PUMPS & TURBINES

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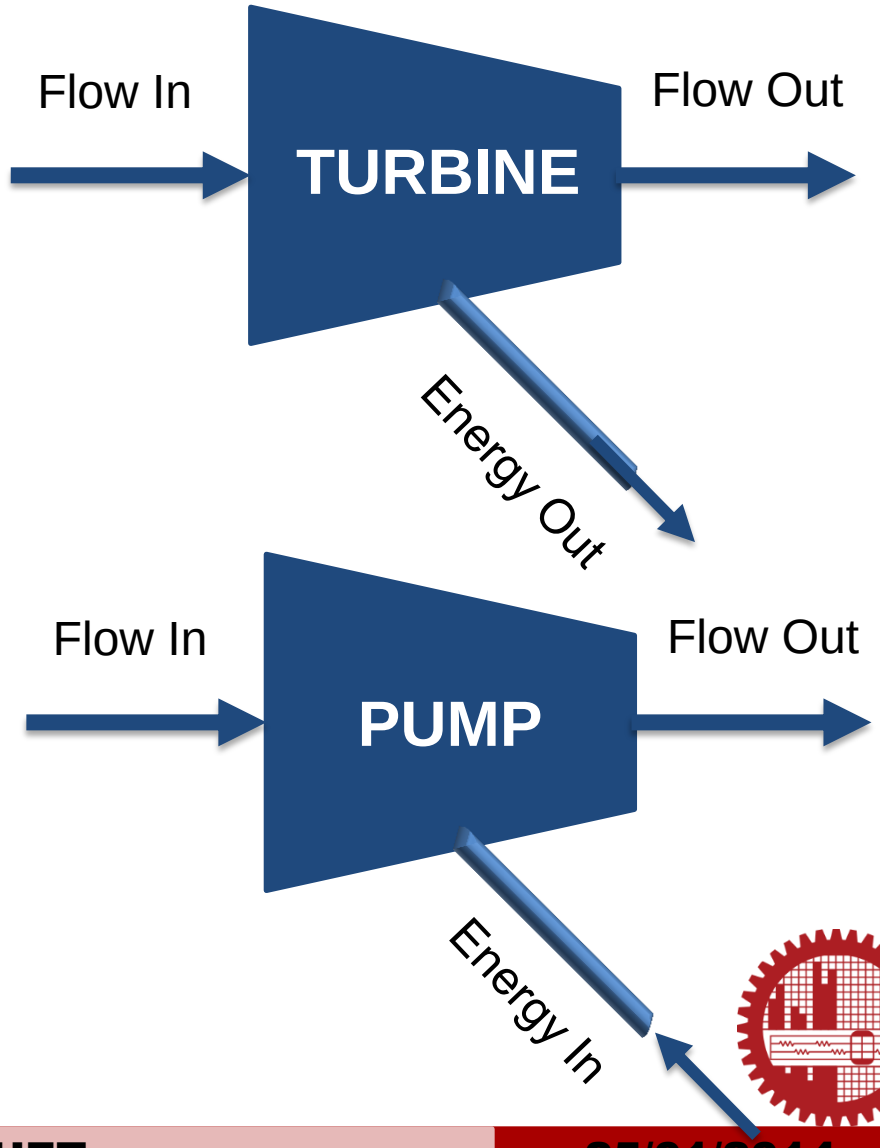
Hydraulic Energy

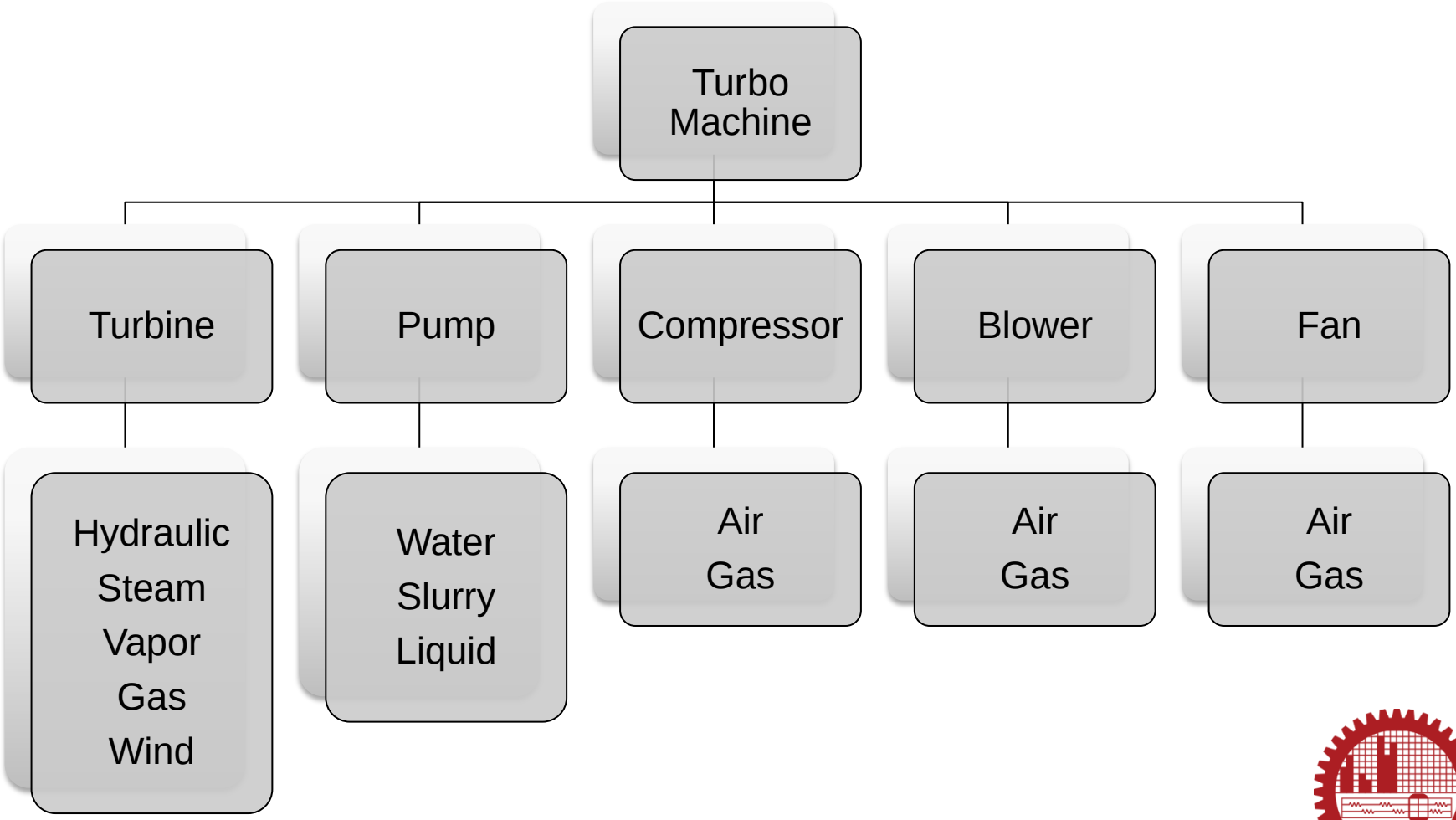
- Kinetic Energy
- Pressure Energy
- Potential Energy
- Thermal Energy

Turbo Machinery

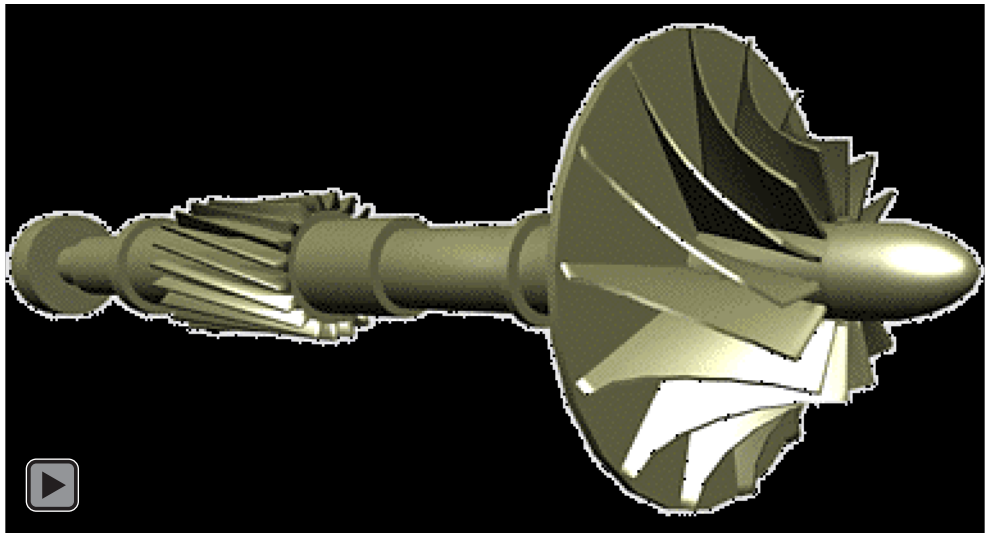
- Turbo machines are dynamic fluid machines that either ***extract energy*** from a fluid (turbine) or ***add energy*** to a fluid (pump) as a result of dynamic interactions between the device and the fluid.
- Latin *Turbo* means to *spin* or *whirl*



