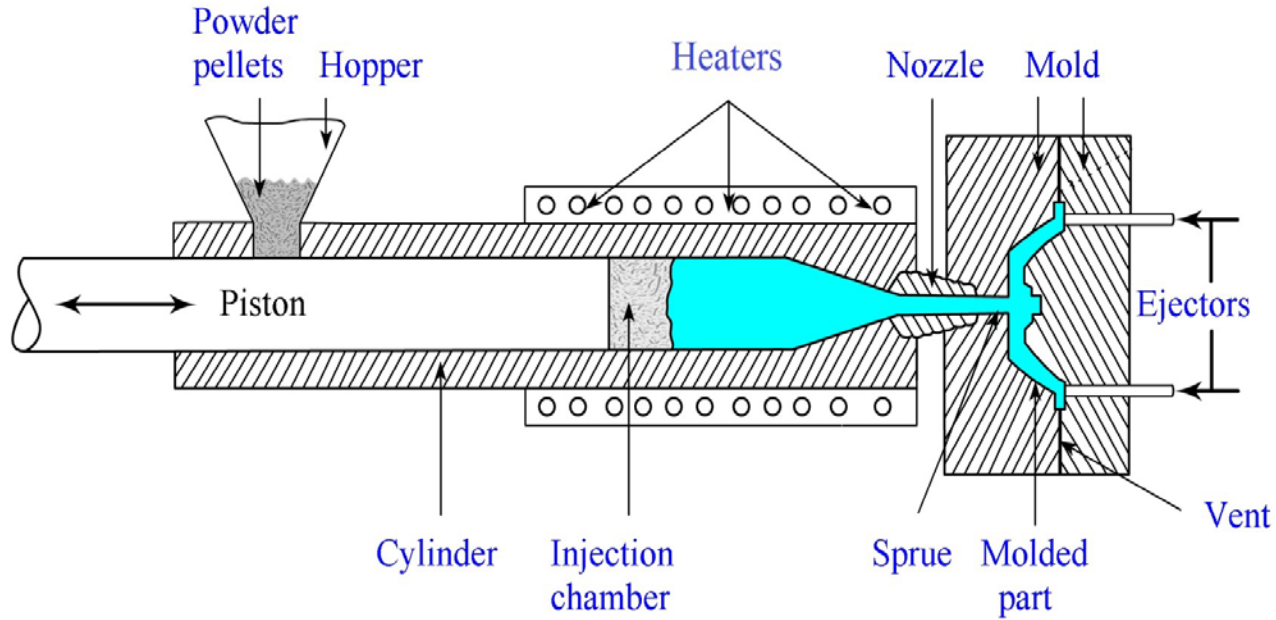
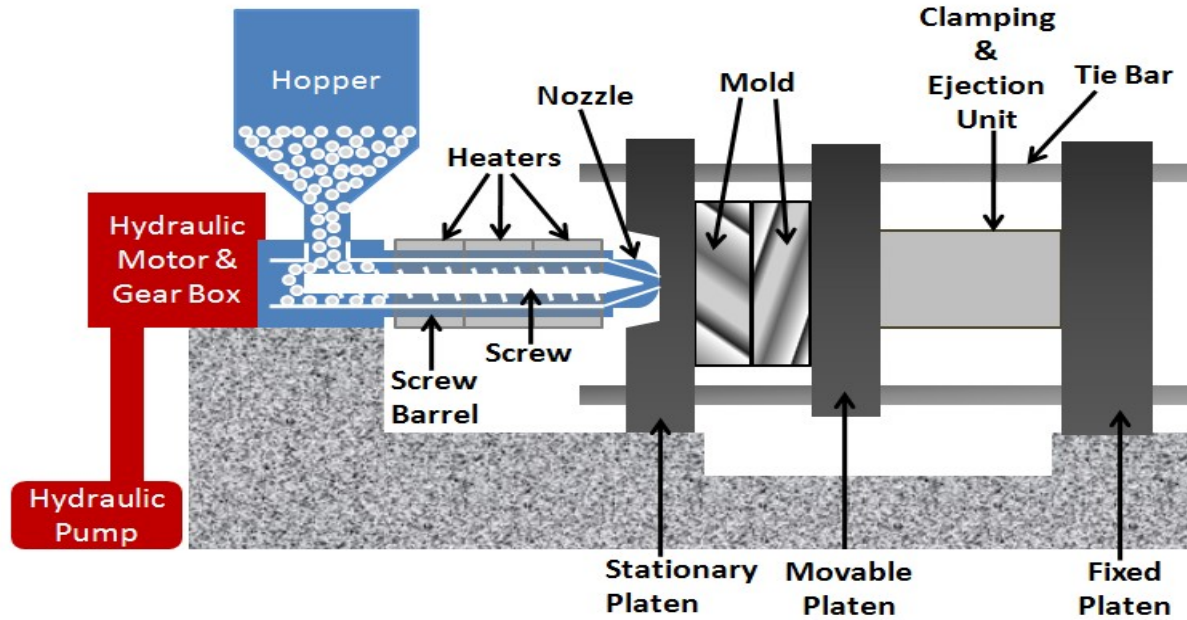


