

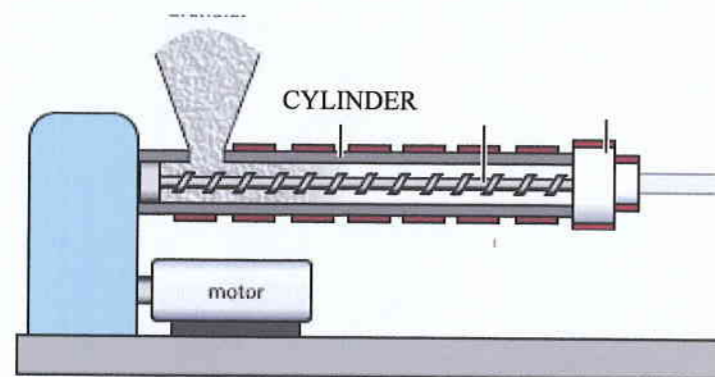
Manufacturing Research

Manufacturing research

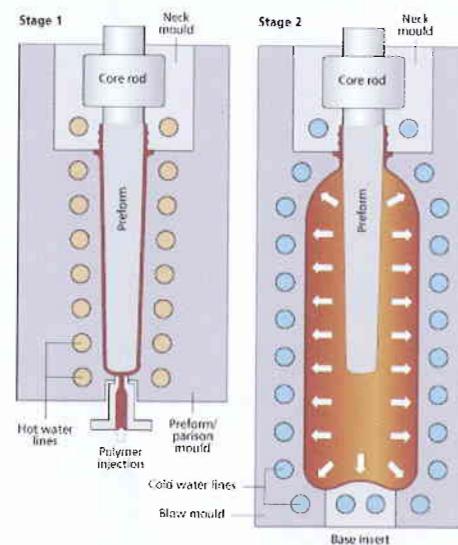
I am going to research some methods of how I could shape the plastic and get it to the size I want my helmet to be.

Here are some effective methods of moulding and shaping plastic.

Extrusion - This continuous process is used for the production of semi-finished goods such as films, sheet profiles, tubs and pipes. They are termed "semi-finished" because they must be further processed before they become useful articles. Plastic material is first loaded into a hopper and then fed into a long heated chamber through which it is moved by the action of a continuously revolving screw. At the end of the heated chamber, the molten plastic is forced out through a small opening called a die that is cast in the shape of the finished product. As the plastic extrusion comes from the die, it is fed onto a conveyor belt where it is cooled by blowers or by immersion in water. The operation's principle is the same as that of a meat mincer but with added heaters in the wall of the extruder. Examples of products include lawn edging, pipe, film and window trim.

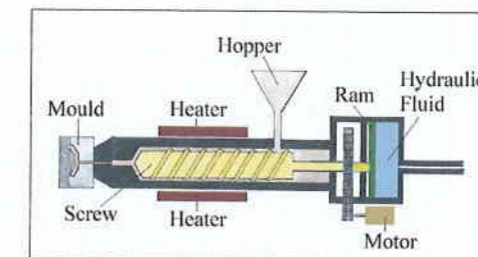


Blow moulding - Blow moulding is a process used in conjunction with extrusion. The die forms a molten tube of thermoplastic material. Using compressed air, the tube is then blown to conform to the interior of a chilled mould which clamps around the tube. Overall, the goal is to produce a uniform melt, form it into a tube with the desired cross section and blow it into the exact shape of the product. This process is intended for use in manufacturing hollow plastic products and its principal advantage is its ability to produce hollow shapes without having to join two or more separately moulded parts. This method is used to make items such as commercial drums and bottles.



Rotational Moulding - This process is relatively simple in concept since heat is used to melt and fuse a plastic resin inside a closed mould without using pressure. Rotational moulding consists of a mould mounted on a machine capable of rotating on two axes simultaneously. Solid or liquid resin is then placed within the mould and heat is then applied. Rotation distributes the plastic into a uniform coating on the inside of the mould until the plastic part cools and sets. This process is used to make hollow configurations. Common rotationally moulded products include shipping drums, storage tanks and some consumer furniture and toys.

Injection moulding - Since this process can produce mouldings of high quality and with great accuracy, it is very widespread. It is predominately used for thermoplastics but smaller amounts of thermosets and elastomers are also processed this way. In injection moulding, plastic material is also put into a hopper, which feeds into a heating chamber. A plunger pushes the plastic through the heating chamber where the material is then softened into a fluid state. At the end of this chamber, the resin is forced into a closed mould. Once the plastic cools to a solid state, the mould opens and the finished product is ejected. This process is used to make such items as butter tubs, yoghurt containers, closures, fittings and razors.



Stages of Injection moulding

Stage 1

Granulated or powdered thermoplastic plastic is fed from a **hopper** into the Injection Moulding machine.

Stage 2

The Injection Moulding machine consists of a hollow steel barrel, containing a rotating screw (**Archimedian Screw**). The screw carries the plastic along the barrel to the mould.

Heaters surround the barrel melt the plastic as it travels along the barrel.

Stage 3

The screw is forced back as the melted plastic collects at the end of the barrel.

Once enough plastic has collected a **hydraulic ram** pushes the screw forward injecting the plastic through a **spruce** into a mould cavity.

The mould is warmed before injecting and the plastic is injected quickly to prevent it from hardening before the mould is full.

Stage 4

Pressure is maintained for a short time (**dwell time**) to prevent the material creeping back during **setting** (hardening). This prevents shrinkage and hollows, therefore giving a better quality product.

The moulding is left to cool before removing (**ejected**) from the mould. The **moulding** takes on the shape of the mould cavity.

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