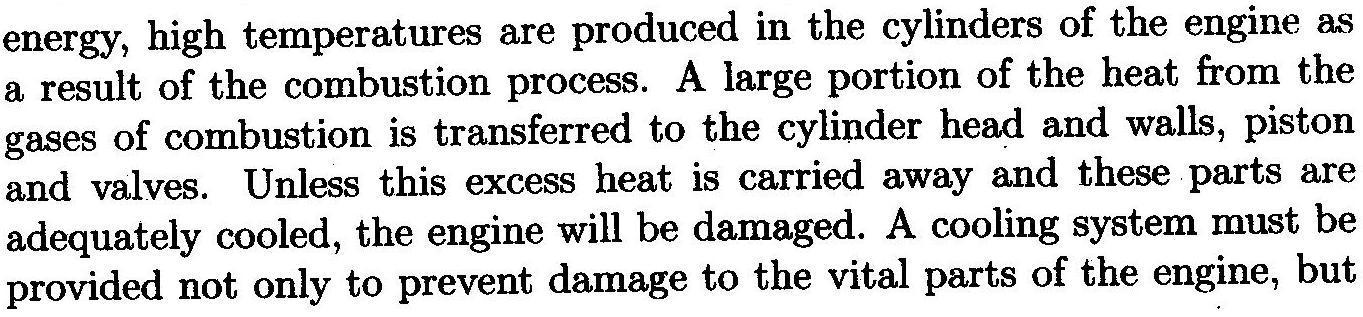
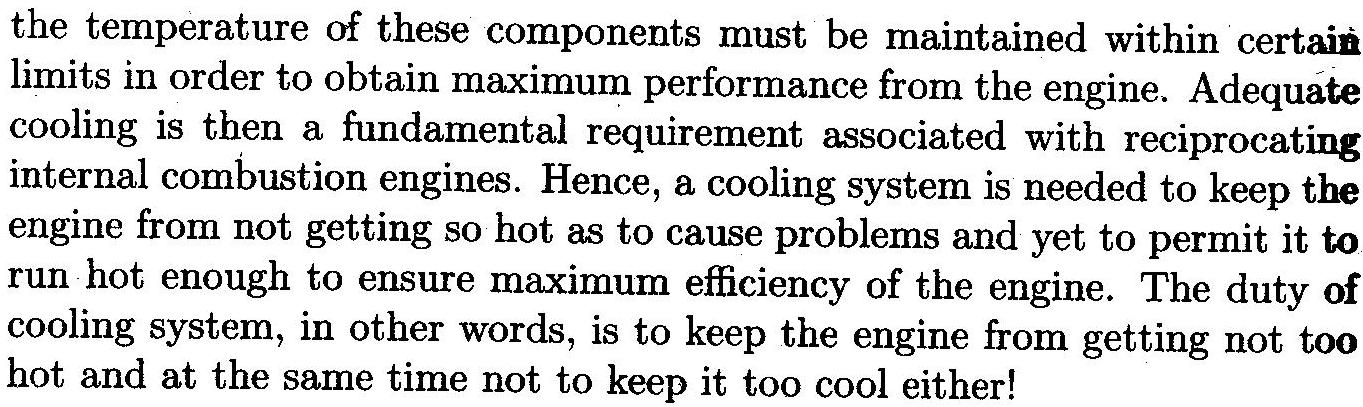
**(5)** General carburetor **(6)** Mikuni carburetor

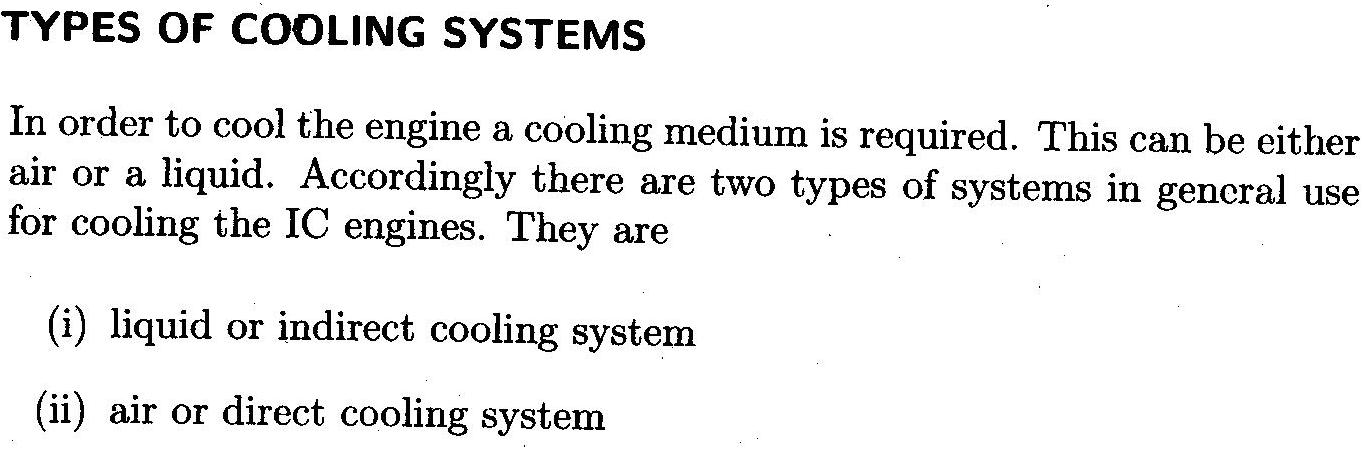
**Exhaust System**

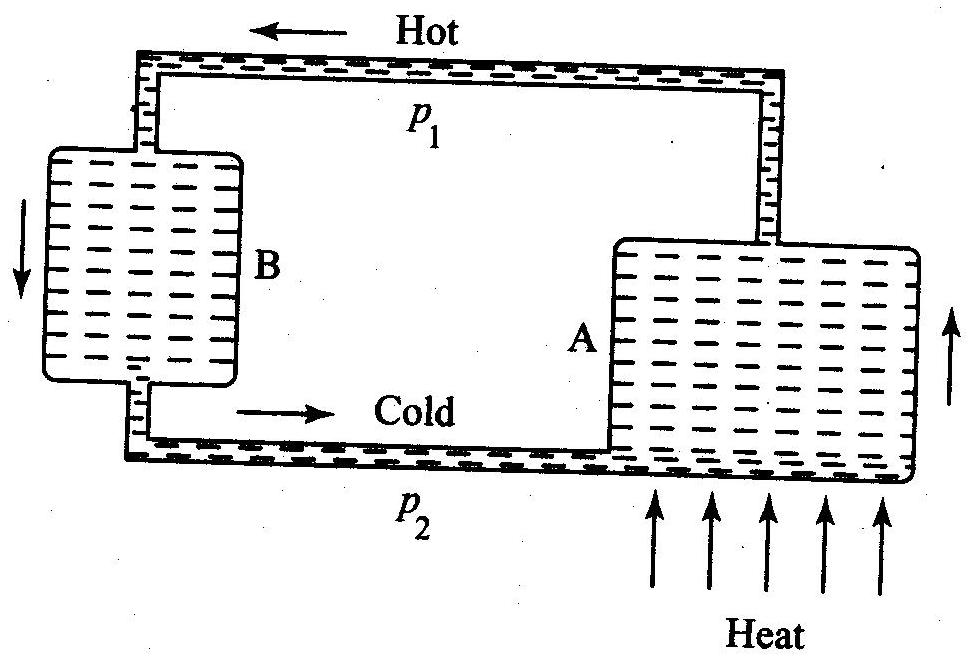
