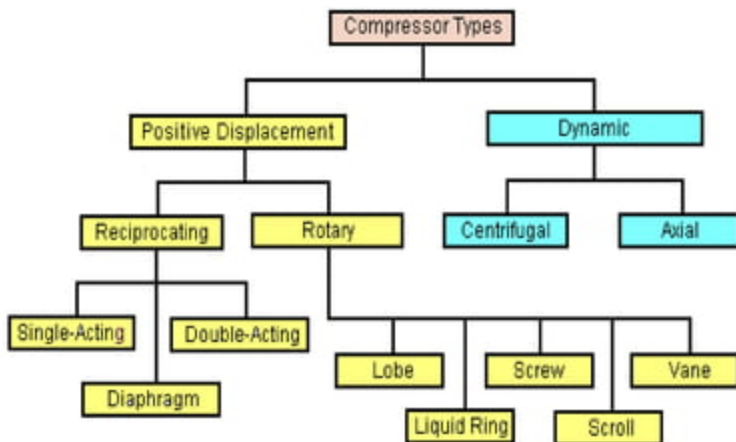


Compressor

Compressor is the mechanical equipment which is used to increase the pressure of the air by reducing its volume. They are somehow similar to the pumps both increase the pressure and both transport the fluid through their pipes.

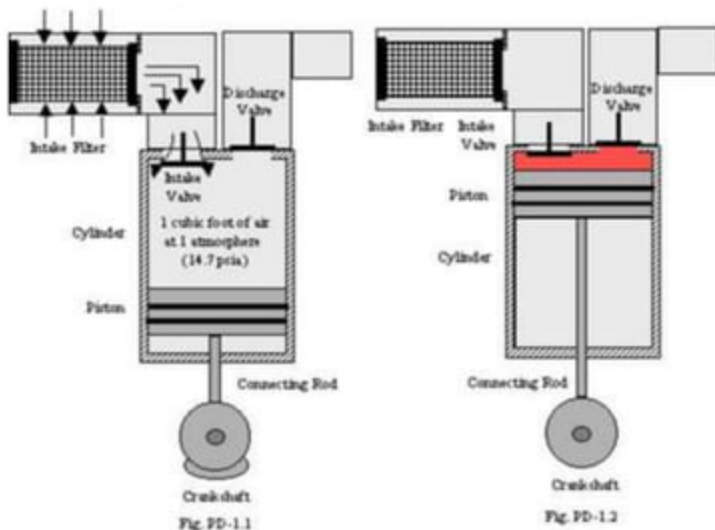


Compressor types on the basis of its displacement



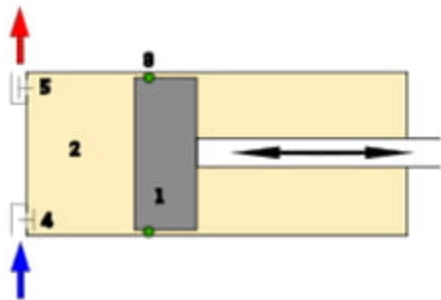
Positive Displacement

The compressors which compresses the air by the displacement of a mechanical linkage reducing the volume.



Reciprocating Compressor

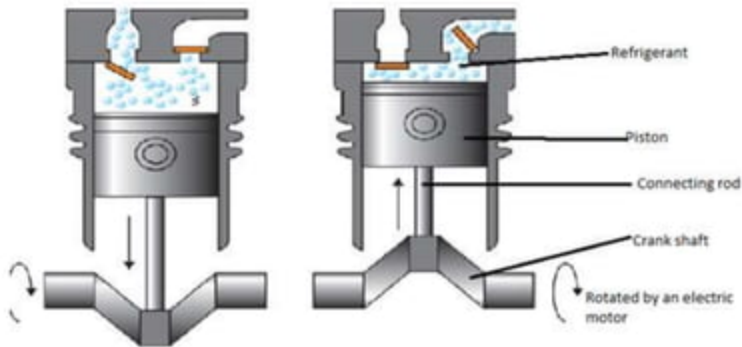
These compressors use the piston driven by the crankshaft. They can be either stationary or portable. It can be single staged or multistage and can be driven by the electric motors or internal combustion engines as well. They are made for intermittent duty.



