CLASSIFICATION OF PROCESS

PIAT

CLASSIFICATION PROCESS

- Flow Process
- Non-Flow Process
- Quasi-Static Process
- Reversible Process
- Irreversible Process
- Adiabatic Process

CLASSIFICATION PROCESS

- **Flow Process. It is one in which fluid enters the system and leaves it after work interaction, which means that such processes occur in the systems having open boundary permitting mass interaction across the system boundary.**

- **Non flow process: It is the one in which there is no mass interaction across the system boundaries during the occurrence of process. Different type of non-flow process of perfect gas are given:**

  - **(a) constant volume process (Isochoric process)**
  - **(b) constant pressure process (Isobaric Process)**
  - **(c) Isothermal process**
  - **(d) adiabatic process**
  - **(e) polytropic process (a polytropic process is a reversible process involving a gas or vapor in a closed or open system involving both heat and work transfer such that a combination of properties are maintained constant. It follows the equation PV^n= C where P is pressure, V is Volume and n the polytropic index and C is a constant)**

CLASSIFICATION PROCESS

- (c) Isothermal process
  - (i) Temperature Remains Constant
  - (ii) Changes Take place at slow rate
  - (iii) Specific Heat of the gas is infinite
- (d) Adiabatic process
  - (i) No Transfer of Heat energy
  - (ii) Changes must take place at fast rate
  - (iii) Specific Heat of the gas is Zero
- (e) Polytropic process (a Polytropic process is a reversible process involving a gas or vapor in a closed or open system involving both heat and work transfer such that a combination of properties are maintained constant. It follows the equation PV^n= C where P is pressure, V is Volume and n the polytropic index and C is a constant)

CLASSIFICATION PROCESS

- **Quasi-Static Process.** When a process proceeds in such a manner that the system remains infinitesimally close to an equilibrium state at all times, it is called a 'Quasi-static or – Quasi Equilibrium' process

  - **(a) A sufficiently slow process**
  - **(b) Properties change is steady in all parts**
  - **(c) It is an idealized process**
  - **(d) Easy to analyze**
  - **(e) Max output at Quasi static process**

CLASSIFICATION PROCESS

- **Steady - Flow Process.** Defined as a process during which a fluid flows through a control volume steadily
  - **(a) Fluid properties can change from point to point within the control volume, but at any fixed point they remain the same during the entire process**
  - **(b) During a steady – flow process, fluid properties within the control volume may change with position but not with time**
  - **(b) The Volume V , the mass m, and the total energy content E of the control volume remain constant during a steady flow process**

TYPE OF PROCESS

- **Prefix *iso-* is often used to designate a type of process for which a particular property remains constant**

  - An Isothermal Process. Temperature remains constant during the process

  - An Isobaric Prpcess. Pressure remains constant during the process

  - An Isochoric (Isometric) Process. Volume remains constant during the process

  - An Isentropic Process. Entropy remains constant during the process

  - An Isenthalpic Process. Enthalpy remains constant during the process

THERMODYNAMIC CYCLE

- **Cycle**

  - If a system undergoes a serious of processes in such a way that its initial and final states are identical then the system is said to have undergone a cyclic process or simply a cycle

  - A thermodynamic cycle is a sequence of processes that begins and ends at the same state

  - At the end of cycle, all properties of the fluid have the same values as they had at the initial state

POINT AND PATH FUNCTION

- **Point Function**

- When system undergoes a change from one state to another, the properties of the system also change, which depends only on end states and not on the path followed between these two states. Therefore these properties are called state functions or point functions

- A Point function can be represented by a point on any plot, e.g. Temp, Pressure, Volume etc.

- These properties have exact differentials designated by symbol '*d*'

- Change is always denoted by *dp or dt or dv*

POINT AND PATH FUNCTION

- **Path Function**

  - A quantity whose value depends on the particular path followed during the process is called a path function

  - It requires a particular path and direction to represent the quantity on any plot. e.g. Heat, Work etc.

  - Path functions have inexact differentials designated by symbol *đ*

  - Change is always denoted by đw or đQ

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