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**COOLING SYSTEM**

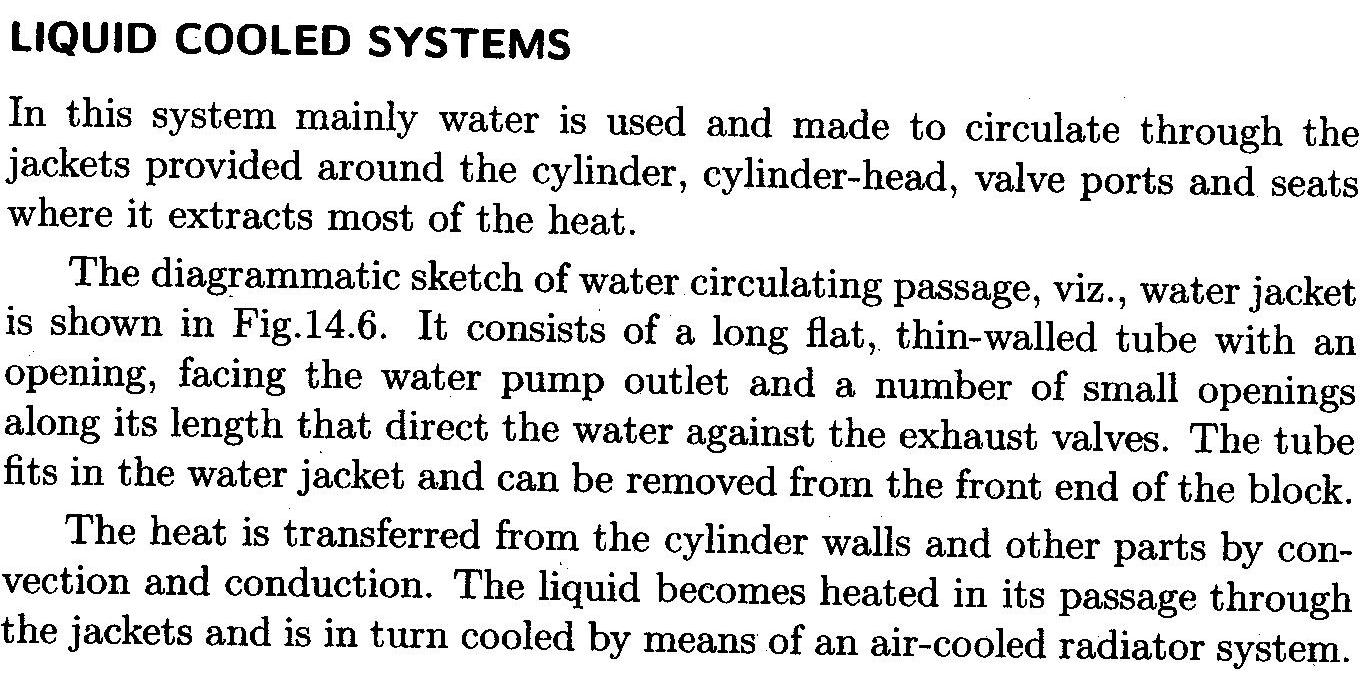
**NEED FOR COOLING SYSTEM**

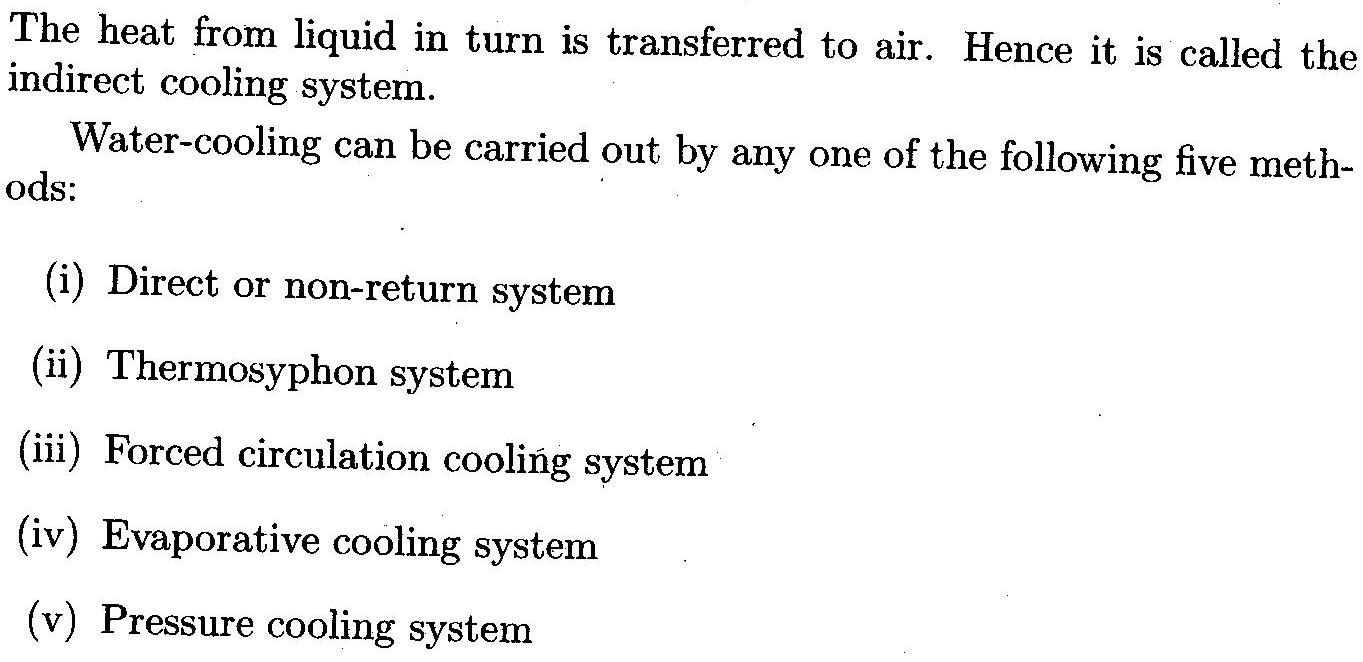
