

# STUDY OF TURBINE

Ex No. :

Date:

Aim :

To study the working of various types of steam turbines .

**Study of steam turbines:**

**Introduction:**

A steam turbine is rotary machine which is designed to convert the energy of high temperature steam into mechanical power. In this the steam is first expanded in a set of nozzles or passages upto exit pressure where in the pressure energy of steam is converted into kinetic energy.

**Classification of Steam Turbine :**

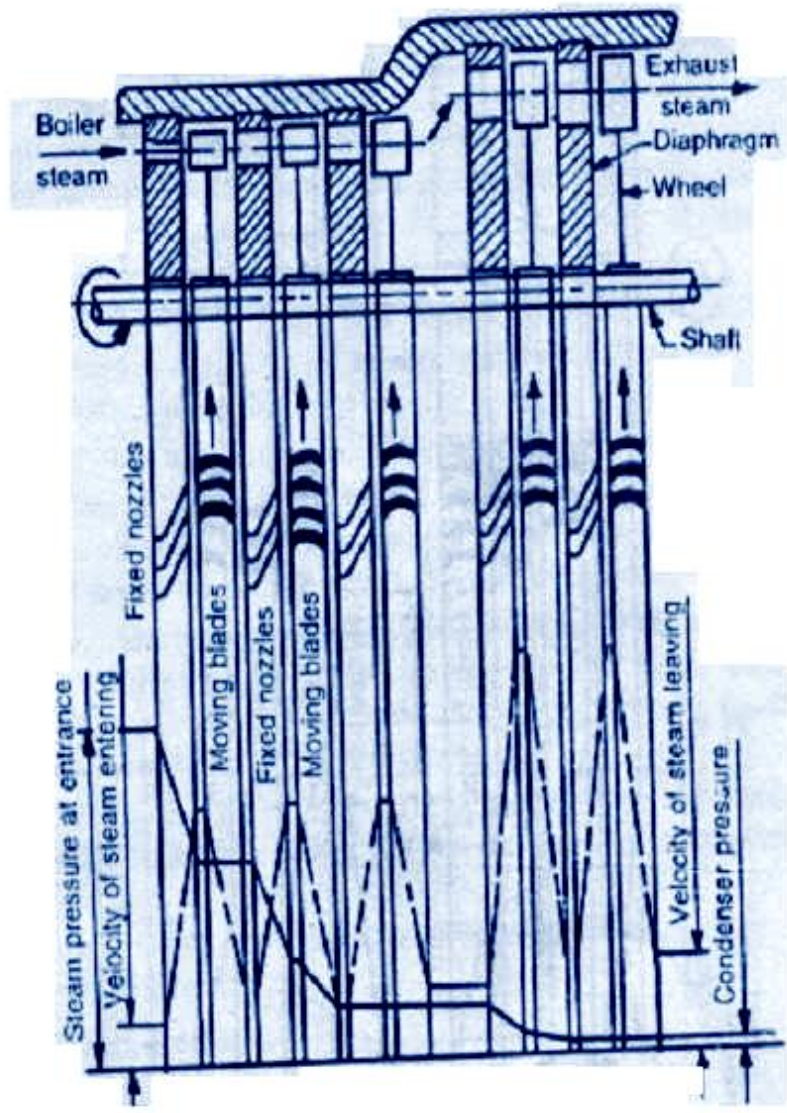
Steam turbines are classified according to :

1. Principle of action of steam
  - a. Impulse turbine
  - b. Reaction turbine
2. Direction of steam flow
  - a. Axial
  - b. Radial
  - c. Tangential
3. Number of pressure stages
  - a. Single stage
  - b. Multi stage
4. Method of governing
  - a. Throttle
  - b. Nozzle
  - c. By-pass
  - d. Combination of throttle , nozzle by pass

**Impulse Turbine:**

**Velocity compound impulse turbine (Curtis Turbine)**

Arrangement of velocity compounded impulse turbine is shown in fig. In this type of turbine steam expands in a set of nozzle from the boiler pressure upto the condenser pressure which converts its pressure energy into kinetic energy. This high velocity steam is passed over the rings of moving blades, each ring of moving blades being separated by a ring of fixed



Pressure Compounding

blades. A part of high velocity steam is absorbed in the first ring of moving blades and remaining in the first ring of moving blades is passed to next ring of fixed blades. The function of fixed blades is to change the direction of flow of steam so that it can guide over the second ring of moving blades. The velocity of steam while passing over the fix blades is particularly constant except last for overcoming the friction losses . Again a part of steam velocity is absorbed in the second ring of moving blades & the process of absorbing the steam velocity continues till it finally wasted in exhaust.

