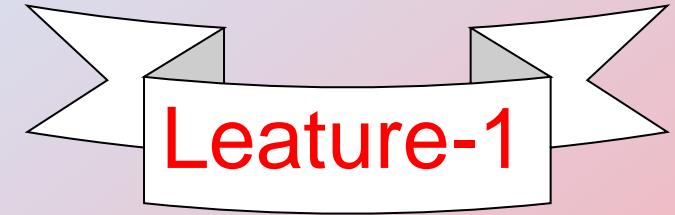


University of Diyala  
College of Engineering  
Mechanical Engineering Dep  
Class: Third Class



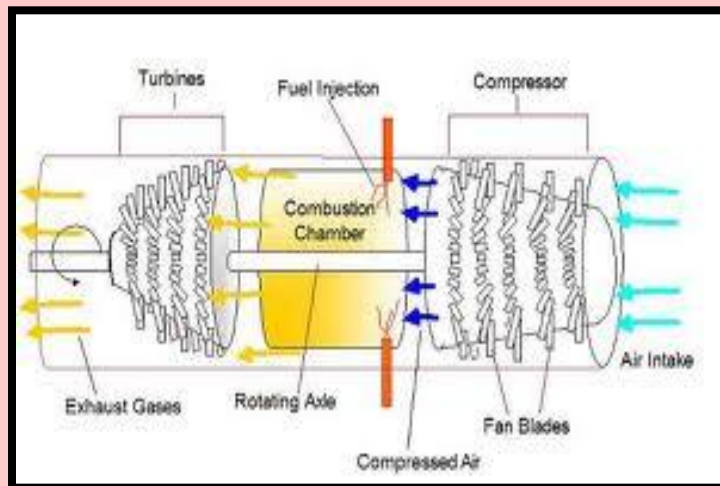
# **Turbomachine**

## **Introduction to Turbomachine**

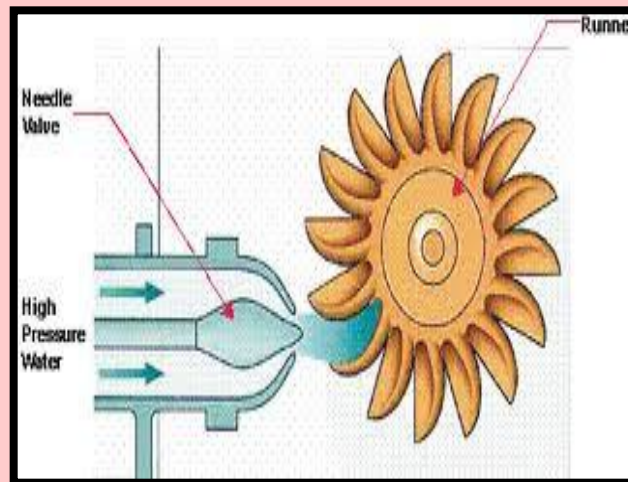
**By**  
**Assistant Lecturer**  
**Layth Abed Hassnawe**

**Turbomachine is defined as a:** device that extracts energy or imparts energy to a continuously flowing stream of fluid by the dynamic action of one or more rotating blade rows.

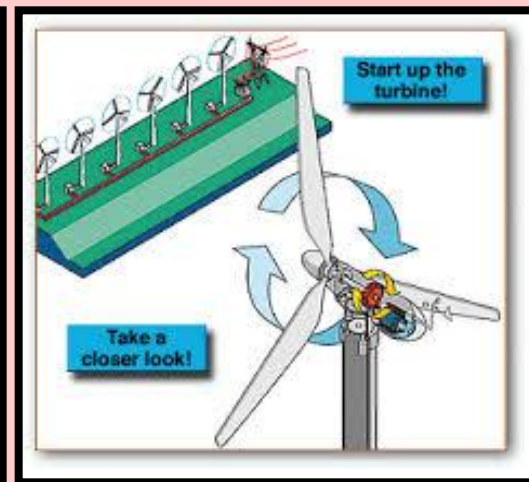
- The machine **adds energy** to the fluid it is commonly called pump
- The machine **extracts energy** from the fluid it is commonly called turbine