**It may be noted that during the process of converting thermal energy to mechanical******

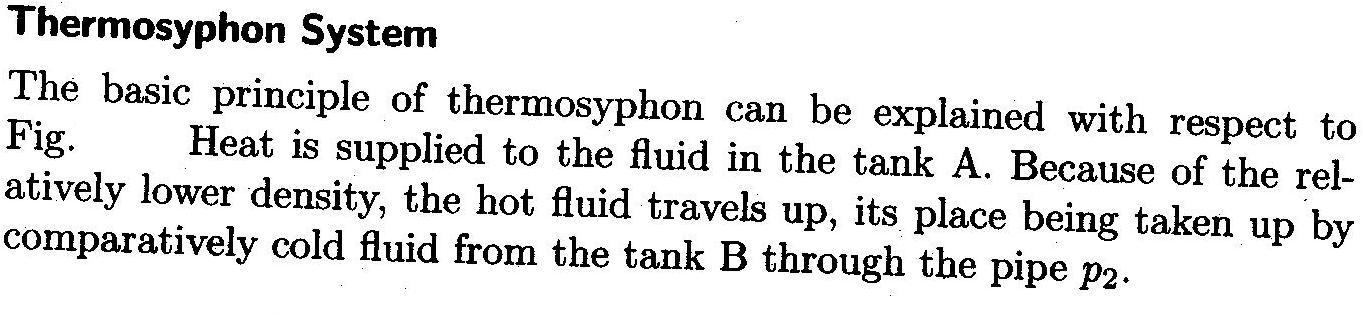
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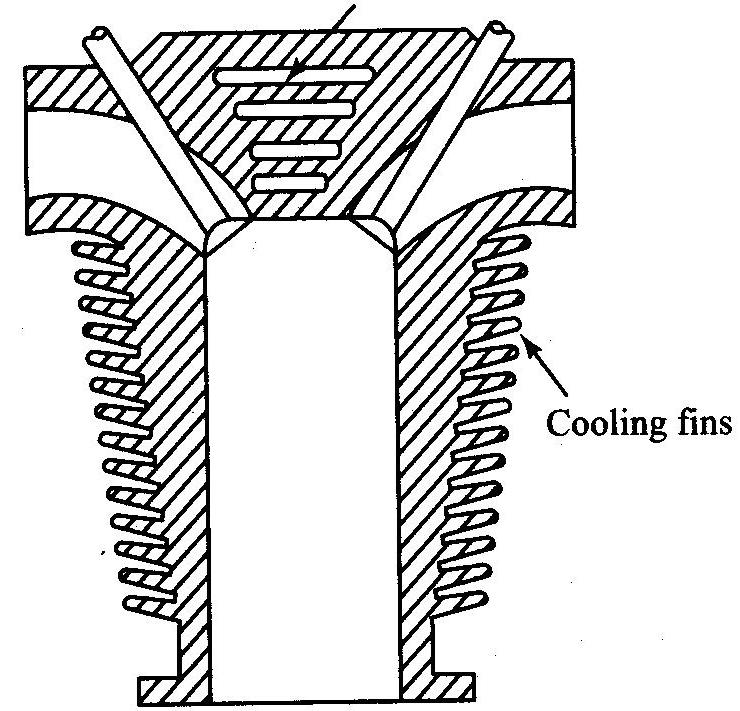