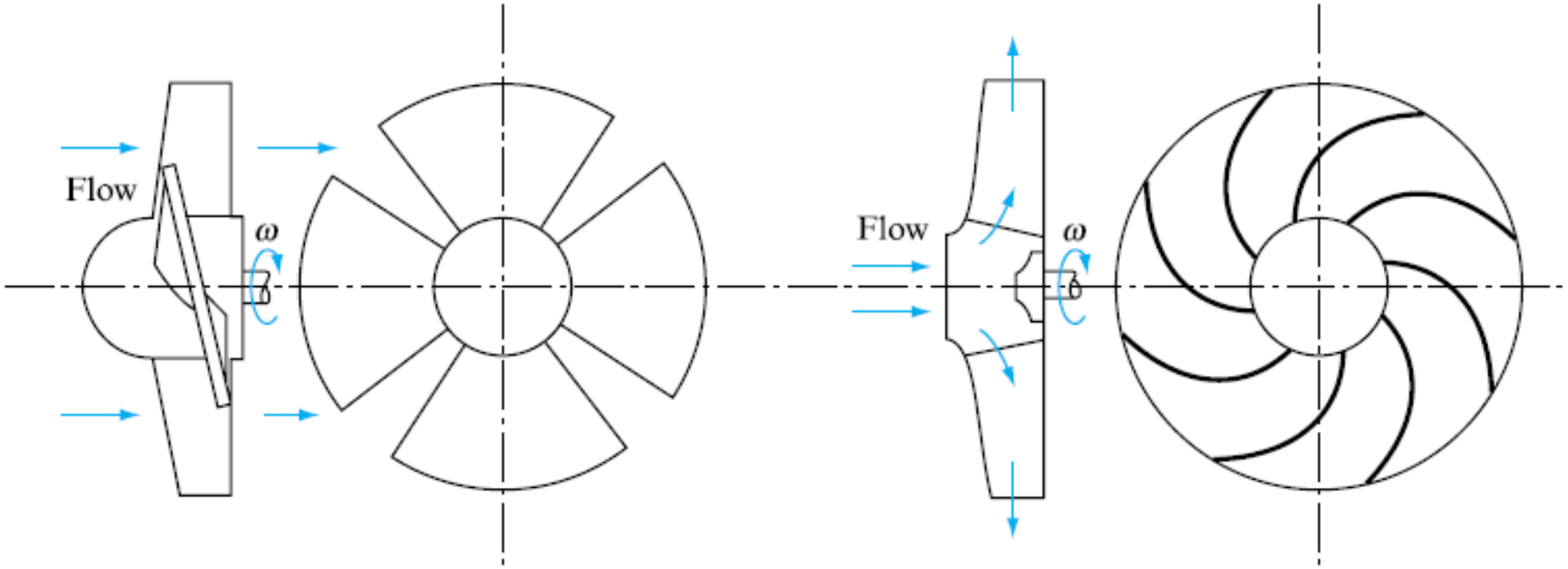
Classifications of Turbo Machinery



Turbo Machinery



Axial Flow & Radial Flow Impeller



(a) Axial flow impeller

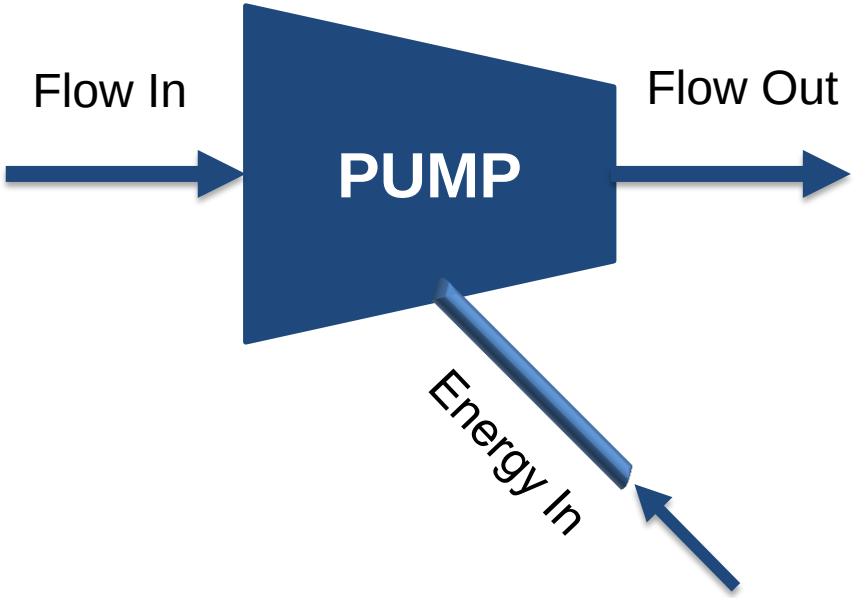
(b) Centrifugal impeller

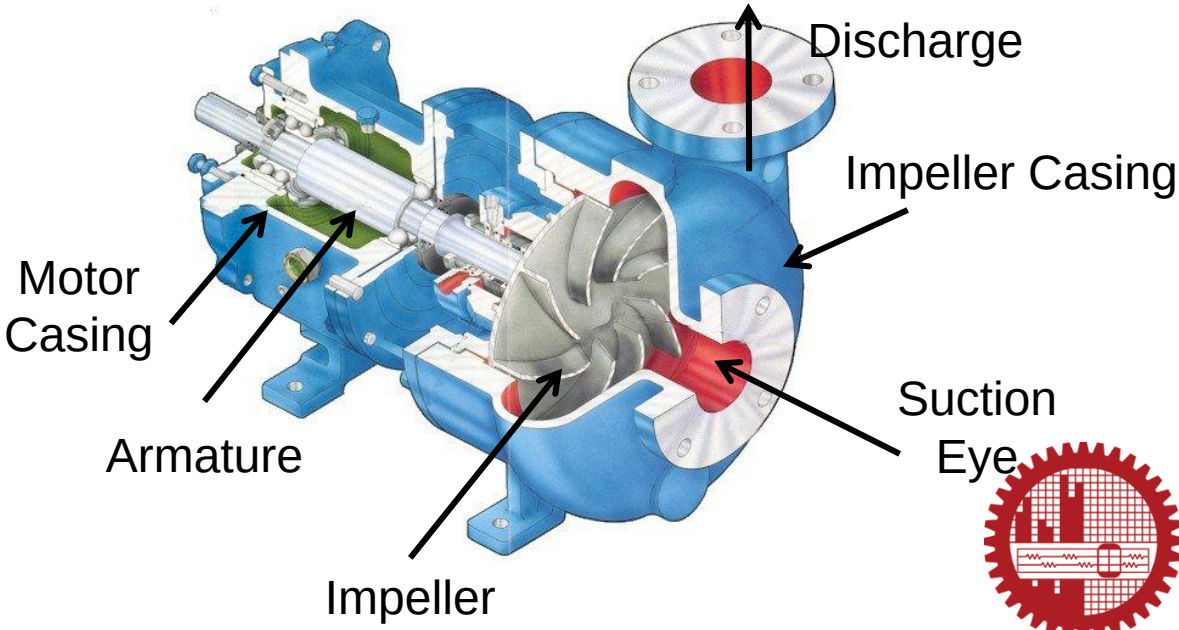
PUMPS

Pump

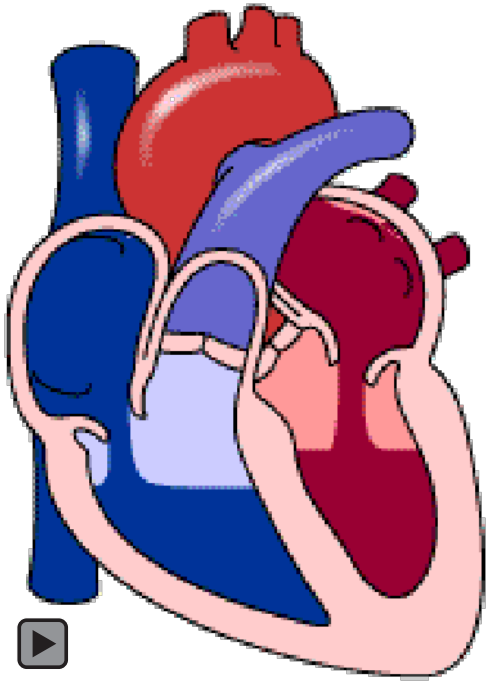
A pump is a mechanical device which transfer energy from an external source to the liquid flowing through a conduit.

