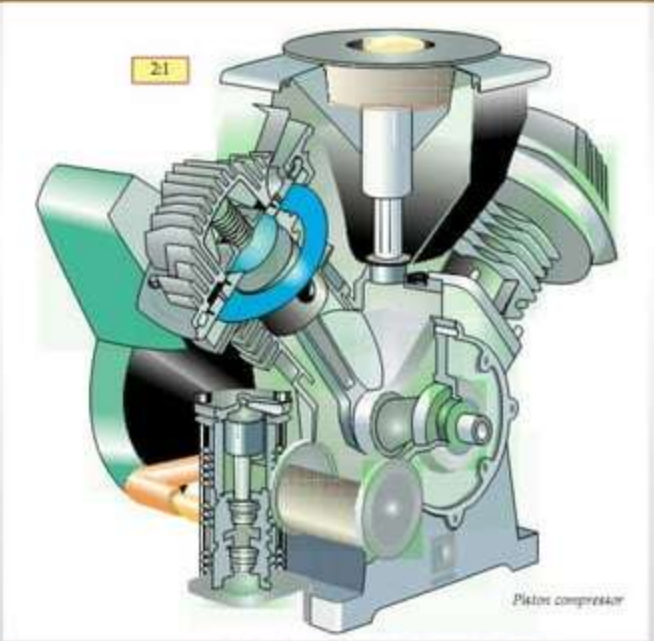
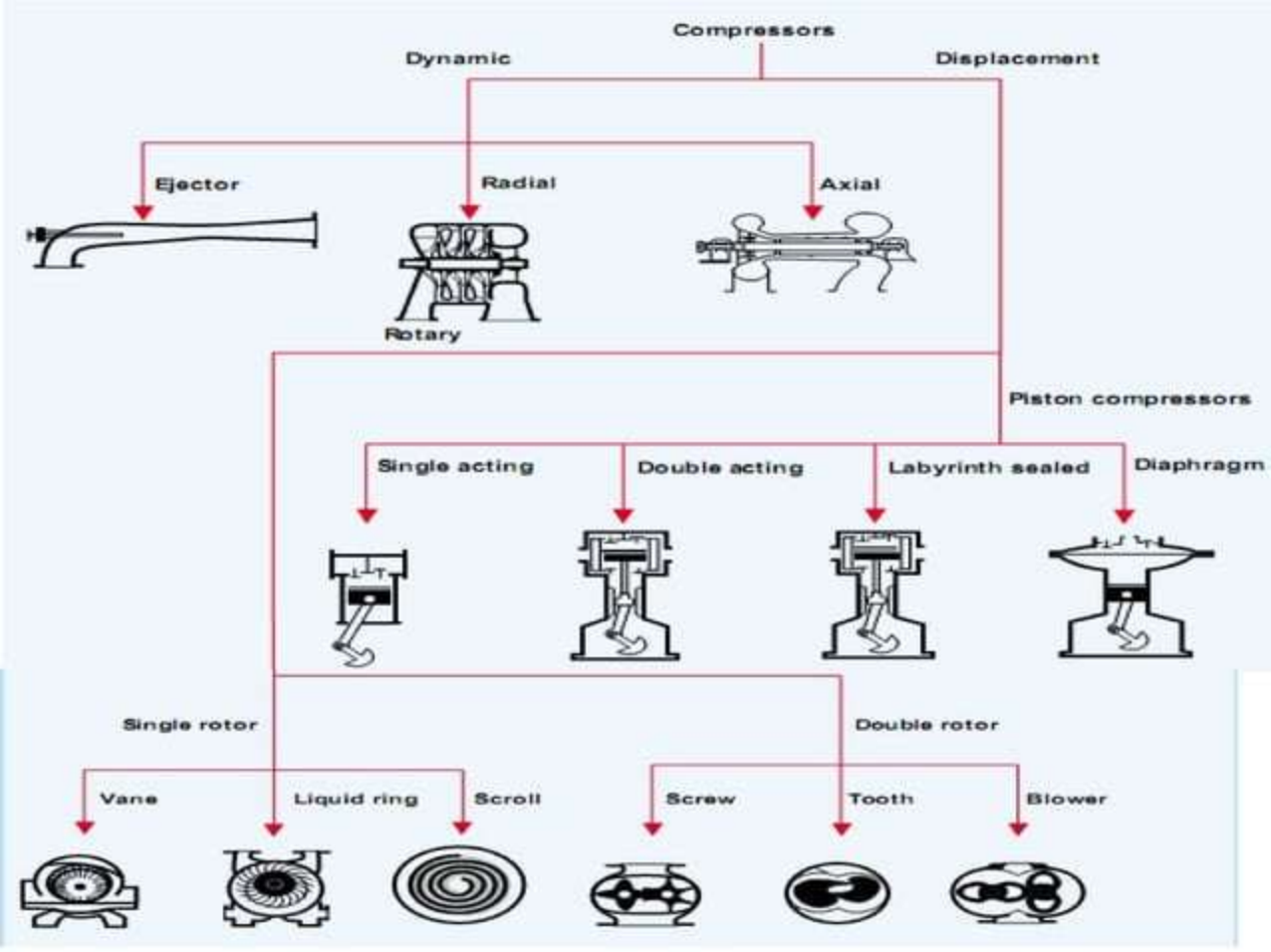
Compressor



