

## Unit-III (ME201)

### Steel:

(1) Plain carbon steel (Unalloyed steel)

(2) Alloy steel

### PLAIN CARBON STEEL

This steel is an alloy of carbon and iron having carbon upto 1.5% in combined form of iron carbide.

Plain carbon steels can be classified according to their carbon content:-

- a): Dead mild steel – upto 0.15% Carbon
- b): Low carbon steel or mild steel – 0.15% to 0.30% Carbon
- c): Medium carbon steel – 0.3% to 0.6% Carbon
- d): High carbon steel – 0.6% to 1.5% Carbon

**a)- Dead mild steel (upto 0.15% C):-** It is used for making high ductility wires, thin sheets, rods, tubes etc.

**b)- Low carbon or mild steel (0.15% to 0.30% C):**

**Properties:-** (i) It is soft, malleable and offers good ductility.

(ii) Tough but have low wear resistance.

(iii) Easily forged and welded.

**Applications:-** It is used for making screws, nuts, bolts, rivets, thin canes, chains, wires, Automobile frames.

c) -**Medium carbon steel**: It contains 0.3 to 0.6% of carbon and is stronger than mild steel.

**Properties:** It is harder but less ductile than mild steel.

**Application:-** Used for making stronger screws, nuts, bolts, rivets, shafts, connecting rods, gears, crankshafts, axles, crank hooks etc.

d) **High carbon steel**:

**Properties:** (i) Mechanical properties can be easily changed by various heat treatment processes.

(ii) Highest tensile strength and hardness in plain carbon steels.

(iii) Lowest ductility and machinability in plain carbon steels.

**Applications:** - Due to good tensile strength and hardness, high carbon steels find extensive application in hand tools, cutting tools, drills, milling cutters, wood working tools, chisels, shear blades, spring wires, etc.

## **ALLOY STEEL**

Alloy steel is steel in which elements other than carbon such as nickel, chromium, molybdenum, tungsten, vanadium, cobalt, Mn are added to obtain the desired properties.

Alloy steels may be classified according to their chemical composition, microstructure and purpose to use-

i) – **Stainless steel** – The steel which resists the oxidation and corrosion due to the presence of Cr with small quantity of Ni, Mn, & C is known as **stainless steel**.

**Application:** -Dairy equipments, kitchen utensils, surgical equipments, chemical plants, blades, scissors, etc

**ii) - Tool steels or Alloy tool steels**

Tool and die steels are special alloy steels which have high hardness and impact toughness greater abrasion and wear resistance.

These are of two types-

**(a) – Low alloy tool steel:** It contains alloying elements less than 10%.

**Application:** - in making chisels, files, taps, dies, boring tools, etc.

**(b) – High alloy tool steel:** It contains alloying elements more than 10%. It is also known as High speed steel.

It is capable of cutting metal at a much higher speed than other steels.