

1.8 Metals

Properties:



Hardness: The ability of a material to withstand cutting and scratching (timber is generally quite soft and can be cut and scratched with metal tools).

Malleability is the ability of a material to be permanently deformed in all directions without fracture.

- Compression forces used to shape metals
- Heating the metal enhances this property



Ductility is the ability of a material to deform without breaking by:

- Bending
- Twisting
- Stretching

All ductile materials are malleable but **not** all malleable materials are ductile.



Ferrous:

- **Magnetic**
- Prone to **Rusting**
- Contain **Iron** and **Carbon**
- (Exception Stainless Steel which is designed not to rust, and some types are not magnetic)

Non-Ferrous:

- **Non - Magnetic**
- Do not **Rust**
- Do not contain **Iron**
- Can **Oxidise** or **Tarnish**

Alloy:

Are made up of a mixture of two or more different types of metal or elements and can be either **ferrous** or **non-ferrous**

Key Terms:

Rust is a chemical reaction between Iron and moist air

Oxidization is where a metal has a chemical reaction to Oxygen

Cast Iron:

Hard skin, brittle and good in compression

Mild Steel:

Tough, Ductile, Malleable, Poor corrosion resistance

Stainless Steel:

An Alloy that is; Corrosion Resistant, Hard, Tough Resists wear.

Aluminium:

Corrosion resistant, malleable, ductile, easily machined and a good strength to weight ratio

Brass:

An Alloy that is; Corrosion resistant, easily machined, a good heat/electrical conductor, harder than copper.

Copper:

Corrosion resistant, malleable, ductile, tough good heat/electrical conductor

Vices, Brake discs and Manhole covers

Screws, Nails, Bolts, Girders and Car body panels

Kitchenware, Sinks, Cutlery and Medical equipment

Aircraft, Foil, Window frames and Drinks cans

Plumbing fittings, Locks and Musical instruments

Electrical wire, Printed circuits, Gas and Water pipes

Metal Ore

The Earth's crust contains many types of rock or **Ore**, which contain Metallic minerals. Ore is mined from the ground and the metallic minerals must be extracted before it is processed into stock forms. Small amounts of Carbon is added to the iron ore to create Cast Iron and Mild Steel.

- Most metals are **Smelted** in a blast furnace
- Metals such as Aluminium are extracted by **Electrolysis**