Introduction

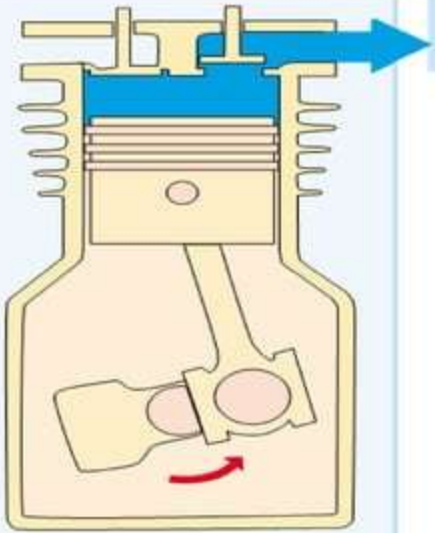
- **Compressor** is a mechanical device that increases the pressure of a gas by reducing its volume
- Compression of a gas naturally increases its temperature
- Compressors are closely related to pumps: both increase the pressure on a fluid and both can transport the fluid through a pipe
- As gases are compressible, the compressor also reduces the volume of a gas
- Liquids are generally incompressible, so the main result of a pump is to move the liquid elsewhere


Compressors
Dynamic
Displacement
Ejector
Radial
Axial
Rotary
Piston compressors
Single acting
Double acting
Labyrinth sealed
Diaphragm
Single rotor
Double rotor
Vane
Liquid ring
Scroll
Screw
Tooth
Blower

Displacement Compressor

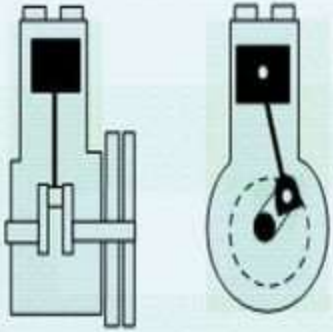
- In displacement compressor air is drawn into a cylinder and is compressed by a moving piston
- The piston compressor has the forward and backward movement is accomplished by a connecting rod and a rotating crankshaft
- If only one side of the piston is used for compression this is called single acting
- If both the piston's top and undersides are used the compressor is called double acting
- Thereafter the volume of the chamber decreases and the air is compressed. When the pressure has reached the same level as the pressure in the outlet manifold, a valve is opened and the air is discharged at a constant pressure, under continued reduction of the compression chamber's volume

Displacement Compressor

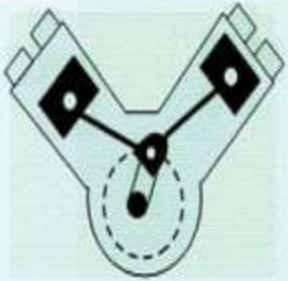


Single stage, single acting piston compressor.