Mechanical Energy → Hydraulic energy

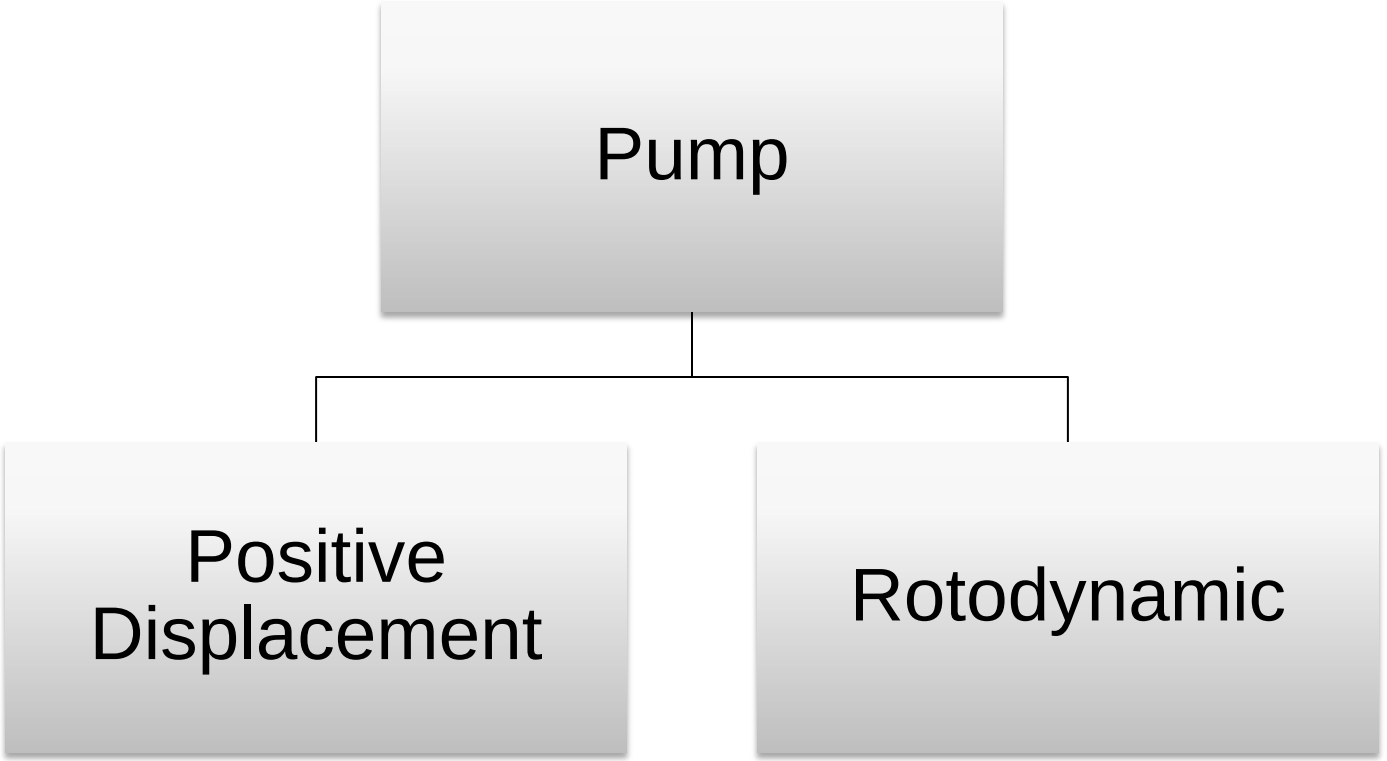




Example of Pumps in Nature

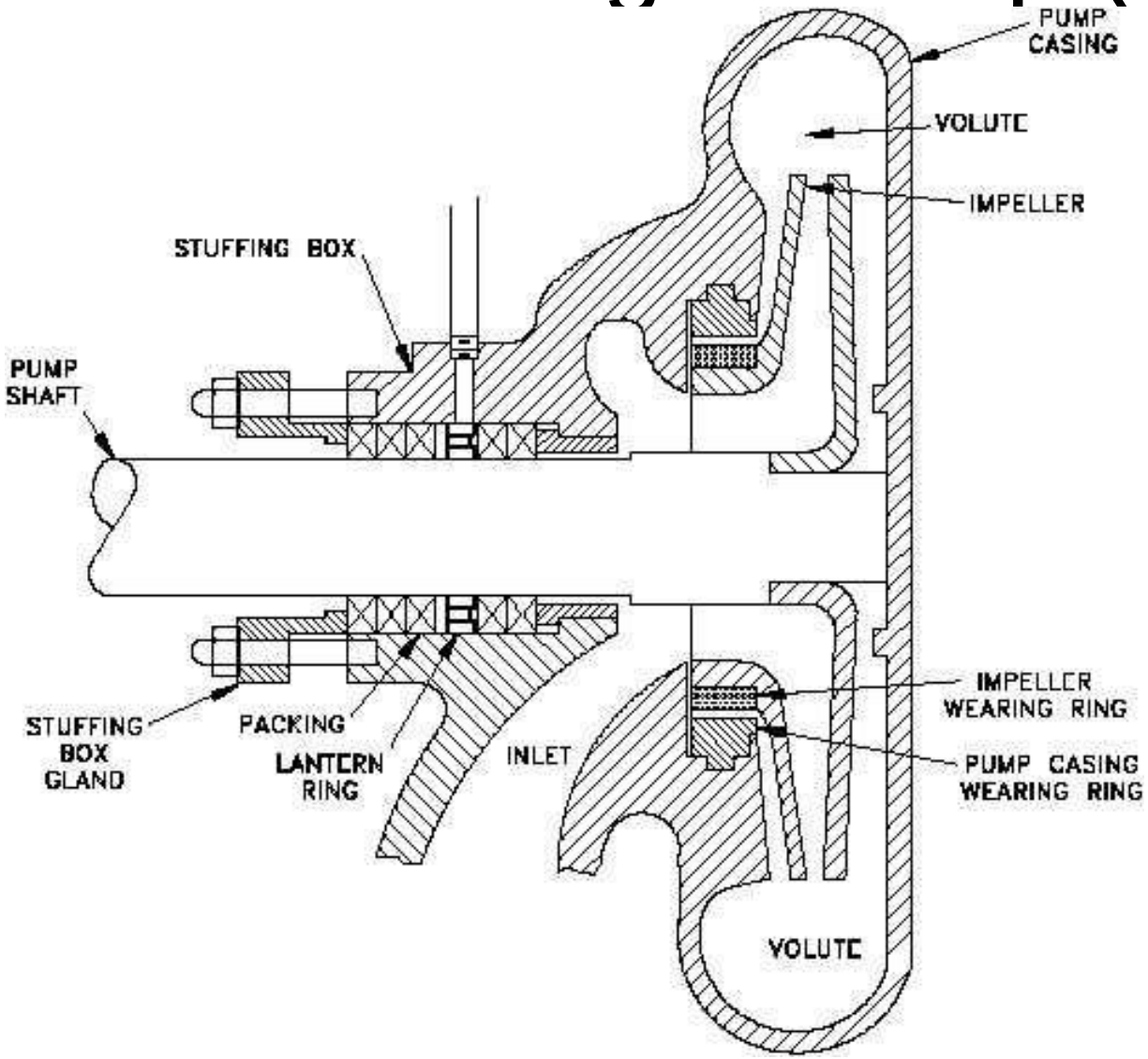


Classification of Pumps

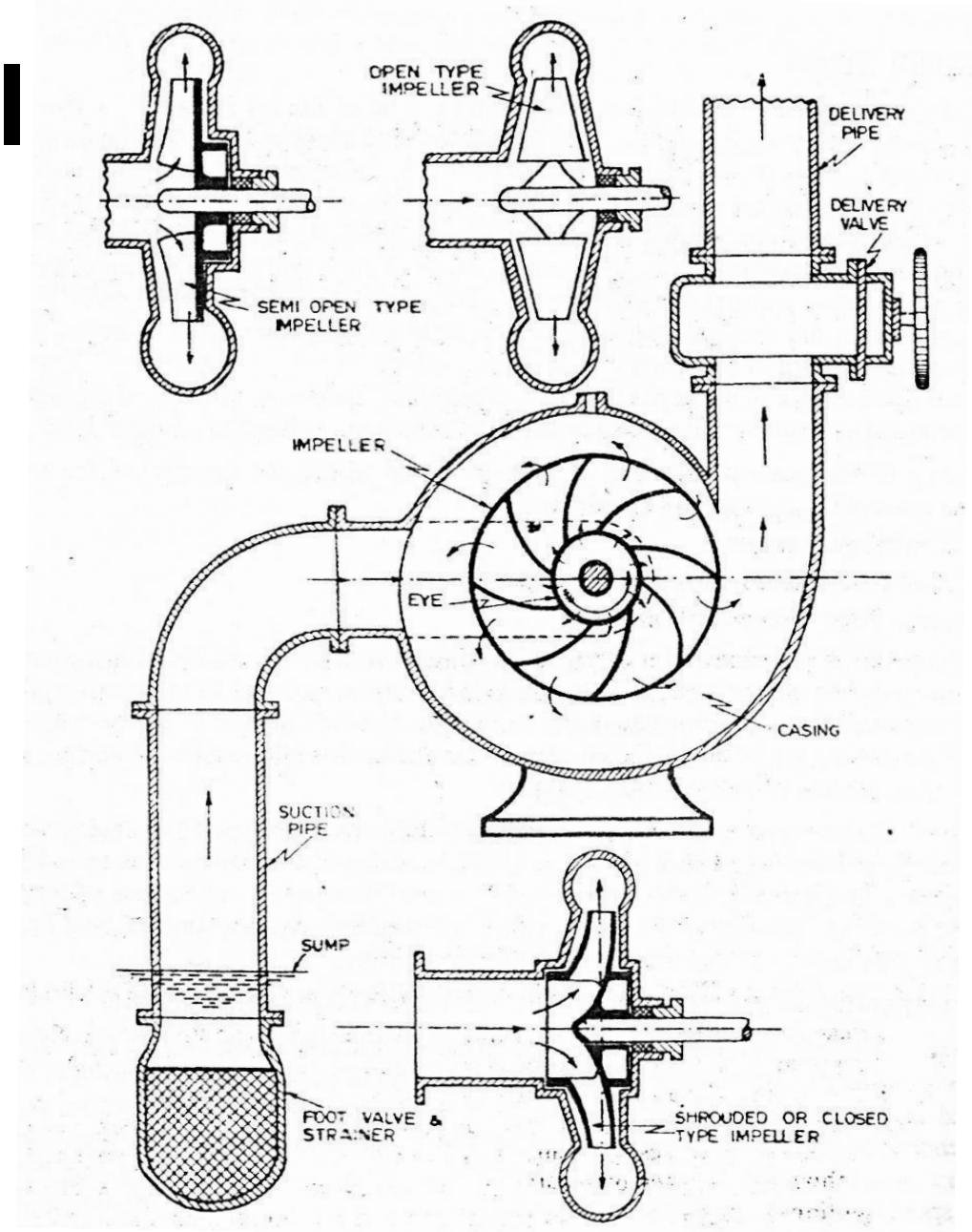


Rotodynamic Pump

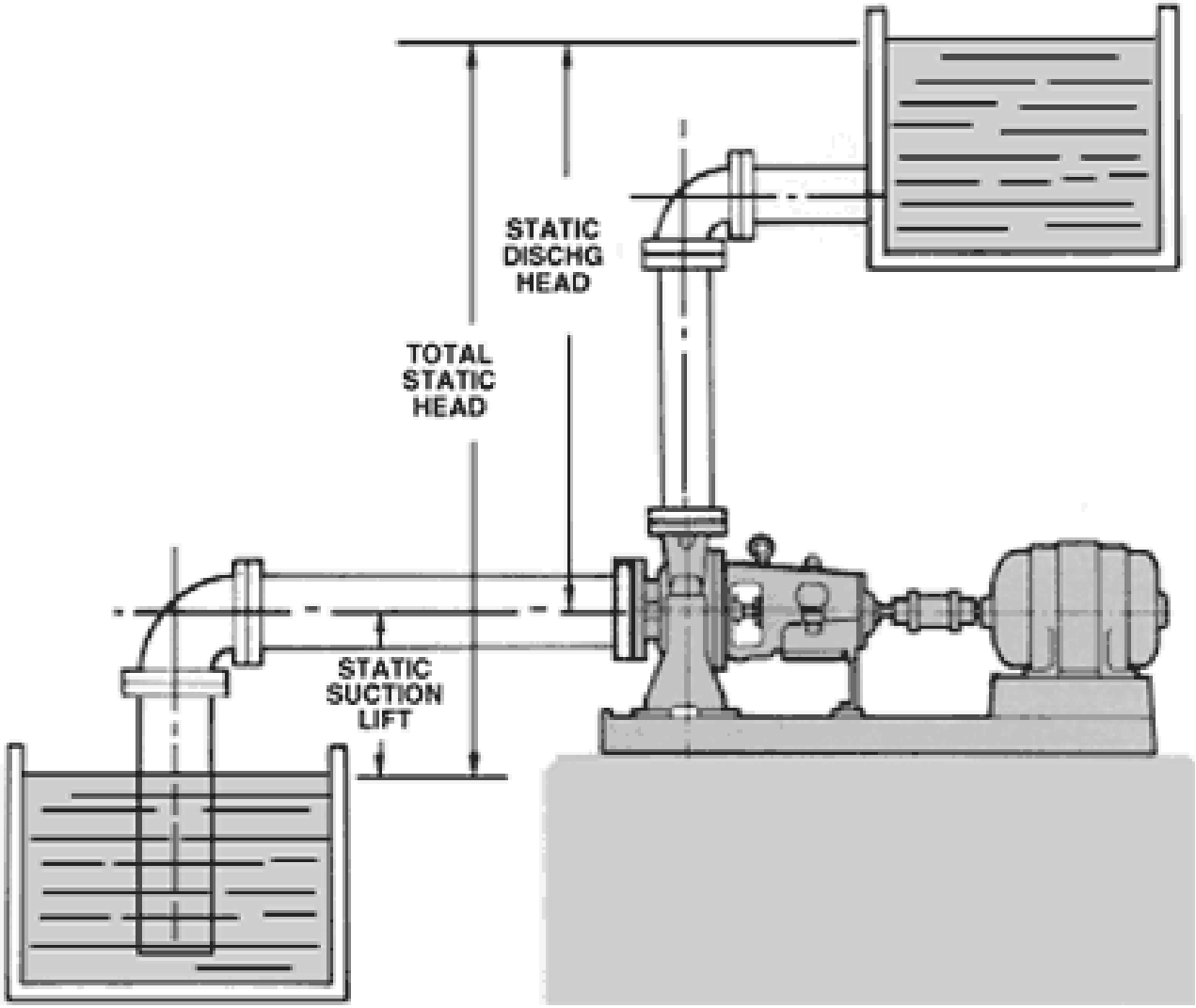
Centrifugal Pump (contd.)



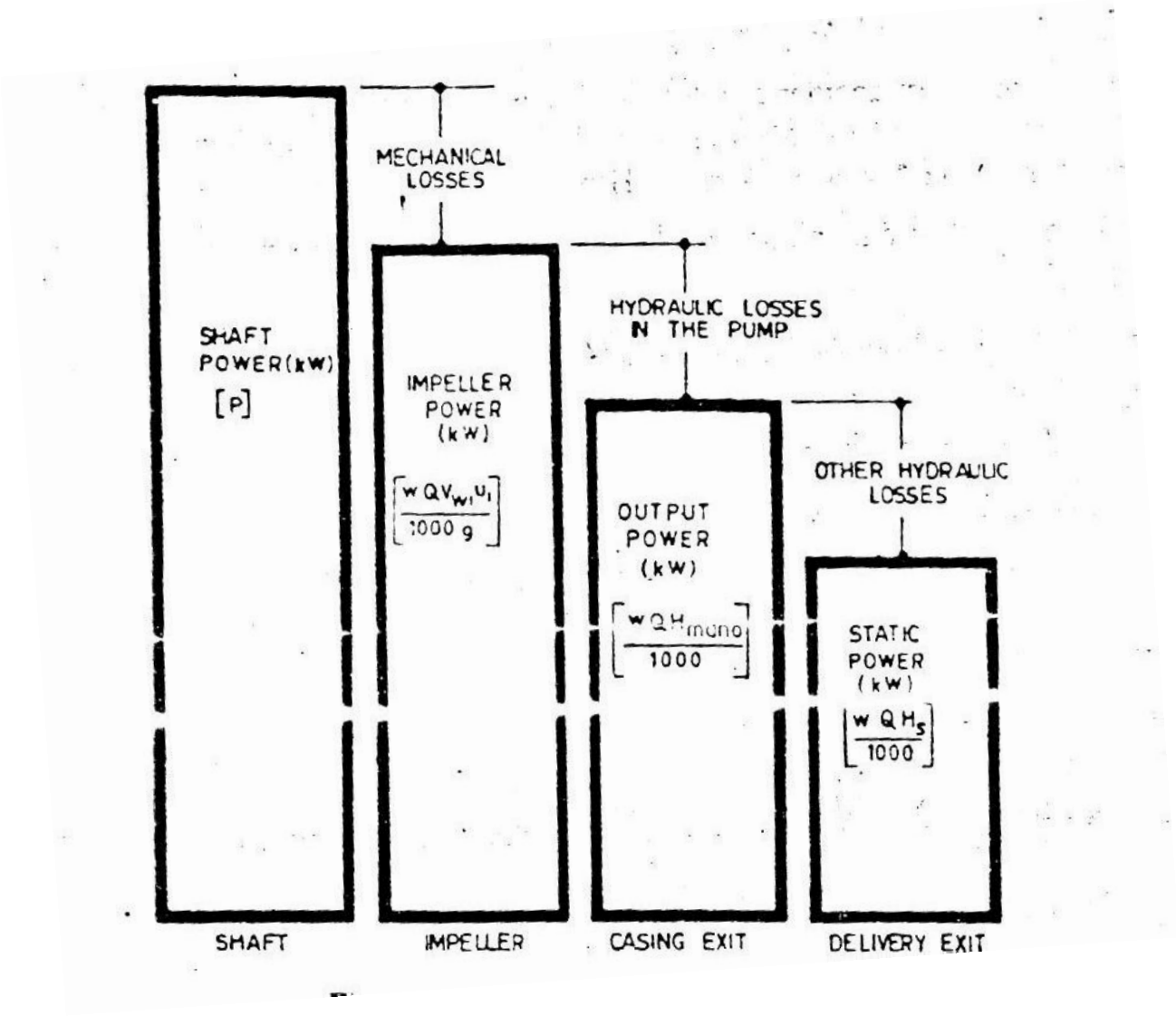
Centrifugal Pump (contd.)



Head of a Centrifugal Pump

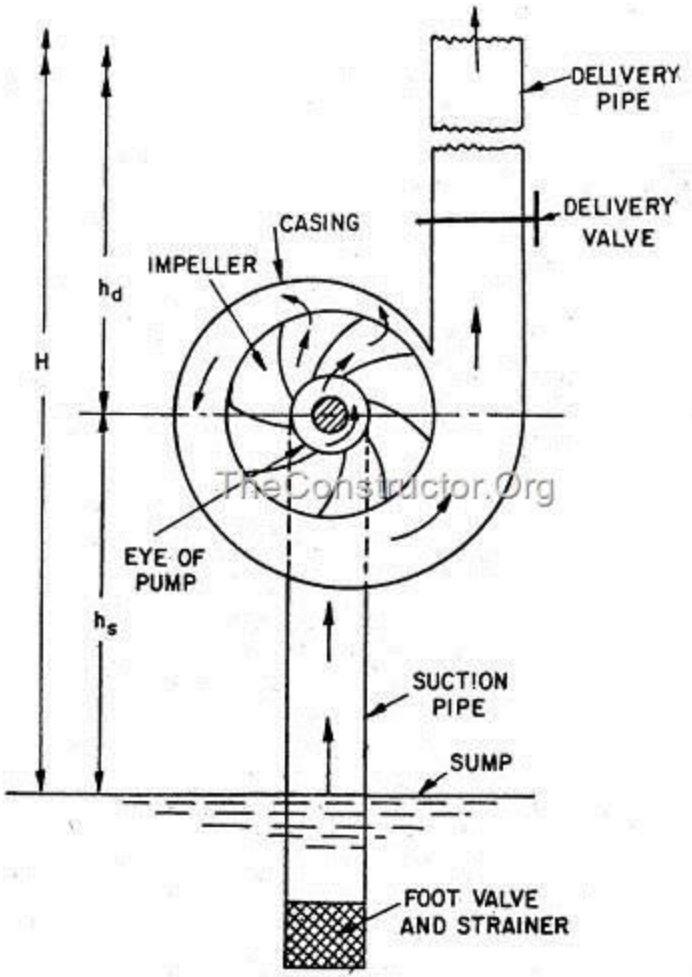


