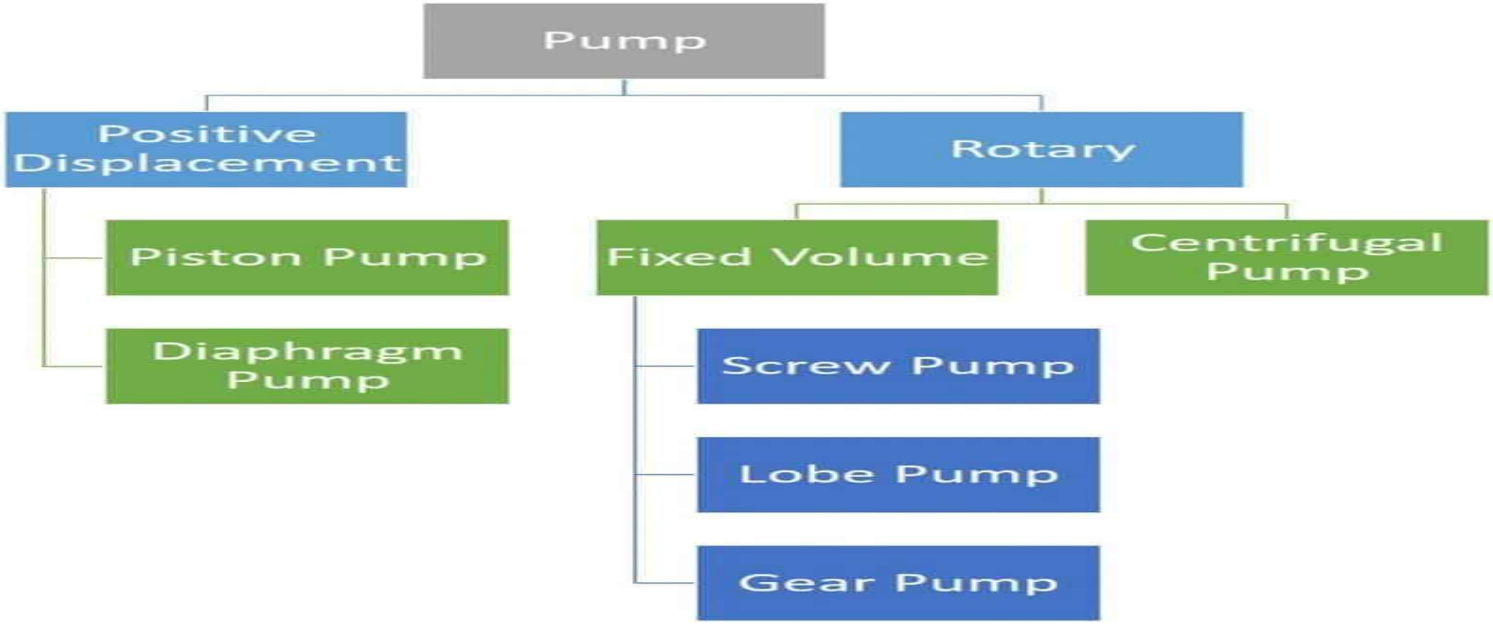
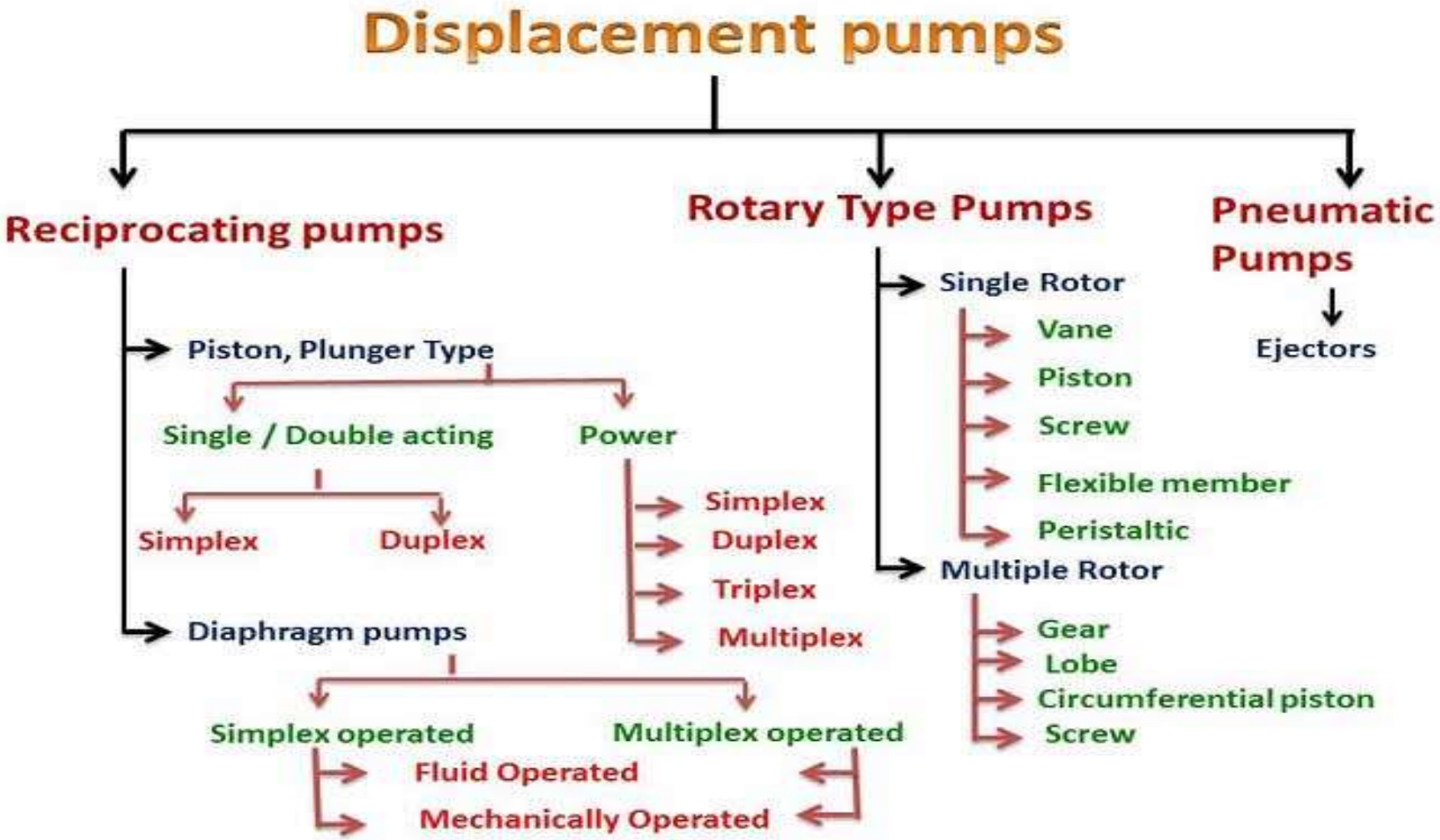
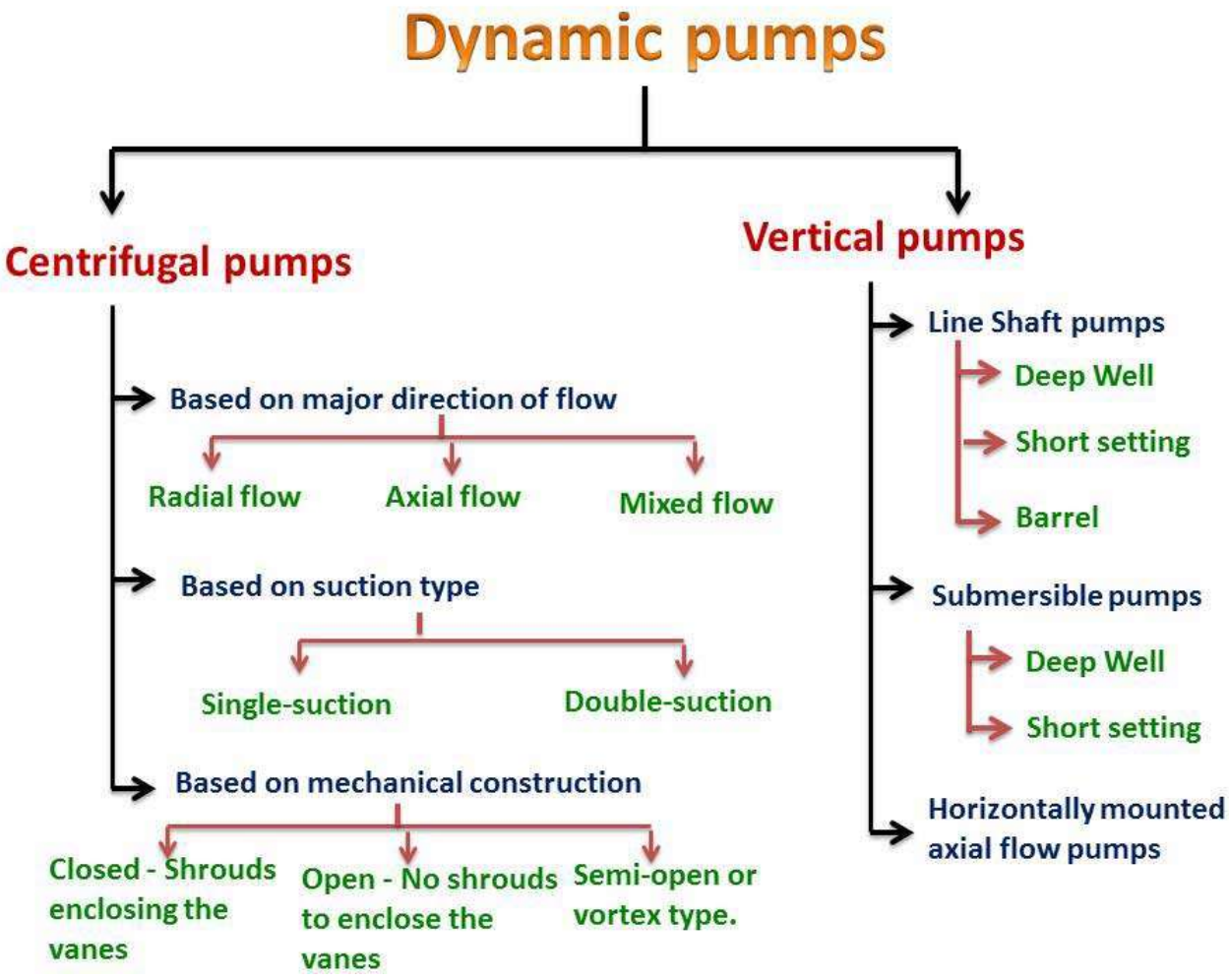
Pump