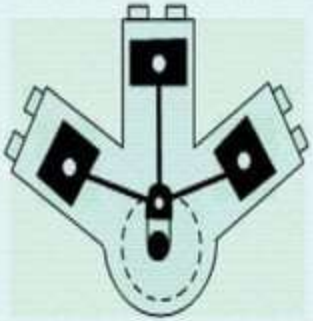
Single acting



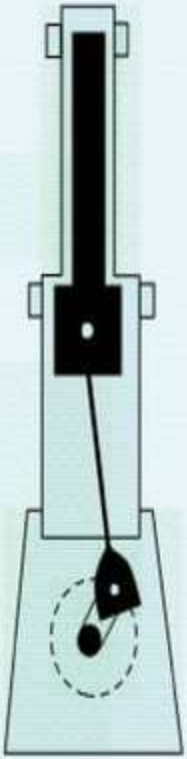
Vertical



V-type

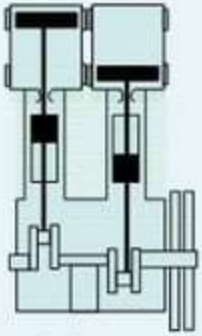


W-type

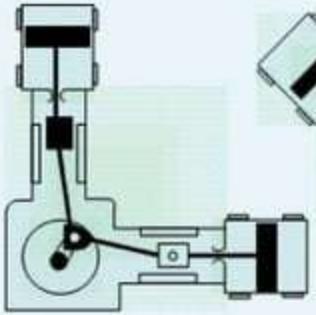


Stepped piston (Two stage)

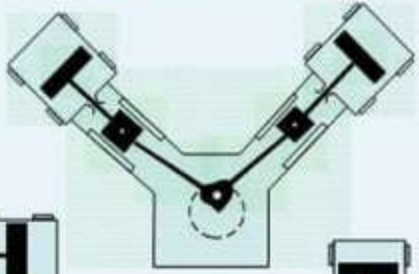
Double acting (cross head type)



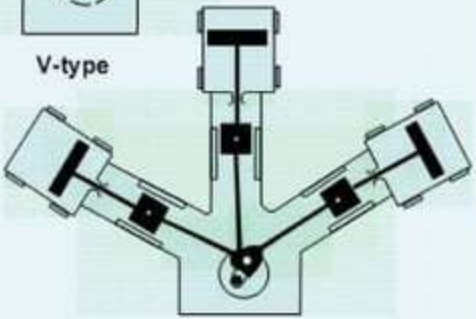
Inline



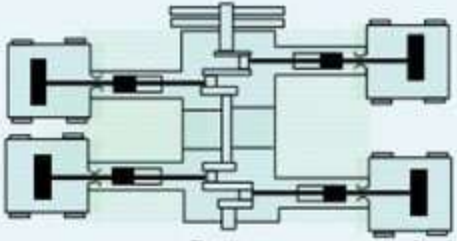
L-type



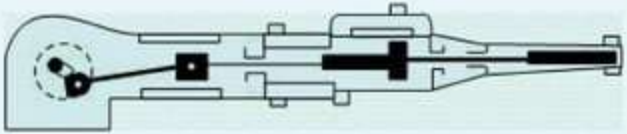
V-type



W-type



Boxer



Horizontal stepped pistons

Important Definition

Crank Shaft:

It drives the connecting rod and absorb the loads from the rods and driver

Connecting Rod:

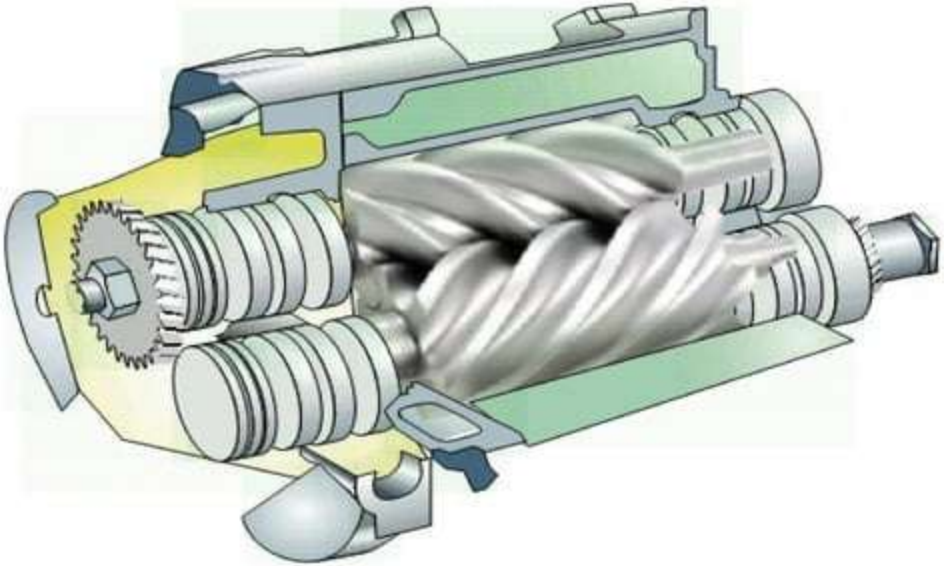
Connecting rod transmits the power from the crankshaft to Crosshead

Crosshead:

A pin is locked in the connecting rod and rotates in the crosshead. Crosshead absorbs the force from the crosshead pin and transmits its to the extension

- Crank shaft moves in pure rotary motion
- Crosshead moves in pure reciprocating motion
- Sequence: Piston rod---Crosshead----Connecting rod----Crankshaft

Screw Compressor




This is from our Compressed Air Fundamentals training module.
The rest of the module can be found at www.BuyBetterTraining.com

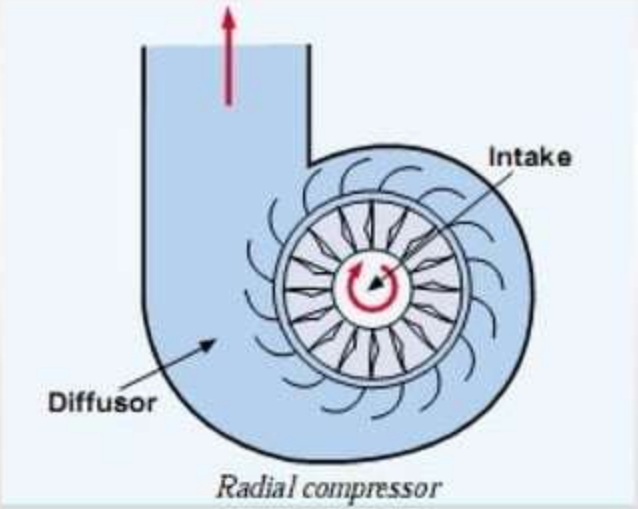
Screw Compressor

- It is done by the two helically rotors (male and female rotor)
- Male rotor has convex lubes; Female rotor has concave flutes
- Inlet port is designed in such a way that the air/gas can enter to the flutes
- As the rotor rotate, male rotor lubes enter to the flutes and decreasing the volume of trap gas

Dynamic Compressor

- In dynamic compression air is drawn into a rapidly rotating compression impeller and accelerates to a high speed
- The gas is then discharged through a diffuser, where the kinetic energy is transformed to static pressure
- Gas is transformed to pressure when it is forced to decelerate under expansion
- Depending on the main direction of the flow they are called radial or axial compressors

