



Chemical Engineering

PUMP





PUMP



- ⌚ A **pump** is a device that moves fluids (liquids or gases), or sometimes slurries, by mechanical action.
- ⌚ Pumps can be classified into three major groups according to the method they use to move the fluid:

☐ PUMPS CAN BE CLASSIFIED BY THEIR METHOD OF DISPLACEMENT



Positive Displacement*

Impulse Pumps*

velocity pumps

gravity pumps

steam pumps

Valveless pumps*



POSITIVE DISPLACEMENT PUMPS

☼ A positive displacement pump moves a fluid by repeatedly enclosing a fixed volume and moving it mechanically through the system. Although there are a wide variety of pump designs, the majority can be placed into two categories:

reciprocating and ***rotary***.



A 3D electric water pump model

Positive
Displacement*





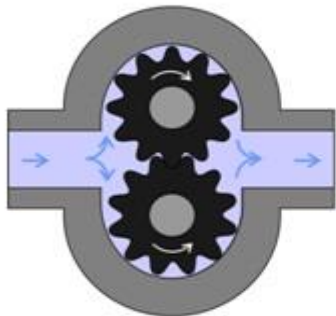
A 3D electric water pump model

ROTARY POSITIVE DISPLACEMENT PUMPS

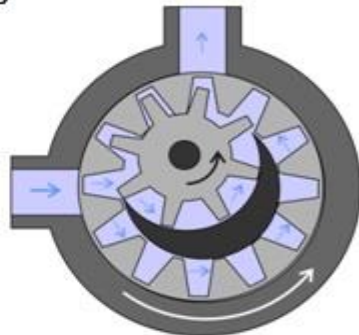


- Rotary positive displacement pumps use the actions of rotating cogs or gears to transfer fluids. The rotating element develops a liquid seal with the pump casing and creates suction at the pump inlet.

External Gear Pump



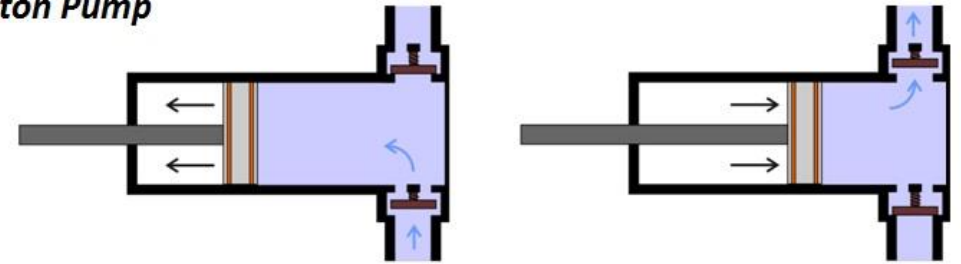
Internal Gear Pump



Suction stroke

Compression stroke

Piston Pump

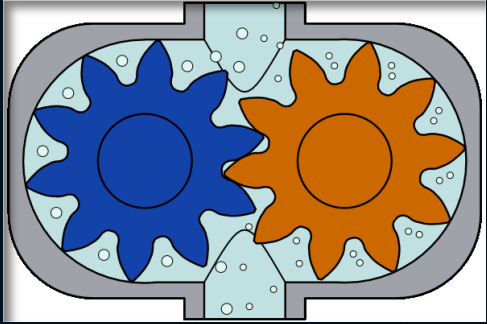


- A Reciprocating Positive Displacement pump works by the repeated back-and-forth movement of either a piston, plunger or diaphragm. These cycles are called *reciprocation*.



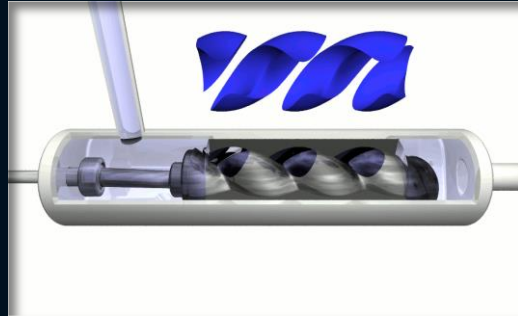
RECIPROCATING POSITIVE DISPLACEMENT PUMPS

THE POSITIVE DISPLACEMENT PRINCIPLE APPLIES IN THESE PUMPS



GEAR PUMP

- ⌚ This is the simplest of rotary positive displacement pumps. It consists of two meshed gears that rotate in a closely fitted casing. Gear pumps see wide use in car engine oil pumps .



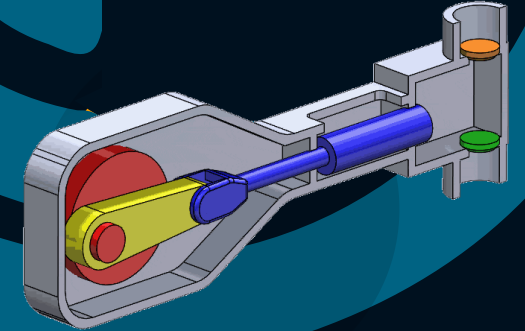
SCREW PUMP

- ⌚ A screw pump is a more complicated type of rotary pump that uses two or three screws with opposing thread .one screw turns clockwise and the other counterclockwise.