**Principle of Thermosyphom System**



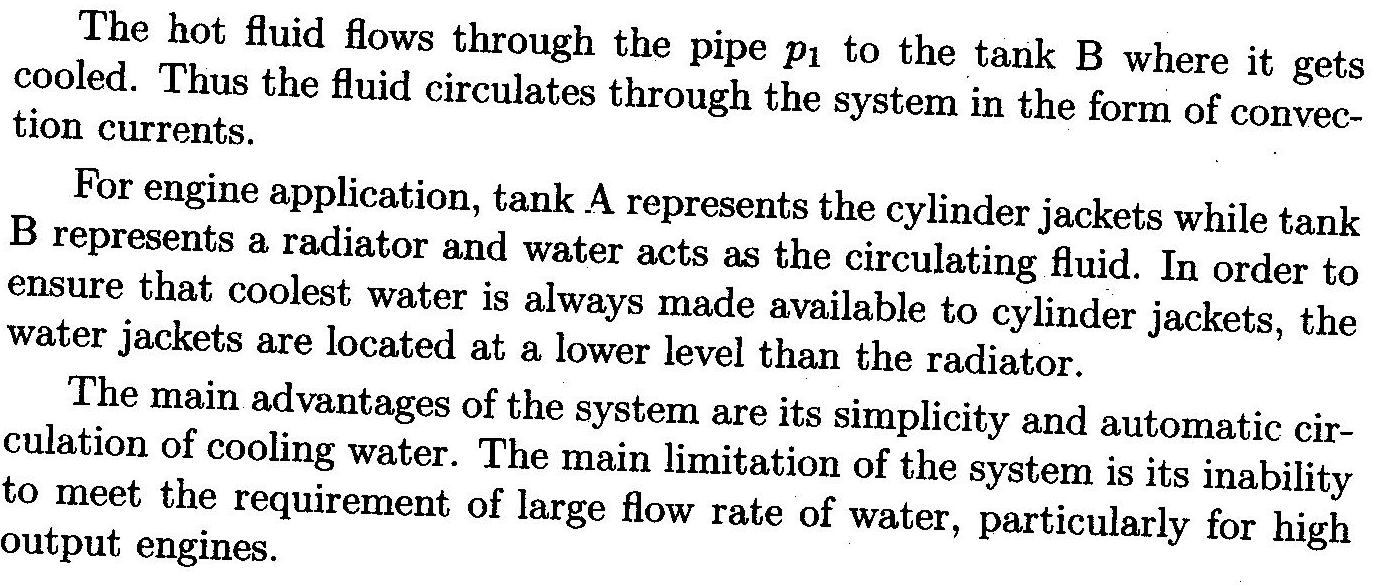




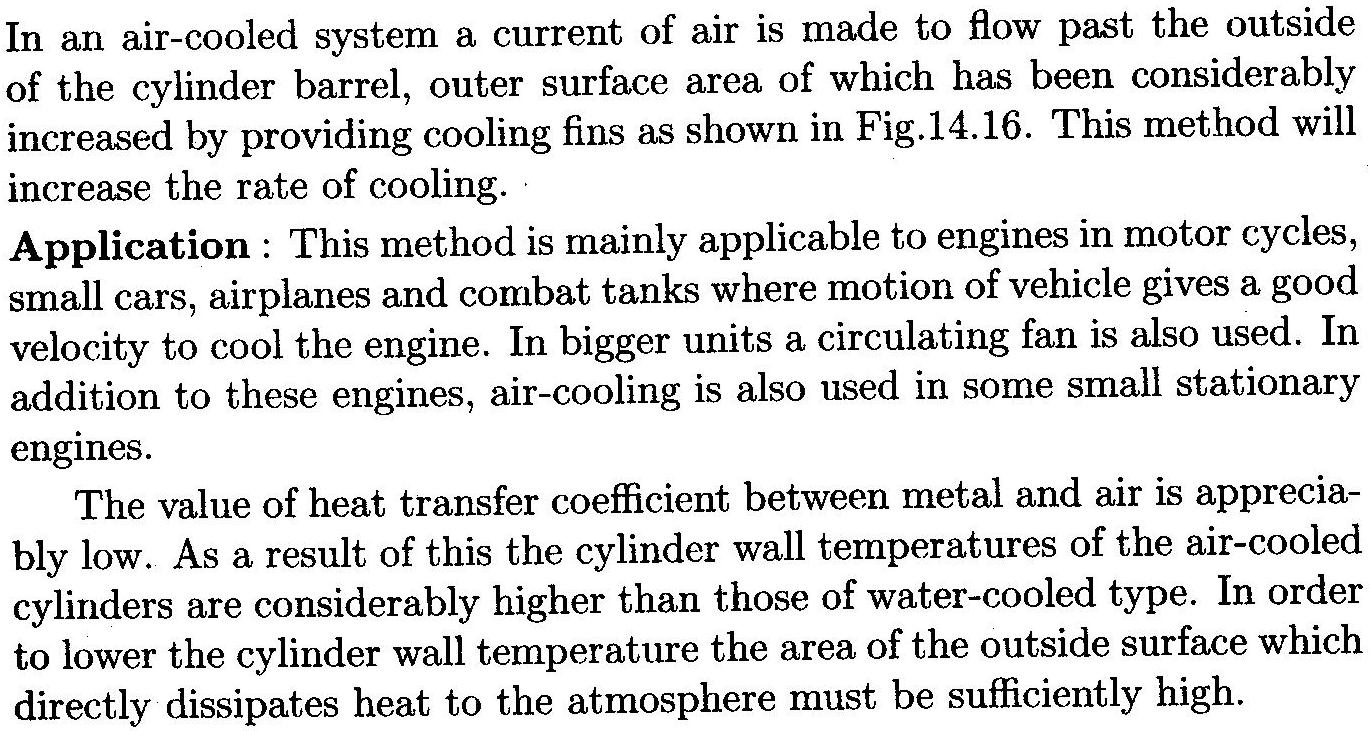
**Cooling Fins between walls**

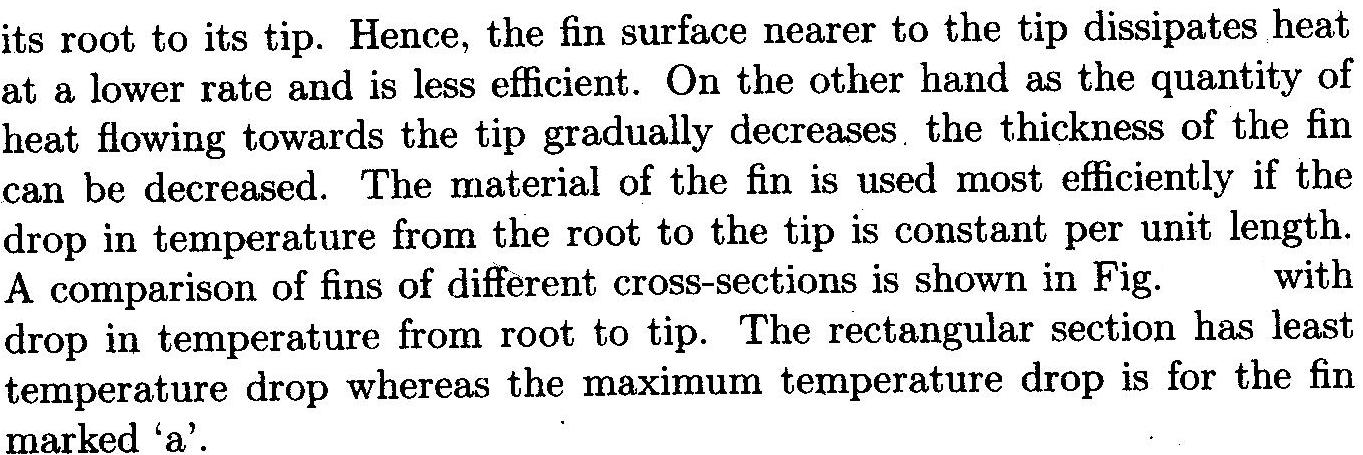