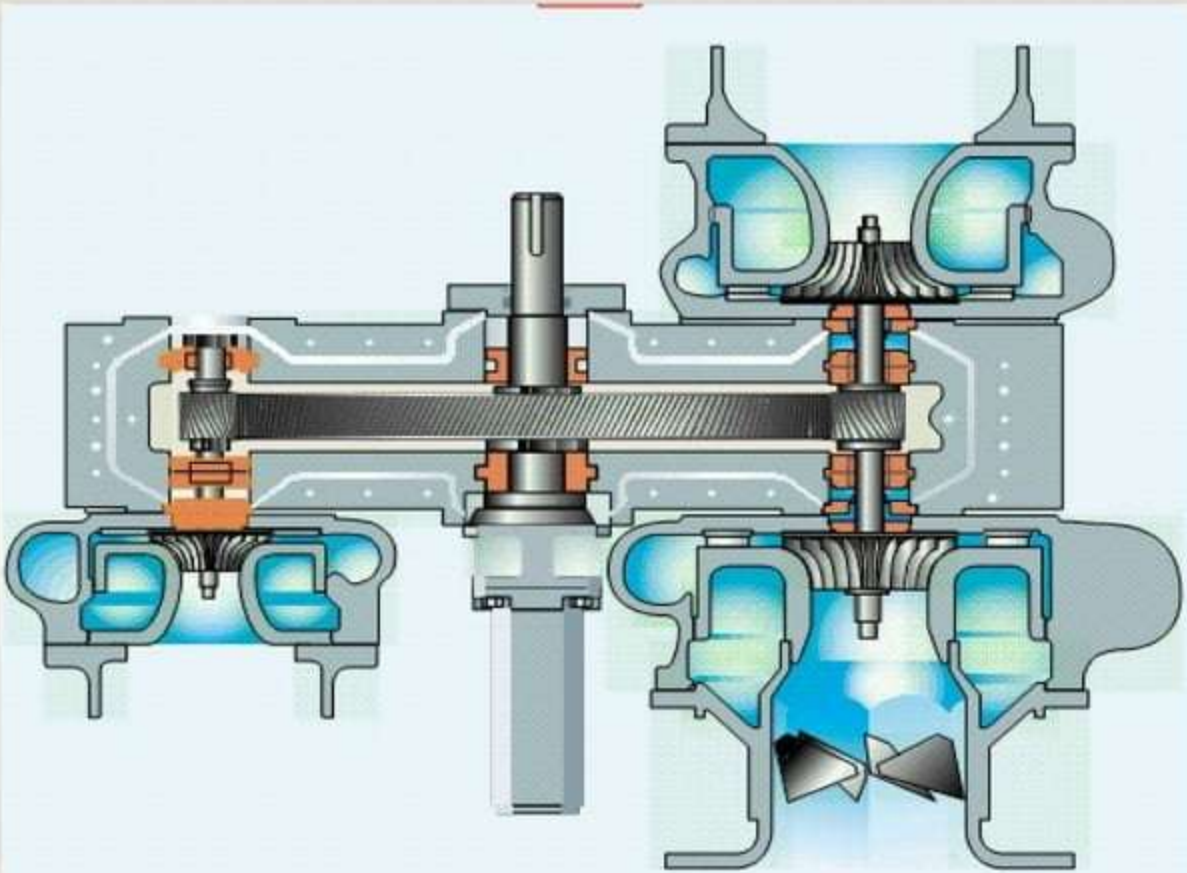
Dynamic Compressor



Radial compressor

Dynamic Compressor

- A vaned rotating disk or impeller in a shaped housing to force the gas to the rim of the impeller, increasing the velocity of the gas.
- A diffuser (divergent duct) section converts the velocity energy to pressure energy



Application of Compressor

- Gas feeding and air compression
- Refrigeration
- Recycle and air service
- Gas lift and reinjection
- Pipe line boosting
- Valve controlling
- Aircraft
- Rail and Buses breaking system

Types of pump cavitation

1. Vaporization cavitation, also called inadequate NPSHa cavitation.
2. Internal re-circulation cavitation.
3. Vane passing syndrome cavitation.
4. Air aspiration cavitation.
5. Turbulence cavitation.

Prevention or Action measures to be taken against pump cavitation are discuseed in the following sections.

Pump cavitation due to vaporization

Change the pump.

Reduce motor RPM if possible.

Increase the diameter of the eye of the impeller.

Use an impeller inducer.

It's called "classic

Use two lower capacity pumps in parallel.

Use a booster pump to feed the principal pump.