FLEXIBLE IMPELLER

- ⌚ A flexible impeller pump is a positive displacement pump that, by deforming impeller vanes, draws the liquid into the pump housing and moves it to the discharge port with a constant flow rate.



PISTON PUMP

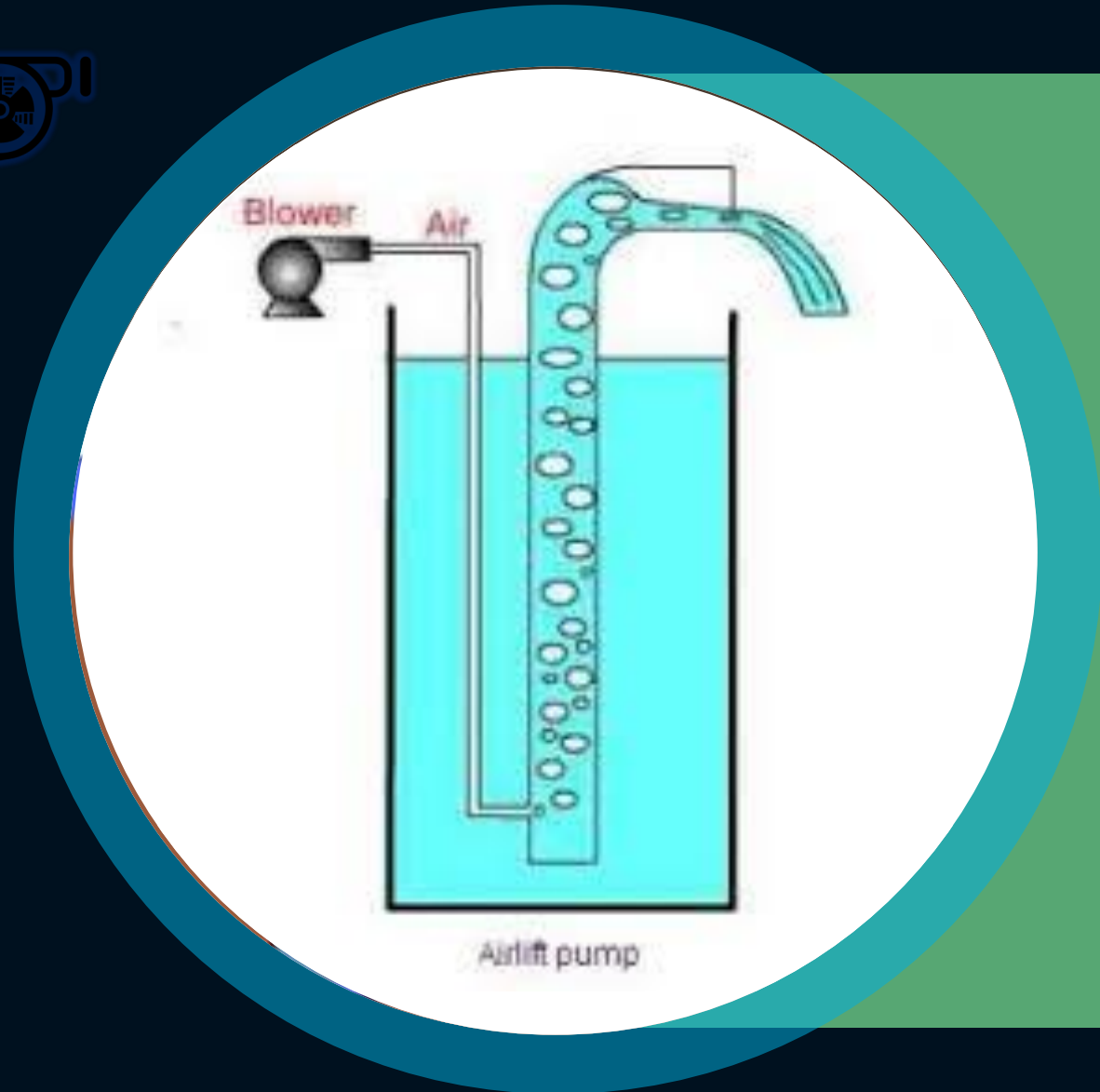
- ⌚ Piston pumps can be used to move liquids or compress gases. They can operate over a wide range of pressures.