# Injection Molding

- Injection molding is the one of the most commonly used processing techniques for the plastic components.
- It is used to manufacture thin walled plastic parts for a wide variety of shapes and sizes.
- Plastic material is melted in the heating chamber and then injected into the mold, where it cools and finally the finished plastic part is ejected.



## Plunger Type Injection Molding Setup



## Reciprocating Screw Type Injection Molding Setup

# Injection Molding Process

- Plastic materials usually in the form of powder or pellets are fed from hopper into the injection chamber.
- The “*piston and cylinder/reciprocating screw*” arrangement is used to forward the material inserted from the hopper in to the injection chamber.
- The material is heated in the injection chamber with the application of heating elements.

# Injection Molding Process Cont..

- The molten plastic material is then injected into the mold through a nozzle.
- The molded part is cooled quickly in the mold.
- Final plastic part is removed from the mold.
- The process cycle for injection molding is very short, typically between 2 to 60 seconds.

The complete injection molding process is divided into four stages:

- Clamping
- Injection
- Cooling
- Ejection

# Clamping

- Two halves of the mold must be tightly closed, before the molten plastic material is injected into the mold.
- One half of the mold is attached to the injection unit (nozzle) and other half is allowed to slide on the guide ways.

# Clamping Cont..

- The clamping of mold is operated hydraulically which pushes the moving half part of the mold towards the fixed part to make an air tight chamber.
- The pressure and the time required to close and open the mold depends upon the machine capability.



# Injection

- The plastic material is melted by the application of heat and forwarded through the piston towards the nozzle and finally into the mold.
- The molten plastic is then injected into the mold quickly.

# Injection Cont..

- The amount of material that is injected into the mold is referred to as the shot volume.
- The injection time can be estimated by the shot volume, injection power and pressure.

# Injection Molding Animation

Source:

<https://www.youtube.com/watch?v=b1U9W4iNDiQ>

# Materials Used

The injection molding process can be used to process materials such as:

Acetal, Acrylic, Nylon, Polycarbonate,  
Polyetheretherketone (PEEK), Polyethylene (PE),  
Polypropylene (PP), Polyvinyl Chloride (PVC) etc.

# Applications

- The injection molding process can be used to manufacture thin walled plastic housing products which require many ribs and bosses on the interior surfaces.
- These housings are used in a variety of products including household appliances, electronics, power tools and as automotive dashboards.

- Thin walled products include different types of open containers, such as buckets.
- It is also used to produce several daily use items such as toothbrushes or small plastic toys, many medical devices, including valves and syringes.

# Advantages

- Higher production rate
- Close tolerances on small intricate parts
- Minimum wastage of material
- Complex geometry can be easily produced

# Limitations

- Tooling cost higher
- High setup cost
- Large undercuts can not be formed