Metals

Ferrous Metals:

Mild Steel: (0.15-0.3% Carbon content)

Advantages	*Disadvantages*
• Versatile material • Easily worked • Can be heated/hammered into shape • Ductile/tough/malleable • High tensile strength	• Rusts • Limited ways to be treated (only case hardening) • Poor strength to weight ratio

Uses: General engineering (construction), Nuts and Bolts, Pipelines, Machinery parts

Medium Carbon Steel (0.3-0.7%)

Advantages	*Disadvantages*
• Harder than mild steel • Ductile • Strong • Wear resistant	• Less ductile/malleable than mild steel • Hard to shape/cut

Uses: Garden tools, Springs, Gears, Railroad

High Carbon Steel *(0.7-1.4%)*

Advantages	*Disadvantages*
• Extremely hard/strong • Strong • Cheap in comparison to other hard substances	• Brittle • Expensive • Difficult to form/cut/weld

Uses: Drills, Woodcutting tools, Saws, Knives

Cast iron *(2.5-4.0%)*

Advantages	*Disadvantages*
• Good casting properties • High machinability • Good wear resistance • Corrosion resistant	• Very heavy • Brittle • Low tensile strength

Uses: Machinery, Cooking pots, Disk brakes, Pipes

Non-ferrous Metals:

Aluminium *(650^{0}C MP)*

Advantages	*Disadvantages*
• Lightweight • Corrosion resistant • Good conductor of electricity • Malleable	• Cracks under stress • Needs annealing when worked • Does not withstand great loads

Uses: Aircraft, Engine components, Utensils, Tins

Copper (1100^{0}C MP)

Advantages	*Disadvantages*
• Good heat and electrical conductor • Ductile • Malleable	• Needs annealing when worked • Danger of electrolysis when in water • Corrodes easily (rusts) • Expensive

Uses: Electrical cables, Circuits, Generators, Heating

Zinc (420^{0}C MP)

Advantages	*Disadvantages*
• Corrosion resistant • Self-healing • Recyclable • Eco-friendly • Durable	• Low toughness • Brittle when worked • May corrode when in contact with water/moisture for a long time

Uses: Roofing, Castings, Batteries

Tin (230^{0}C MP)

Advantages	*Disadvantages*
• Malleable • Ductile • Corrosion resistant	• Rusts easily • Hard to recycle • Not very strong

Uses: Cans, Used in alloys, Used in Superconducting magnets

Alloys:

Alloys are made by combining two or more metallic elements, to give improved properties such as greater strength or resistance to corrosion.

Stainless Steel *(Chromium, Nickel, Steel)*

Advantages	*Disadvantages*
• Corrosion resistant • Heat resistant • Can be recycled • Good strength to weight ratio • Hygienic	• Expensive • Hard to machine

Uses: Kitchen utensils, Medical tools, Construction

Duralumin *(Aluminium, Copper, Manganese)*

Advantages	*Disadvantages*
• Lightweight • Strong • Casts well • Tough/hard	• Not corrosion resistant • Brittle

Uses: Aviation industry, Automobile industry, Pipelines

Brass *(Copper, Zinc)*

Advantages	*Disadvantages*
• Casts well • Easy to machine • Good conductor of heat and electricity • Low friction coefficient	• Susceptible to cracking when cold worked • Needs to be constantly annealed • Not very corrosion resistant

Uses: Ship propellers, Electrical comments, Locks, Gears