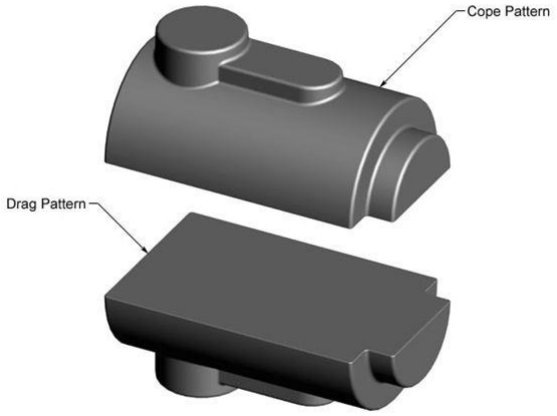
Casting &moulding

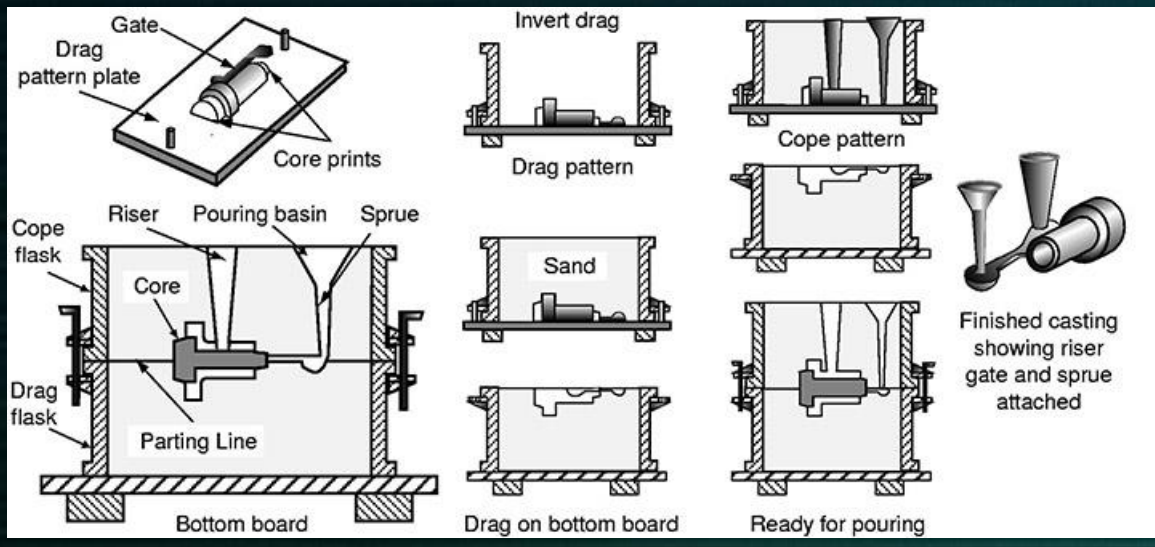
SECTION 2.4

What is casting and moulding?

This is a shaping process where molten metal or plastic is poured or forced into a mould and then solidifies to take on the shape of the hollow area within the mould.

To form a complex shape it is more cost effective to cast or mould it than machine or stick pieces together due to the waste material produced and the labour needed to glue it or time to machine.





Sand casting

This is a process used to make melt parts.

The processes uses a mould or pattern that can be simply one part or more complex using two parts that need to line up. The mould or pattern needs to be smooth with no sharp edges or corners.

The mould or pattern is placed in trays called the cope and drag along with a sprue and riser piece which allow the molten metal to be poured in.

These are covered with a special type of sand called Green sand or Petrobond sand that sticks together holding the shape of the mould or pattern once it is removed.
The molten metal is then poured into the mould through the sprue filling the cavity left by the mould.

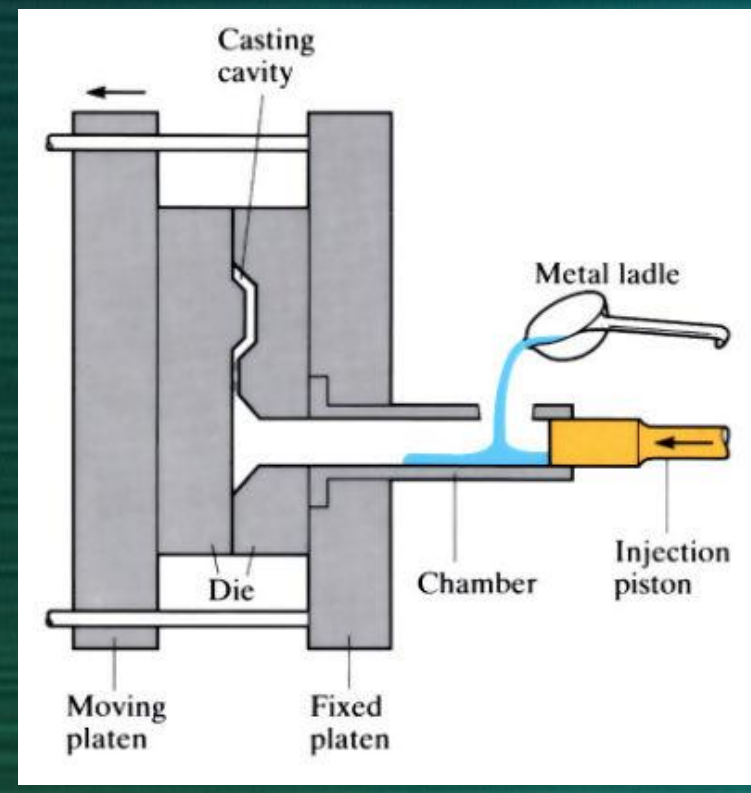
Each sand casting mould is used once as the shape is usually broken when removing the metal part however the sand is reusable once the casting is complete.
The metal piece has the riser and sprue piece cut off and is then machined to achieve a quality finish.