Reciprocating Types

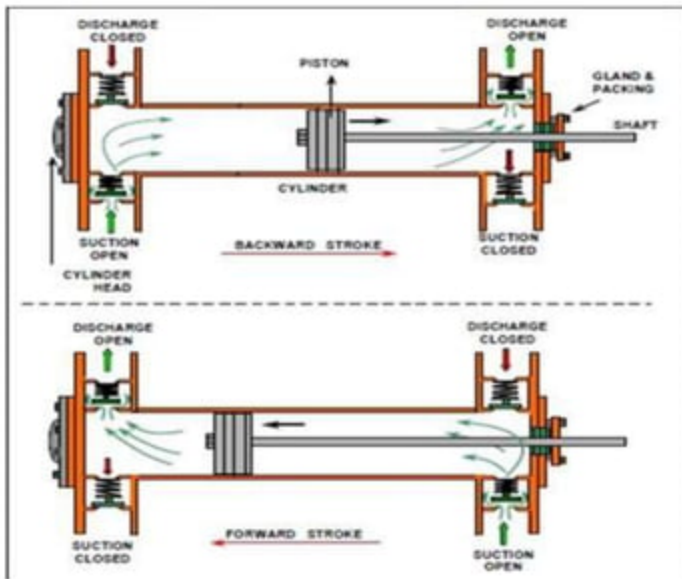
Single Acting Comp:

Compressor which compresses the air in one direction only having single piston.



Double Acting Compressor:

It also has just one cylinder but is pipe up such way that its capable of taking in discharging fluids from both ends and hence increases the **efficiency**

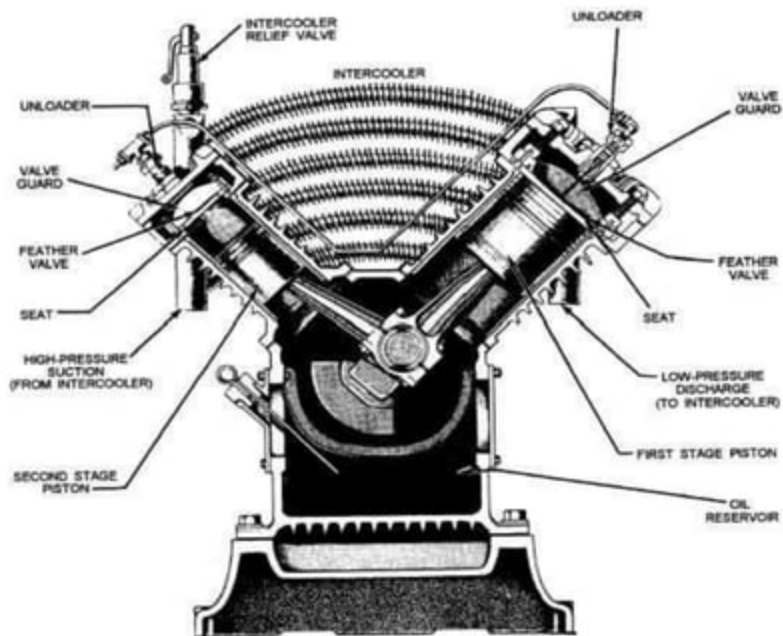


Multistage Compressors:

Multistage compressor is simply the compression of the fluid in two or more cylinders instead of one cylinder.



Labeled Diagram



Pressure as per Stages of Compressor

Single Stage Compressor : Low delivery pressure(< or = **10 bar**)

Multistage Compressor : Low delivery pressure(> or = **10 bar**)

Pressure as per final delivery of gas

Low pressure compressors(final pressure <**10 bar**)

Medium pressure compressors(final pressure b/w **10 bar to 80 bar**)

High pressure compressors(final pressure b/w **80 bar to 1000 bar**)

Advantages and Disadvantages of Reciprocating Compressors

Advantage:

- Suitable for high pressure ratios
- Easy maintenance
- Easy to operate
- Relatively cheap

Disadvantage:

- Multiple Machines are required
- Maintenance prone
- Sounds too much
- High outlet temperature of compressed air

Cooling Methods

Heat dissipation is happened with the help of fins over the cylinder. Air blows across the fins and hence decreasing the effect of heat during pistons movement is created .

