

## 1.5 COMPONENTS OF DIESEL POWER PLANTS

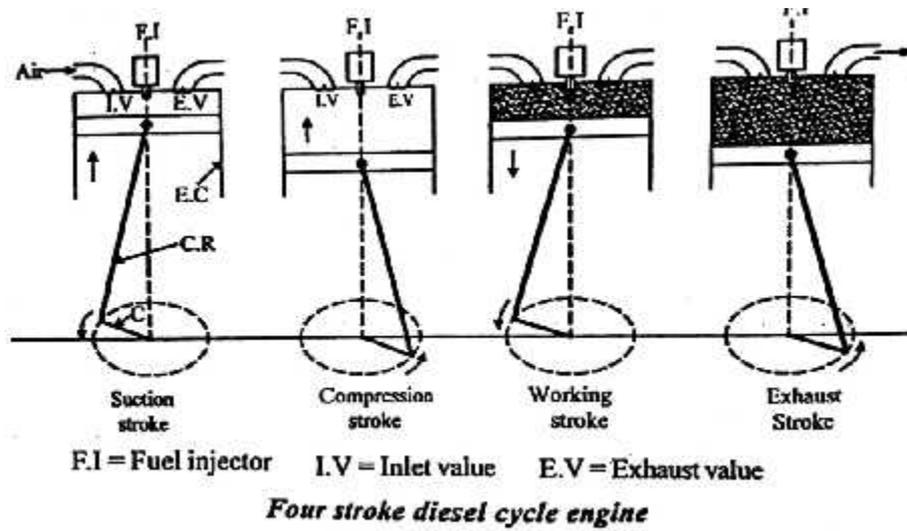
For generating electrical power, it is essential to rotate the rotor of an alternator by means of a prime mover. The prime mover can be driven by different methods. Using diesel engine as prime mover is one of the popular methods of generating power. When prime mover of the alternators is diesel engine, the power station is called **diesel power station**.

The mechanical power required for driving alternator comes from combustion of diesel. As the diesel costs high, this type of power station is not suitable for producing power in large scale in our country.

For hydro power station, plenty source of water and big dams are required. But where all these facilities are not available, such as no easy way of coal transportation and no scope of constructing dam, there diesel plant is established.

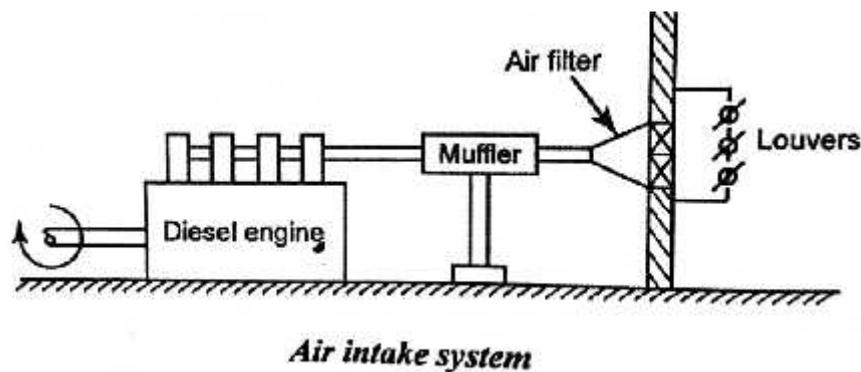
Diesel power plants are also popularly used as standby supply of different industries, commercial complexes, hospitals, etc. During power cut, these diesel power generators are run to fulfill required demand.

## COMPONENTS OF DIESEL POWER PLANT



### Air intake system

This system supplies necessary air to the engine for fuel combustion. It consists of a pipe for supplying of fresh air to the engine. Filters are provided to remove dust particles from air because these particles can act as an abrasive in the engine cylinder.



### Engine starting system

For starting a diesel engine, initial rotation of the engine shaft is required. Until the firing

start and the unit runs with its own power. For small DG set, the initial rotation of the shaft is provided by handles but for large diesel power station. Compressed air is used for starting.