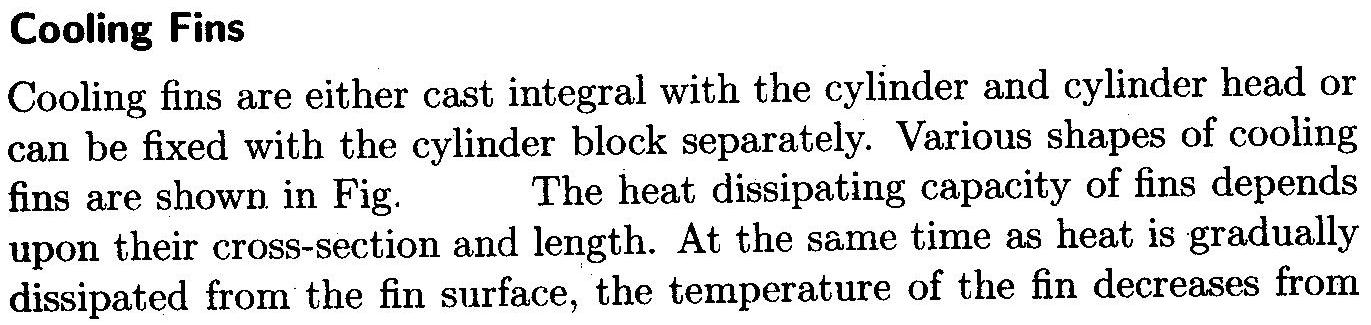
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**Cooling Fins on an engine cylinder increase the surface area of cooling**

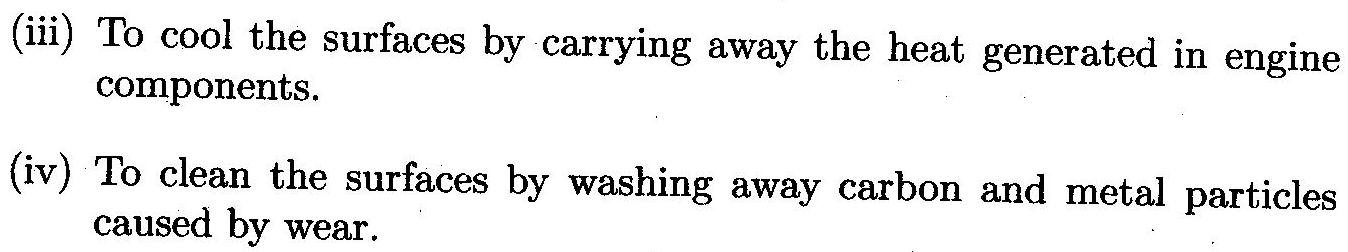