Pump: A device that raises, transfers, delivers, or compresses fluids especially by suction or pressure or both.

Pump is a machine or mechanical equipment which is required to lift a fluid (liquid, semi-solid, gas, steam etc) from low level to high level or to flow fluid from low pressure area to high pressure area or as a booster in a piping network system. Principally, pump converts mechanical energy of motor into fluid flow energy.

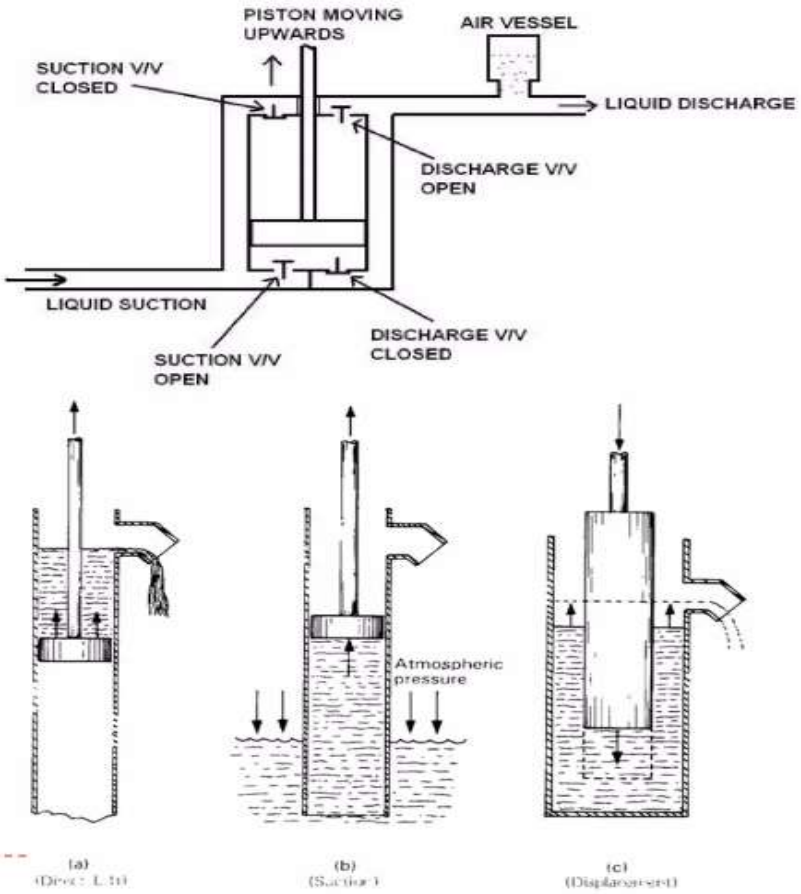


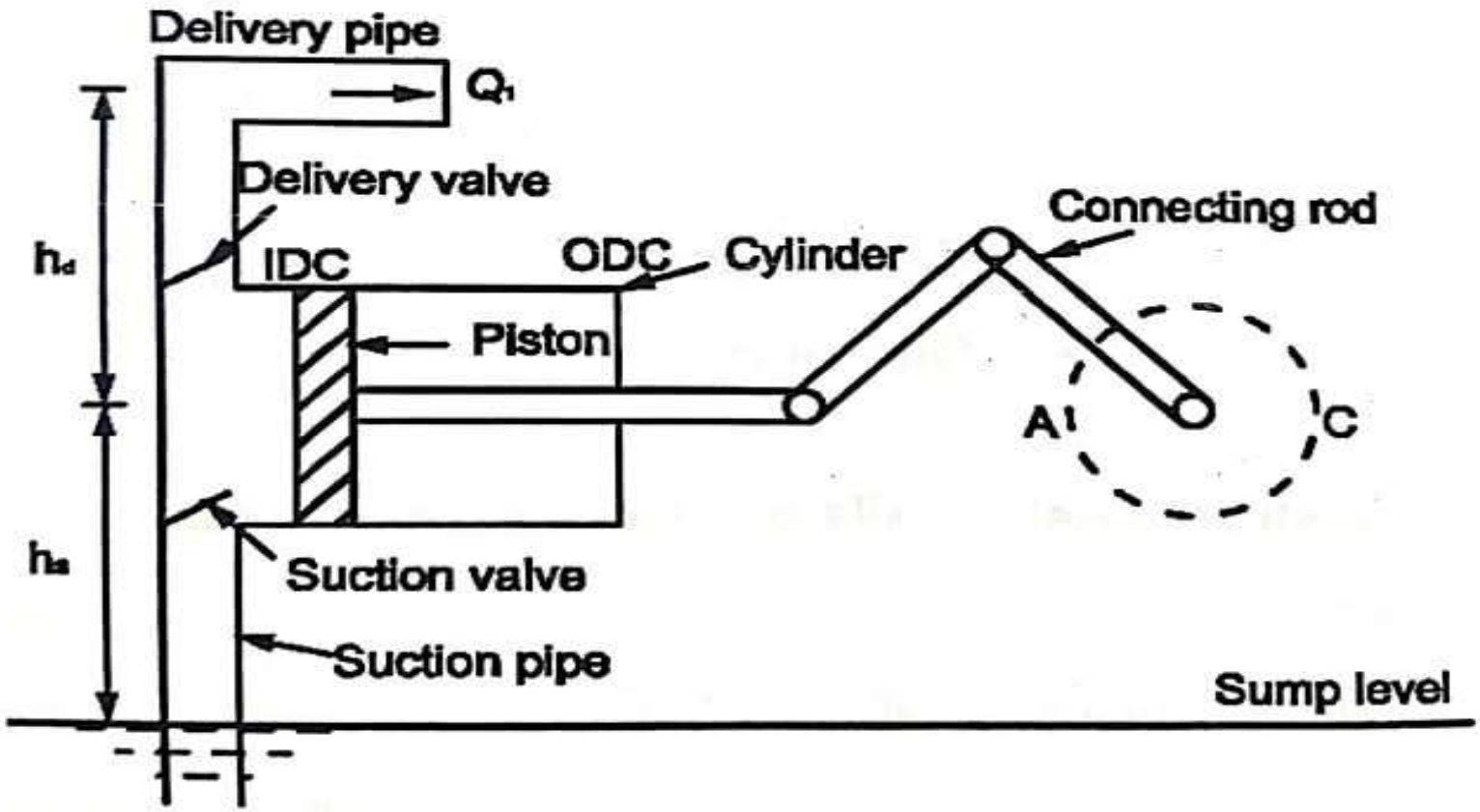

Displacement pumps
Reciprocating pumps
Piston, Plunger Type
Single / Double acting
Simplex
Duplex
Power
Simplex
Duplex
Triplex
Multiplex
Diaphragm pumps
Simplex operated
Multiplex operated
Fluid Operated
Mechanically Operated
Rotary Type Pumps
Single Rotor
Vane
Piston
Screw
Flexible member
Peristaltic
Multiple Rotor
Gear
Lobe
Circumferential piston
Screw
Pneumatic Pumps
Ejectors