Efficiency

- Reciprocating compressor with double or more acting piston is very efficient
- These compressors are more efficient when not running at full load while running on full load screw compressors are more suitable.

Rotary Compressors

These compressors does not have any reciprocating motion in fact it has rotating motion with screws, scrolls, and vanes rotating along side a shaft

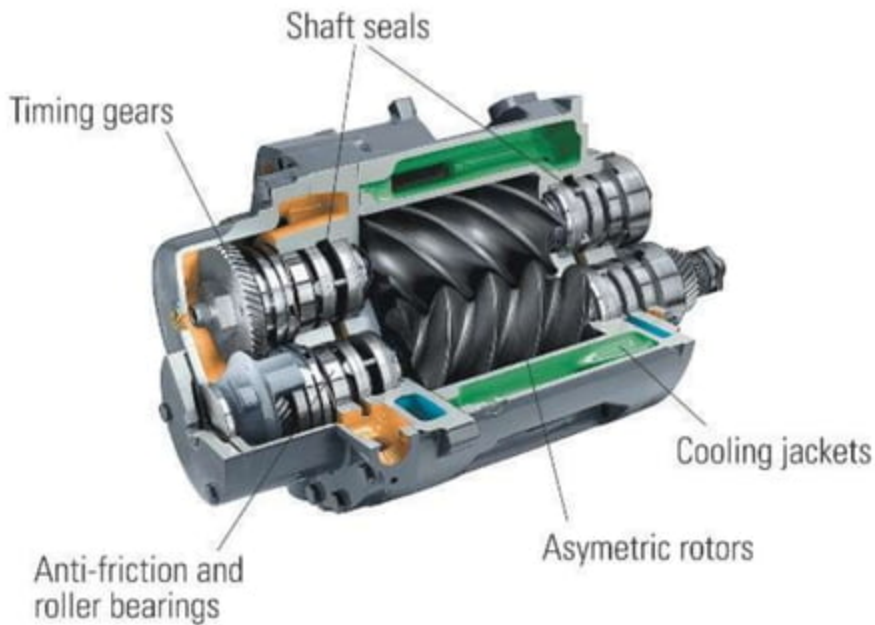
(1):Screw compressors

A type of gas compressor that uses a rotary type positive displacement. They are used in place of piston comp where large volume of air compression is needed and without intermittence. It has a pair of helical rotors where it traps air, as the rotor rotates in the cylinder. The male rotor and female rotor are being built inside the cylinder for compression. They are generally used in large industrial areas.

Applications

- They are used for larger industrial units
- Where continuous supply is required
- They are commonly seen at construction sites and with road repair crew throughout the world

Screw Compressors

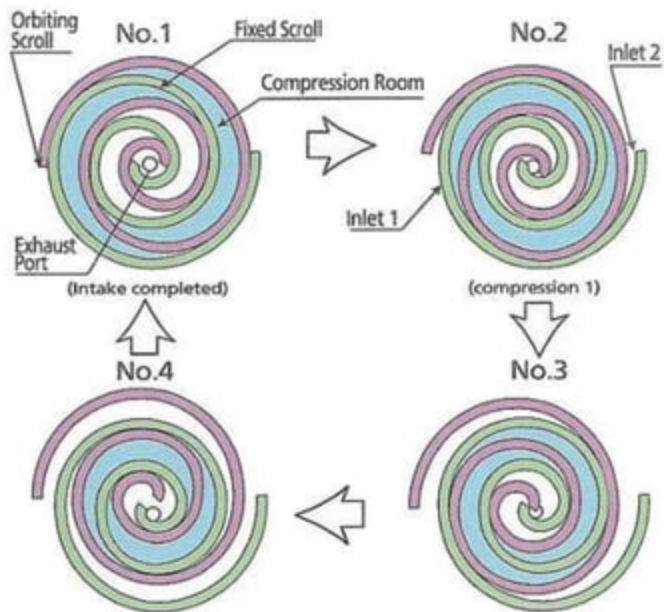


(2): Scroll/Spiral Compressors

A scroll compressor has one fixed scroll which remains stationary all the time with another orbiting scroll which rotates through the use of swing link. When this happens, the pockets of the air are pushed slowly to the center of scrolls due to the movement of the rotating scroll causing the reduction of the volume and hence increase in the pressure.



