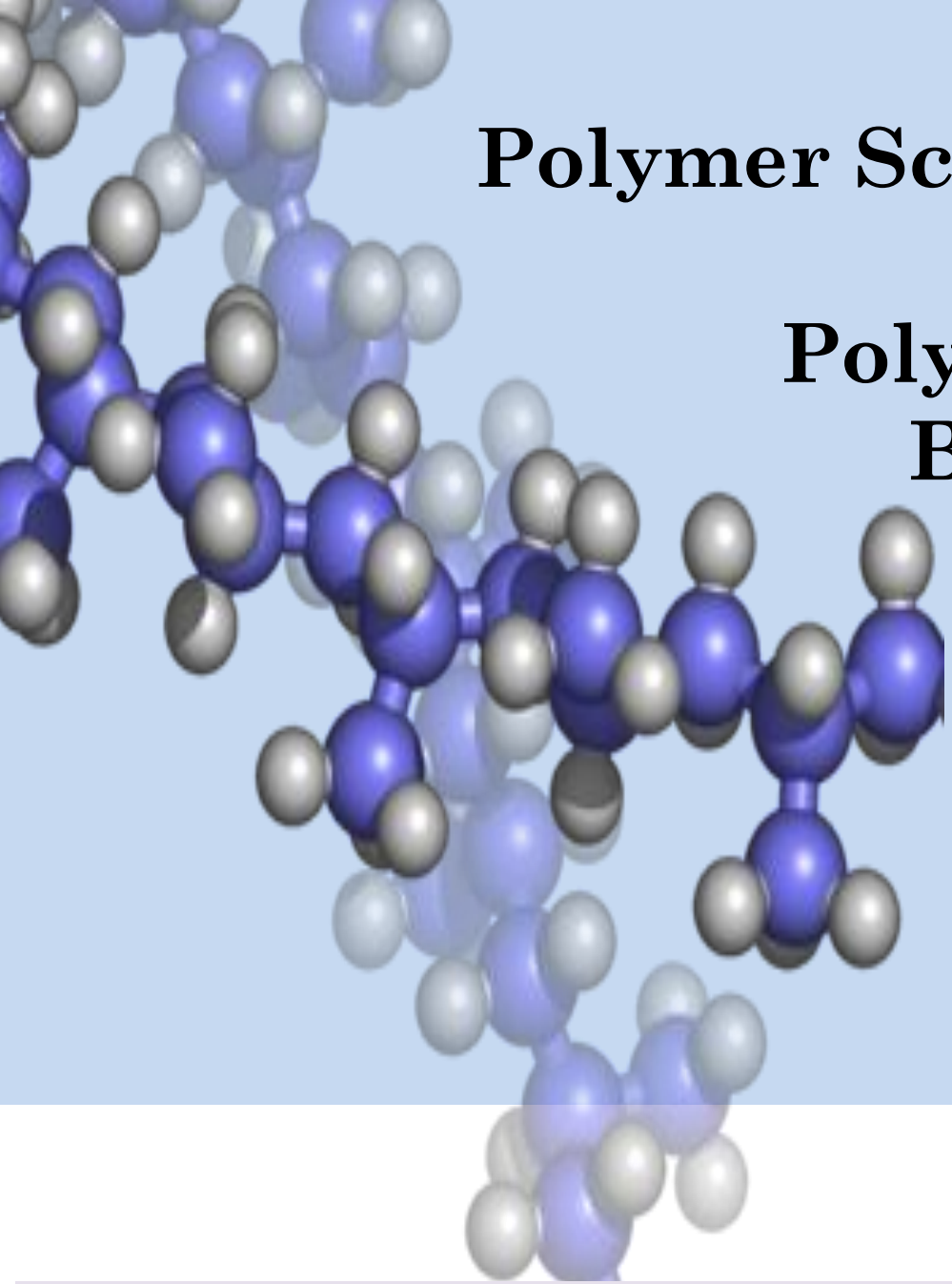

Polymer Science & Engineering

Polymer Processing: Blow Molding

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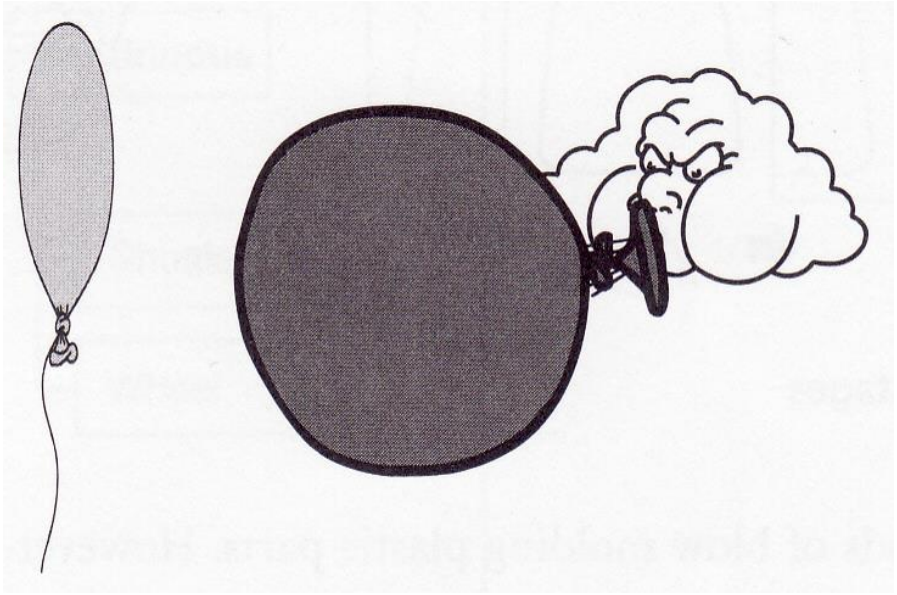
The principle of blow molding

A simple explanation of the principle of blow molding is similar to inflating a balloon