Dynamic pumps
Centrifugal pumps
Based on major direction of flow
Radial flow
Axial flow
Mixed flow
Based on suction type
Single-suction
Double-suction
Based on mechanical construction
Closed - Shrouds enclosing the vanes
Open - No shrouds to enclose the vanes
Semi-open or vortex type.
Vertical pumps
Line Shaft pumps
Deep Well
Short setting
Barrel
Submersible pumps
Deep Well
Short setting
Horizontally mounted axial flow pumps

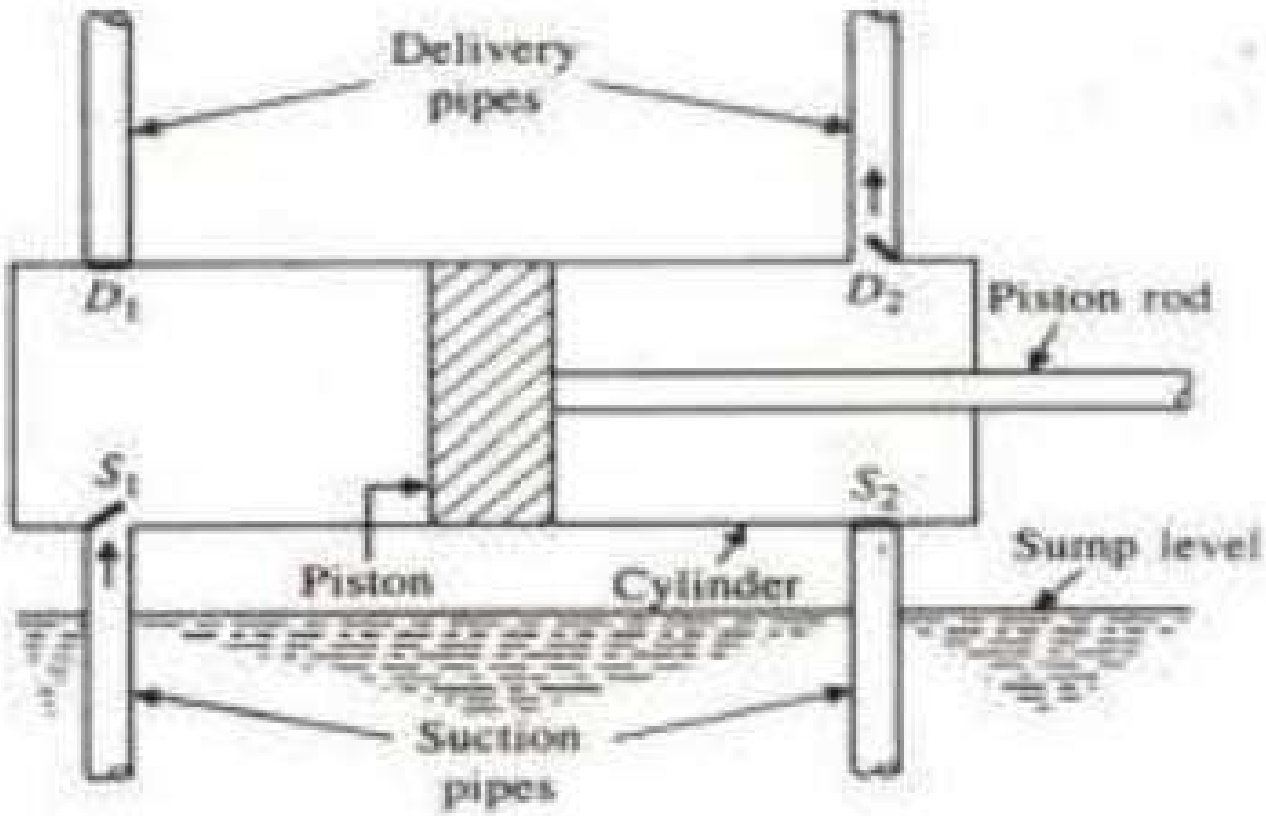
Pumps: Types

- **Positive Displacement Pump**
- These types of pumps displace fixed volumes of fluid during each cycle or revolution of the pump.
- No longer used for distribution system pumping in most water systems, but portable units may be used for dewatering excavations during construction.

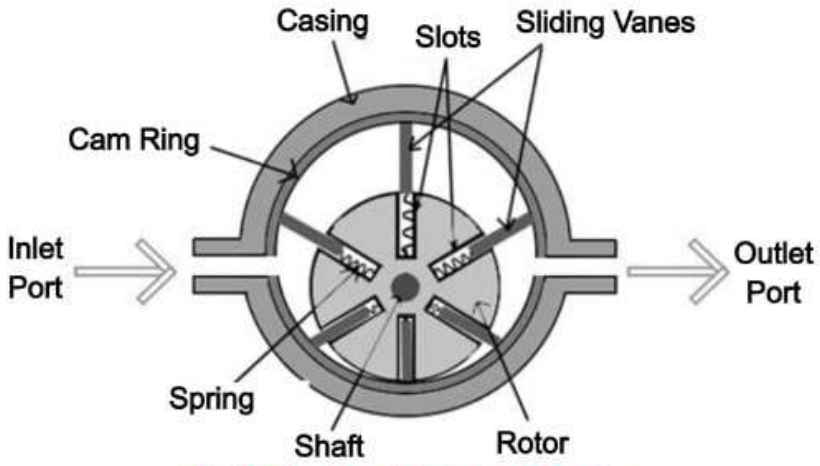




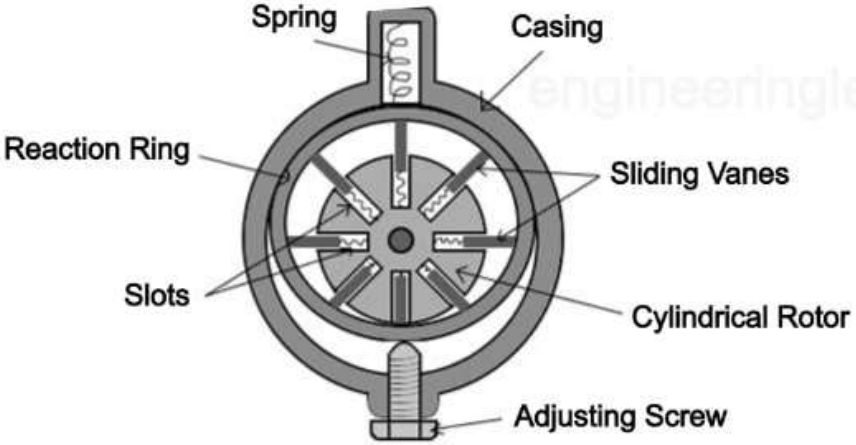
Working of Single acting Reciprocating Pump



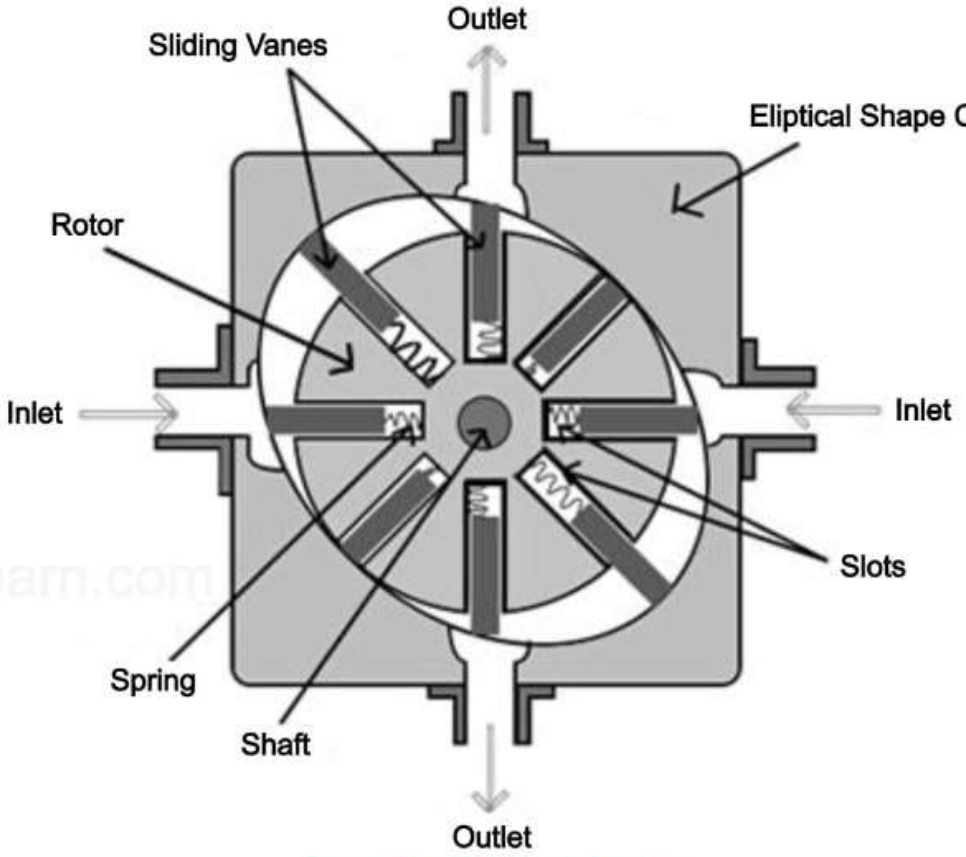
Working of Double acting Reciprocating Pump