The various methods used for starting are

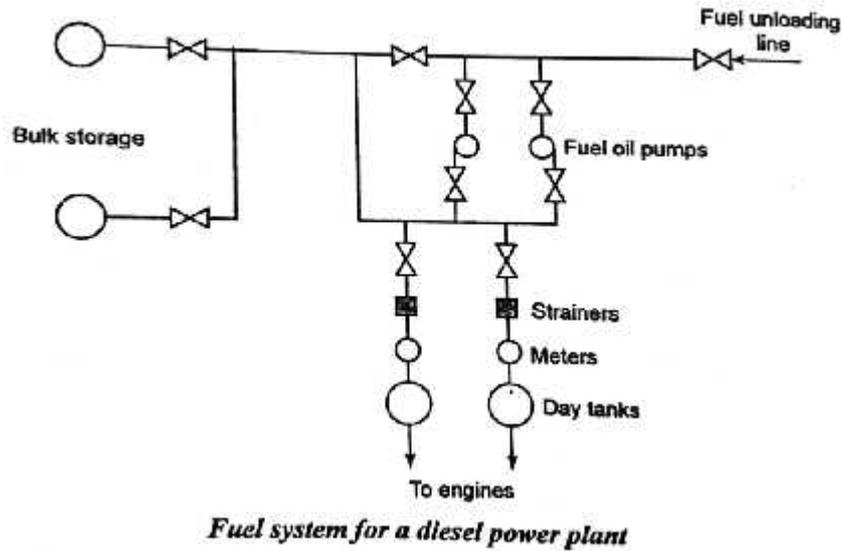
1. Starting by an auxiliary engine
2. Use of electric motors or self starters
3. Compressed air system

The compressed air system includes the following

1. Storage tank/vessel
2. A safety valve
3. Interconnecting pipe work

### **Fuel System**

In fuel supply system there are one storage tank strainers, fuel transfer pump and all day fuel tank. Storage tank where oil is stored. Strainer: This oil is then pumped to dry tank, by means of transfer pump. During transferring from main tank to smaller dry tank, the oil passes through strainer to remove solid impurities. From dry tank to main tank, there is another pipe connection. This is overflow pipe. This pipe connection is used to return the oil from dry tank to main tank in the event of overflowing. From dry tank the oil is injected in the diesel engine by means of fuel injection pump.



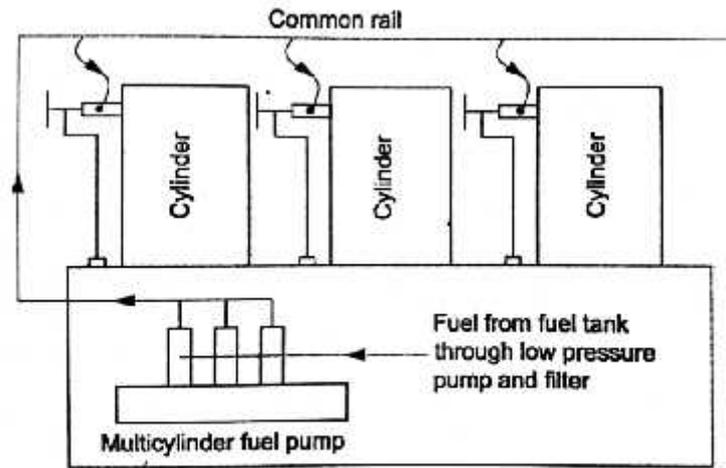
## **Fuel injection system**

The functions of the fuel injection system are to meter a small amount of oil, inject into the cylinder at a proper time, atomize and mix with the air.

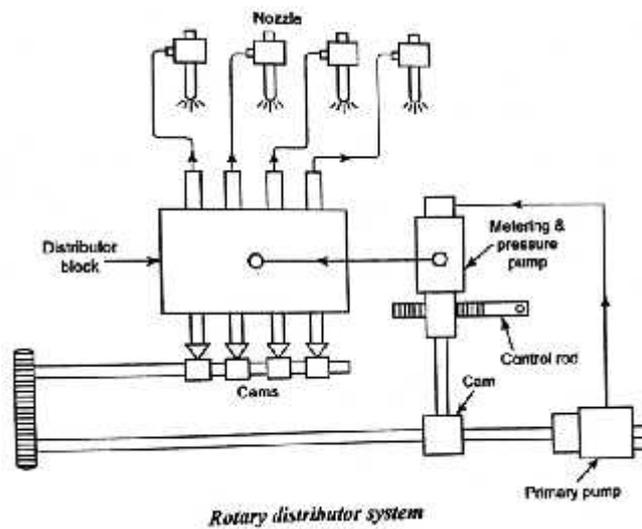
## **Types of fuel injection system**

- 1.Common rail injection system
- 2.Individual pump injection system
- 3.Distributor system