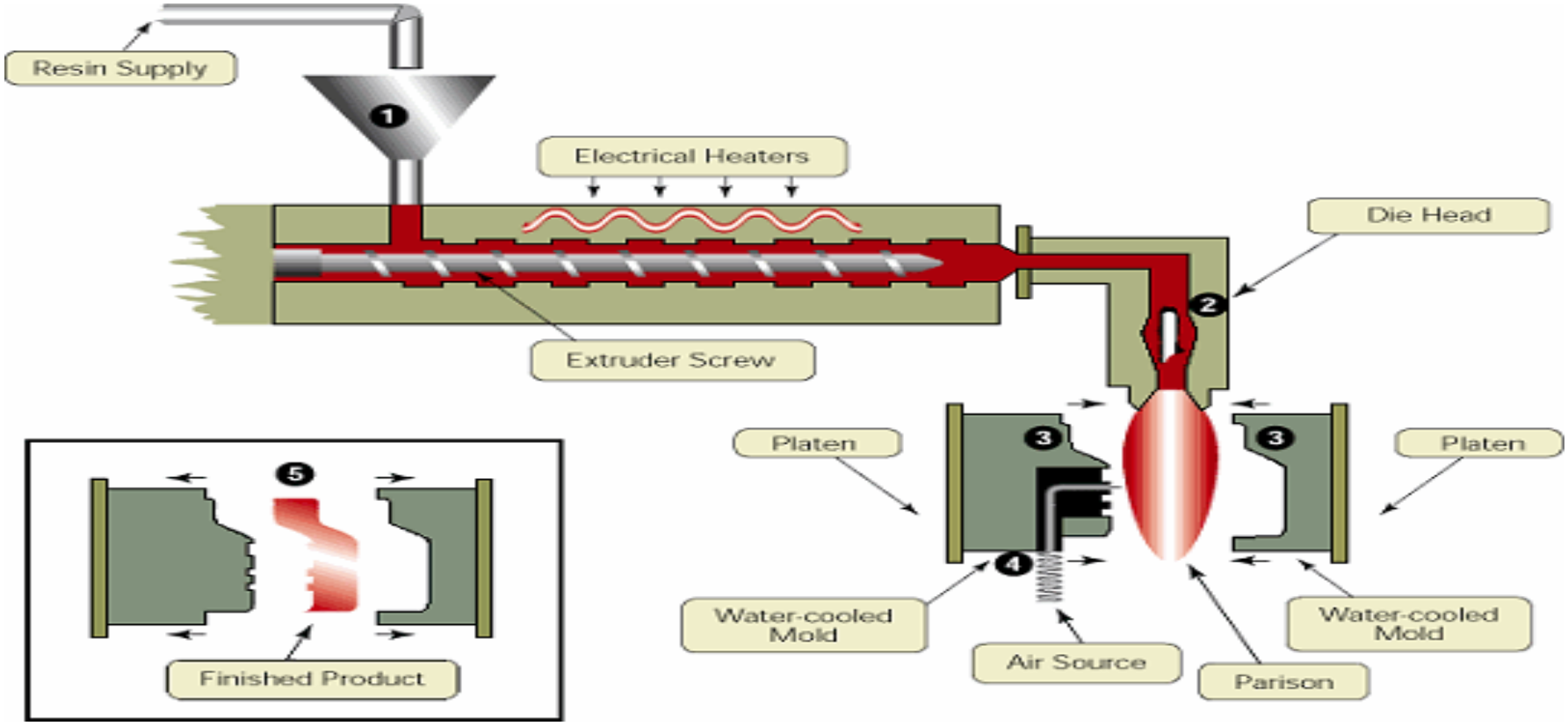


- Blow Molding is a process that can create hollow parts.
- There are two different industry segments that use Extrusion Blow Molding, packaging (bottles) and industrial (any parts that are not bottles).

The process starts with the formation of a hollow tube of plastic, called a *parison*.

- The tube is extruded downward until it extends past the bottom of the mold.