Losses in a Pump



Priming

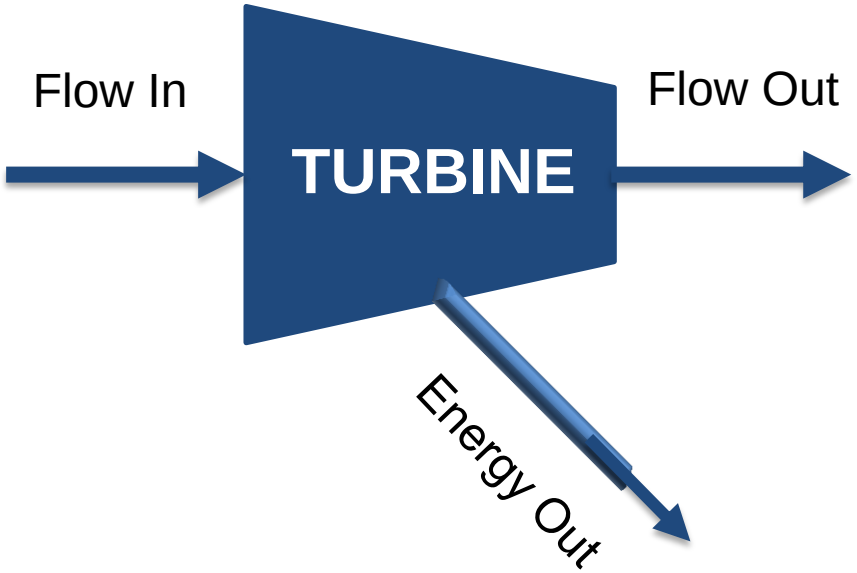
- Density of air is about 800 times smaller than that of water
- Obviously an impeller running in air would produce only a small head.
- The first step in the operation of a centrifugal pump is to fill the pump with the liquid to be pumped.
- This process is called the priming of the pump.
- Priming is done by pouring liquid into the funnel provided for this purpose.



