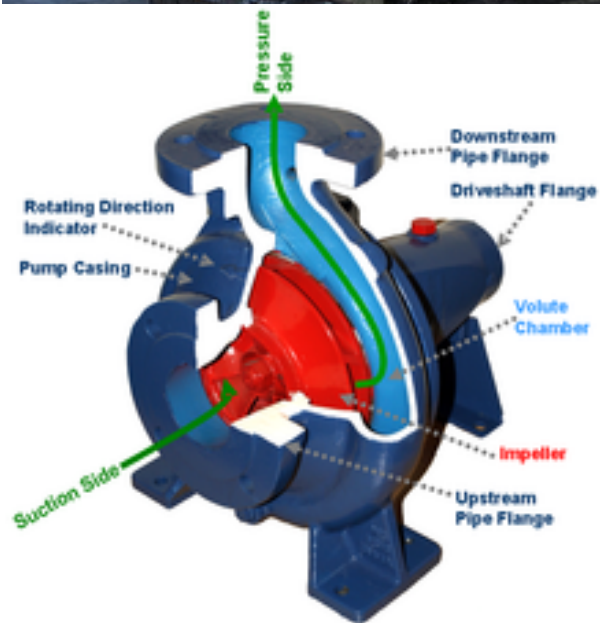


## Pumps - Introduction



Images from: [https://en.wikipedia.org/wiki/Centrifugal\\_pump](https://en.wikipedia.org/wiki/Centrifugal_pump)

# Pumps - Introduction

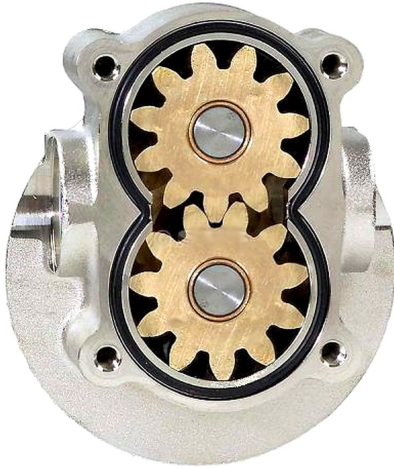
## Types of Fluid Machines

1. Those that do work on the fluid
  - a. pumps (used for liquids)
  - b. fans (used for gases/vapor;  $\Delta p < \text{a few inches of H}_2\text{O}$ )
  - c. blowers (used for gases/vapor;  $\text{a few inches of H}_2\text{O} < \Delta p < 1 \text{ atm}$ )
  - d. compressors (used for gases/vapor;  $\Delta p > 1 \text{ atm}$ )
  
2. Those that extract work from the fluid
  - a. turbines

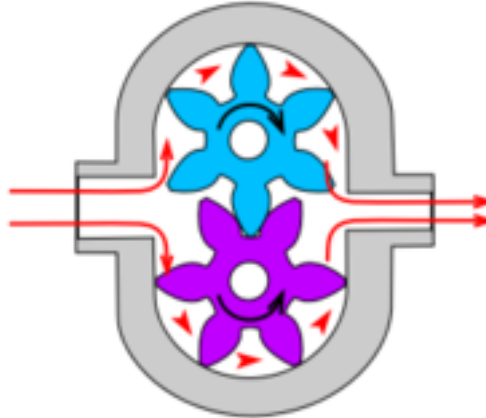
# Pumps - Introduction

## Types of Pumps

1. Positive Displacement Pumps (PDPs)
  - a. force fluid movement using changes in volume
  - b. e.g., reciprocating piston engines, heart, gear pumps, rotating screw pumps, bellows
  - c. typically produce a periodic flow rate
  - d. large  $\Delta p$  (pressure rise) possible but usually have a small  $Q$  (flow rate)

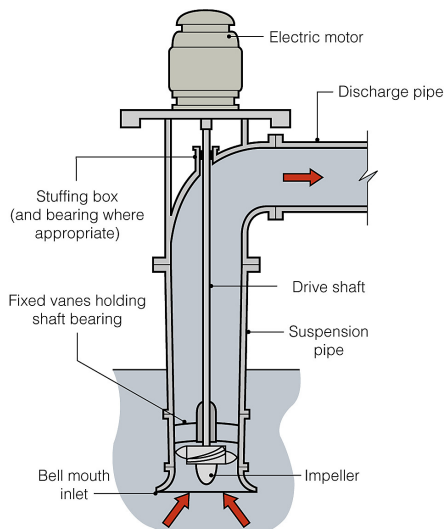


<https://www.enginegearonline.com/1-gpm-reversible-gear-pump-12v-for-motor-oil-diesel-fuel-and-water/>



[https://en.wikipedia.org/wiki/Hydraulic\\_pump](https://en.wikipedia.org/wiki/Hydraulic_pump)

2. Dynamic Pumps
  - a. no closed volumes as in PDPs
  - b.  $\Delta p$  due to changes in fluid momentum
  - c. e.g., axial flow and radial flow pumps (aka turbomachines), jet pumps, electromagnetic pumps
  - d.  $(\Delta p_{\text{dynamic pumps}})$  typically  $< (\Delta p_{\text{PDP}})$
  - e.  $(Q_{\text{dynamic pumps}})$  typically  $> (Q_{\text{PDP}})$



[http://repository.lboro.ac.uk/articles/file/Axial\\_flow\\_pump/7713008/1](http://repository.lboro.ac.uk/articles/file/Axial_flow_pump/7713008/1)



[https://en.wikipedia.org/wiki/Axial\\_flow\\_pump#/media/File:2011MarchScottNCraig\\_207\\_1.jpg](https://en.wikipedia.org/wiki/Axial_flow_pump#/media/File:2011MarchScottNCraig_207_1.jpg)

Many pump tutorials and explanatory videos are available online.