- The mold then closes on the parison.

Extrusion blow molding

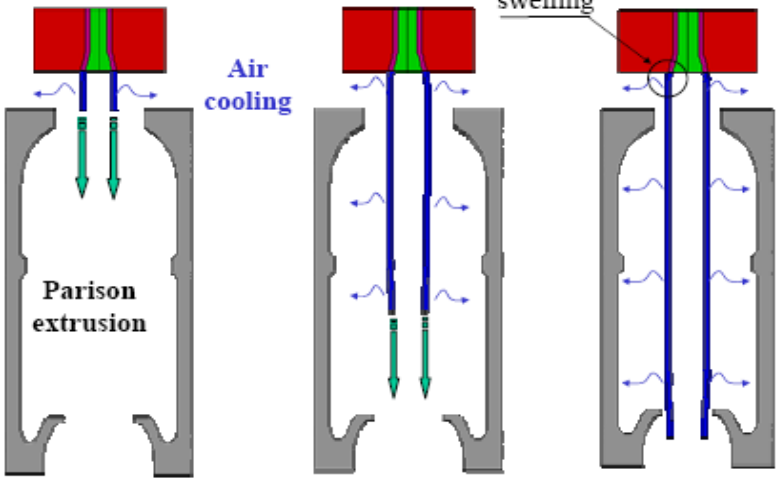


Blow Molding Stages

Blow molding has five stages :-

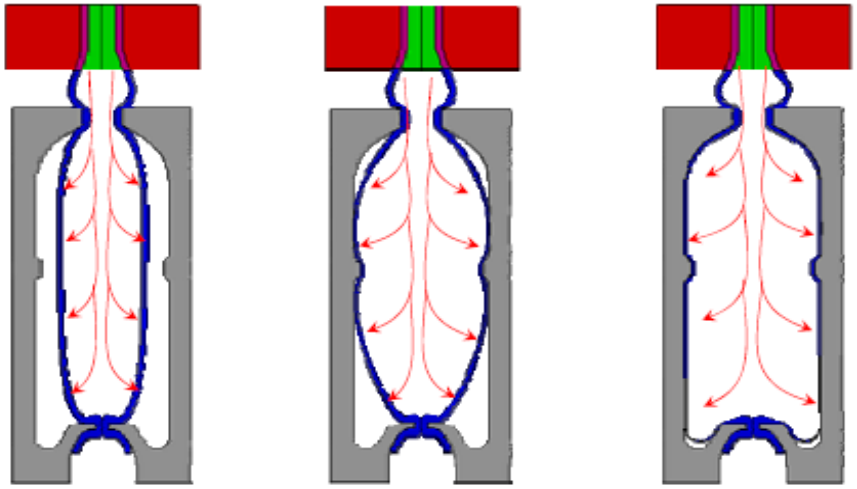
1. Plasticizing or melting the resin
2. Parison or preform production
3. Inflation of the parison or preform
4. Ejection of the part
5. Trimming and finishing of the part