Fluid = Gas



Fluid = Water



Fluid = Air

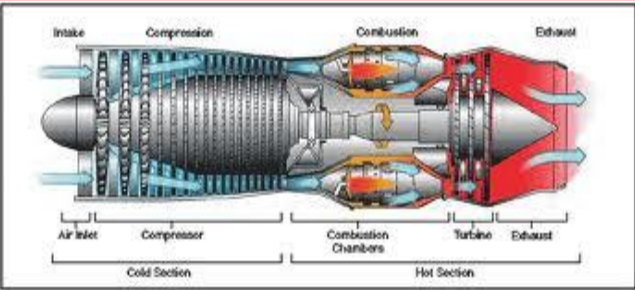
# Classification of TURBOMACHINES

1

## Shrouded & Unshrouded

### *Shrouded turbo machines*

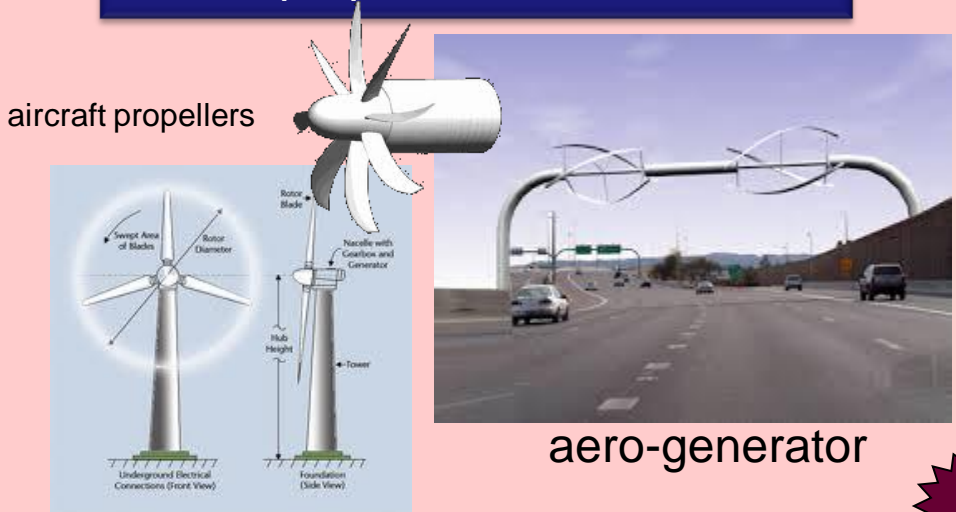
If the rotating member is enclosed in a casing or shrouded in such a way that the working fluid cannot be diverted to the flow around the edges of the impeller, example of this are turbines , pumps



turbines

### *Unshrouded turbo machines*

If the fluid flows around the edges of the impeller which is not shrouded , example of this are wind mill or aero-generator and aircraft propellers

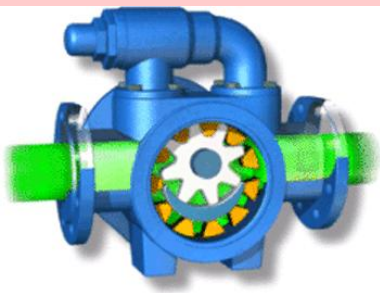


# Classification of TURBOMACHINES

2 Works

Work is done on the fluid

If the work is done by the rotating member on the fluid. Example (pump, compressor)



pump



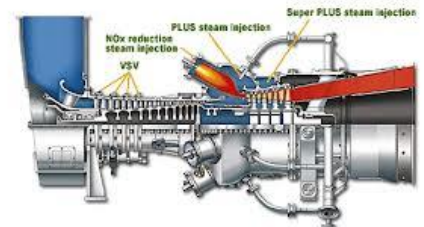
Compressor

Work is done by the fluid

If the work is done by the fluid on the rotating member. Example (Hydraulic Turbine, Gas Turbine)