Unbalanced Vane Pump

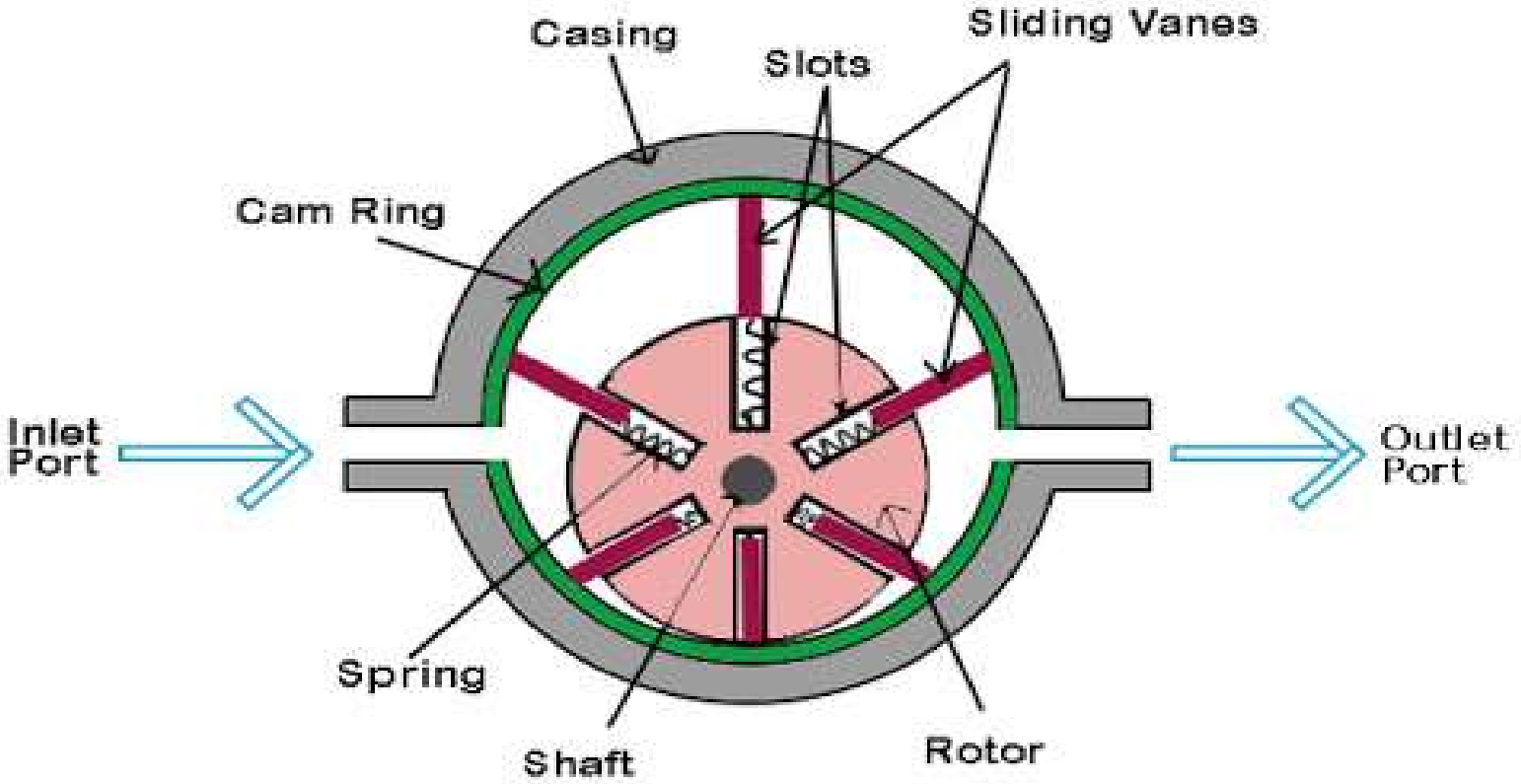


Variable Displacement Vane Pump



Balanced Vane Pump

Types of Vane Pump

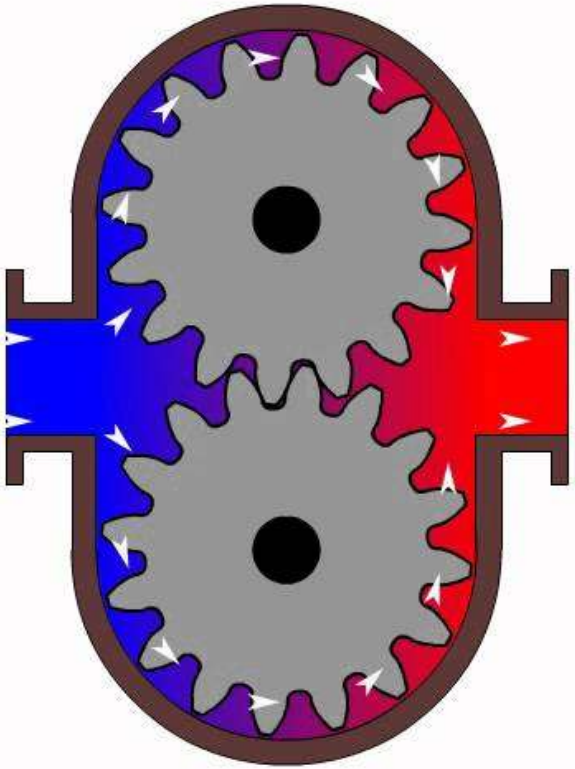

Casing
Slots
Sliding Vanes
Cam Ring
Inlet
Port
Outlet
Port
Spring
Shaft
Rotor

Vane Pump

www.mekanizmalar.com

Gear Pump

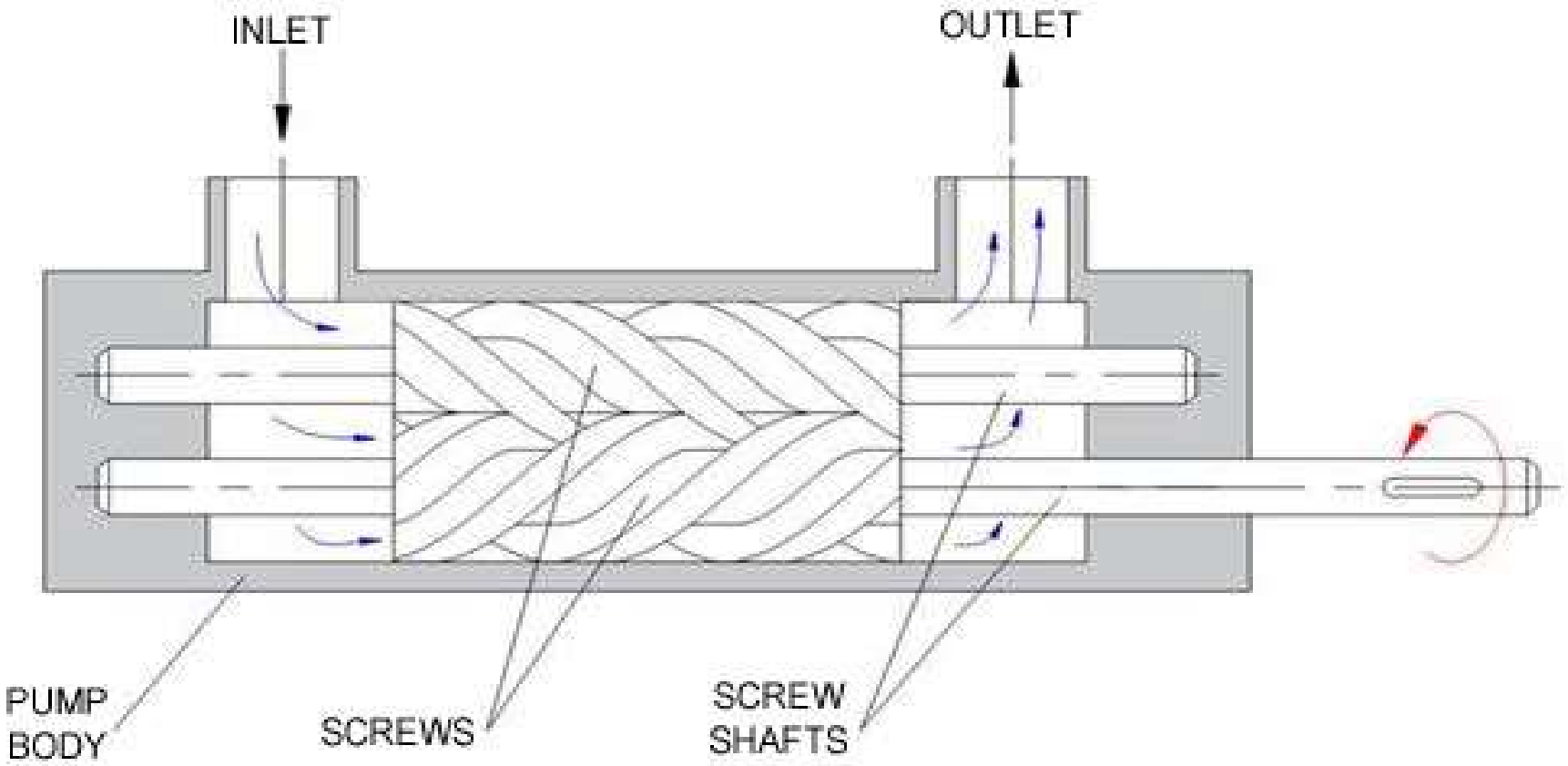
0.5
Rotation Speed