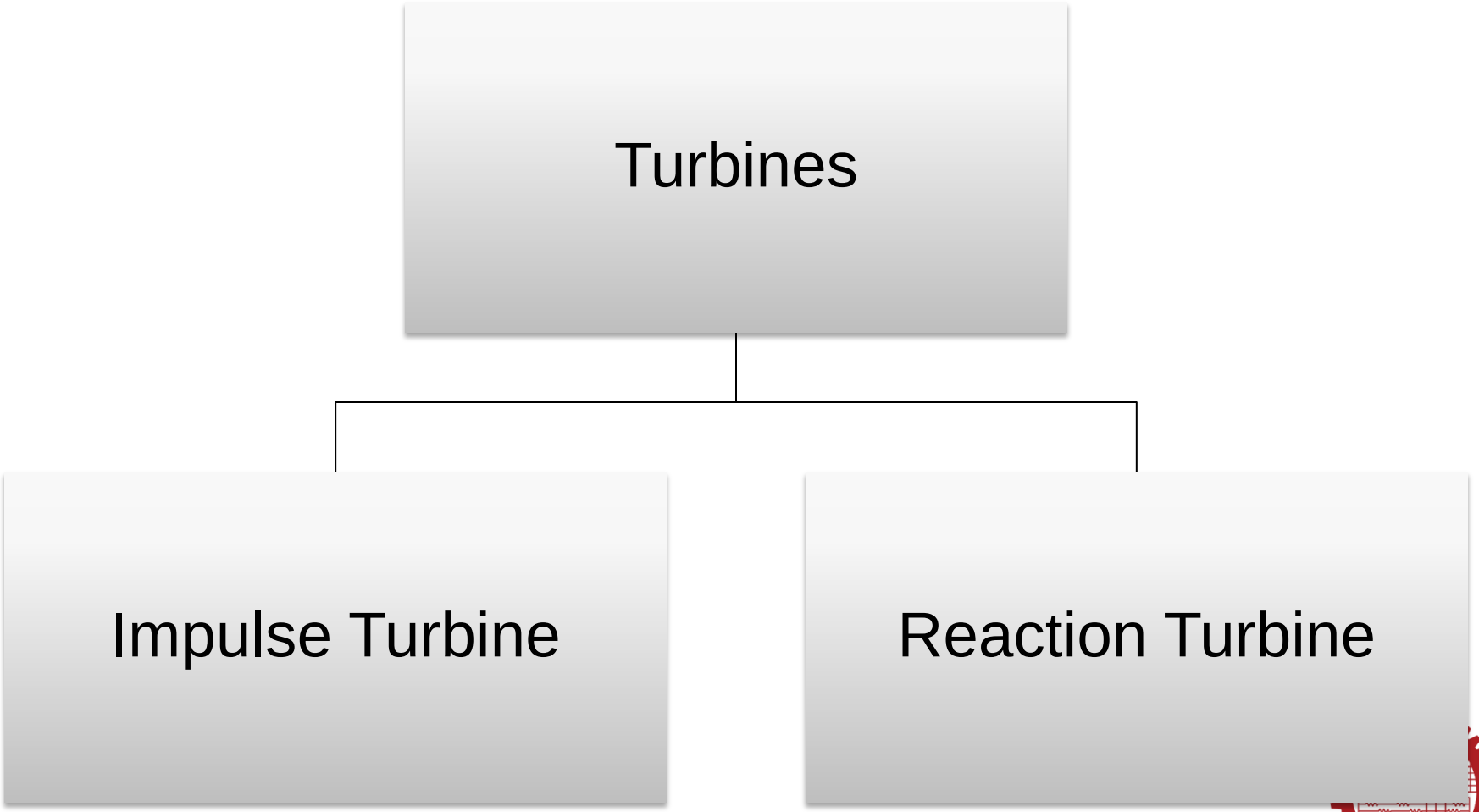
TURBINES

TURBINE

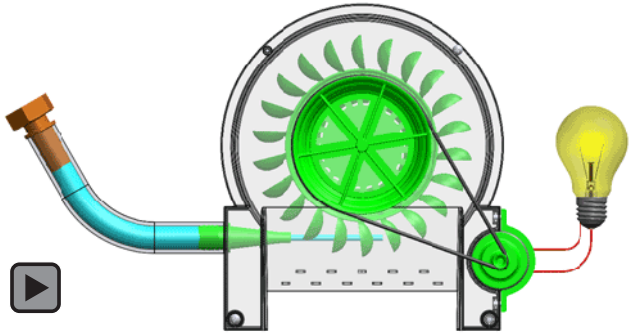
- Turbines are devices that convert the energy of fluid into mechanical energy.
- Water → potential or kinetic energy.
- Steam/Flue → thermal energy

