Layout of **Steam Power Plant**

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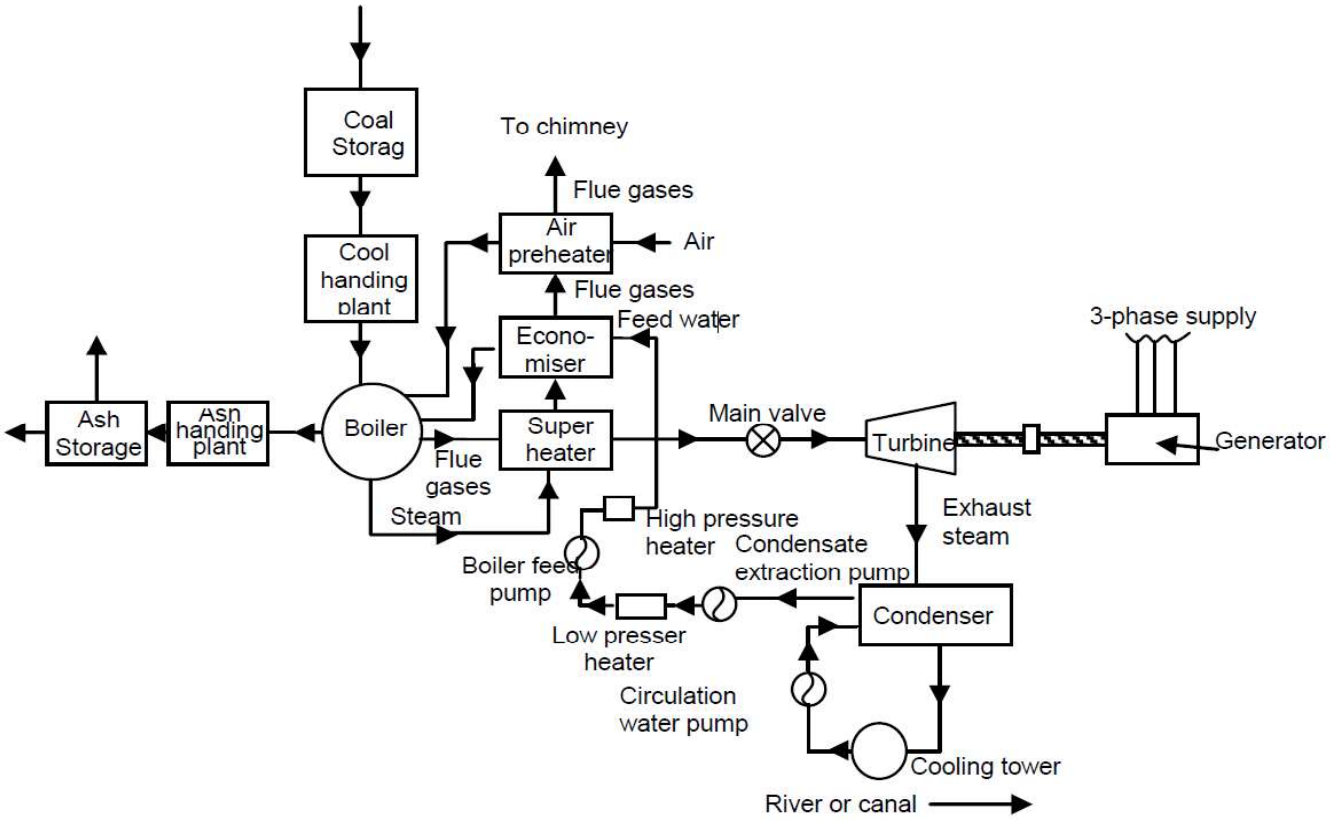
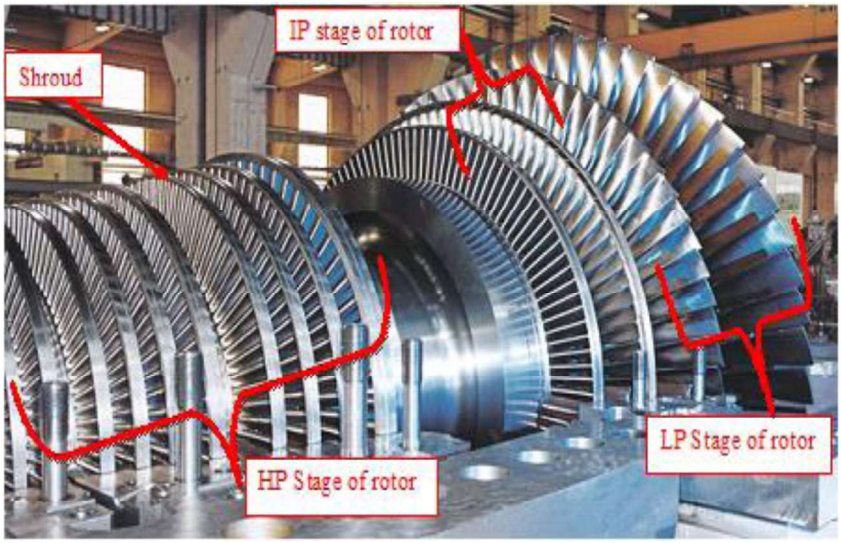
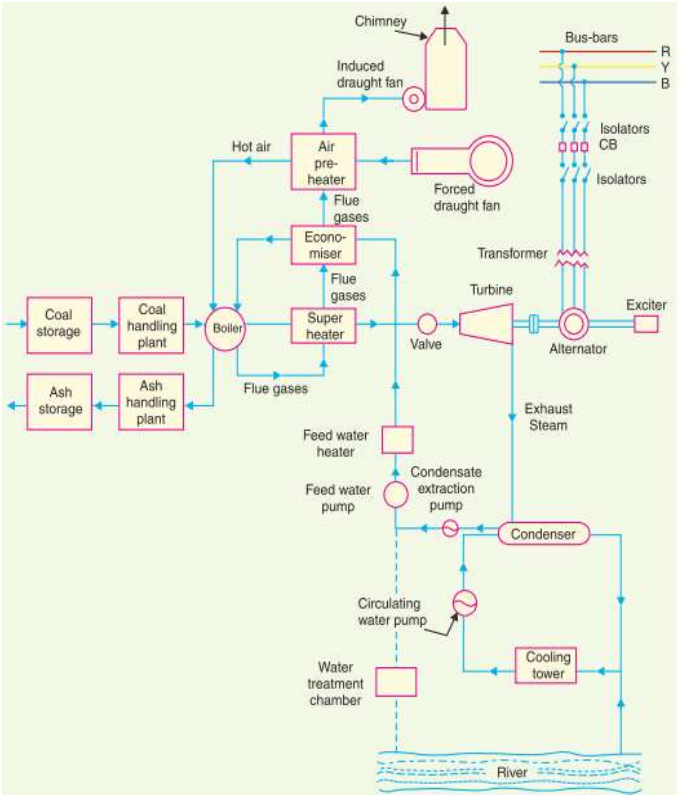



