Material Properties and Qualities

S.No	Properties	Qualities
1	Physical Properties	Colour, Density, Melting point, Size, Shape, etc.
2	Chemical Properties	Corrosion resistance, atomic weight, molecular weight, chemical composition, atomic number
3	Mechanical Properties	Strength, Elasticity, Plasticity, Ductility, Brittleness, Hardness, Toughness, Stiffness, Resilience, Creep
4	Electrical Properties	Resistivity, Conductivity, Capacity, Dieelectric strength
5	Magnetic Properties	Relative Permeability , Reluctivity, Susceptibiliity
6	Thermal Properties	Specific heat,Thermal capacity,Thermal Conductivity,Thermal stress, Laten heat
7	Technological Properties	Malleability, Machinability,Weldability, Castability, Formability
8	Aesthetic Properties	Appearance, Texture and ability to accept special finishes
9	Economic Properties	Raw material and Processing costs, Availability
10	Other Properties	Optical, Acoustical and Physiochemical Properties

Mechanical Properties

- Mechanical Properties are those characteristics of material that describe its behaviour under the action of external forcees
- A knowledge of mechanical properties is very essential for an engineer to select a suitable material for his various design purposes

Most Important
Mechanical properties

- **Elasticity:** it is the property of a material by virtue of which it is able to retain its original shape and size after the removal of the load.

  Example: Rubber

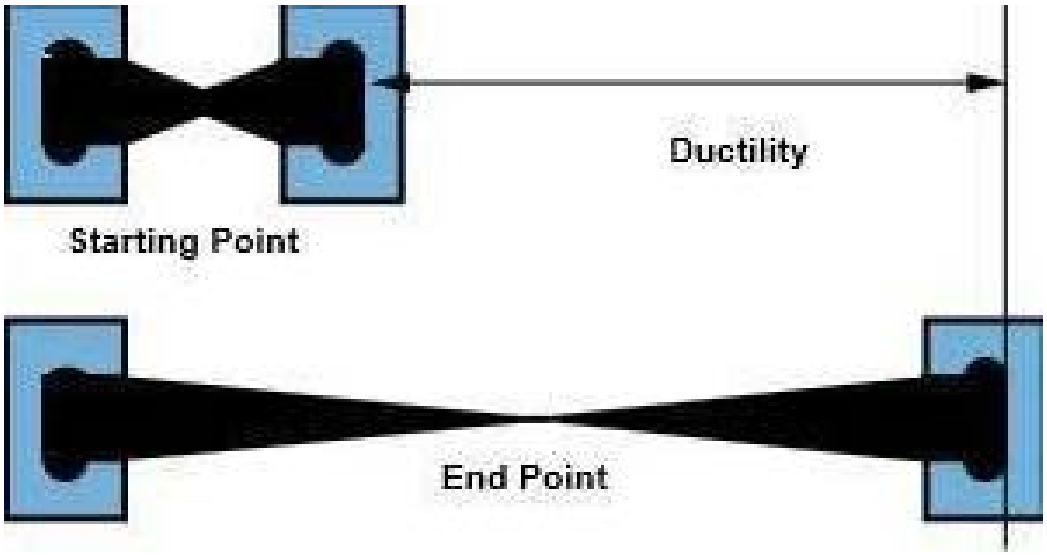
- **Plasticity:** It is the property of the material by virtue of which a permanent deformation (without fracture) takes place, whenever it is subjected to the action of external forces