### **Pressure compounded Impulse Turbine(Rateau Turbine)**

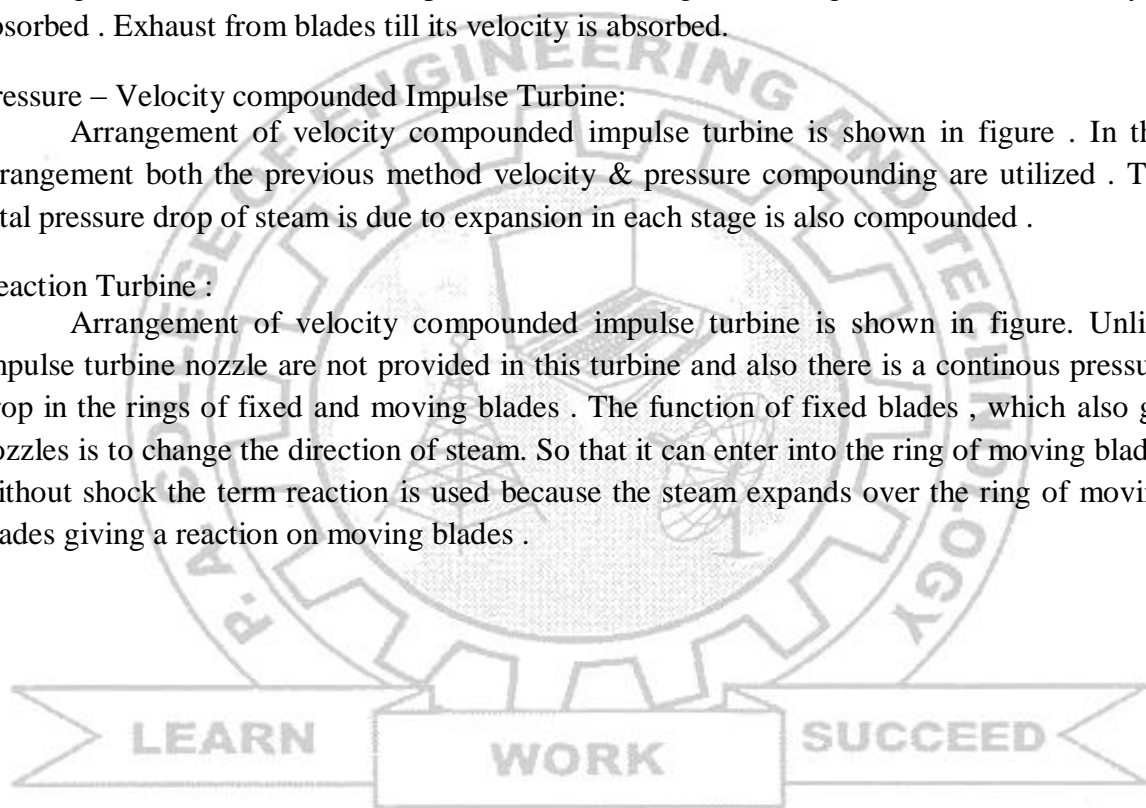
Arrangement of velocity compounds impulse turbine is steam is shown in fig . In this type of turbine the total pressure drop does not take place in a single ring of nozzle, but it is divided up in between the set of nozzle ring steam from the boiler is partially expanded in the first ring of nozzle and then it is passed over the ring of moving blades till its velocity is absorbed . Exhaust from blades till its velocity is absorbed.

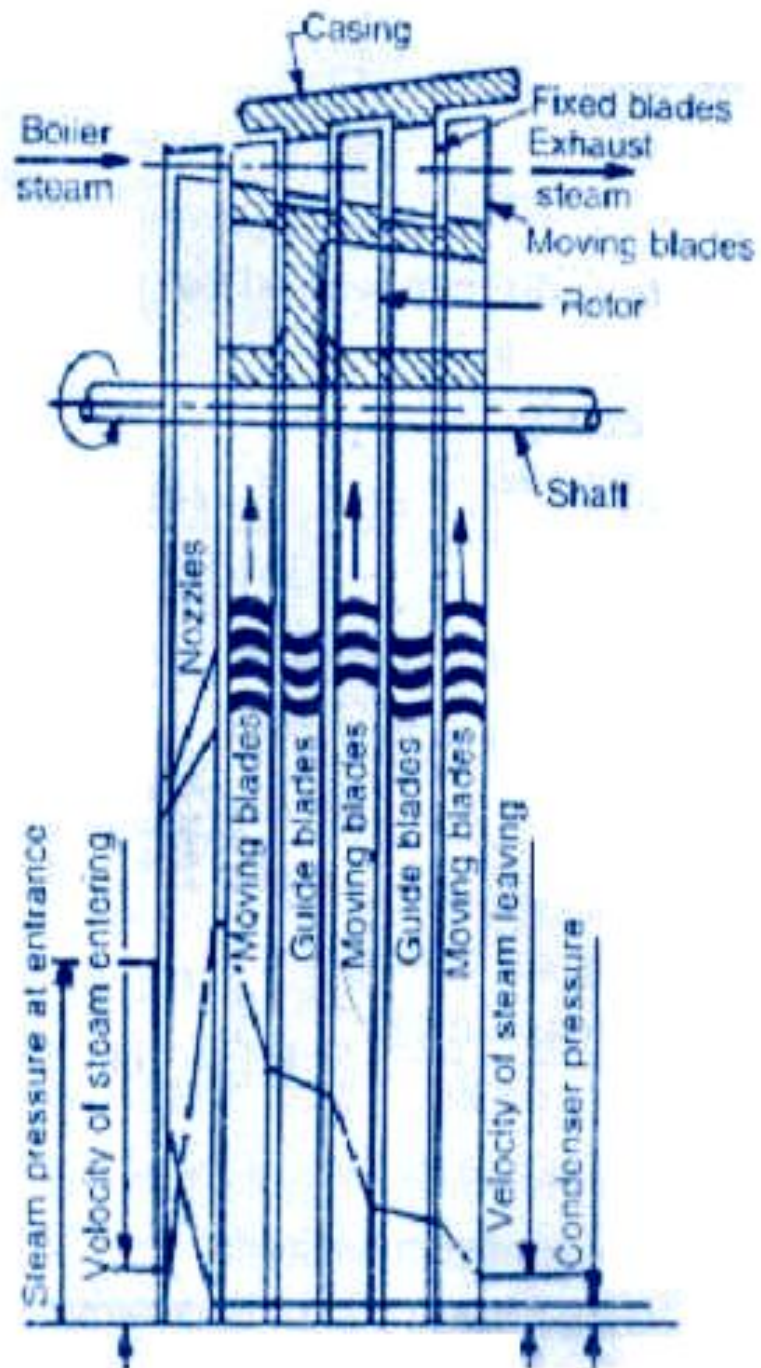
Pressure – Velocity compounded Impulse Turbine:

