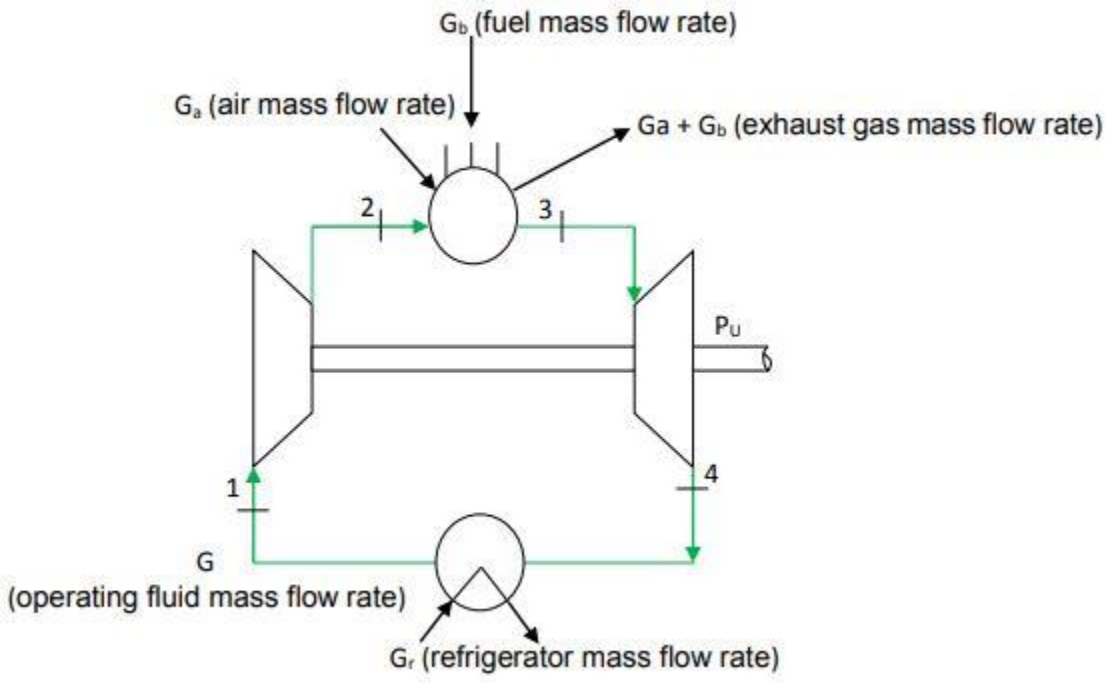
Air at room pressure and temperature is compressed to a high pressure in the turbo compressor

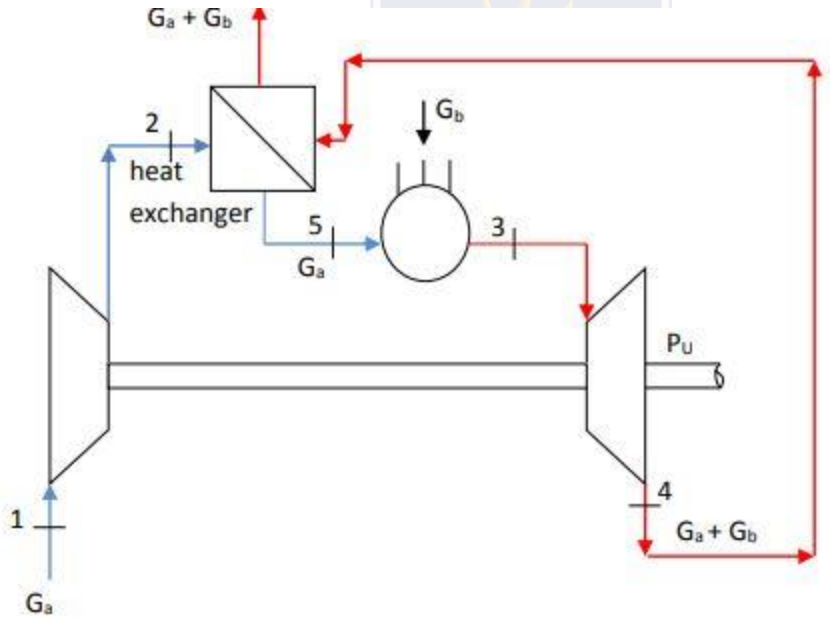
Fuel is added in the combustion chamber where combustion takes place resulting in high-temperature combusted gases

The hot gases expand in the turbine back to the atmospheric pressure producing mechanical power. The cycle is said to be open because fresh air enters the compressor continuously and exhaust is expelled, but thermodynamically it is as if the operating fluid returns to its initial state. Part of the mechanical power generated by the turbine is used to drive the compressor.



GAS TURBINE PLANTS WITH REGENERATIVE INNER HEAT EXCHANGER

If outlet flue-gas temperature (T4) is higher than the temperature at the end of compression (T2) the exhausted gas can be used for pre-heating compressed air. In figure the schematic picture of a plant with regenerative heat exchanger is shown.



CYCLES WITH INTER COOLING AND REHEATING

To increase the cycle efficiency (15) it is possible to:

Reduce the heat supplied

Reduce the compressor power

Increase the turbine power The reduction of heat is achieved with regenerative cycles as seen in the last chapter. It is possible to demostrate that the minimum work needed to compress a gas is spent with isothermal compression. It is very difficult to achieve such compression because, during compression, countinous heat subtraction would be necessary to keep the temperature constant. It is possible to approximate the isothermal compression with multiple stage compression with inter cooling in between. The power of a gas turbine is increased with re-heating (re-combustion) during expansion. It is possible to have further combustion, after the first expansion, because of the large amount of excess air used. In figure scheme of a plant with regeneration, inter cooling and re-heating is shown, while in figure there is the corresponding thermodynamic cycle.

Applications •

The diesel power plant finds wide application in

1. Peak load plant (2-50 MW)
2. Mobile plant
3. Stand by units
4. Emergency plant
5. Nursery plant
6. Starting stations
7. Central stations-where capacity required is small (5-10 MW)
8. Industrial concerns-where power requirement is small (500kW)

Diesel power plant are more economical due to their higher efficiency.

Site selection-Factors

1. Foundation sub soil condition
2. Access to the site
3. Distance from the load center
4. Availability of water
5. Fuel transportation

FACULTY OF ENGINEERING & TECHNOLOGY

SELECTION OF SITE FOR THERMAL POWER PLANT

1. Land Availability.

Power plant needs a wide range of land requirements. For example, coal plants tend to need larger areas to support rail lines, coal piles, and landfills. Natural gasfired power plants may only need area for the generation facilities and support equipment . Needed information includes the site size (acres), and the portion of the site (acres) that would be occupied by plant buildings and systems.

2. Water Availability.

Many power plant technologies use water from lakes, rivers, municipal water utilities, or groundwater. Surface water is used for plant cooling and groundwater is used for plant processes. Generally, the presence of adequate and usable water resources at or near a site is preferred over sites with remote, inadequate, or low-quality water resources.

3. Fuel Availability.

Fuel availability influences choices positively; its marginal utility is diminishing with supply. Without a higher level of availability, alternative fuels are unlikely
to be adopted.

4. Skilled Manpower. Availability

A power plant requires labor for construction and operation. Local communities can benefit from these employment opportunities. Generally, sites that can make use of local labor are more desirable.