  Example: Clay

Most Important
Mechanical properties

❖ **Ductility:** It can be drawn into wires before rupture takes place

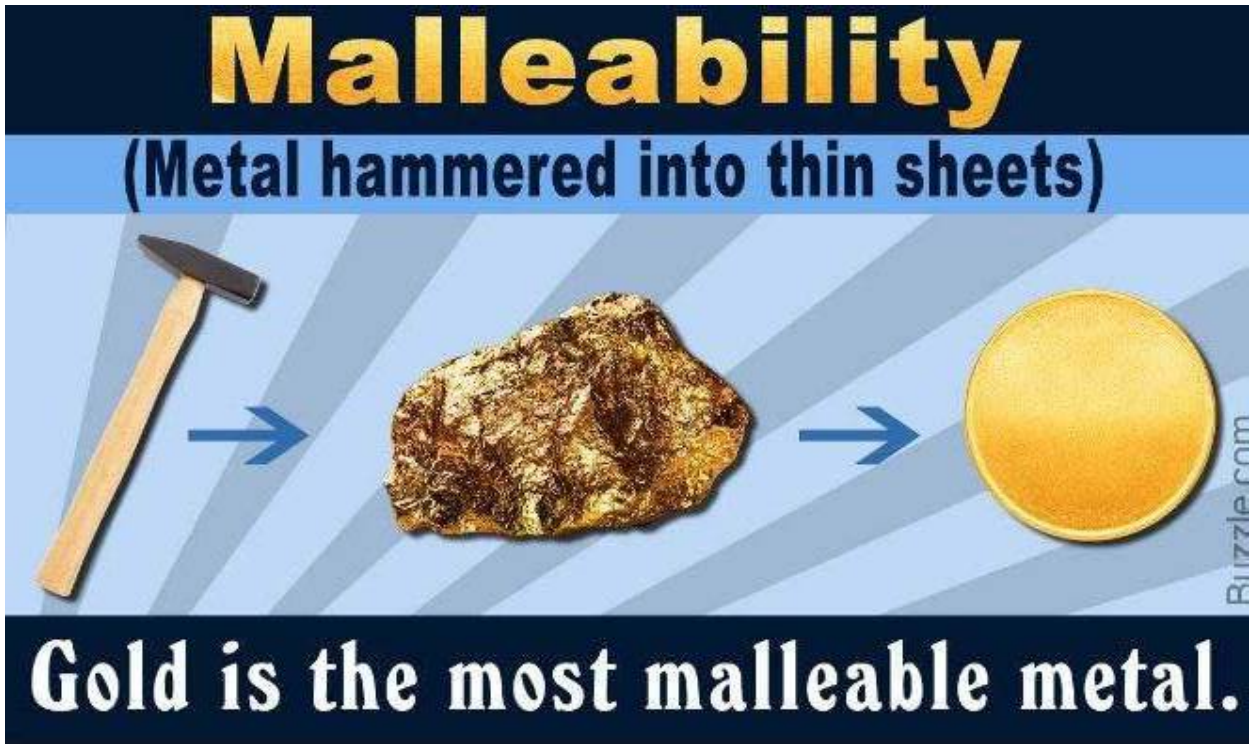
Example: Gold, silver, iron copper and aluminium



Most Important
Mechanical properties

- **Malleability:** It can be withstand deformation under compression without rupture (or) break

  Example: Gold, Lead



Most Important
Mechanical properties

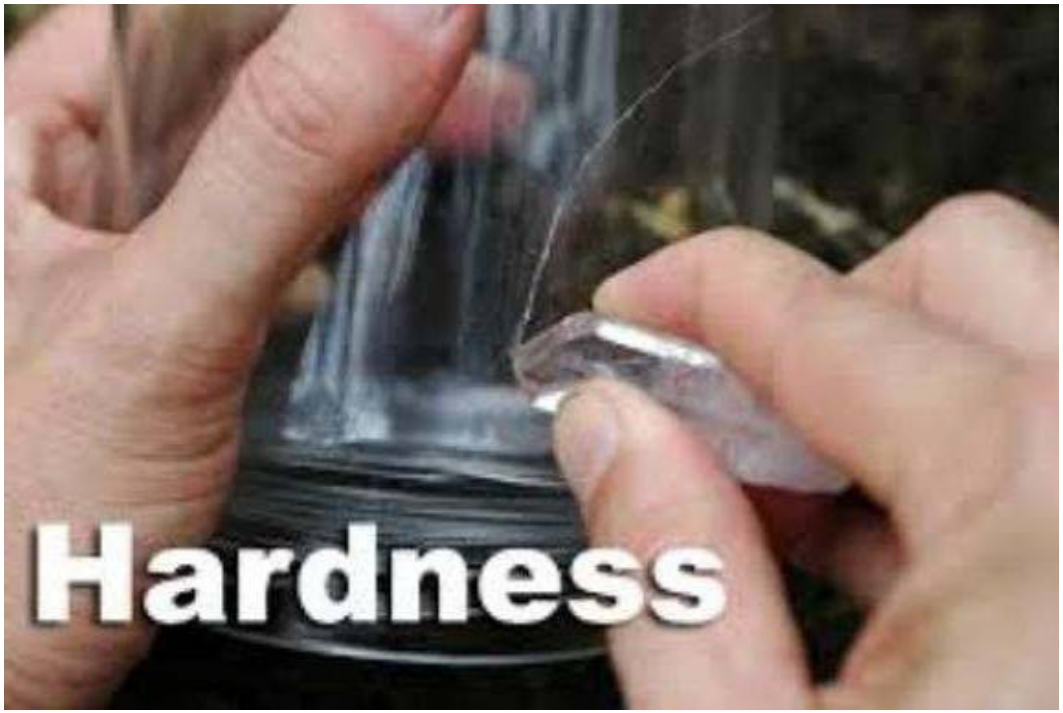
- **Brittleness:** It will fracture without any appreciable deformation