Arrangement of velocity compounded impulse turbine is shown in figure . In this arrangement both the previous method velocity & pressure compounding are utilized . The total pressure drop of steam is due to expansion in each stage is also compounded .

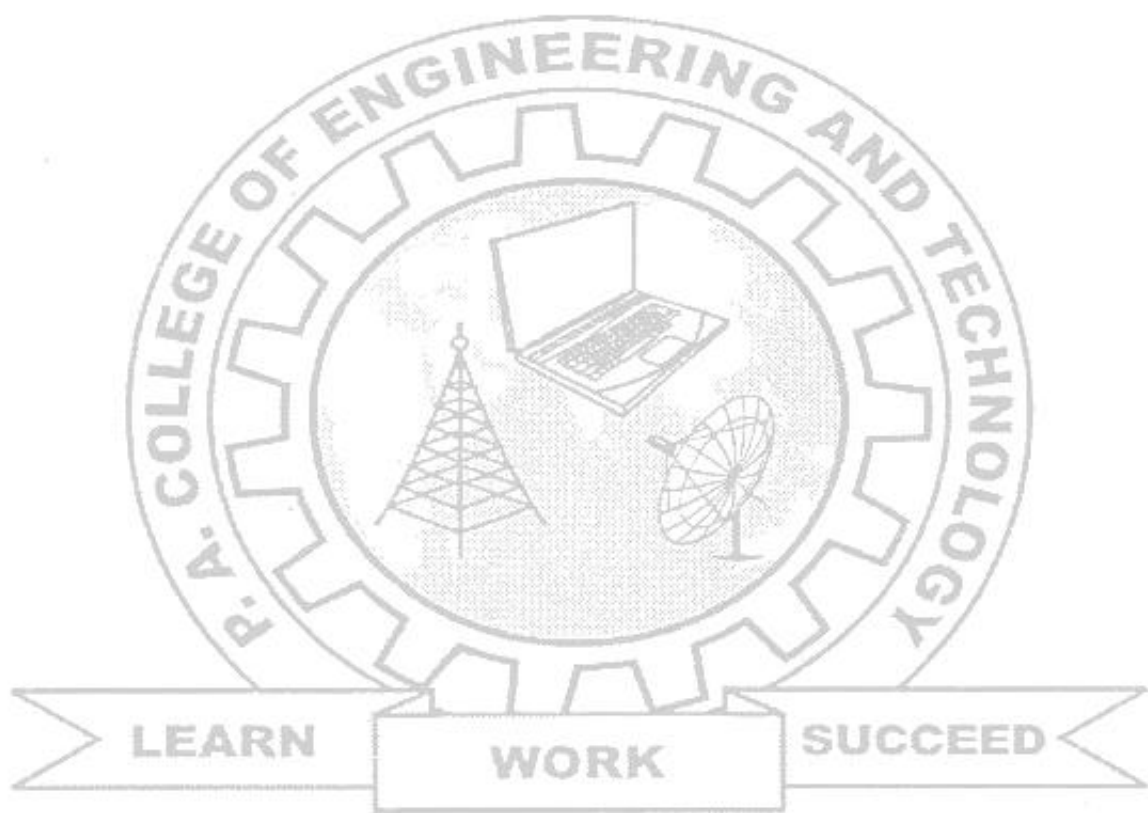
Reaction Turbine :

Arrangement of velocity compounded impulse turbine is shown in figure. Unlike impulse turbine nozzle are not provided in this turbine and also there is a continous pressure drop in the rings of fixed and moving blades . The function of fixed blades , which also get nozzles is to change the direction of steam. So that it can enter into the ring of moving blades without shock the term reaction is used because the steam expands over the ring of moving blades giving a reaction on moving blades .





Velocity Compounding



**Result :**

Thus the working of various types of steam generator (steam boilers) & steam turbine are studied .