

# Diesel power plant



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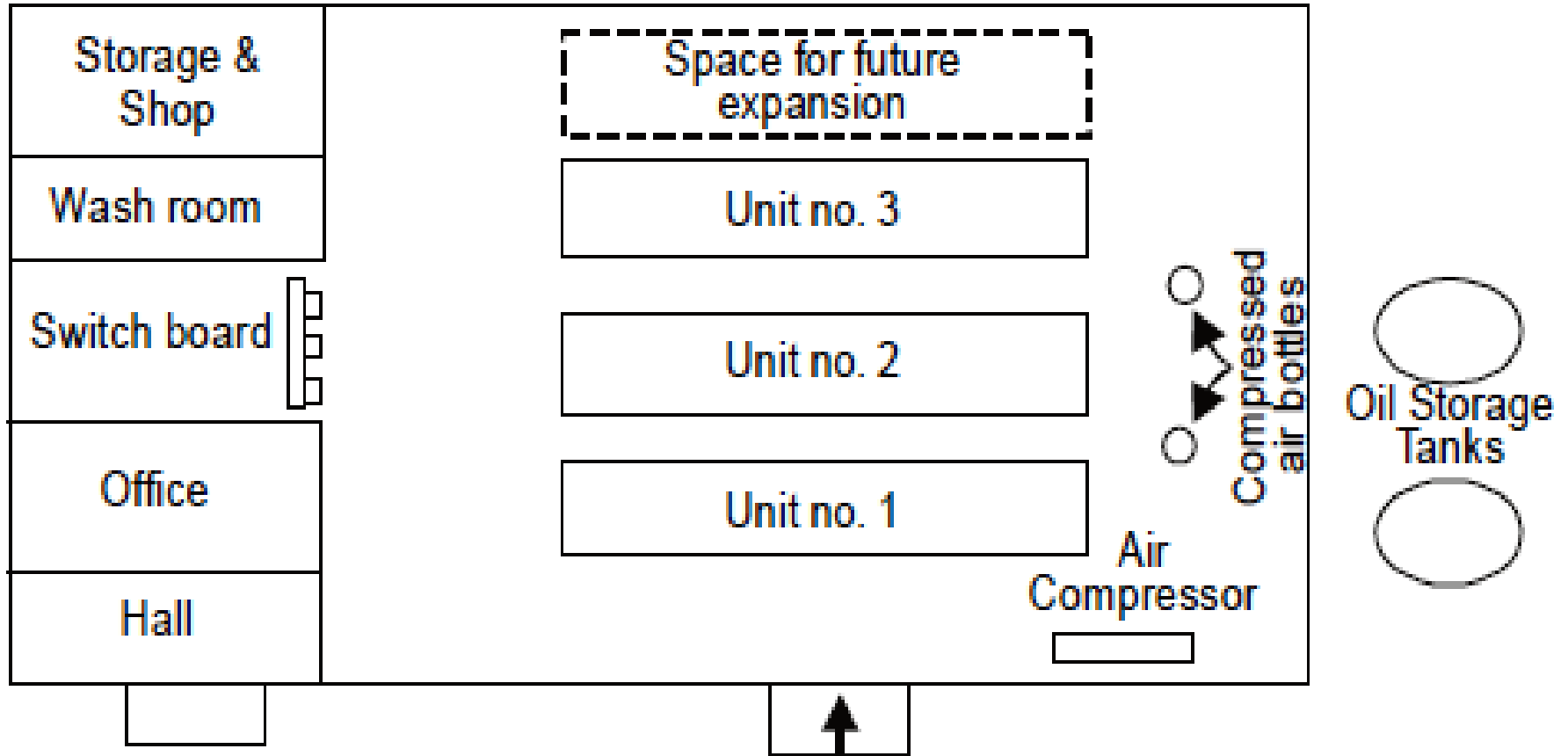
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# General layout



Front Entrance

General layout Diesel Power Plant

# Diesel power plant

- A generating station in which diesel engine is used as the prime mover for the generation of electrical energy is known as **diesel power station**.
- 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.

