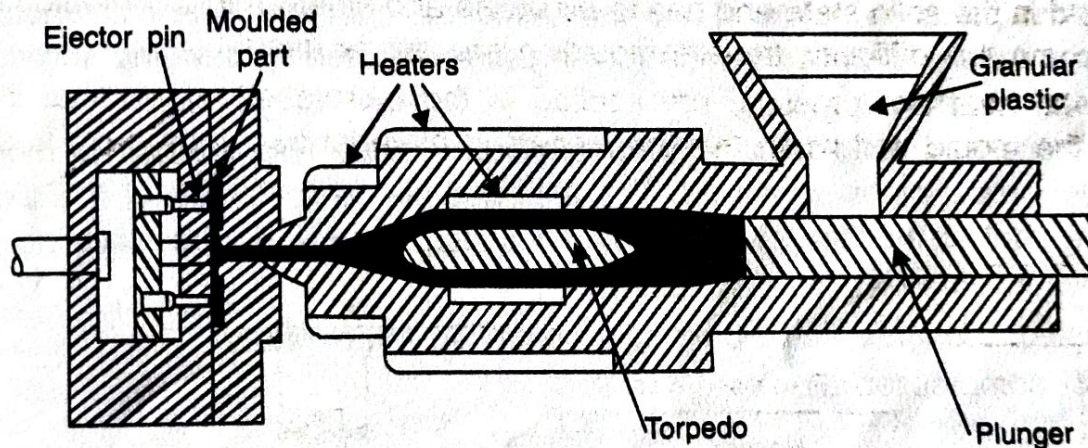


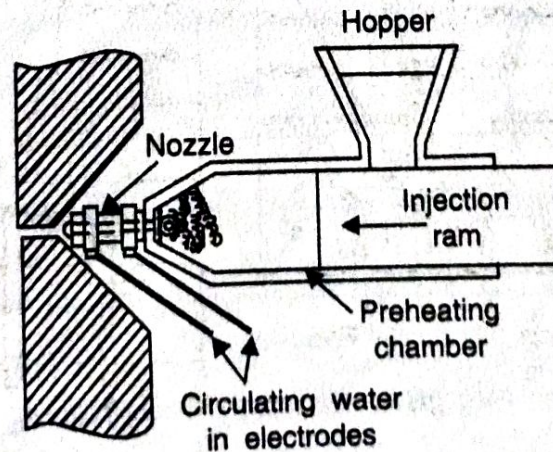
30.13 INJECTION MOULDING

Injection moulding is the most widely used process for high volume production of thermoplastic resin parts.

In this process, the granules of dry raw material (powdered plastic compound) are fed by gravity from a hopper into a cavity that lies ahead of a moving ram or plunger. As the ram advances, the material is forced into a heated chamber, where it is preheated. From there it is



(a) Using Heated Manifold and Heated Torpedo



(b) Used for Thermosetting Plastics

Fig. 30.3. Injection Moulding.

forced through a torpedo section, where it is melted and superheated (200 to 300°C). The heated material is then forced through a nozzle which is mounted against the mould. After feeding the material into the mould, it is allowed to cool. When sufficient hardening takes place, the mould is opened and produced part is ejected out by ejector pins.

Some injection moulding machines use the screw instead of ram (plunger). This screw rotates and reciprocates axially, to control the flow of material and to provide the pressure.

The injection moulding has the following advantages over the compression moulding :

- ❖ It is a faster method.
- ❖ It is most economical method for mass production of single product.
- ❖ The metal inserts can be easily cast with the product.
- ❖ The products having complex shape or thin walls can be easily moulded.
- ❖ The material wastages are low because the runners and sprues can be grinded and reused.
- ❖ This process can be easily mechanized i.e. easily automated.

30.14 EXTRUSION MOULDING

Extrusion means the continuous flow of material through a die. In this process, the powdered polymer or monomer is fed by a screw along a cylindrical chamber. As the powder moves towards the die, it is heated and melts. It is then forced through the die opening of desired shape. Hopper is used to feed the powdered material into the cylindrical chamber. The cylindrical chamber is heated by electricity, burning oil or steam. A rotating screw is used for carrying, mixing and forcing the material through the die.

Extrusion process is used for the thermoplastic material. This method is mostly used for making long tubes, rods, pipes, ropes etc. The extruded shape (outcome of the die opening) is carried through a cooling medium by a conveyor. Cooling is done by the following means :

- ❖ By exposure to air at room temperature
- ❖ By passing through a liquid bath at a controlled temperature.
- ❖ By jet of compressed air.