Hydraulic turbine



Gas turbine



# Classification of TURBOMACHINES

3

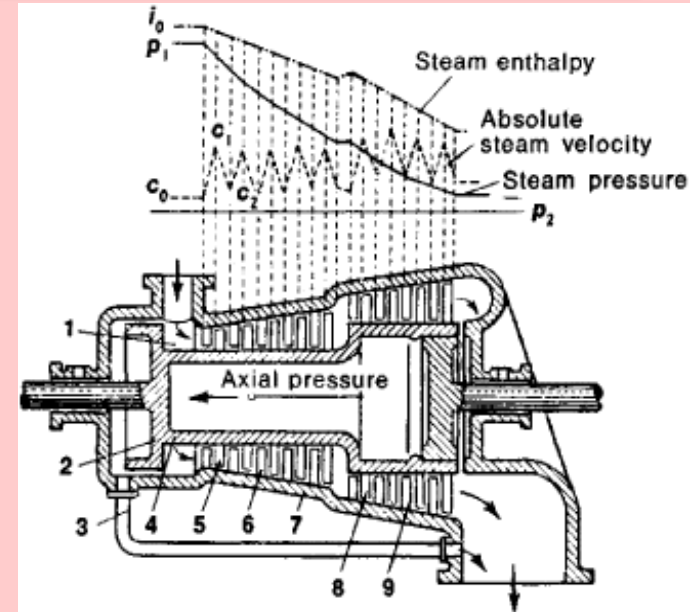
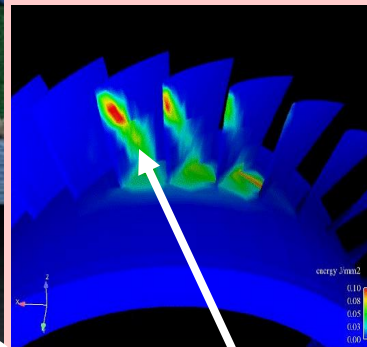
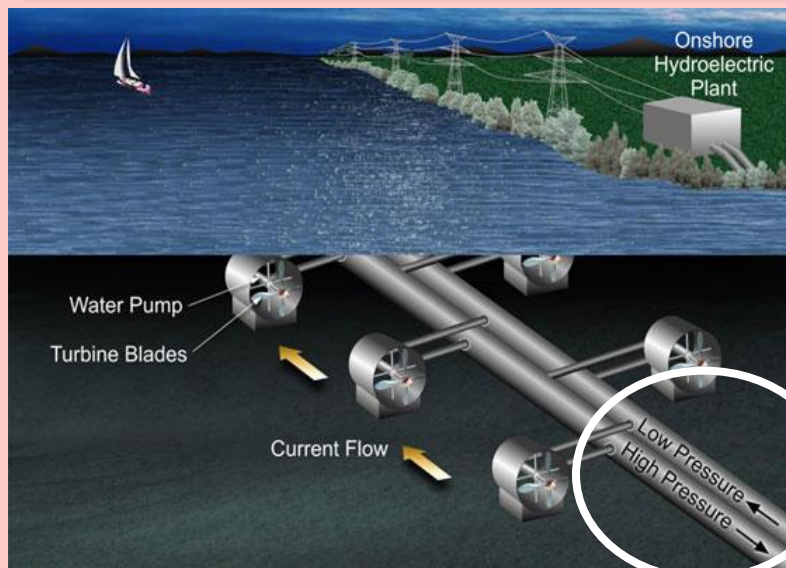
Energy Transfer

## Energy transfer from rotating blades

In the work absorbing machines the fluid pressure and enthalpy increases from inlet to outlet. For example the Head (in the case of hydraulic machines) the fluid pressure and enthalpy increases from inlet to outlet.