Extrusion Phase



Step 1

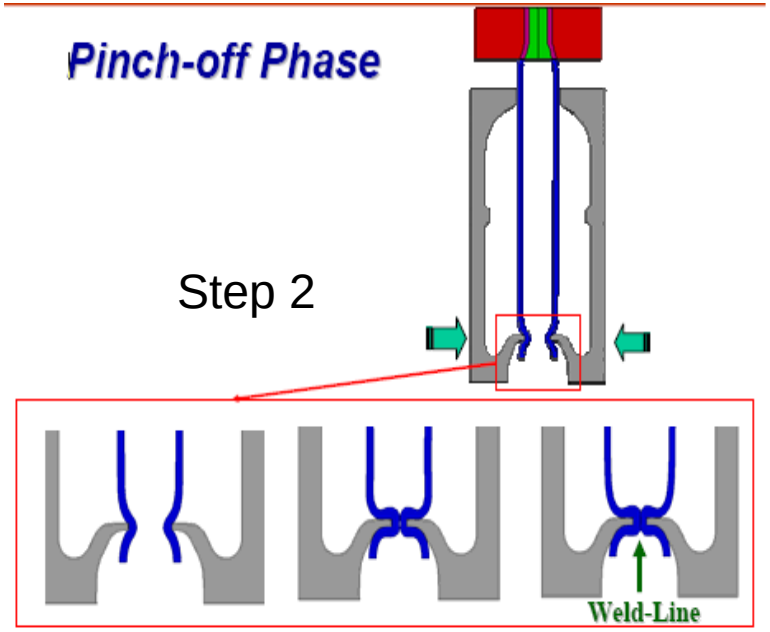
Inflation or Blowing Phase



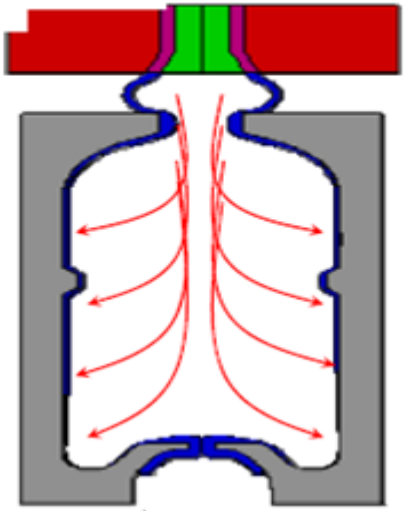
Step 3

Pinch-off Phase

Step 2

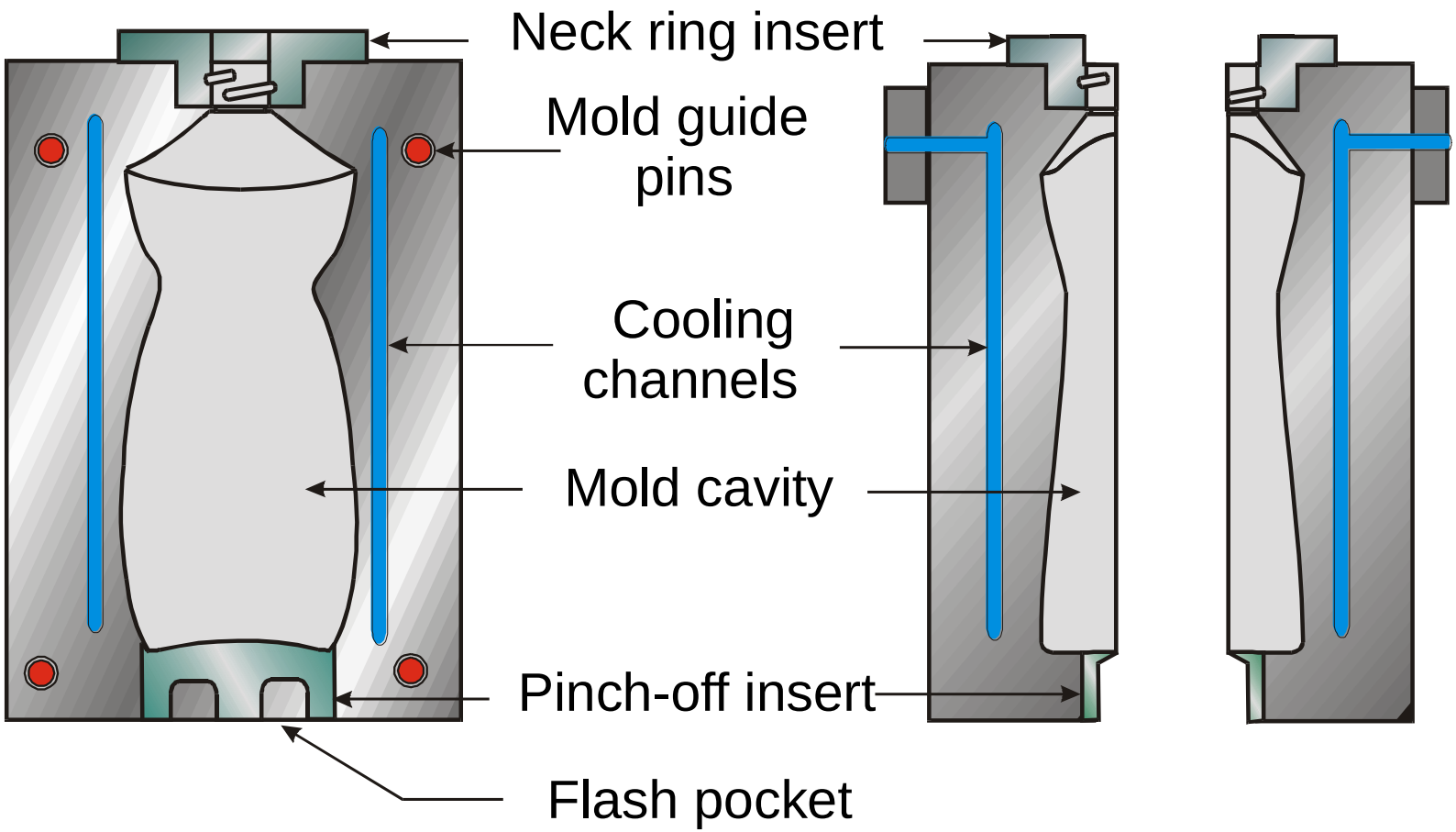


The Cooling Phase

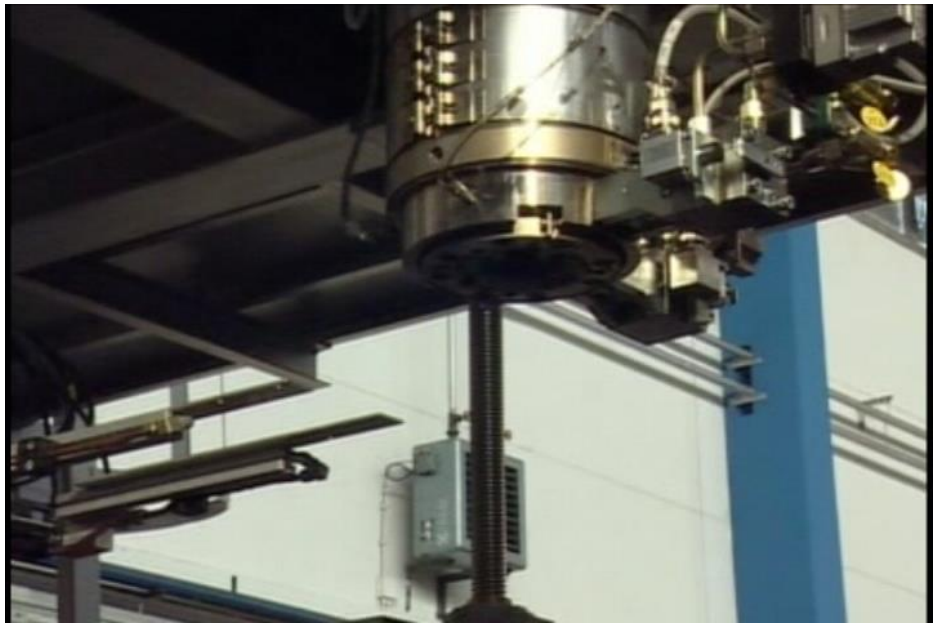


Step 4

Blow Mold


Neck ring insert
Mold guide pins
Cooling channels
Mold cavity
Pinch-off insert
Flash pocket

Parisons



There are two ways to get air into the parison:

- Blow pins are used to bring the air in on the parting line of the mold.
  - In bottles, it is inserted through the neck.

- Blowing needles are used to create very small holes in a part. Such pins can be located anywhere in a mold.

Key Processing Parameters

- **Melt Temperature** – Changes the viscosity of the material.
- **Extruder Speed** – Determines the speed that the parison is made.
- **Blow Time** – Although blowing forms the product, holding the pressure on the product keeps it in contact with the mold and increases the cooling.
- **Blow Pressure** – Helps to pick up surface detail in the mold.
- **Parison Drop Time** – How long the parison hangs and stretches before the mold closes.
- **Parison Programming** – Creates local thickness changes in the parison.
- **If the parison is off-center**, it will cause thickness variation around the circumference of the part.

Process Advantages

- Molds are inexpensive vs. injection molding. Since molding pressures are much lower, tooling can be produced in aluminum.
- Irregular geometry can be easily molded if the mold can open without destroying the part.
- There is the ability to combine several components into one part.
- The inside volume of the part can be filled with foam while the mold is still closed.