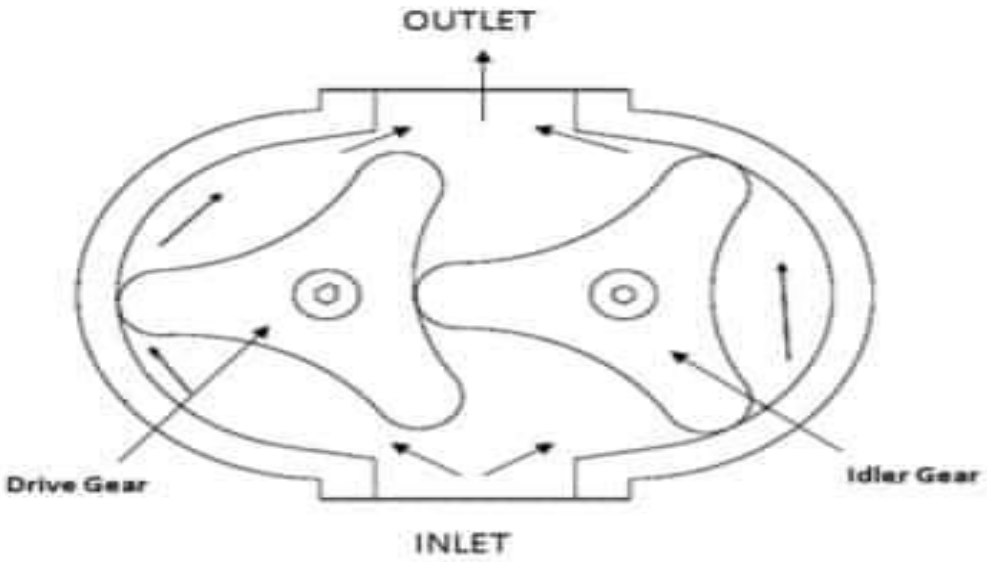


The white arrows
show the fluid path

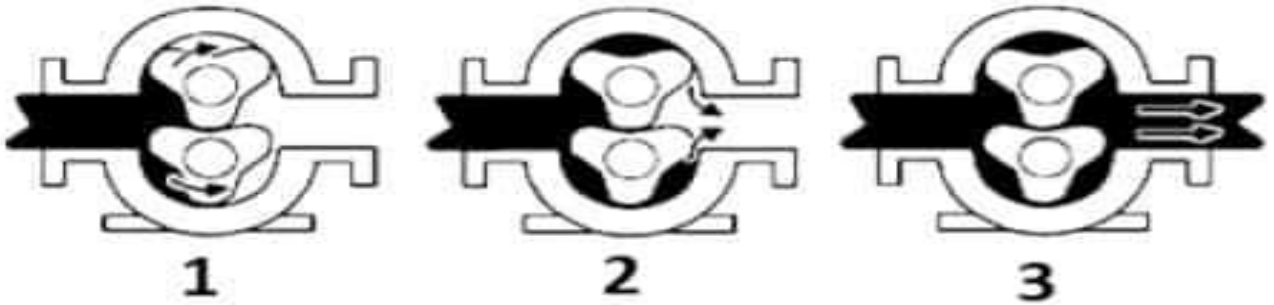
Low Pressure inlet

High pressure exit


INLET
OUTLET
PUMP
BODY
SCREWS
SCREW
SHAFTS

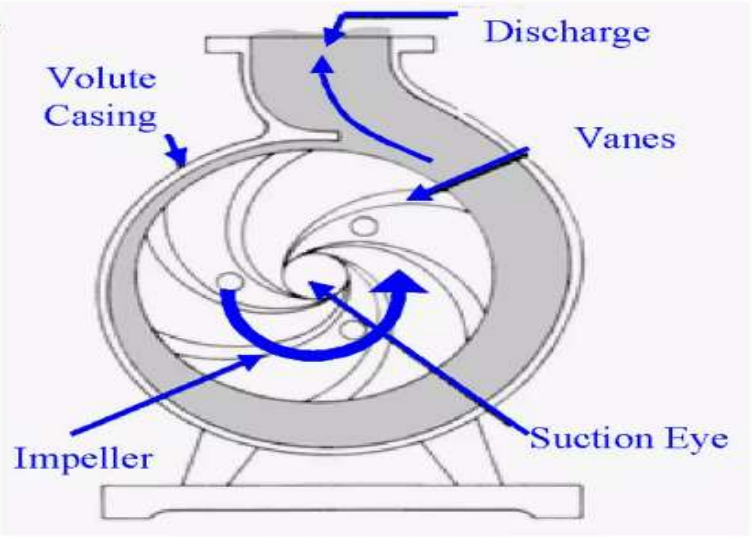


Stages of operation of Lobe pump

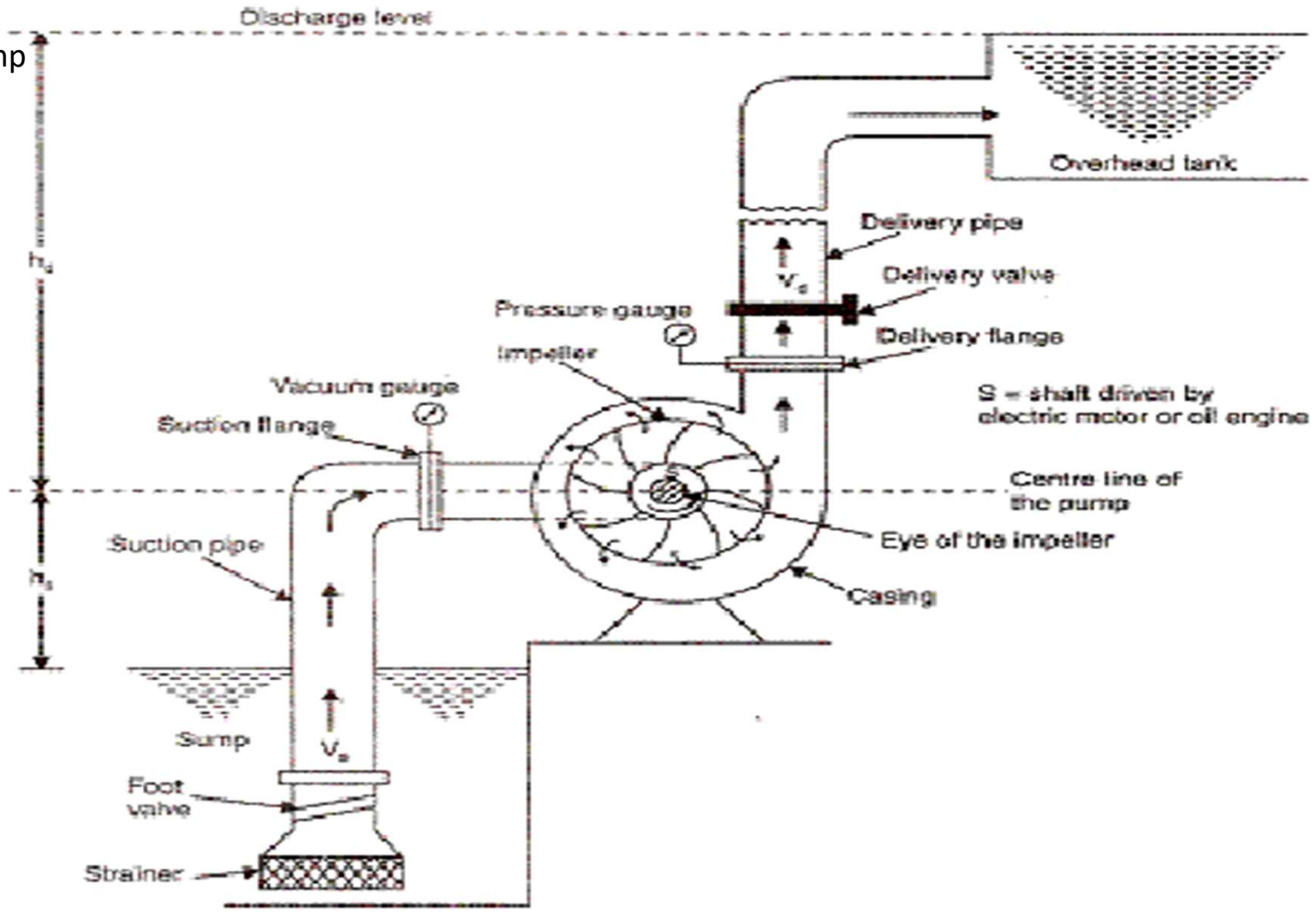


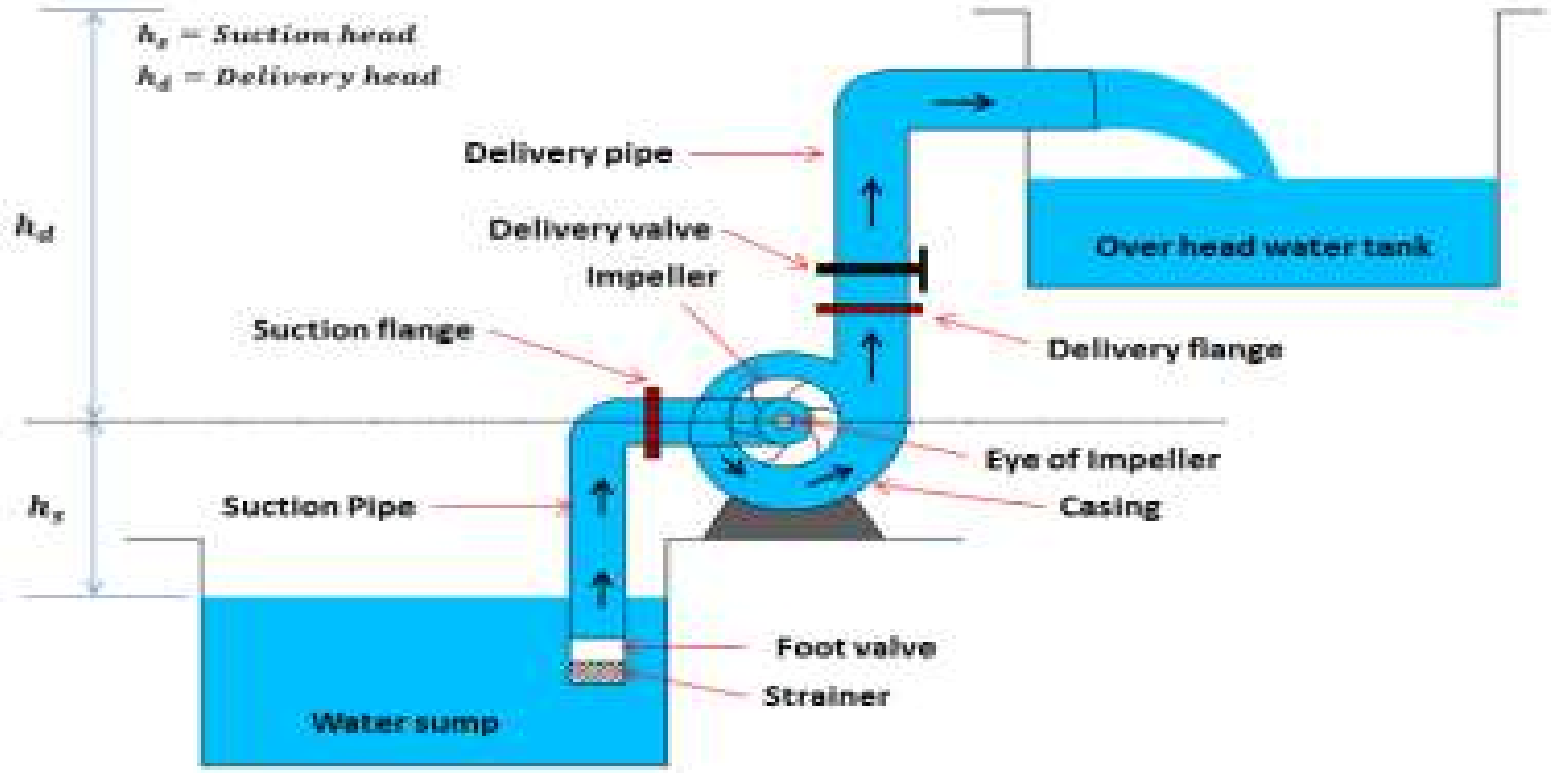
Pumps: Types

- **Centrifugal Pump**
- Frequently used in water distribution systems.
- Water enters the pump through the eye of the spinning impeller and goes outward from the vanes to discharge pipe.
- A centrifugal pump consists of: a rotating element (impeller) and housing which encloses the impeller and seals the pressurized liquid.