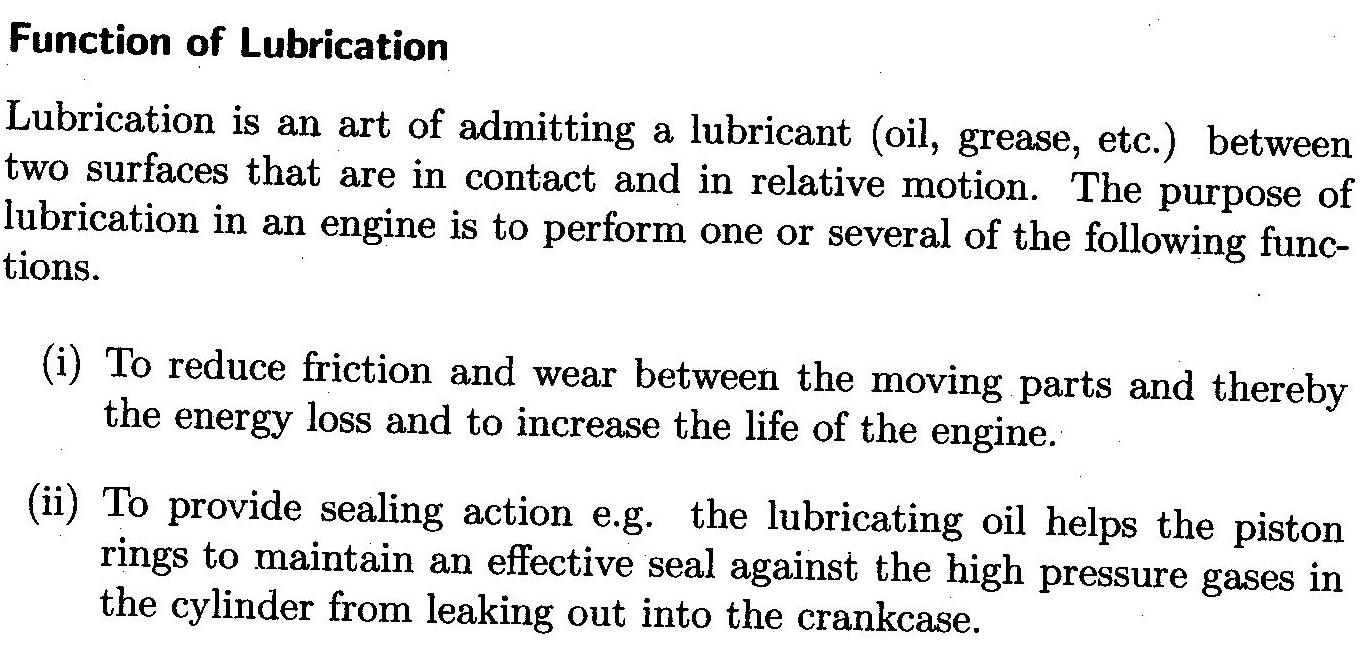
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**AIR COOLED SYSTEMS**

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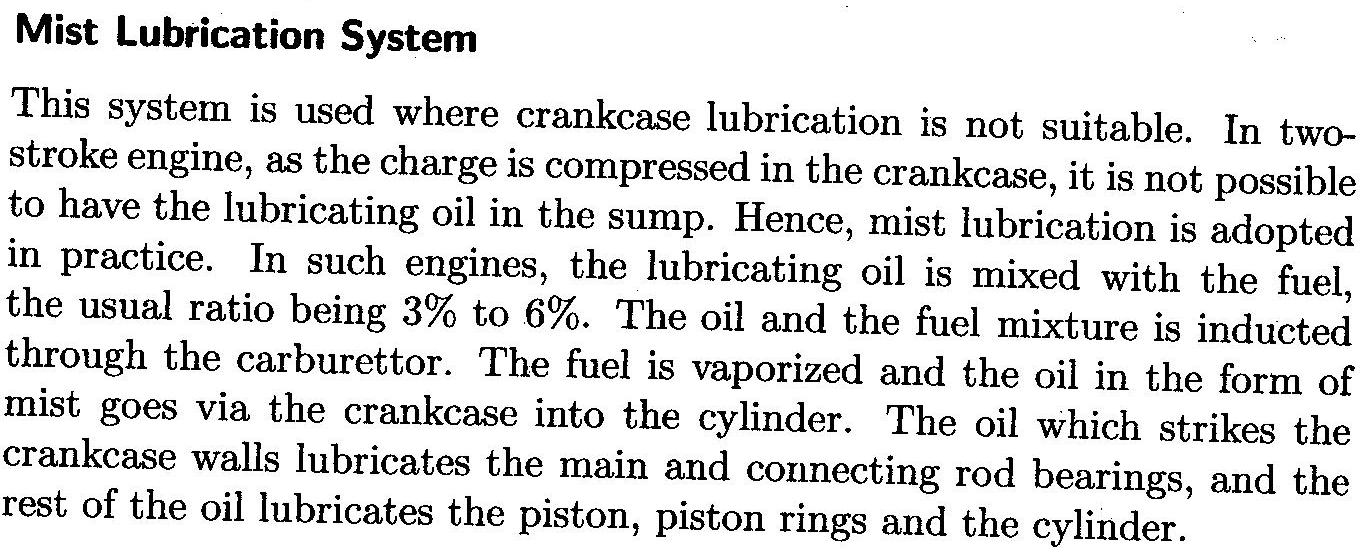
