COMMERCIAL PRODUCTION METHODS

Over the past forty years plastics have replaced traditional wood and metal materials for making products and parts of products. Some advantages of using plastics are:

- They do not rot or corrode
- They are light in weight
- They are easy to use in mass production
- They come in a vast range of colours
- They can be clear and transparent
- Lubrication is not required for moving parts
- Moving parts work more quietly

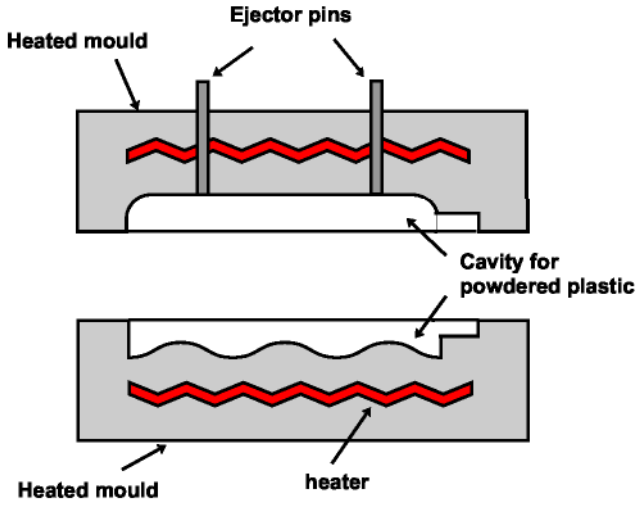
The most common production method for producing products in plastics is **Injection Moulding** (see worksheet 35d).

This process is only suitable for thermoplastics.

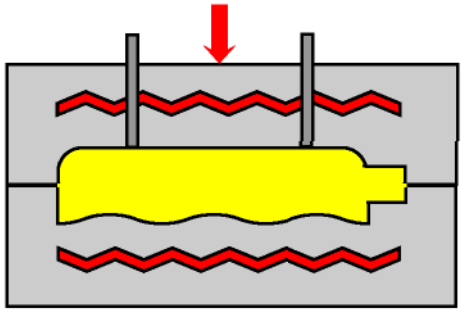
Compression Moulding

This method is used for thermoset plastics and produces products that need to resist heat, such as saucepan handles, hairdryer casings, mains electric sockets, etc. **A)** The exact amount of powdered or granular plastic is placed in the mould. **B)** The two halves are then closed and great pressure is applied. **C)** The combination of the heat from the moulds and the pressure melts the plastic and it fills the cavity without any waste. **D)** The mould opens and the plastic product cools and sets. **E)** The product is then ejected from the mould by ejector pins.

Split mould for a saucepan handle



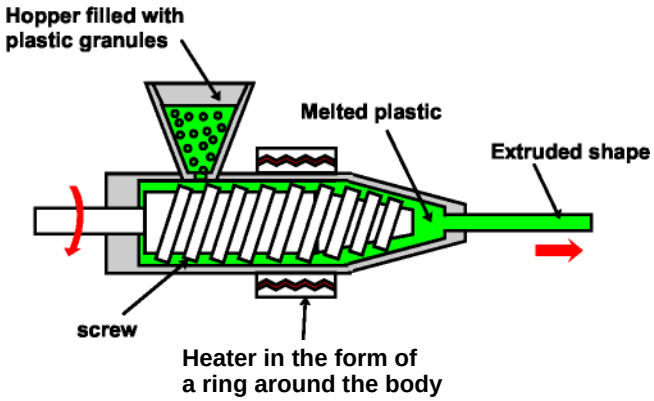
The mould closed and filled with plastic



Extrusion

This process is similar to squeezing toothpaste from a tube; the paste comes out with the same circular cross section shape as the hole in the tube.

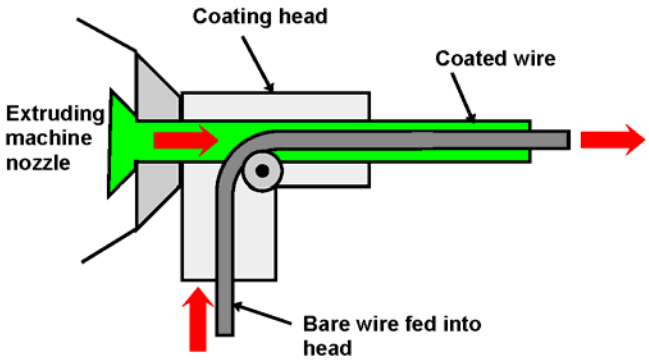
The machine is very similar to an injection moulding machine, except that the ram is replaced by a screw system that continuously feeds plastic granules through the machine. This means that very long lengths of plastic can be produced.



Typical extruded cross-sections

Extrusion Coating

Extrusion is used for covering electric wires. A special head is attached to the nozzle of the extruder. Bare wire is fed in and turned 90°, to be coated with PVC.