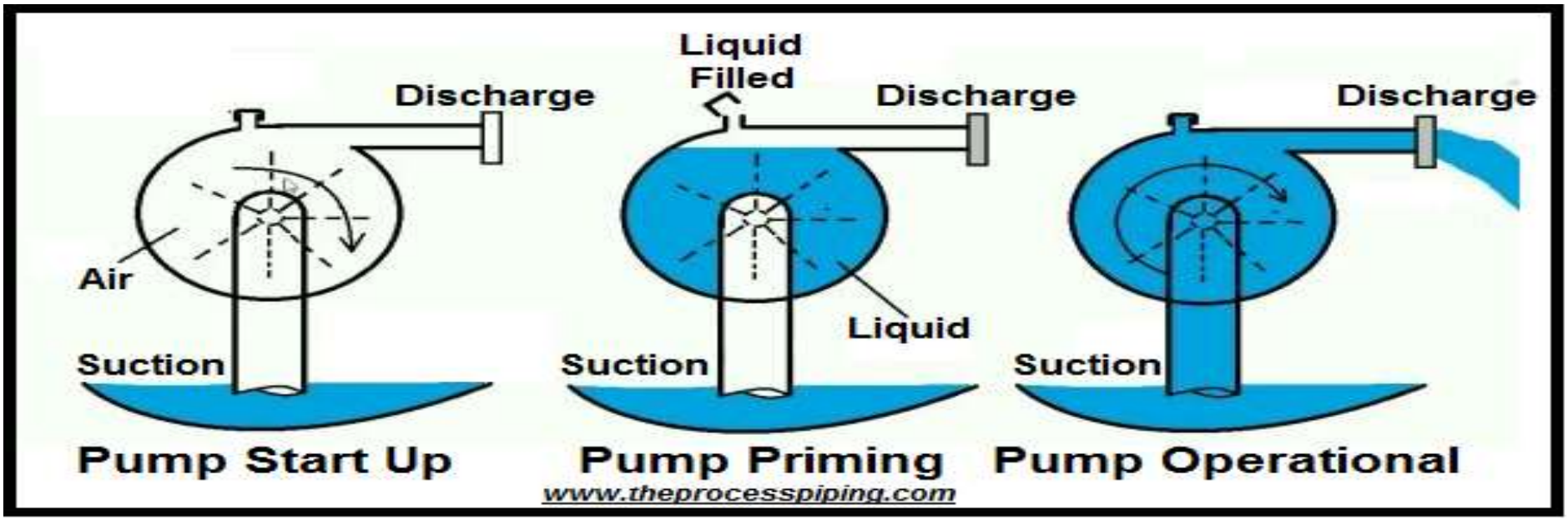
Centrifugal Pump





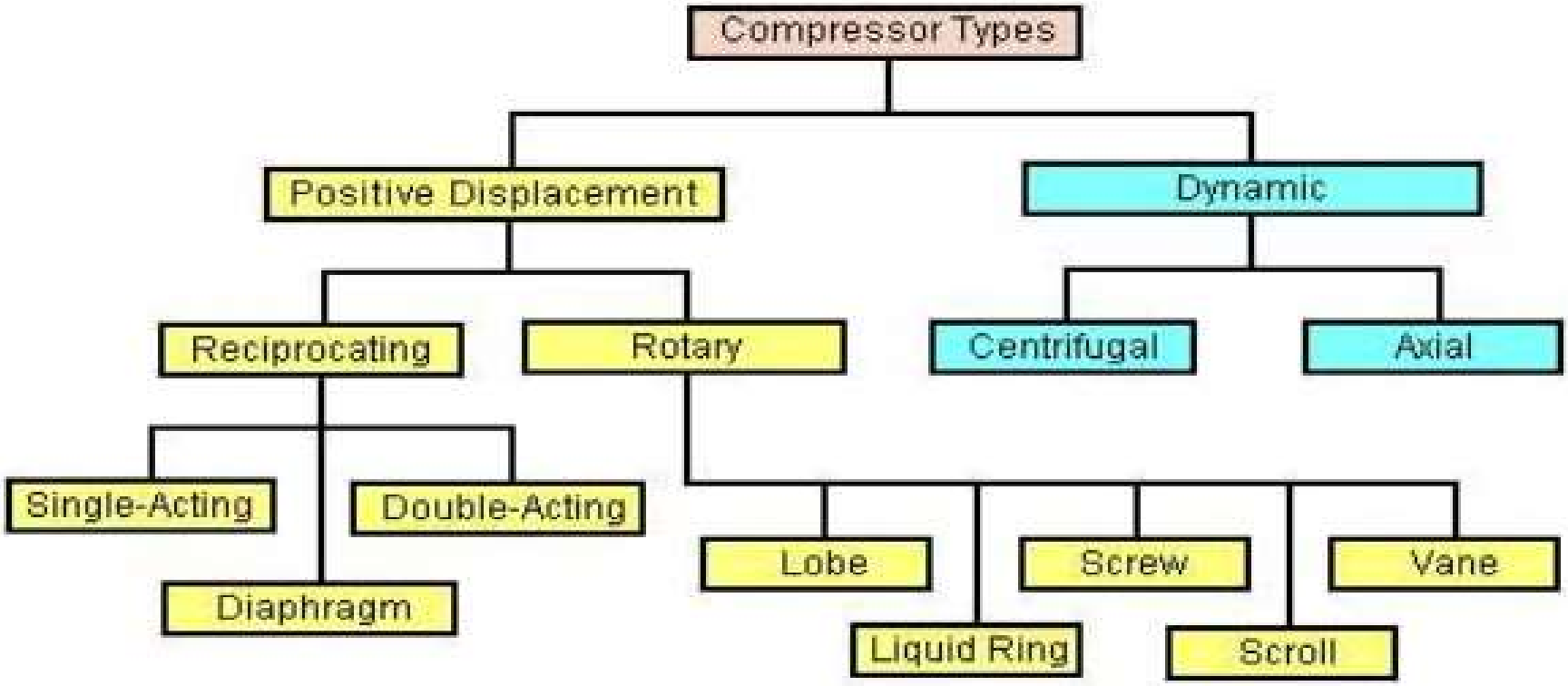
Centrifugal Pump Working

Pump Priming is the process of removing air from the pump and suction line. In this process the pump is been filled with the liquid being pumped and this liquid forces all the air, gas, or vapor contained in the passage ways of pump to escape out. Priming maybe done manually or automatically. Not all pumps require priming but mostly do. There are Self Priming Pumps and also some layout situations where priming is not required



A **compressor** is a mechanical device that increases the pressure of a gas by reducing its volume. An air compressor is a specific type of gas compressor. Compressors are similar to pumps: both increase the pressure on a fluid and both can transport the fluid through a pipe

Pump	Compressor
Increase the kinetic energy of the fluid which further increases the pressure energy	Increase the potential energy by pressuring in smaller volume
Fluid can be liquid or gas	Uses only gas
The volume form inlet to outlet is not changed	There is a volume change
There is not necessarily a pressure change	There must be a pressure change
No storage	Has storage capacity
Cheaper	More expensive


Compressor Types
Positive Displacement
Dynamic
Reciprocating
Rotary
Centrifugal
Axial
Single-Acting
Double-Acting
Diaphragm
Lobe
Liquid Ring
Screw
Scroll
Vane

Positive displacement compressor

- In the positive-displacement type, a given quantity of air or gas is trapped in a compression chamber and the volume it occupies is mechanically reduced, causing a corresponding rise in pressure prior to discharge.

- At constant speed, the air flow remains essentially constant with variations in discharge pressure.
- Ex: Reciprocating compressors, vane compressors & so on.

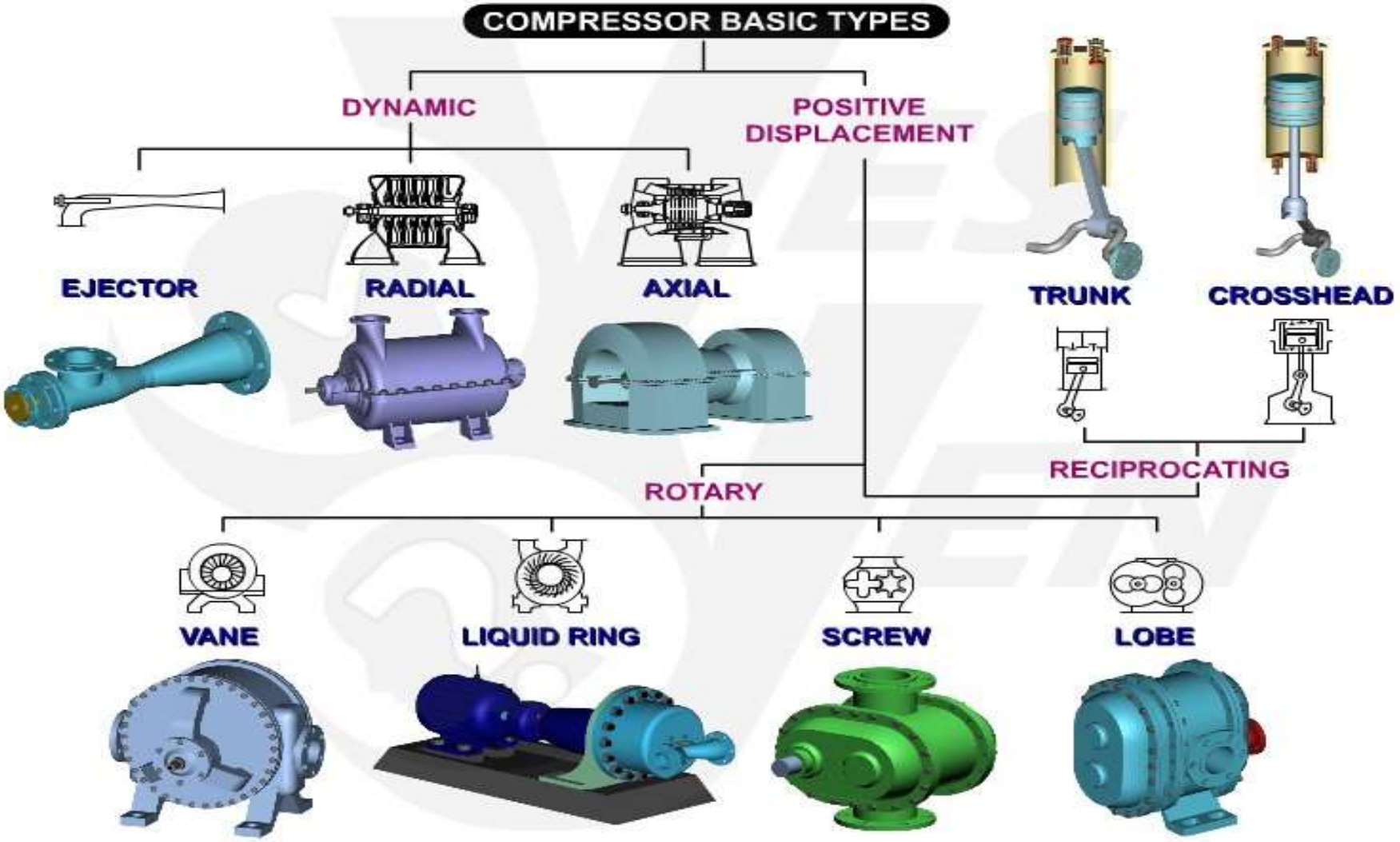
Dynamic compressors:

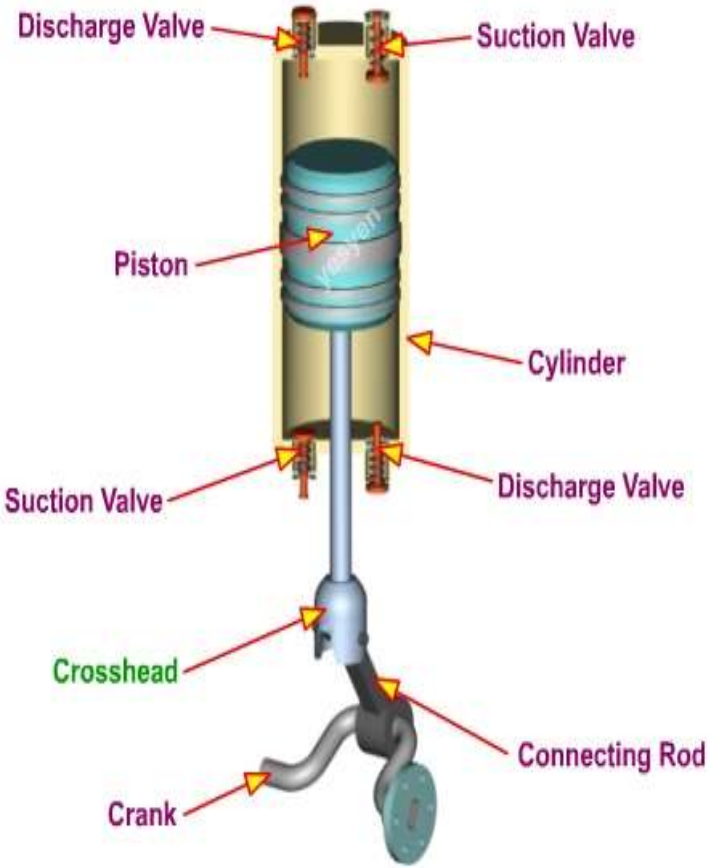
- Dynamic compressors impart velocity energy to continuously flowing air or gas by means of impellers rotating at very high speeds.

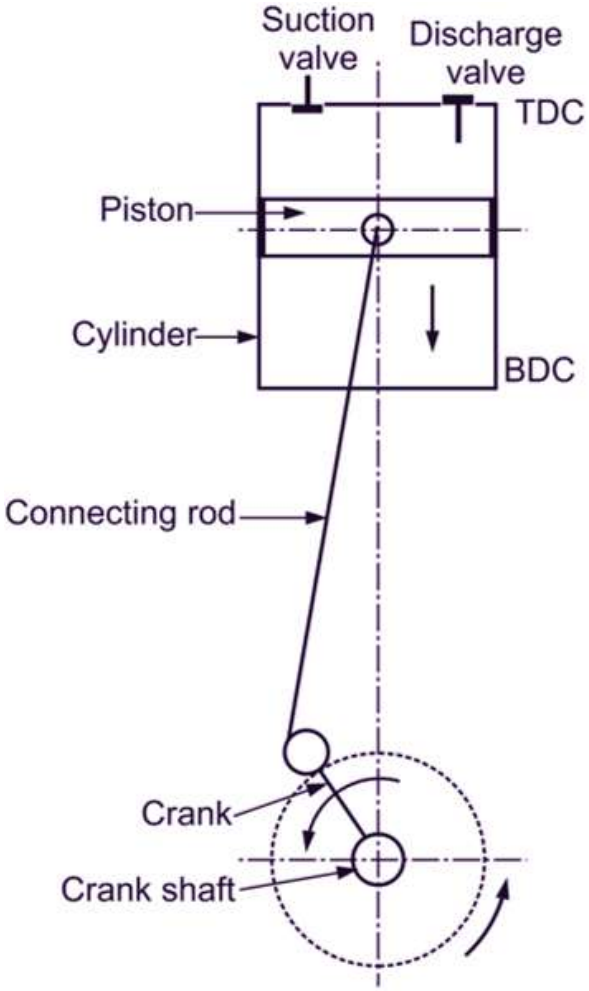
- The velocity energy is changed into pressure energy both by the impellers and the discharge volutes or diffusers.

- In the centrifugal-type dynamic compressors, the shape of the impeller blades determines the relationship between air flow and the pressure (or head) generate.

- Ex: centrifugal compressors, axial compressors.


COMPRESSOR BASIC TYPES
DYNAMIC
POSITIVE DISPLACEMENT
EJECTOR
RADIAL
AXIAL
TRUNK
CROSSHEAD
RECIPROCATING
ROTARY
VANE
LIQUID RING
SCREW
LOBE



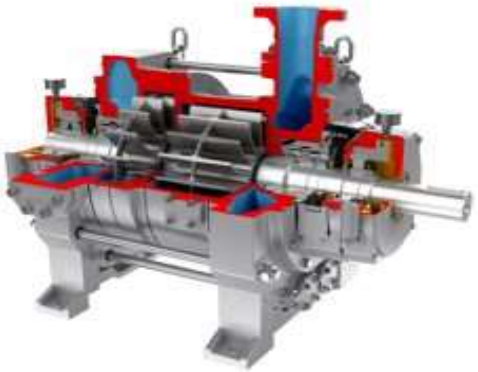


Reciprocating Compressor

Scroll

Screw

Reciprocating

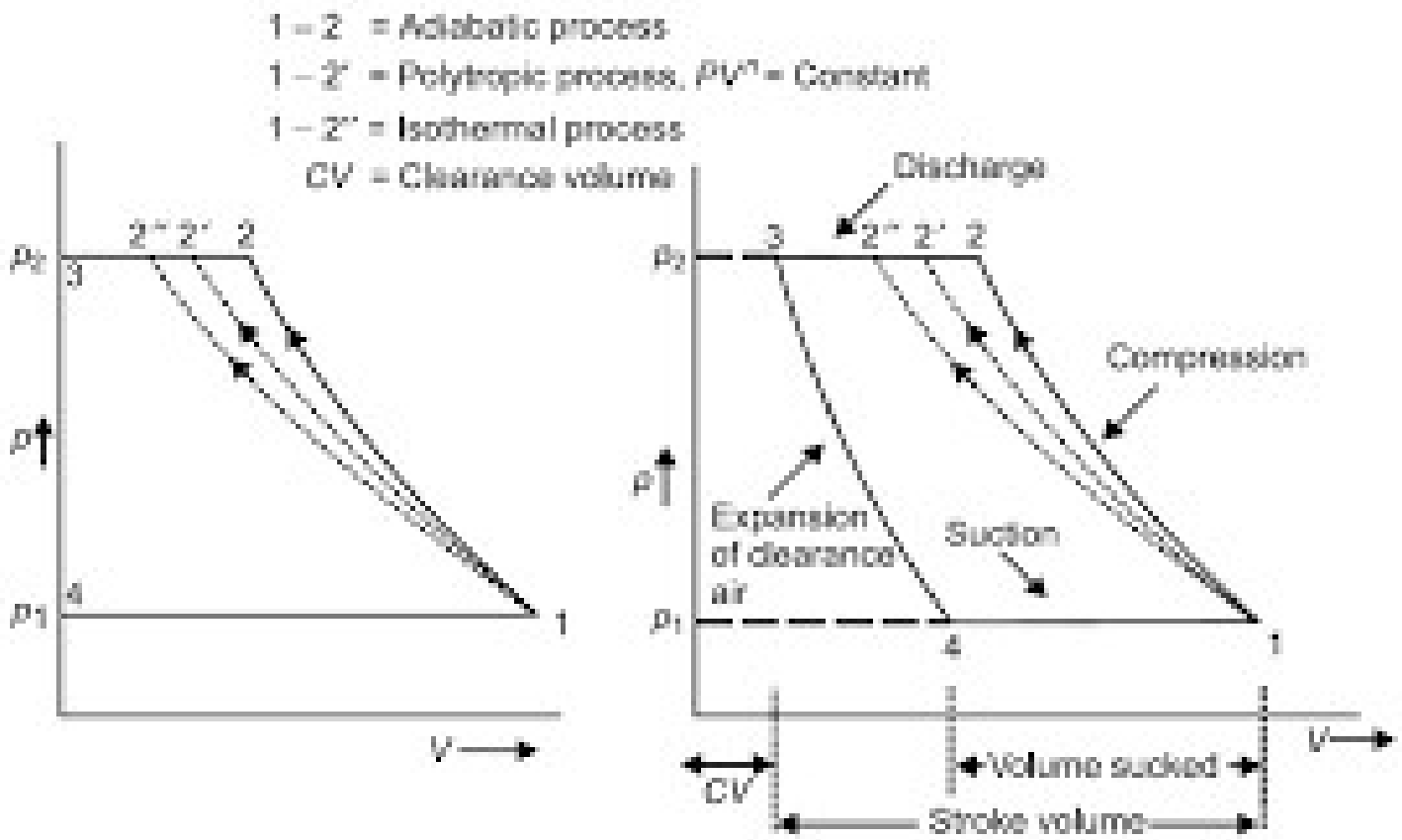


Liquid-Ring

Rotary-Lobe

Rotary-Vane

Rotary Compressor



With and Without Clearance volume in compressor

Multistage Reciprocating Compressor