## Energy transfer to the rotating blades

In the work delivering machines the fluid pressure and enthalpy decreases from inlet to outlet



# Classification of TURBOMACHINES

4

Direction of flow

## Axial flow machine

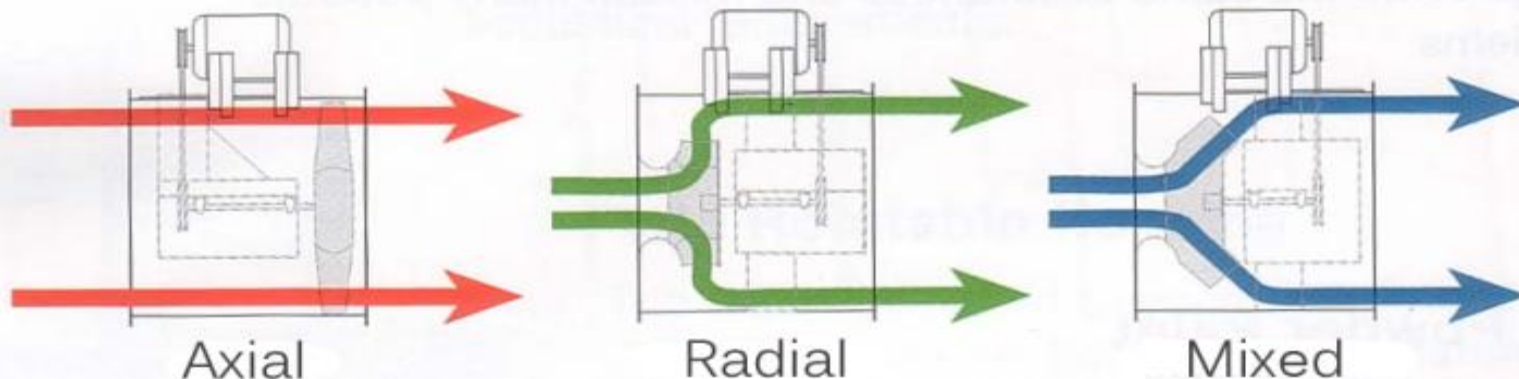
If the flow is axial with rotating member

## Mixed flow machine

If the flow is partly axial and partly radial with rotating member

## Radial flow or centrifugal machine

If the flow is only with rotating member



## Notes:

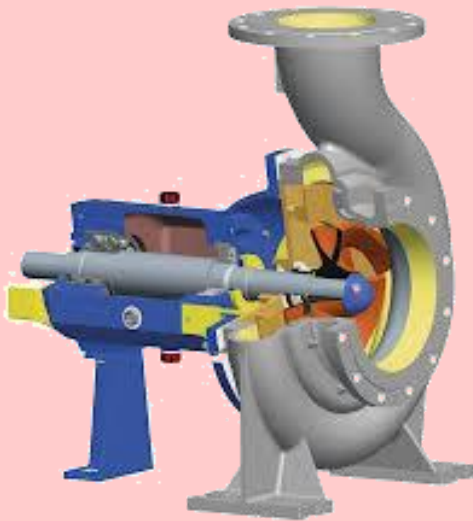
1- A device which pumps liquids is simply called a pump.

2- If the pump gases, then three different terms may be used upon the pressure rise.

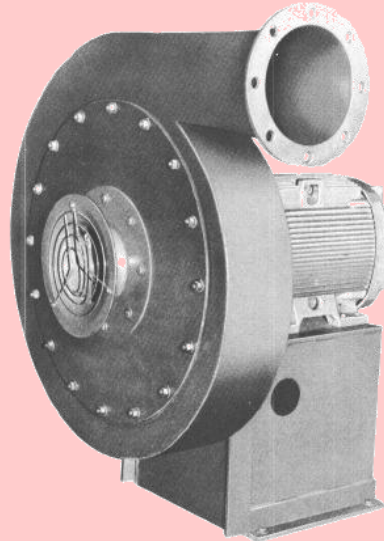
2-1 nearly 0.07 bar pressure rise , the device is called a **fan**.

2-2 between 0.07 and 3 bar absolute pressure it is called a **blower**.

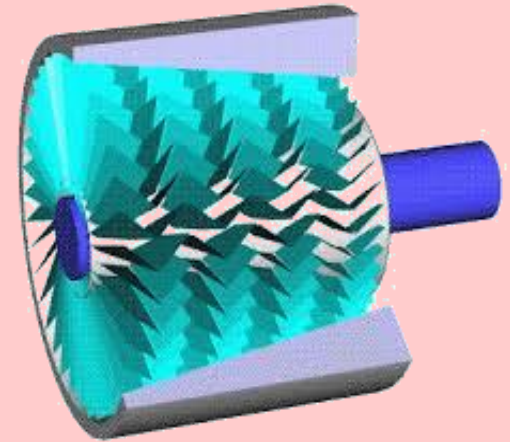
2-3 above 3 bar absolute pressure is called a **compressor**.