## Used when:

- Demand of power is less
- Sufficient quantity of coal and water is not available
- Transportation facilities are inadequate
- This plants supply power to hospitals, radio stations, cinema houses and telephone exchanges.

# Advantages

- The design and layout of the plant are quite simple.
- It occupies less space as the number and size of the auxiliaries is small.
- It can be located at any place.
- It can be started quickly and it can pickup load in a short time.
- There are no standby losses.
- It requires less quantity of water for cooling.
- The overall cost is much less than that of steam power station of same capacity.
- The thermal efficiency of the plant is higher than that of a steam power station.
- It requires less operating staff.

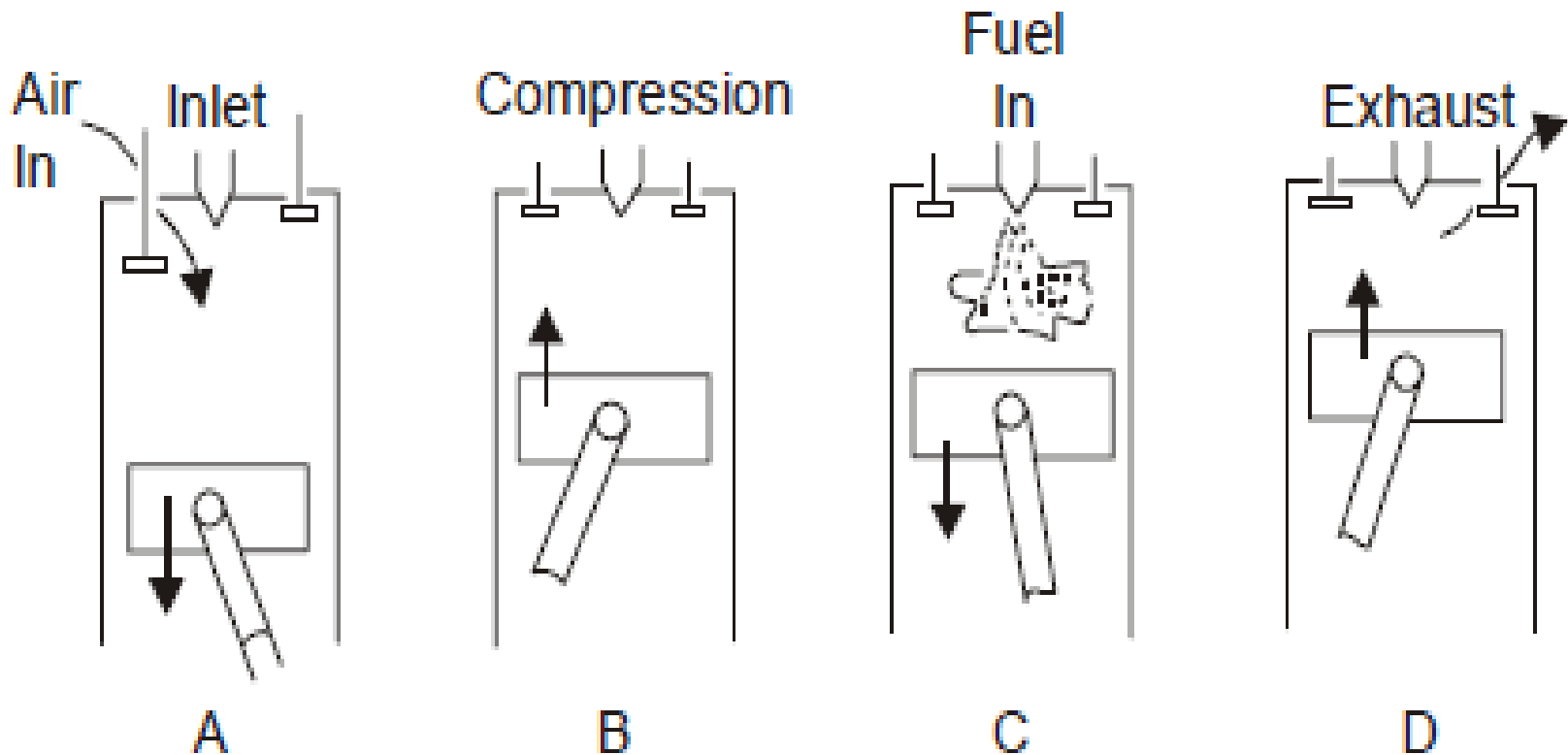
# Disadvantages

- The plant has high running charges as the fuel (diesel) used is costly.
- The plant doesn't work satisfactorily under overload conditions for a longer period.
- The plant can only generate small power.
- The cost of lubrication is generally high.
- The maintenances charges are generally high

# APPLICATION OF DIESEL POWER PLANT

- They are quite suitable for mobile power generation and are widely used in transportation systems consisting of railroads, ships, automobiles and aeroplanes.
- They can be used for electrical power generation in capacities from 2 to 50 MW.
- They can be used as peak load plants for some other types of power plants.
- Industrial concerns where power requirements are small say of the order of 500 kW, diesel power plants become more economical due to their higher overall efficiency.

# Mechanism:



A. Air Charging

B. Compression

C. Ignition

D. Exhaust





# The essential components of diesel electric plants are:

**Engine:** This is the main component of the plant which develops required power. The engine is generally directly coupled to the generator.

**Air-filter and supercharger:** The function of the airfilter is to remove the dust from the air which is taken by the engine. The function of the supercharger is to increase the pressure of the air supplied to the engine to increase the power of the engine. The superchargers are generally driven by the engines

**Exhaust system:** This includes the silencers and connecting ducts. The temperature of the exhaust, gases is sufficiently high, therefore, the heat of the exhaust gases many times is used for heating the oil or air supplied to the engine.