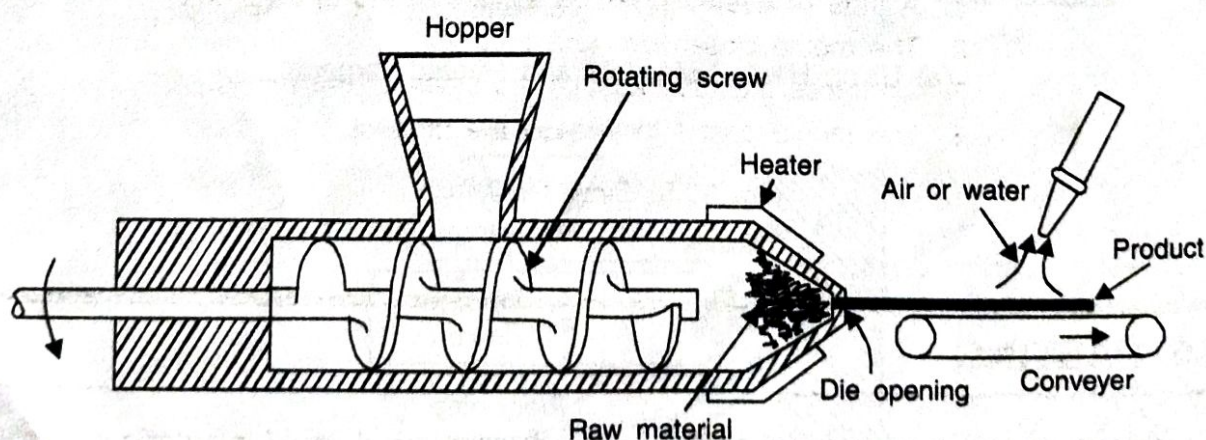


Fig. 30.4. Extrusion Moulding.

Rapid cooling must be prevented because it causes warpage and sets some internal strains in the finished pieces.

Advantages

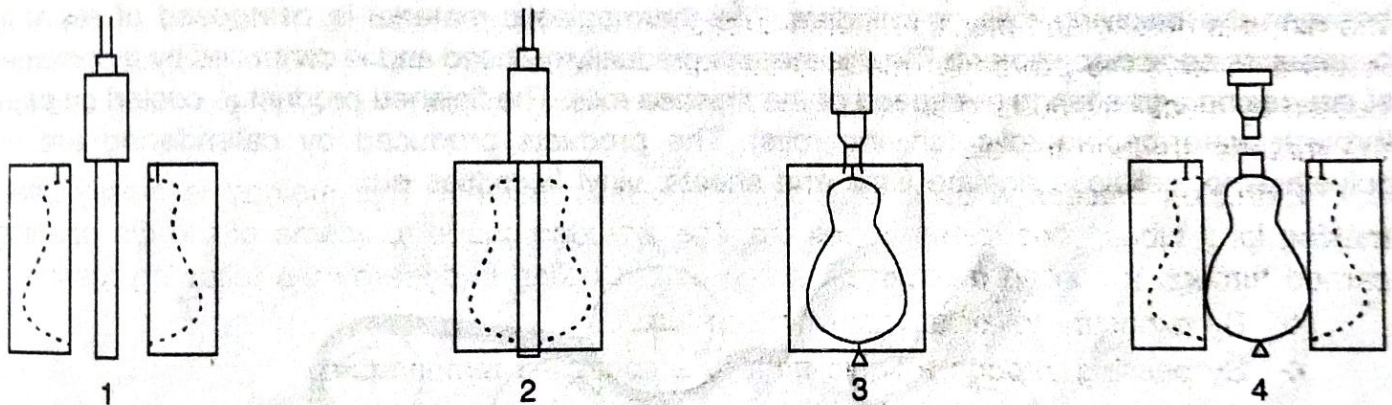
- ❖ Low initial cost.
- ❖ Continuous production.
- ❖ High uniaxial strength.
- ❖ Intricate profiles can be produced.
- ❖ Material thickness can be accurately controlled.

30.15 BLOW MOULDING

This process is applied to only thermoplastic material for making thin walled hollow articles such as bottles and floatable objects. In this process a heated closed end thermoplastic tube is placed in the mould and air pressure is applied to inflate it i.e. the tube will expand to the walls of the cavity. After the product is cooled sufficiently, the mould is opened and the product is removed.

In this process, the mould is in two halves. The cylinder or tube of plastic material (known as parison) is heated and placed between the jaws of a split mould.

When the mould is closed, it pinches off the parison and the product is completed by air pressure which forces the material against the mould surfaces. The mould should be properly vented to eliminate the poor surface finish.



1. A tube of heated plastic is placed in the open mould.
2. The mould closes over the tube.
3. Air forces the tube against the sides of the mould.
4. The mould opens to release the product.

Fig. 30.5. *Blow Moulding.*