Working Principle



Vane Compressor

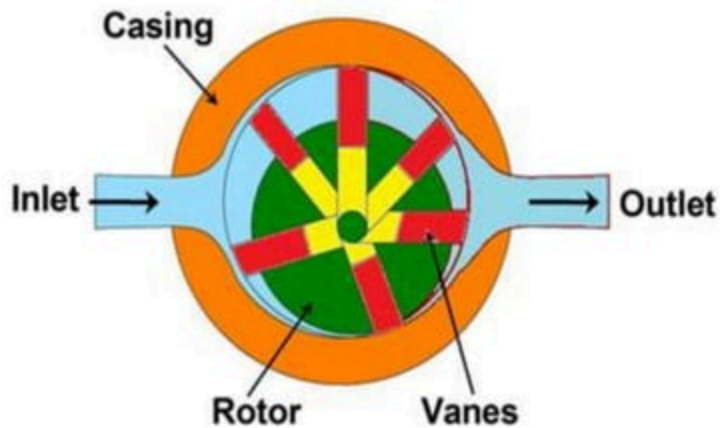
Rotary vane compressor consists of a rotor with a number of blades inserted in radial slots in the rotor. As the rotor turns, blades slide in and out of the slots keeping contact with the outer wall of the housing. Thus, a series of increasing and decreasing volumes is created by the rotating blades. They can be either stationary or portable , can be single staged or multistage driven by electric motors or I.C engines.

Pressure

Dry vane machines are used at relatively low pressures(e.g., **2bar** or **29 psi**) for bulk material movement while oil injected machines have the necessary volumetric efficiency to achieve pressures up to about **13 bar** or **190 psi** in a single stage. A vane compressor is comparatively quieter in operation than piston compressor.

They can have mechanical efficiency of about **90%**

Vane Compressors



Roto Dynamic Compressors

Compression is carried out by a rotating element which is imparting velocity to the flowing air or gas and hence developed desired pressure, and compression is achieved by the dynamic action of rotor.

Two major types of dynamic compressors

- Centrifugal Compressors
- Axial compressors

Centrifugal Compressors

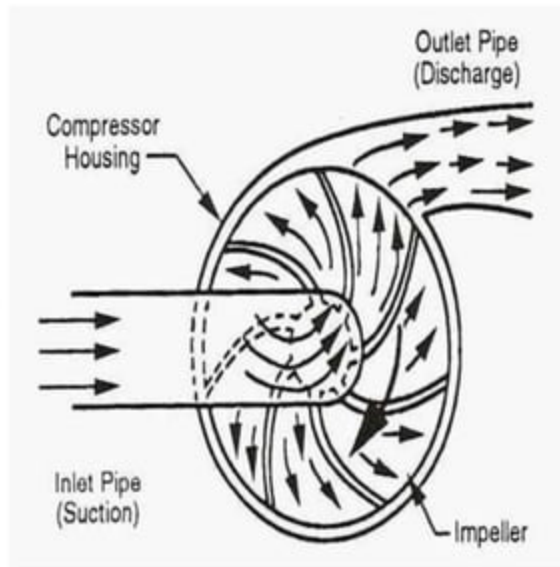
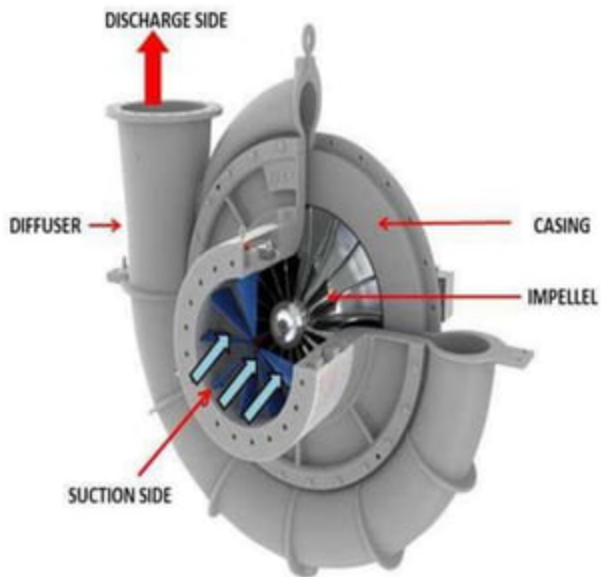
They use a rotating disk or impeller in a shaped housing to force the gas to the rim of the impeller, increasing the velocity. A diffuser or divergent duct converts the velocity energy to pressure energy.

