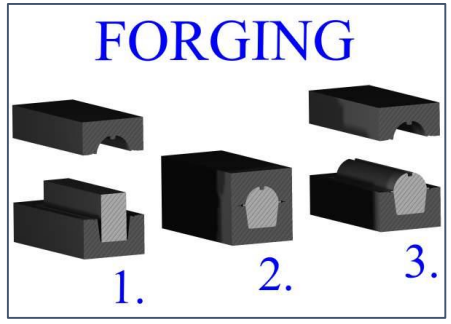
Metal Manufacturing Processes

Year 9 Design & Technology

Metals, alloys, ferrous and non-ferrous



Casting - A manufacturing process involving melting materials such as metals and pouring them into a cast.

Forging - A manufacturing process involving compressing metals to deform them into the desired shapes. it is one ot the strongest methods of manufacturing

Here are examples of metal processing. These include; Pewter casting and forging but there are others too.

? Name 2 Non- ferrous metals and 2 ferrous metals and their uses.

? What are the differences and similarities between Ferrous and Non-ferrous metals? Can you give examples? EXPLAIN your answers

? Can you name 2 Metal manufacturing processes can you name? Which metals best suit these are processes?

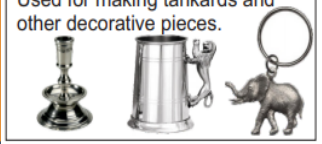
Non-Ferrous Metal- Metals which do not contain Iron such as Pewter, Aluminium, gold

NON-FERROUS METALS PEWTER

Pewter is a soft, malleable alloy, 85% to 99% tin. Other metals are copper, lead, antimony and bismuth. Has a low melting point compared to many metals (170–230 °C) making it highly suitable for casting.

Usually purchased in ingots and cast to shape in a workshop.

Used for making tankards and other decorative pieces.



NON-FERROUS METALS ALUMINIUM

Light grey in colour. Smelted from bauxite ore. Aluminium 95%, Copper 4%, Manganese 1%

Ductile, soft, malleable, machines well on lathes and milling machines. Very light and resists corrosion. Can be cast into products from ingots.

Used widely in aircraft, drinks cans, window frames, ladders, and kitchen ware.

NON-FERROUS METALS COPPER

Reddish brown in colour, darkens slowly when in contact with air. This metal is not an alloy.

Ductile, can be beaten into shape as it is relatively soft. Conducts electricity and heat.

Electrical wiring, tubing, kettles, bowls, pipes and plumbing. Used also in the production of printed circuit boards.

NON-FERROUS METALS BRASS

A copper alloy. Deep yellow to golden colour. An alloy, mixture of copper and zinc 65% - 35%.

Casts and machines well. Surface tarnishes slowly on contact with air. Conducts electricity. Resists corrosion.

Parts for electrical fittings, engineering, ornaments, musical instruments.

NON-FERROUS METALS BRONZE

A copper / tin alloy. Tin content up to 10%.
Engineers well on lathes and works quite well with handtools.

Once used for ship fittings, due to its resistance to corrosion. Now replaced by stainless steel. Used for ornaments, cast bronze sculptures and ships propellers. Used also for bearings in engineering.

Ferrous Metal- Metals which contain Iron such as steel, wrought iron

FERROUS METALS THE ALLOY STEEL

Iron is the most used metal in the world, largely due to it being the main constituent of the alloy steel.

Common steel typically has 0.2 to 2.1% carbon content, with the rest being iron.

Our modern world relies on steel

FERROUS METALS - MILD STEEL

Carbon 0.1 - 0.3%
Iron 99.9 - 99.7%

Alloy of carbon and iron. Tough. High tensile strength. Can be case hardened. Rusts very easily unless the surface is protected from moisture.

Most common metal used in school workshops. Used in general metal products and engineering.

FERROUS METALS CARBON STEEL

Carbon 0.6 - 1.4%
Iron 99.4 - 98.6%

Alloy of iron and carbon. Higher carbon content than mild steel. Tough and strong. Carbon steel can be heat treated e.g. hardening and tempering. Used for cutting tools such as drills and lathe tools.

FERROUS METALS STAINLESS STEEL

Alloy of iron, nickel and 10.5% to 11% chromium.
Tough, resistant to rust and stains. Does not corrode.
Cutlery, medical instruments, specialist corrosion resistant products such as pipes. Stainless steel pots and bans. Jewellery and watches.

Extra reading https://thelibraryofmanufacturing.com/forging.html

https://technologystudent.com/despro_flsh/mats_metals1.html **Extra reading**