Pump-Fluid Water



Blower-Fluid Air



compressor- Fluid gas



The machine **extracts energy** from the fluid it is commonly called turbine

## Types of turbines

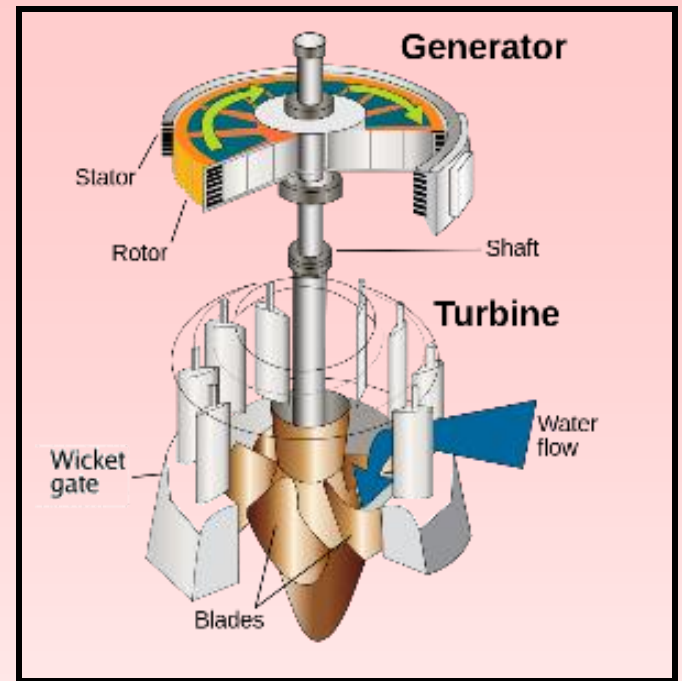
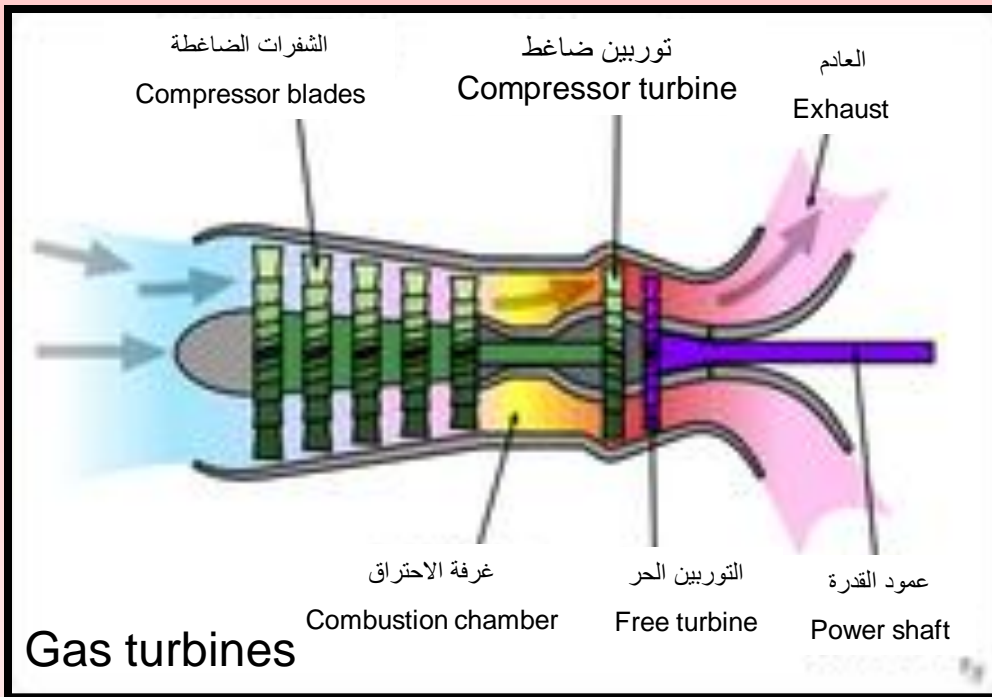
Classification of the turbines ‘depending on the type of fluid administered  
‘According to this classification ‘there are four types of turbines:

- 1- watery turbine.
- 2- Steam turbine.
- 3- Gas turbine.
- 4- Wind turbine.