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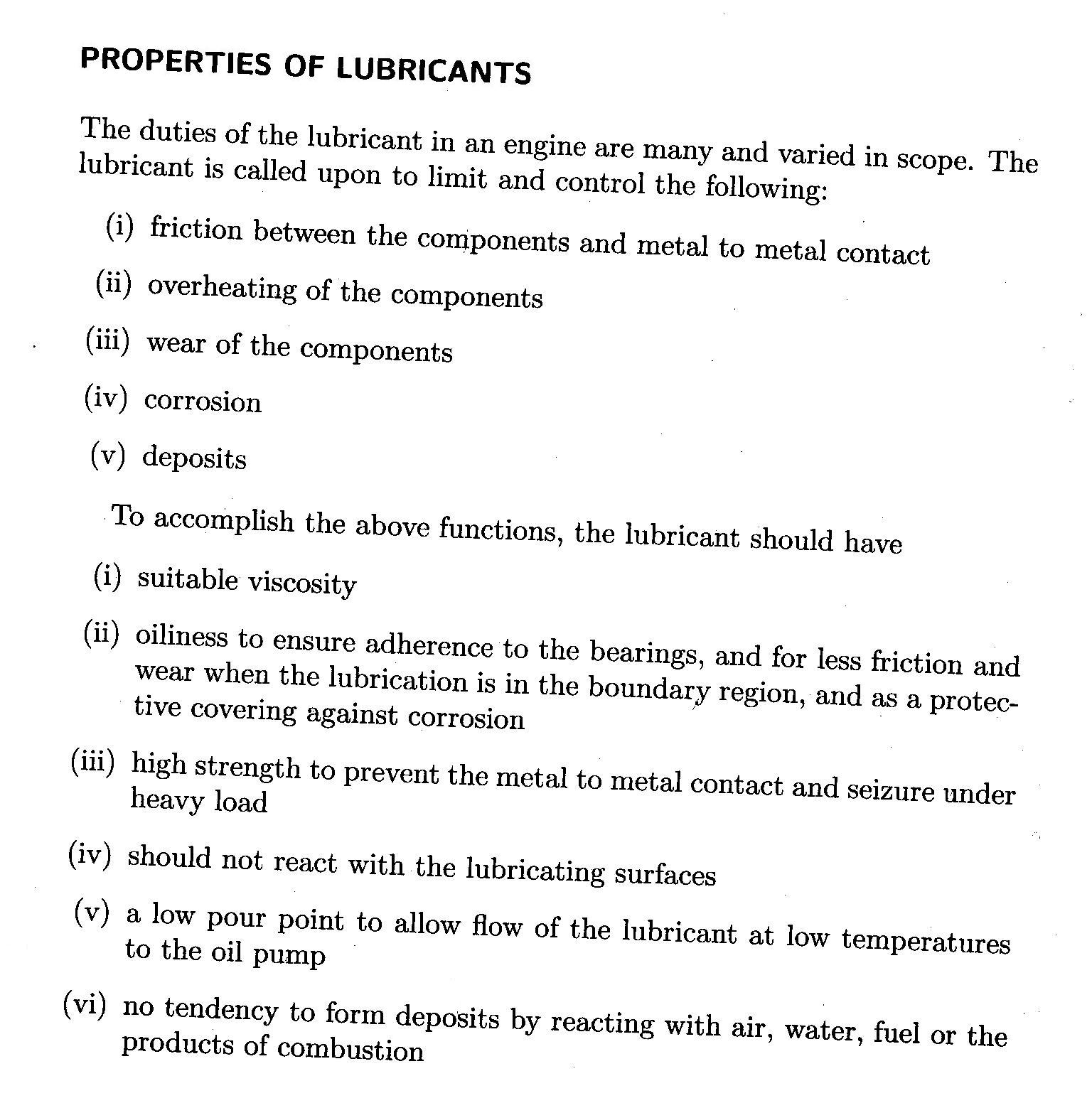
**LUBRICATION SYSTEM**

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**The various lubrication systems used for internal combustion engines may be classified as—**

1. **Mist Lubrication Systems**
2. **Wet Sump Lubrication Systems**
3. **Dry Sump Lubrication Systems**

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