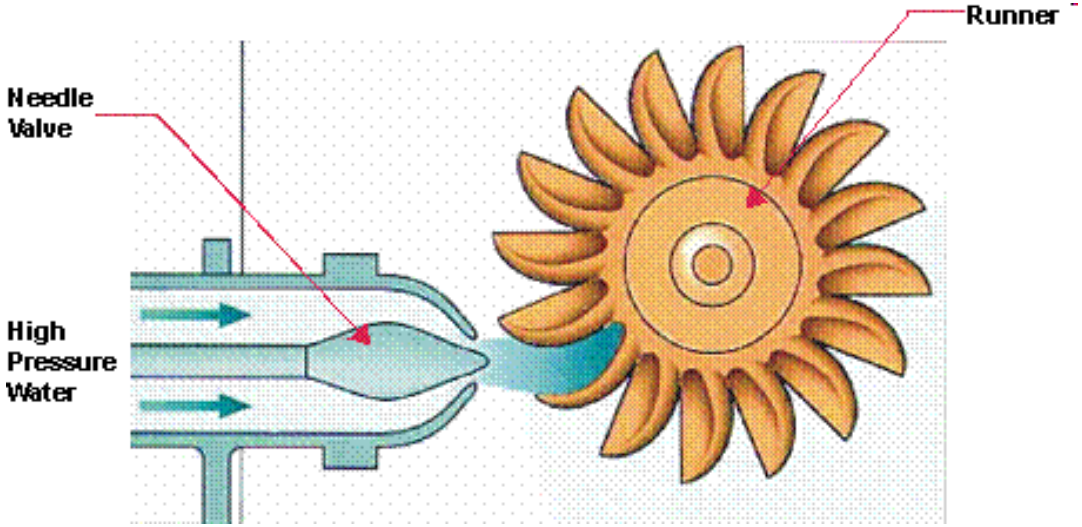


Classification of Turbines



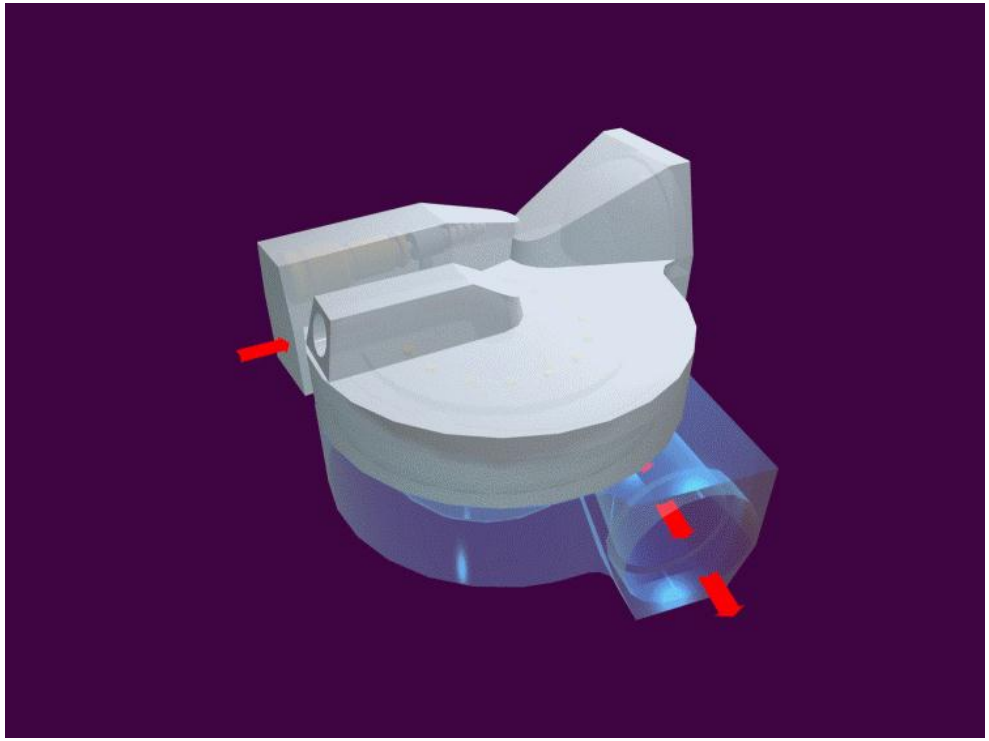
Pelton Wheel

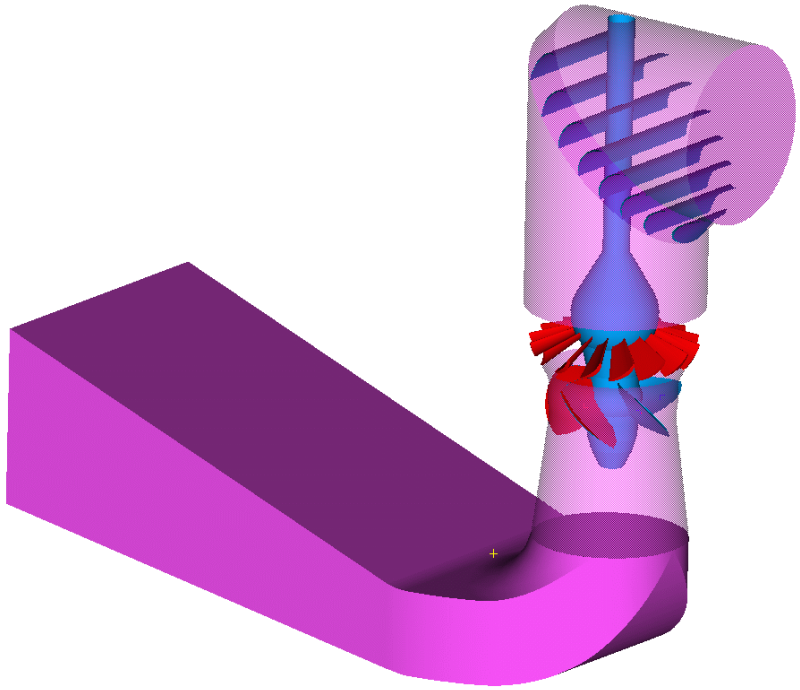




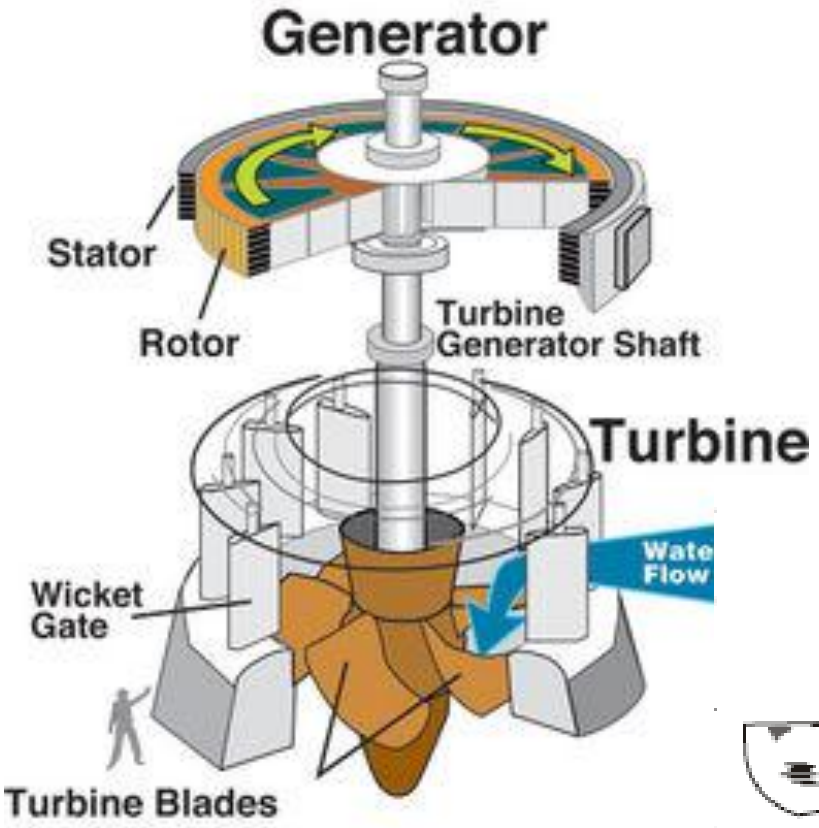
Pelton Wheel (contd.)

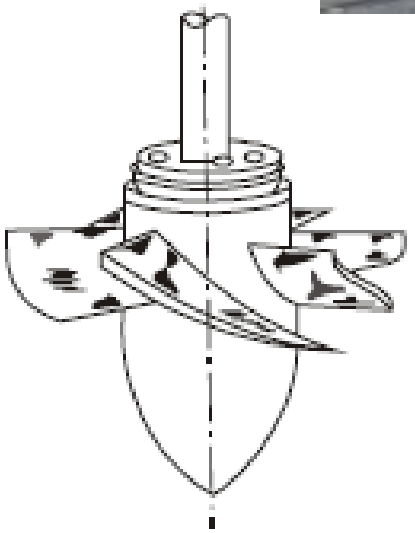
Kaplan Turbine



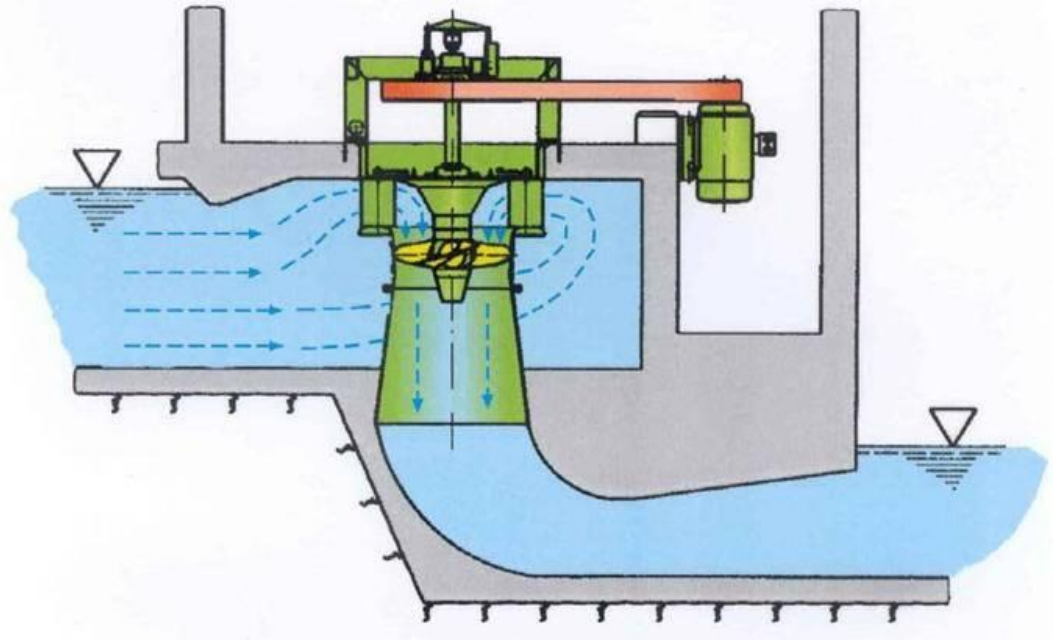


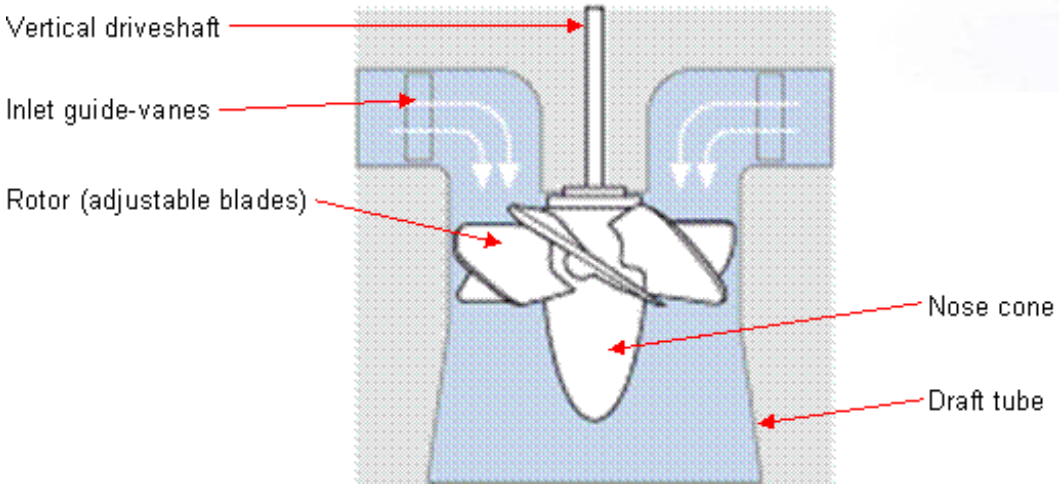
Kaplan Turbine (contd.)