## Common rail injection system



*Common rail injection system*

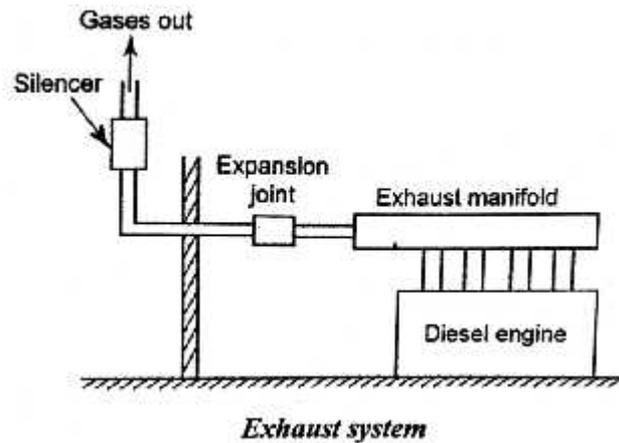


*Rotary distributor system*

## EXHAUST SYSTEM

The exhaust gas is removed from engine, to the atmosphere by means of an exhaust system.

A silencer is normally used in this system to reduce noise level of the engine.

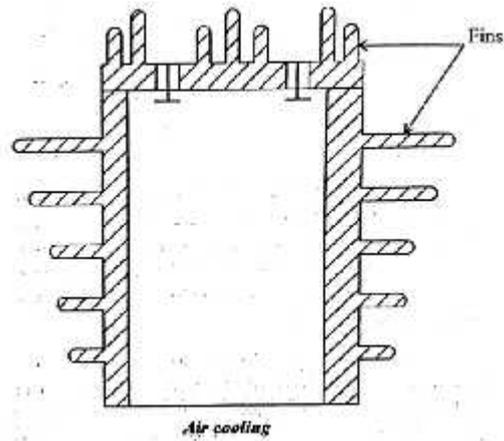


## **COOLING SYSTEM**

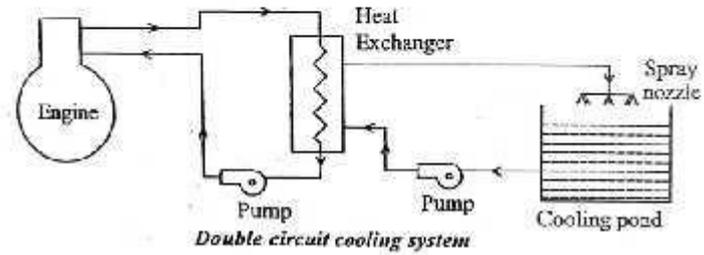
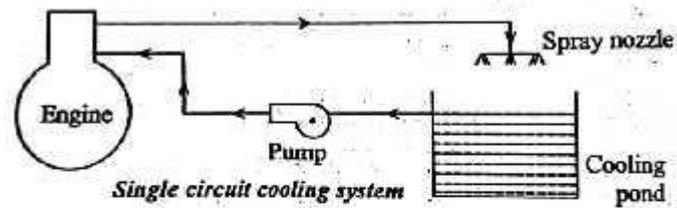
The heat produced due to internal combustion, drives the engine. But some parts of this heat raise the temperature of different parts of the engine. High temperature may cause permanent damage to the machine. Hence, it is essential to maintain the overall temperature of the engine to a tolerable level.

