

# Materials - Metals

## Where do metals come from?

Metals are made from ores which are rocks that are dug up from the ground in the form of quarries or mines and processes into metals and further refined into useable forms.

The use of pure metals is rare as most are combined to improve their properties, when two are mixed they form an alloy.



### Ferrous

These are metals that contain iron or Ferrite, examples are cast iron, mild steel, medium steel or high carbon steel.

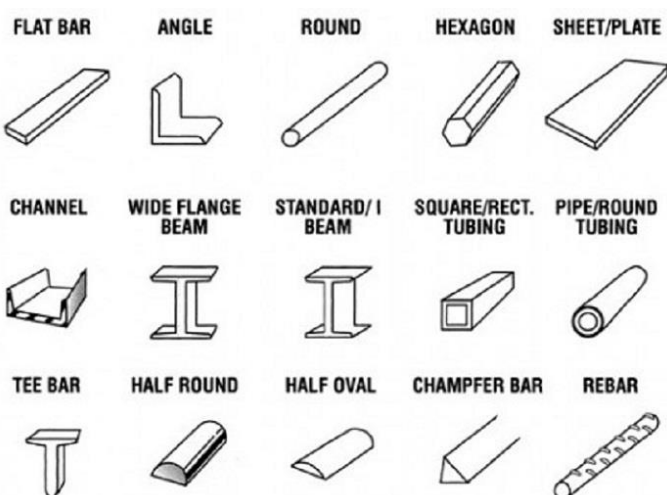
### Non Ferrous

These are metals that don't contain iron, examples are Aluminium, copper, brass, Bronze, lead and zinc.

Ferrous metal	Properties
Cast iron	3-3.5% carbon, good compressive strength, Hard, difficult to machine but good for casting, Brittle, poor corrosion resistance, low cost.
Low carbon steel	>0.3% carbon, low strength, tough, low cost cannot be hardened.
High carbon steel	0.8-1.4% carbon, strong and hard not as tough as low carbon steel, difficult to form but can be hardened.
Stainless steel	11.5% chromium, strong, hard, difficult to machine, corrosion resistant and relatively expensive.

Non Ferrous metals	Properties
Aluminium	Common, alloyed to improve properties, cost more than low carbon steel, better corrosion resistance and lightweight.
Copper	Excellent conductor of electricity and heat, very ductile so used for electrical wires and heating pipes and it is corrosion resistant.
Brass	Alloy of Zinc and copper, machines well to a high finish.
Bronze	Alloy of tin and copper, casts well into things like statues
Lead	Relatively soft, malleable and ductile and very good resistance to corrosion, heavy due to high density.
Zinc	Low melting point so energy saving, casts well and has good corrosion resistance.

## Stock forms of metal



# Materials - Metals

## SECTION 1.1

Explain where metals come from

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What is it called when you mix two different metals together?

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Research on the internet to find out why we have created these types of metals

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What two types of metals are there?

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What is the difference between them?

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## Ferrous metals and alloys

Why is iron not used in Engineering products?

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What is added to iron to make it more useful as an Engineering material?

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What happen when you increase the amount of above to iron?

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Name four different Ferrous alloys

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# Materials - Metals

## SECTION 1.1

What don't these metals contain?

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### Aluminium

In comparison to Steel what is the downside to Aluminium?

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How can this disadvantage be improved upon?

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However, in comparison to steel what is the upside of Aluminium? (there are two upsides)

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What is Aluminium commonly used to make?

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### Copper

Name two properties that make Copper suitable to use

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What is Copper often used to make?

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Why is Copper used in its pure form?

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What can be added to make Copper stronger?

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Where might this need to be done?

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### Brass

What metals are used to make up Brass?

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What is Brass used to make?

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### Bronze

What metals are used to make up Bronze?

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What is Bronze used to make?

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# Materials - Metals

## SECTION 1.1

### Lead

Name four properties that makes Lead a good metal to use

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What industry is Lead commonly used?

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Name a disadvantage of using Lead

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### Zinc

Name a reason why Zinc is a good metal to cast with?

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Why is casting with Zinc financially viable?

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What is commonly made from Zinc?

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What can Zinc be alloyed with to make it stronger?

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