Application:

Used in stationary service in industries such as **oil refineries**, **chemical** and **natural gas processing** plants, small **gas turbine engines** also can be used in I.C engines as **supercharger** and **turbocharger**

Pressure:

Their application can be from 100 horsepower(75 kw) to thousands of horsepower with multiple staging, they can achieve high output pressures greater than **10,000 psi**



CENTRIFUGAL COMPRESSOR

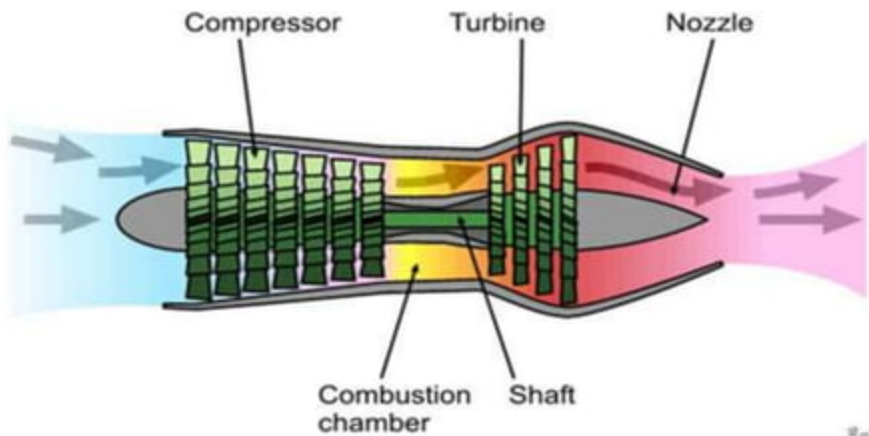
Axial Flow Compressors

Axial flow compressors are dynamic compression that use arrays of fan like airfoils to progressively compress a fluid. They are used where high flow rates or a compact designs are required.

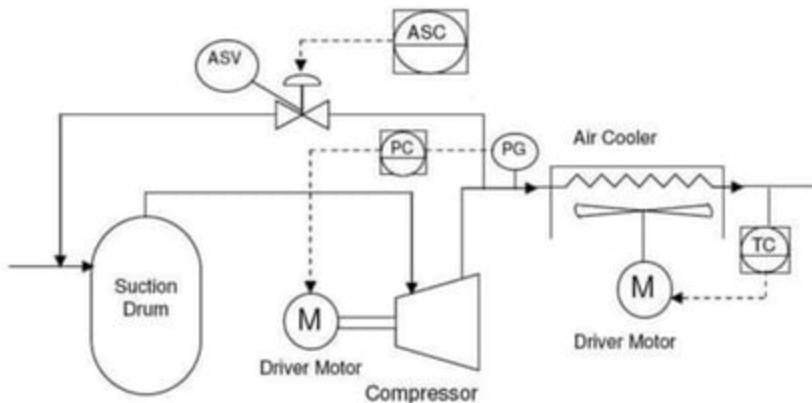
The arrays of airfoils are set in rows, usually as pairs: one rotating and one stationary. These rotating airfoils are known as blades transport and compress the fluid

These compressors can have high efficiency of up to 90%

Axial flow compressors(Turbine)



Process flow of compressor



ASC : Anti Surge Controller
ASV : Anti Surge Valve

TC : Temperature Controller
PC : Pressure Controller