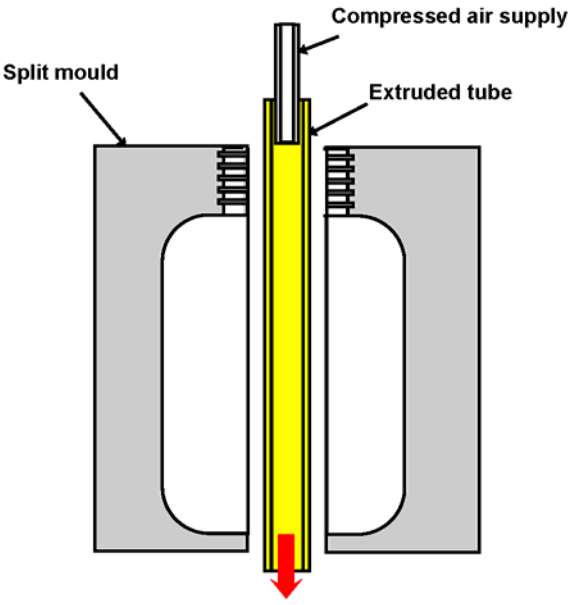
A short length of coated wire

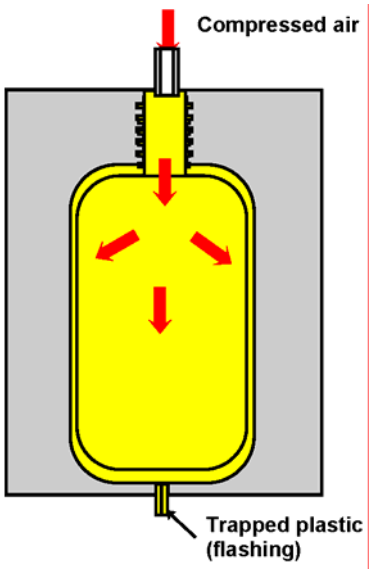
Worksheet 39a

Extrusion Blow Moulding

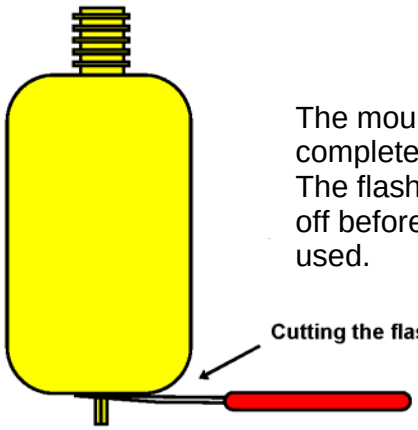
This process is used for producing plastic bottles. An extruding machine is placed vertically above the moulding machine and extrudes a tube of hot, soft plastic directly into the bottle mould.

A typical plastic used for this process is HDPE (High Density Polyethylene).





The mould is closed and compressed air blows the trapped tube of plastic to the sides of the mould. The air is cold and cools the plastic so that it sets quickly.



The mould is opened and the completed bottle is ejected. The flashing needs to be cut off before the bottle can be used.

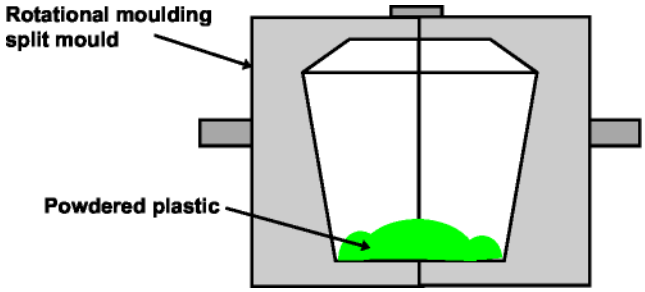
Rotational Moulding

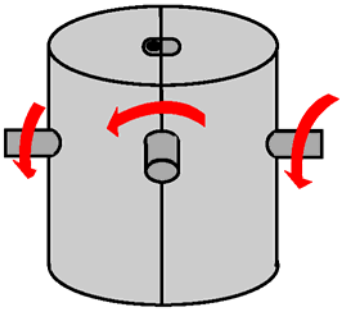
This process is used to make thick walled, hollow products like dustbins, water tanks and oil tanks.

1. The correct amount of powdered plastic e.g. High Density Polythene, is put inside the mould.

2. The mould is closed, heated and slowly rotated in two directions at the same time. The powder melts and evenly coats the walls of the mould.

3. The still rotating mould is cooled with a cold water spray until the plastic inside has set. The mould is then split open and the product removed.





The heated mould rotates in two directions at the same time, rather like some fairground rides.

KEY WORDS **Compression moulding: Extrusion: Blow moulding: Rotational moulding:**

1. Give **five** reasons why plastics have replaced traditional materials in product design.
2. Explain how it is that thermosetting plastics can be used for compression moulding, but not for injection moulding.
3. What device is used to remove plastic mouldings from a mould?
4. What process would you choose to make a plastic curtain rail and why?
5. Explain, with the aid of a diagram, how an electric wire is coated in PVC.
6. Draw an annotated diagram showing the main features of extrusion blow moulding.
7. In the rotation moulding process, why does the mould have to be rotated in two directions at the same time?

A. Identify **five** plastic products or parts of products from home or school and suggest which commercial process you think was used for making them. Give reasons for your choices.

Worksheet 39b