  Example: Cast irons, Glass

Most Important
Mechanical properties

- **Hardness:** It is able to resist abrasion, indentation (or Penetration) , machining and stretching

  Example: Diamond, Glass



Most Important
Mechanical properties

- **Toughness:** It can be absorb maximum energy before fracture takes place

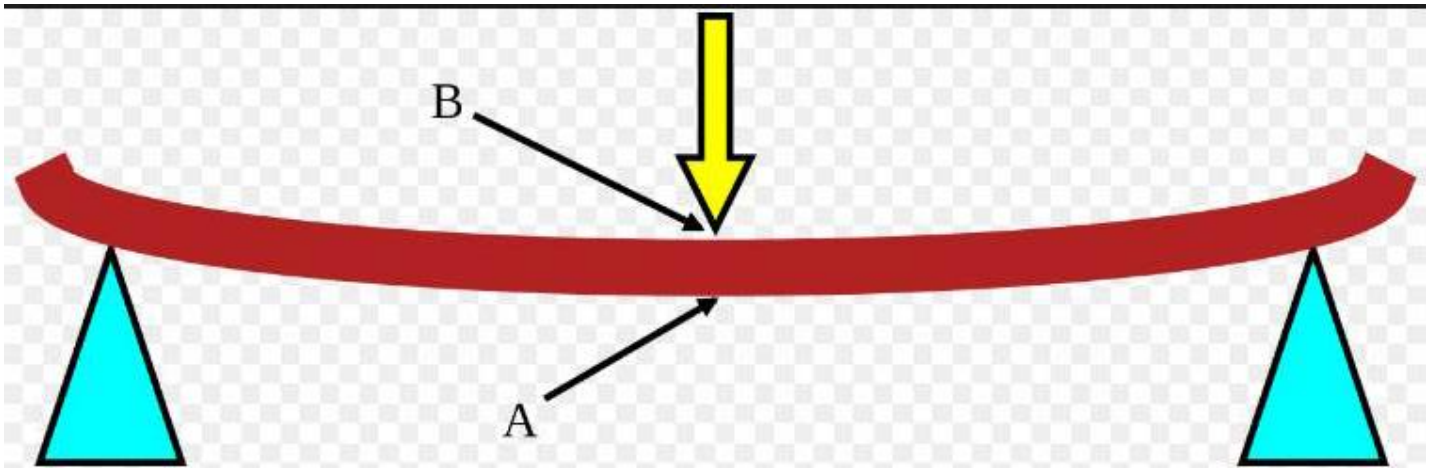
  Example: Mild steel , Brass

Material with high toughness

Material with low toughness

Most Important
Mechanical properties

❖ **Stiffness:** It resist deformation



Most Important
Mechanical properties

❖ **Resilience :** It stores energy and resists shocks or impacts

Most Important
Mechanical properties

❖ **Creep:** It deforms continuously under steady load