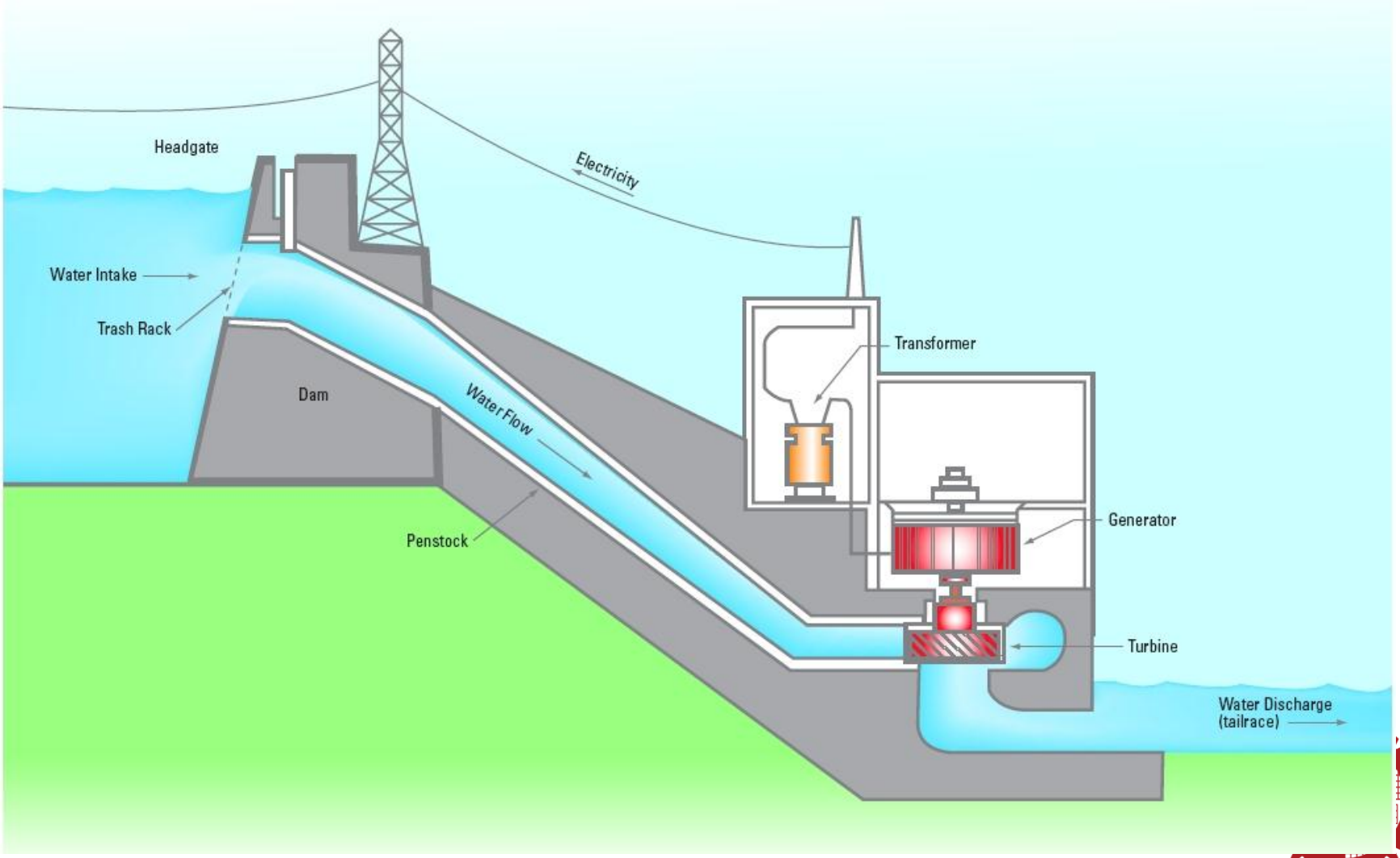


Kaplan Turbine (contd.)

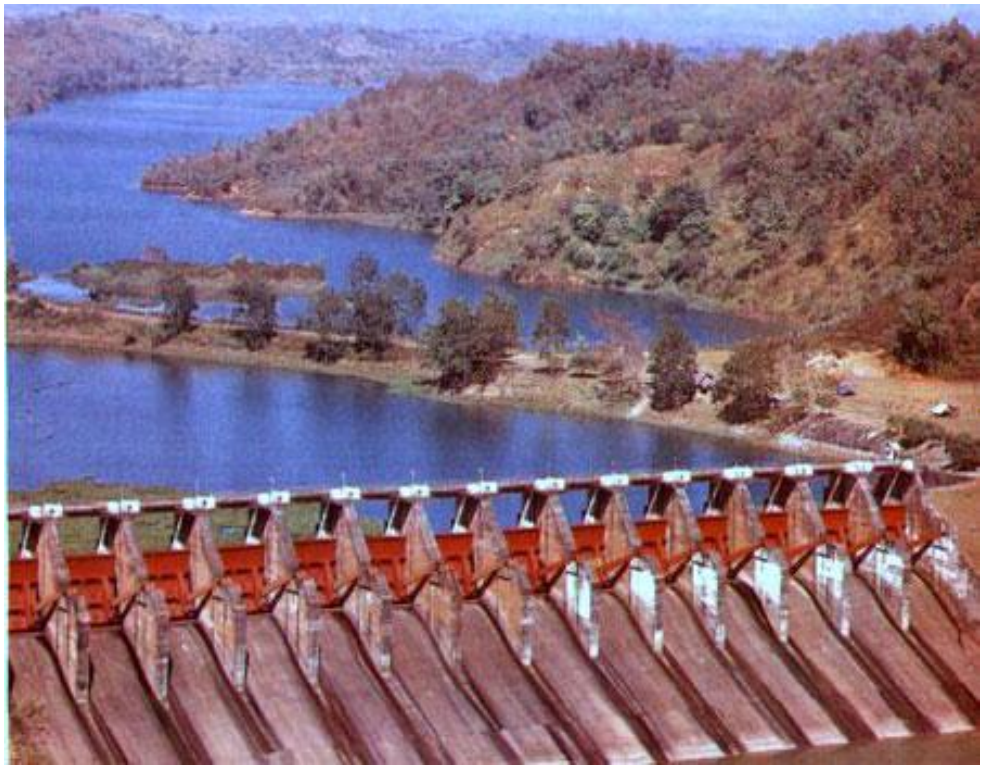




Hydroelectric Power Plant



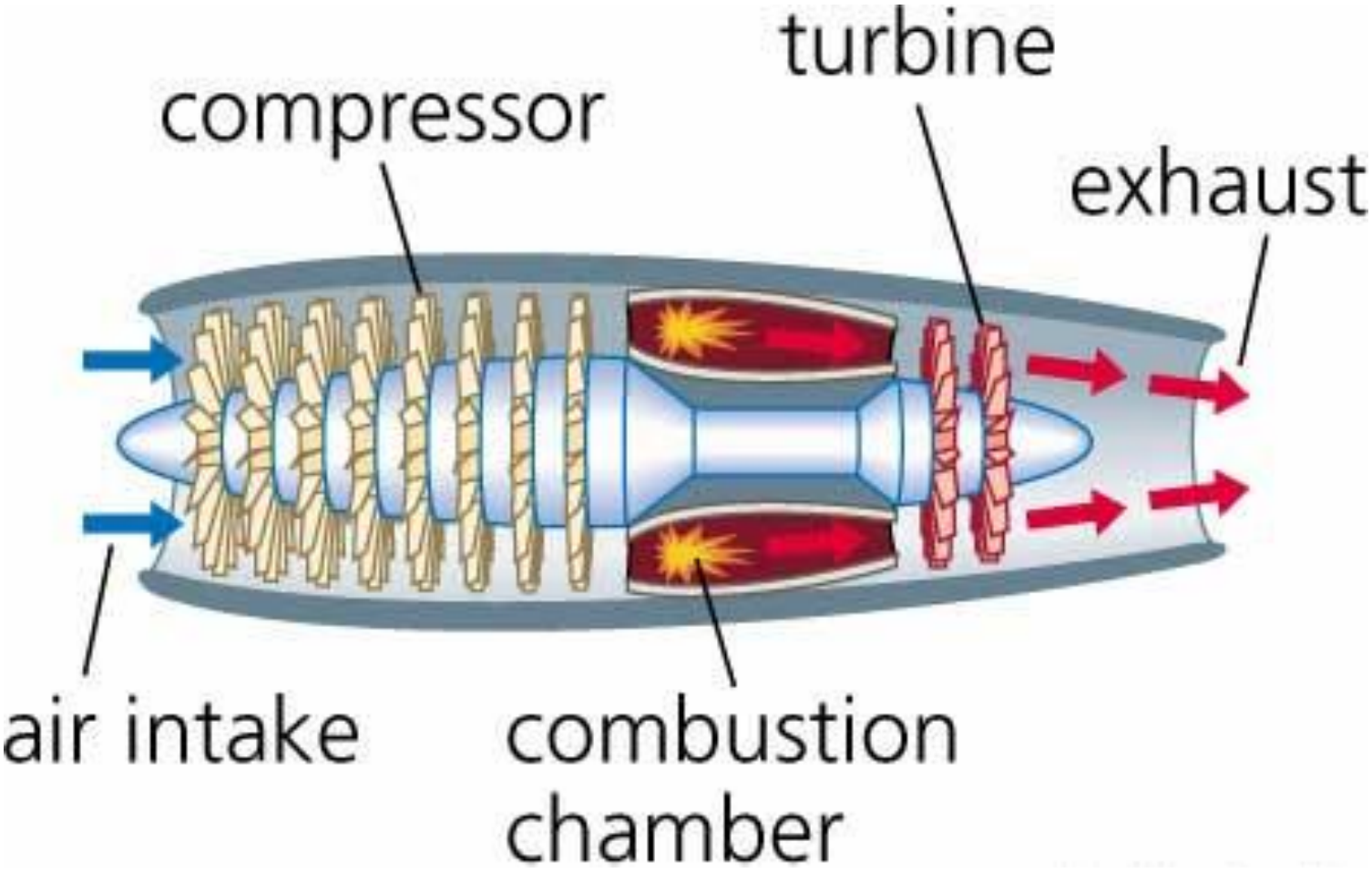
Karnafuli Hydroelectric Power Plant



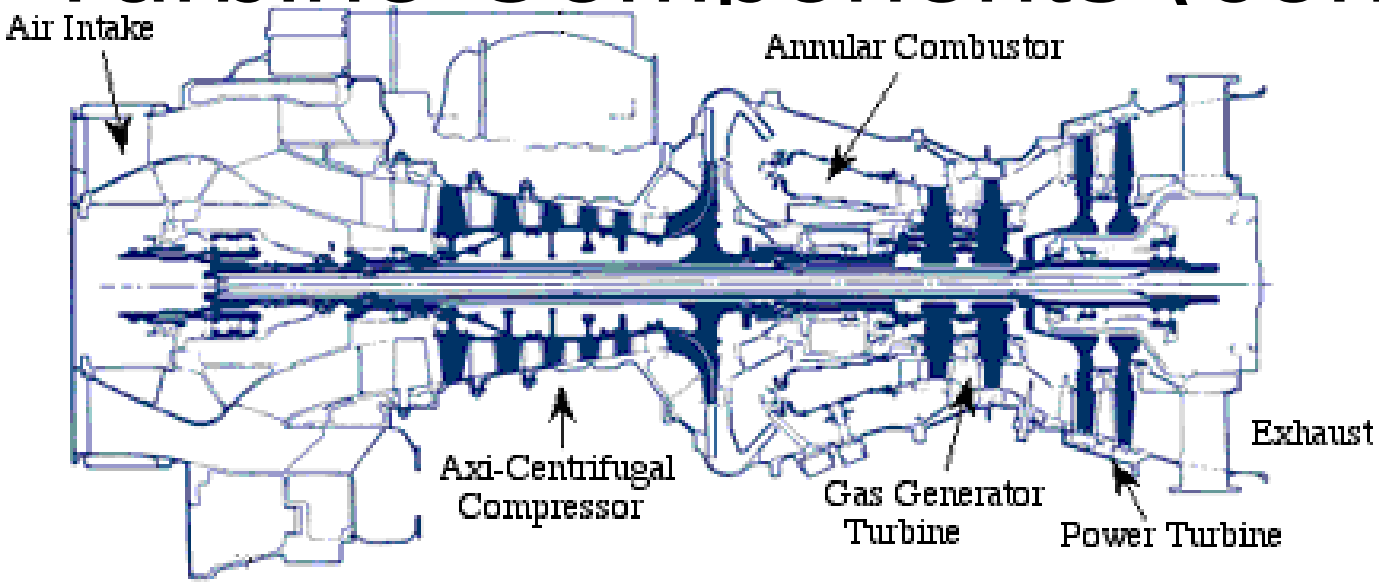
Generation capacity: 230 MW
Reservoir size: 777 sq. km