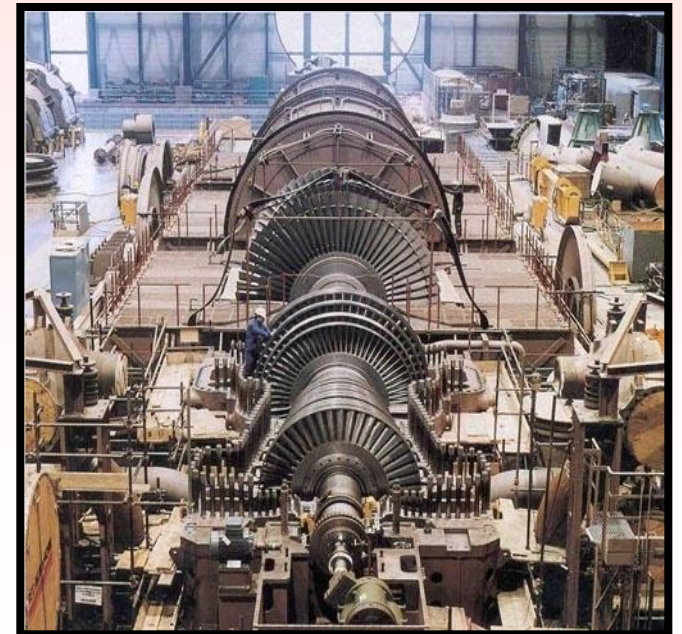
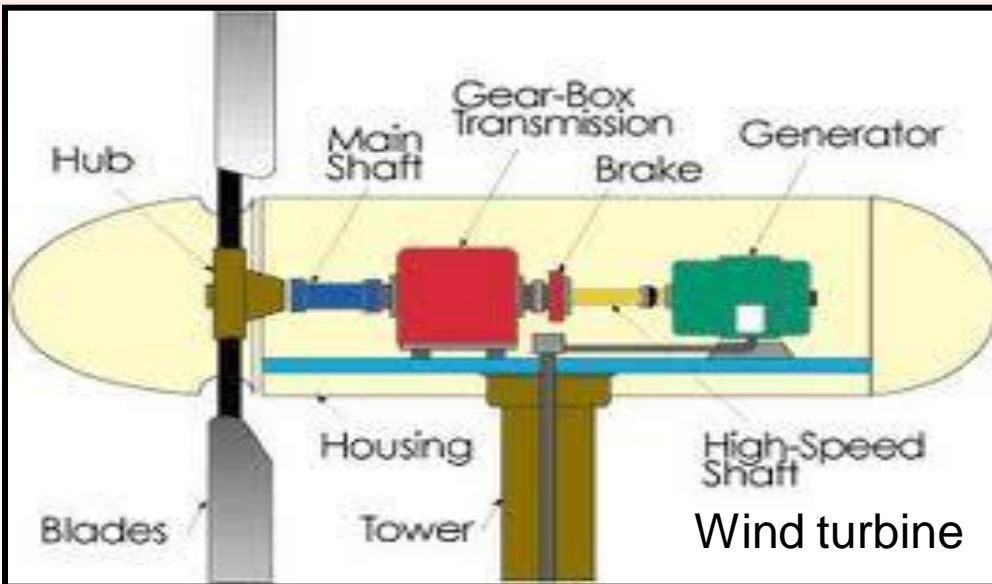
the difference between the turbo machine and the positive displacement machine is

- 1- the fluid is moving continuously across the machine .
- 2- The fluid enters a closed chamber for a very short period of time
- 3-Isolated from the inlet and outlet sections
- 4-The work is done on or by the fluid.





water turbine



Steam turbine