IMPULSE PUMPS



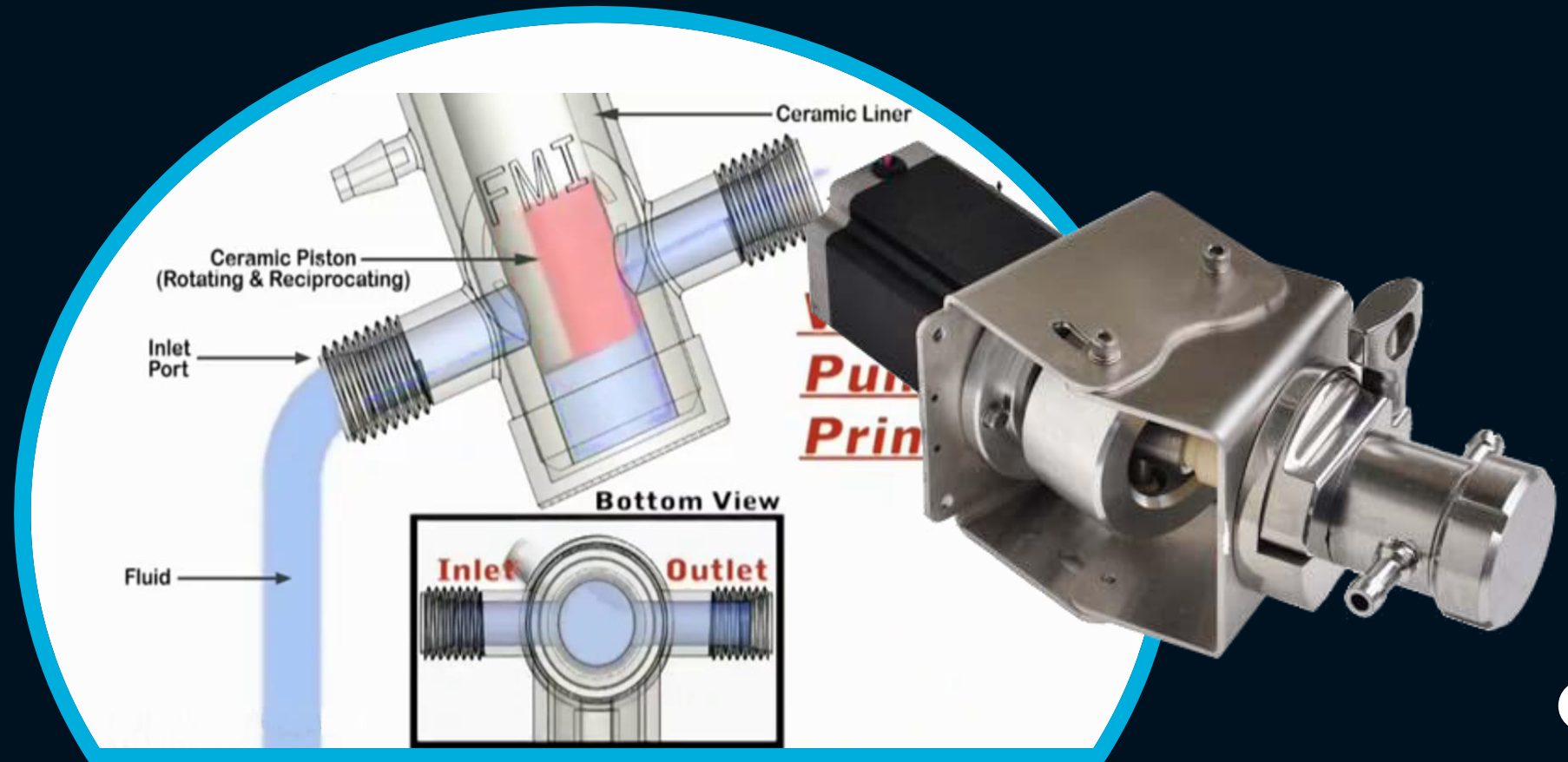
Impulse pumps are a type of pump that operate by a gas (usually air) in some impulse pumps the gas trapped in the liquid (usually water) is released and accumulated somewhere in the pump, creating a pressure that can push part of the liquid upwards.

Conventional impulse pumps include:



VALVELESS PUMPS

🌀 In a valveless pumping system, no valves (or physical occlusions) are present to regulate the flow direction. The fluid pumping efficiency of a valveless system, however, is not necessarily lower than that having valves.





Early applications includes the use of the windmill or watermill to pump water. Today, the pump is used for irrigation, water supply, gasoline supply, air conditioning systems, refrigeration (usually called a compressor), chemical movement , sewage movement , flood control, marine services, etc.



PRIMING A PUMP

Typically, a liquid pump can't simply draw air. The feed line of the pump and the internal body surrounding the pumping mechanism must first be filled with the liquid that requires pumping: An operator must introduce liquid into the system to initiate the pumping. This is called priming the pump.





EFFICIENCY

- ⊙ Pump efficiency is defined as the ratio of the power imparted on the fluid by the pump in relation to the power supplied to drive the pump. Its value is not fixed for a given pump, efficiency is a function of the discharge and therefore also operating head.

The End

Thank You

Abdullah
Mohsenifar