Shroud
IP stage of rotor
HP Stage of rotor
LP Stage of rotor


Chimney
Induced draught fan
Bus-bars
R
Y
B
Isolators
CB
Isolators
Hot air
Air pre-heater
Forced draught fan
Flue gases
Econo-miser
Transformer
Flue gases
Turbine
Exciter
Coal storage
Coal handling plant
Boiler
Super heater
Valve
Alternator
Ash storage
Ash handling plant
Flue gases
Exhaust Steam
Feed water heater
Condensate extraction pump
Feed water pump
Condenser
Circulating water pump
Cooling tower
Water treatment chamber
River

Essentials of Steam Power Plant Equipment

A modern steam power plant comprises of the following components :

1. Boiler
(i) Superheater (ii) Reheater
(iii) Economiser (iv) Air-heater.
2. Steam turbine
3. Generator
4. Condenser
5. Cooling towers
6. Circulating water pump
7. Boiler feed pump
8. Wagon tippler
9. Crusher house
10. Coal mill
11. Induced draught fans
12. Ash precipitators
13. Boiler chimney
14. Forced draught fans
15. Water treatment plant
16. Control room
17. Switch yard.

The layout of a modern steam power plant comprises of the following four circuits :

1. Coal and ash circuit.
2. Air and gas circuit.
3. Feed water and steam flow circuit.
4. Cooling water circuit.

Coal and Ash Circuit. Coal arrives at the storage yard and after necessary handling, passes on to the furnaces.

Ash resulting from combustion of coal collects at the back of the boiler and is removed to the ash storage yard through *ash handling equipment*.

Air and Gas Circuit. Air is taken in from atmosphere through the action of a forced . Passes on to the furnace through the *air preheater*, where it has been heated by the heat of flue gases which pass to the chimney *via* the preheater. The flue gases after passing around boiler tubes and superheater ,economiser, and finally through the air preheater before being exhausted to the atmosphere.

Feed Water and Steam Flow Circuit. Condensate is first heated in a closed feed water heater through extracted steam from the lowest pressure extraction point of the turbine. It then passes through the *deaerator* and a few
more water heaters before going into the boiler through *economiser*.
In the boiler drum and tubes, water circulates due to the difference between the density of water in the lower temperature and the higher temperature sections of the boiler. Wet steam from the drum is further heated up in the superheater for being supplied to the prime mover.

Functions of some important parts

1. ***Boiler.*** Water is converted into wet steam.
2. ***Superheater.*** It converts wet steam into superheated steam.
3. ***Turbine.*** Steam at high pressure expands in the turbine and drives the generator.
4. ***Condenser.*** It condenses steam used by the steam turbine. The condensed steam (known as *condensate*) is used as a feed water.
5. ***Cooling tower.*** It cools the condenser circulating water. Condenser cooling water absorbs heat from steam. This heat is discharged to atmosphere in cooling water.
6. ***Condenser circulating water pump.*** It circulates water through the condenser and the cooling tower.
7. ***Feed water pump.*** It pumps water in the water tubes of boiler against boiler steam pressure.
8. ***Economiser.*** In economiser heat in flue gases is partially used to heat incoming feed water.
9. ***Air preheater.*** In air preheater heat in flue gases (the products of combustion) is partially used to heat incoming air.