

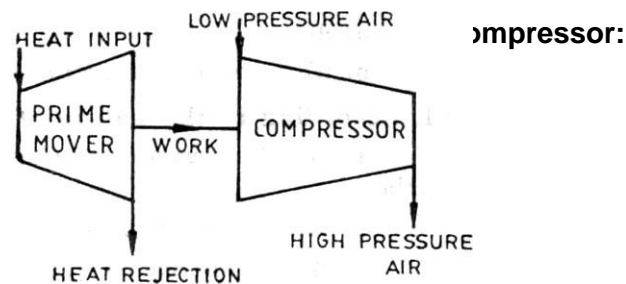
## THERMAL SYSTEMS

### UNIT V: AIR COMPRESSORS

#### 2. Uses of compressed air:

The applications of compressed air are listed below:

- 1) It is used in gas turbines and propulsion units.
- 2) It is used in striking type pneumatic tools for concrete breaking, clay or rock drilling, chipping, caulking, riveting etc.
- 3) It is used in rotary type pneumatic tools for drilling, grinding, hammering etc.
- 4) Pneumatic lifts and elevators work by compressed air.
- 5) It is used for cleaning purposes
- 6) It is used as an atomiser in paint spray and insecticides spray guns.
- 7) Pile drivers, extractors, concrete vibrators require compressed air.
- 8) Air-operated brakes are used in railways and heavy vehicles such as buses and lorries.
- 9) Sand blasting operation for cleaning of iron castings needs compressed air.
- 10) It is used for blast furnaces and air-operated chucks.
- 11) Compressed air is used for starting I.C. engines and also super charging them.



**Fig: 2.1 Air Compressor**

A line diagram of a compressor unit is shown in fig:4.1. The compression process requires work input. Hence a compressor is driven by a prime mover. Generally, an electric motor is used as prime mover. Air from atmosphere enters into the compressor. It is compressed to a high pressure. Then, this high pressure air is delivered to a storage vessel (reservoir). From the reservoir, it can be conveyed to the desired place through pipe lines.

Some of the energy supplied by the prime mover is absorbed in work done against friction. Some portion of energy is lost due to radiation and coolant. The rest of the energy is maintained within the high pressure air delivered.

#### 4. Classification of compressors:

Air compressors may be classified as follows:

According to design and principle of operation:

- (a) Reciprocating compressors in which a piston reciprocates inside the cylinder.
  - (b) Rotary compressors in which a rotor is rotated. According to number of stages:
    - (a) Single stage compressors in which compression of air takes place in one cylinder only.
    - (b) Multi stage compressors in which compression of air takes place in more than one cylinder.
- According to pressure limit:
- (a) Low pressure compressors in which the final delivery pressure is less than 10 bar,

- (b) Medium pressure compressor in which the final delivery pressure is 10 bar to 80 bar and
- (c) High pressure compressors in which the final delivery pressure is 80 to 100 bar.

According to capacity:

- (a) Low capacity compressor (delivers  $0.15\text{m}^3/\text{s}$  of compressed air),
- (b) Medium capacity compressor (delivers  $5\text{m}^3/\text{s}$  of compressed air) and
- (c) High capacity compressor (delivers more than  $5\text{m}^3/\text{s}$  of compressed air). According to method of cooling:
  - (d) Air cooled compressor (Air is the cooling medium) *and*
  - (e) Water cooled compressor (Water is the cooling medium). According to the nature of installation:
    - (f) Portable compressors (can be moved from one place to another).
    - (g) Semi-fixed compressors and
    - (h) Fixed compressors (They are permanently installed in one place). According to applications:
      - (i) Rock drill compressors (used for drilling rocks),
      - (j) Quarrying compressors (used in quarries),
      - (k) Sandblasting compressors (used for cleaning of cast iron) and
      - (l) Spray painting compressors (used for spray painting).

According to number of air cylinders

- (a) Simplex - contains one air cylinder
- (b) Duplex - contains two air cylinders
- (c) Triplex - contains three air cylinders