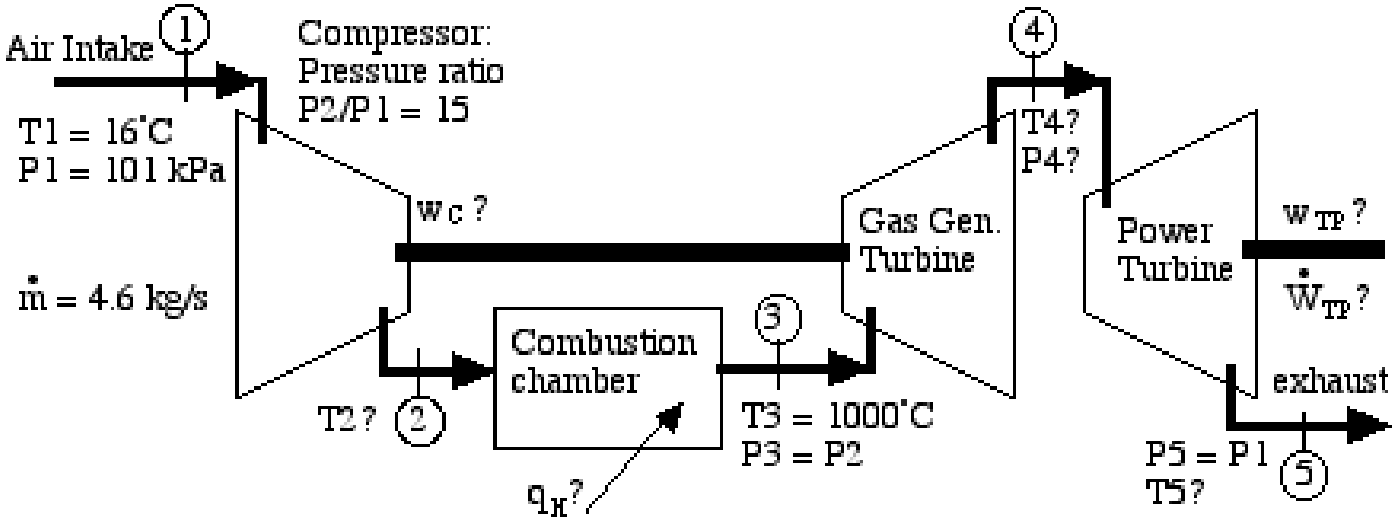
GAS TURBINE

Gas Turbine Components

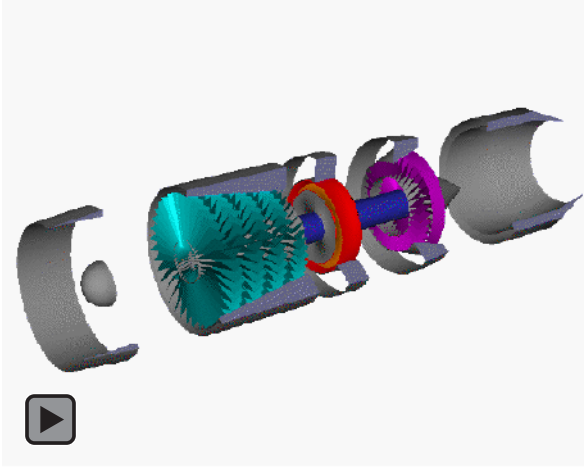


Gas Turbine Components (contd.)

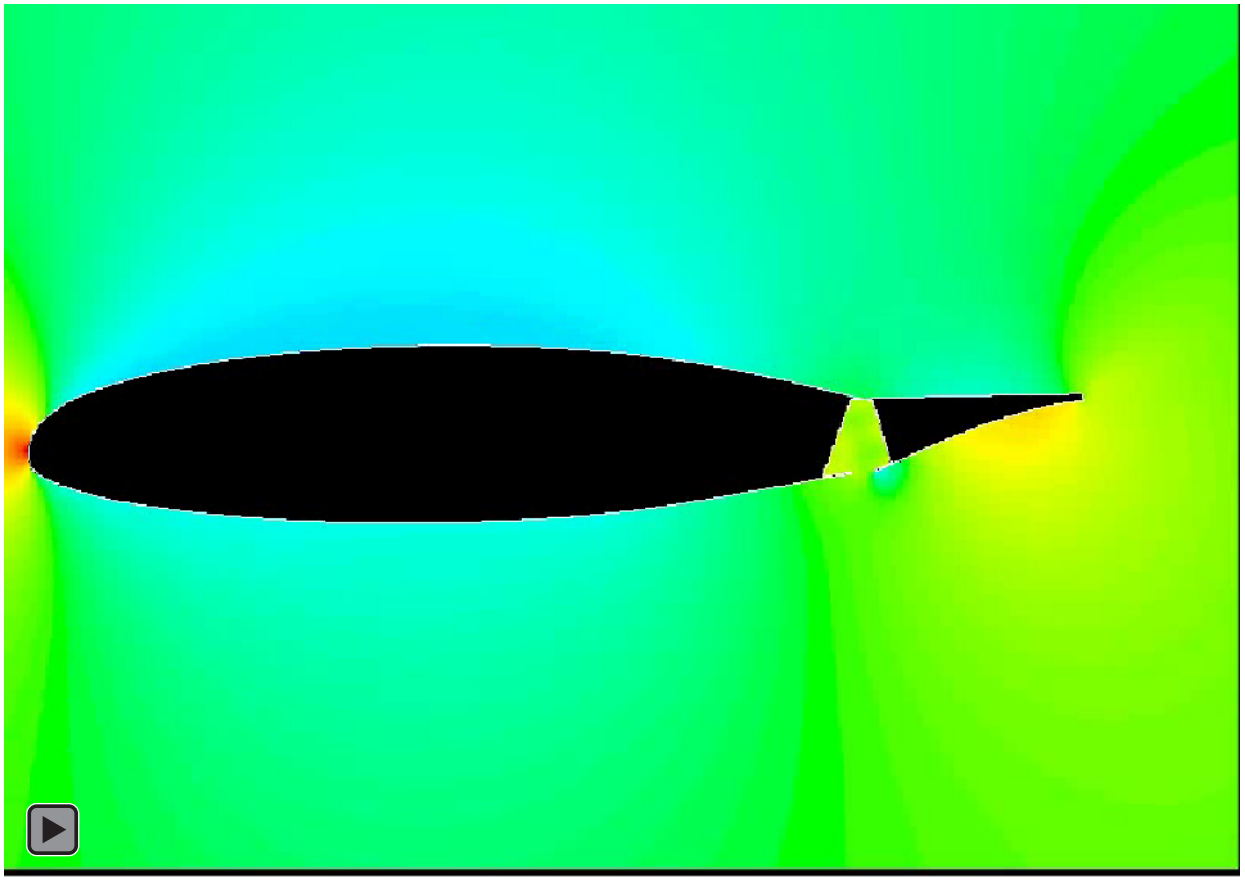




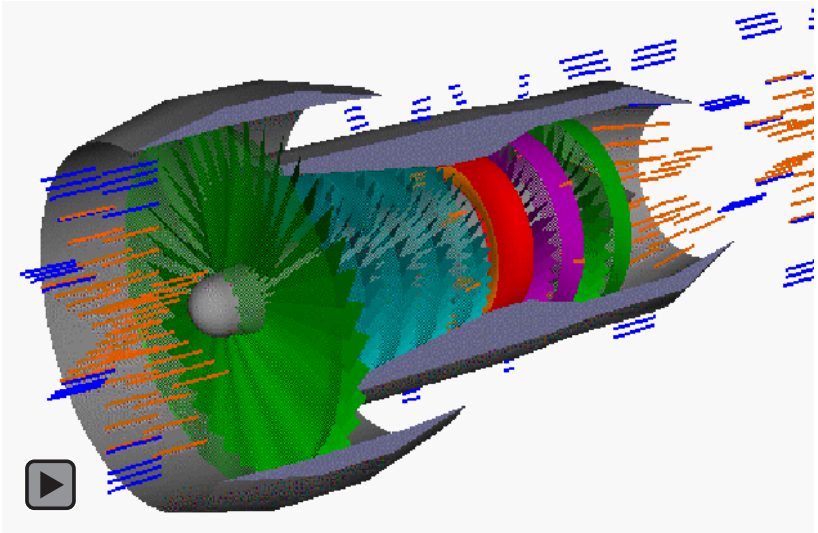
JET ENGINE (Turbo Jet)



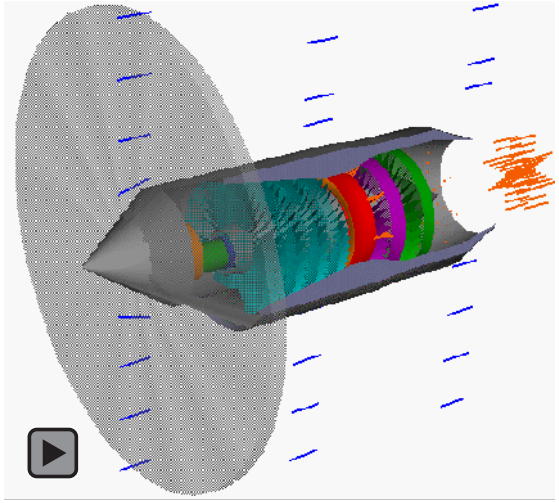
Airfoil



Turbo Fan



Turbo Prop



THANK YOU