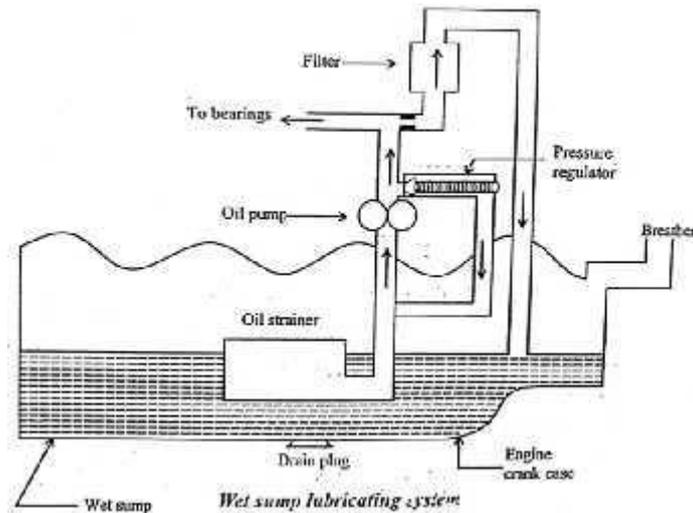
Cooling system of diesel power station does exactly so. The cooling system requires a water source, water source, water pump and cooling towers. The pump circulates water through cylinder and head jacket. The water takes away heat from the engine and it becomes hot. The hot water is cooled by cooling towers and is re-circulated for cooling.

## Air cooling



## Liquid cooling

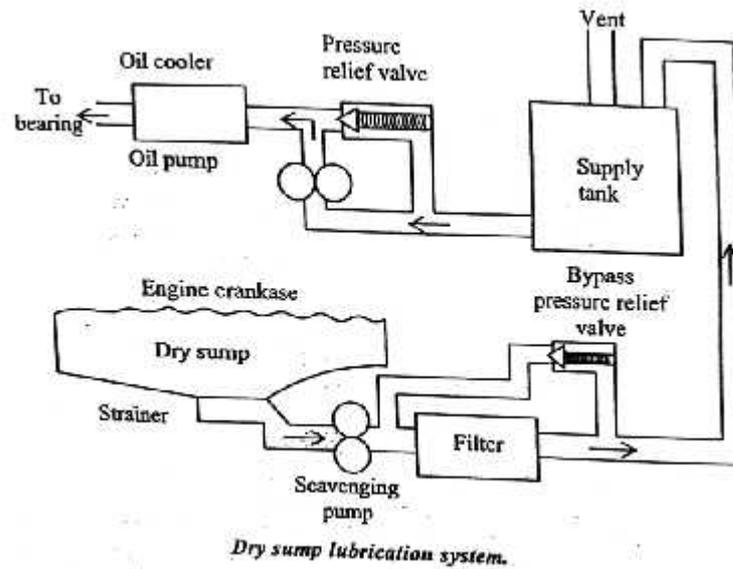




## **LUBRICATING SYSTEM**

This system minimises the wear of rubbing surface of the engine. Here lubricating oil is stored in main lubricating oil tank. This lubricating oil is drawn from the tank by means of oil pump.

Then the oil is passed through the oil filter for removing impurities. From the filtering point, this clean lubricating oil is delivered to the different points of the machine where lubrication is required the oil cooler is provided in the system to keep the temperature of the lubricating oil as low as possible.



In a diesel power station, diesel engine is used as the prime mover. The diesel burns inside the engine and the products of this combustion act as the working fluid to produce mechanical energy. The diesel engine drives alternator which converts mechanical energy into electrical energy.

### **APPLICATION OF DIESEL POWER PLANT**

1. It is suitable for mobile power generation.
2. It is used as peak load plants in combined with thermal and hydro plants.
3. It is used as stand by plants for emergency service.

### **ADVANTAGES**

The advantages of diesel power stations include:

1. This is simple in design point of view.
2. Required very small space.
3. It can also be designed for portable use.
4. It has quick starting facility, the small diesel generator set can be started within few seconds.
5. It can also be stopped as when required stopping small size **diesel power station**, even easier than it's starting
6. As these machines can easily be started and stopped as when required, there may not be any standby loss in the system.
7. Cooling is easy and required smaller quantity of water in this type power station.
8. Initial cost is less than other types of power station.
9. Thermal efficiency of diesel is quite higher than of coal.

### **DISADVANTAGES**

The disadvantages of diesel power stations include:

1. As we have already mentioned, the cost of diesel is very high compared to coal. This is the main reason for which a diesel power plant is not getting popularity over other means of generating power. In other words the running cost of this plant is higher compared to steam and hydro power plants.
2. The plant generally used to produce small power requirement.
3. Cost of lubricants is high.
4. Maintenance is quite complex and costs high.
5. Plant does not work satisfactorily under overload conditions for a longer period.