**Fuel system:** It includes the storage tank, fuel pump, fuel transfer pump, strainers and heater. The fuel is supplied to the engines according to the load on the plant.

**Cooling system:** This system includes water circulating pumps, cooling towers or spray ponds and water filtration plant. The purpose of cooling system is to carry the heat from the engine cylinder to keep the temperature of the cylinder in safe range and extend its life.

# The essential components of diesel electric plants Contd..

**Lubrication system.** It includes the oil pumps, oil tanks, filters, coolers and connecting pipes. The function of the lubrication system is to reduce the friction of moving parts and reduce the wear and tear of the engine parts.

**Starting system:** This includes compressed air tanks. The function of this system is to start the engine from cold by supplying the compressed air.

**Governing system:** The function of the governing system is to maintain the speed of the engine constant irrespective of load on the plant. This is done generally by varying fuel supply to the engine according to load.

# Performance of diesel power plant

The basic performance parameters are (see the class notes for details) :

- Power & Mechanical Efficiency
  - Indicated power (I.P)
  - Brake Power(B.P)
  - Mechanical Efficiency
- Specific output
- Specific fuel consumption(s.f.c)
- Thermal Efficiency:

# Site selection of diesel power plant

The following Factors should be considered while selecting the site for a diesel power plant:

- **Foundation sub-soil condition:** the condition of sub-soil should be such that a foundation at a reasonable depth should be capable of providing a strong support to the engine.
- **Access to the site:** the site should be so selected that it is accessible through rail and road.
- **Distance from that load centre:** the location of the plant should be near the load centre. This reduces the cost of transmission lines and maintenance cost. The power loss is minimized.
- **Availability of water:** Sufficient quantity of water should be available at the site selected.
- **Fuel transportation:** The site selected should be near to the source of fuel supply so that transportation charges are low.