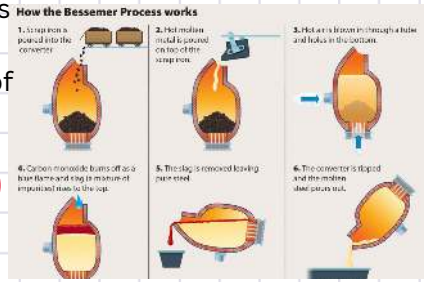
YEAR 8 RES MAT KNOWLEDGE ORGANISER

Iterative design is a circular design process that models, evaluates and improves designs based on the results of testing

Iterative Design Cycle

Bessemer process



Impact of steel

The superior strength and durability of steel over iron meant that the metal took over as the preferred choice of civil engineers to build bridges, tunnels, and railway tracks. Sheffield became one of the most important steel-making centres in the world and was particularly noted for knives and cutlery. The biggest way that the Bessemer Process changed the world was by making steel cost-effective and mass producible. Steel became a dominant construction material solely because of this invention

Metals

Ferrous metals –Mild steel, Cast Iron, High Carbon Steel	
Mild Steel 	**Properties**-Pliable and tough, easy to form, good electrical and thermal conductivity but poor resistance to corrosion **Uses**- Nuts, bolts, screws, bike frames
Non- ferrous metals – Aluminium, Copper, Silver, Gold	
Aluminium 	**Properties**- Light in weight and malleable but strong, a good conductor of heat and corrosion resistant. **Uses**- Drink cans, saucepans, bike frames
Alloys- Brass, Bronze, Stainless steel, Pewter	
Pewter (Tin, Antinomy, Copper)	**Properties**- Does not tarnish, has a low melting point **Uses**- Household objects such trays and decorative object, Ideal for casting
Brass (Copper + zinc) 	**Properties**- strong and ductile (pliable), casts well and is gold coloured but darkens when oxidised with age, a good conductor of heat. **Uses**- Taps, screws, castings, locks and doorknobs, musical instruments

Metal properties

Metals
Metals are malleable.
Metals are ductile.
Metals are good conductors of heat and electricity.
Metals are Lustrous and can be polished.
Metals are solid at room temperature.
The melting and boiling points of metals are generally high.
All metals are strong.
Generally, metals are hard.
Metals are heavy.

Tools & Equipment

	**Centre Punch**- used to mark the centre of a hole to be drilled , a light indent is created to direct the drill bit
	**Junior Hacksaw**- A useful hand saw that can be used to cut woods, metals and plastics
	**Hacksaw**- Used to cut through metal tubes and rods, can also be used on plastics
	**Metalwork vice**- Used to hold materials securely whilst they are being worked on
	**Wet and dry paper**- An abrasive paper that can be used wet or dry to obtain a high quality finish on metals and plastics
	**Files**- used to shape woods, metals and plastics after being cut
	**Pillar Drill**- Machine used to make holes in woods and metals and plastics

Knowledge

- Health and safety
- Iterative design cycle
- Accuracy
- ACCESSFMM - product analysis
- Metals - inc Alloys
- Metal uses & properties
- Metal manufacturing processes
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Jewellery

For centuries, jewellery has been seen as a form of body decoration, allowing for the expression of self and social status.

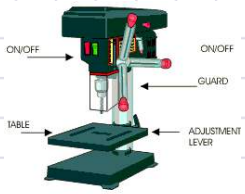
ACCESSFMM

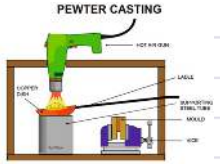
Design specification is a list of criteria for a product.

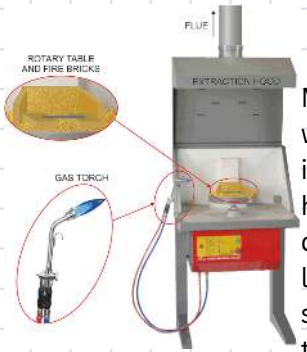
Function refers to to the purpose of an object or the way that an object works.

Aesthetic is the consideration of the beauty of the form of an object.

Aesthetics, Cost, Client, Environment, Size, Safety, Function, Material & Manufacture







Casting

Metal casting is a process in which hot liquid metal is poured into a mould that contains a hollow cut out or cavity of the desired finished shape. The liquid metal is then left to solidify, which is removed from the mould, revealing the end product, or the “Casting Form”

Accuracy

Accuracy in design and manufacture is key to producing reliable, high-quality end products.
It ensures precision, consistency and decreases the likelihood of errors.
This, in turn, reduces waste and costs associated with fixing errors or re-manufacturing
Inspection and testing are crucial steps to verify the accuracy of the manufactured components before assembly. This can involve visual inspection, functional testing, or testing of physical properties.
Factors Impacting Accuracy
The quality of materials used in manufacture can affect the accuracy of the final product. Poor quality materials may have inconsistencies that lead to inaccuracies.
Manufacturing processes can also affect accuracy. Precision processes such as CNC machining provide high levels of accuracy, whereas processes like casting may be less precise