Pressure die casting

This process is a casting /moulding process made from non ferrous metals. This process uses a special type of mould called a die which is made from high carbon steel so it can be used multiple times and it has a higher melting point than the metal being cast.

The die is usually in two halves and has been machined to have a smooth finish so any cast is of a high quality. The die can also have recesses to allow for coolant to flow through. Due to the material used to make the die (high carbon steel) this make it difficult to machine and expensive to manufacture. Therefore the die has to be used multiple times to make it economical.

When casting the die has to be brought together and under pressure molten metal is forced in making a casting that is more accurate than sand casting with more detailed features being able to be included.



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Injection moulding

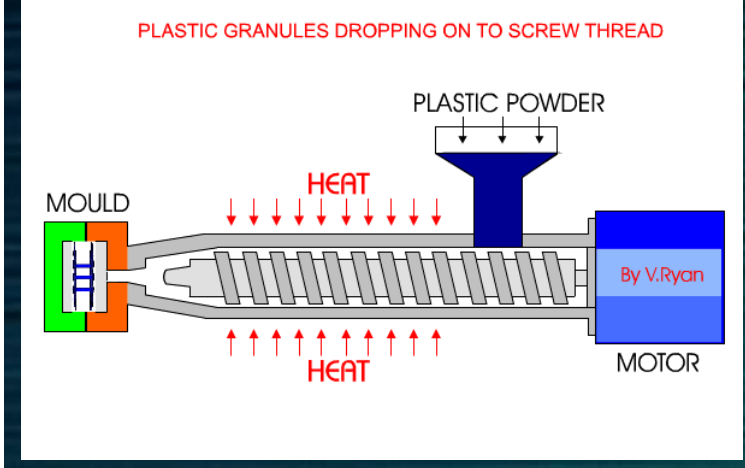
This process is similar to pressure die casting but involves the use of plastic rather than non ferrous metals.
This process is used to make electrical plus, models toys or plastic boxes / parts.

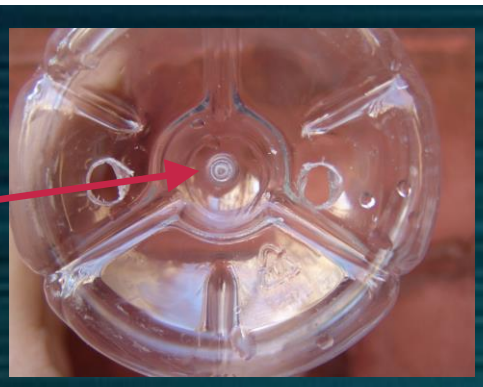
Injection moulding steps:

- Polymer granules placed in hopper
- Rotating screw feeds granules along and are melted by heaters
- The liquid polymer is compressed by the shape of the end nozzle
- Plastic forced into the mould under pressure
- Mould is cooled and casting ejected
- Mould put back together ready for next casting.

The down side to injection moulding is the cost of the equipment which tends to be very expensive. But this process can take seconds to complete a single mould allowing 100,000's of products to be made in one hour making the equipment more affordable per casting.

The Injection moulding process can be identified by the sprue point on the base of the bottle or by a parting line on the side where the two halves of the mould join.





Casting & moulding

SECTION 2.4

Sand casting

Sketch down how sand casting is completed, label each stage to show parts

What is special about the sand used in sand casting?

_____

_____

Why would sand casting only be suitable for one off (one being made) or batch production (2 to 10 being made)?

_____

_____

Explain one of the main issues with sand casting

_____

_____

Pressure Die casting

Sketch down how Pressure Die casting works, label each part

Explain what material type is used to make the mould in die casting?

_____

_____

What type of finish does the die need to have? Why is this necessary?

_____

_____

Casting & moulding

SECTION 2.4

Injection moulding

Sketch down how Injection moulding works, label each part

Name and explain an advantage of using Injection moulding

Name and explain a disadvantage of using Injection moulding

How can the injection moulding process be identified in a product?