

# **POLYMER PROCESSING AND POLYMERIZATION TECHNIQUES**

## **polymer processing**

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### **plastics**

- 1. Thermoplastic**
- 2. thermosetting**

### **Elastomers**

- 1. Natural rubber**
- 2. Synthetic rubber**

### **Fibres**

- 1. Comfort fibre**
- 2. Safety fibre**
- 3. Industrial fibre**

# **POLYMER PROCESSING**

**1. Calendering**

**2. Die Casting**

**3. Injecting moulding**

**4. Thermoforming**

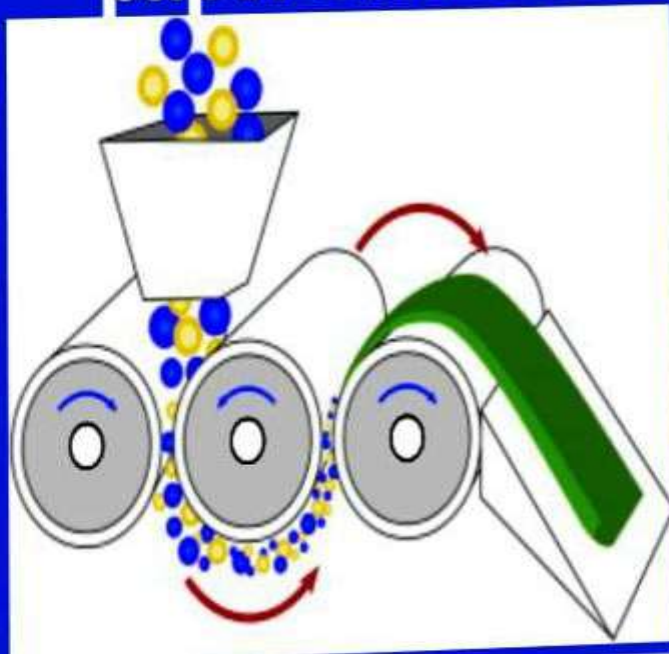
**5. Fibre spinning**

# CALENDERING

**A calender is a series of pressure rollers used to smooth and gloss a sheet material such as paper, clothes or plastic film**

**Important variables are:-**

**Original paper properties  
calendering itself with  
rolling contact against  
paper surface**

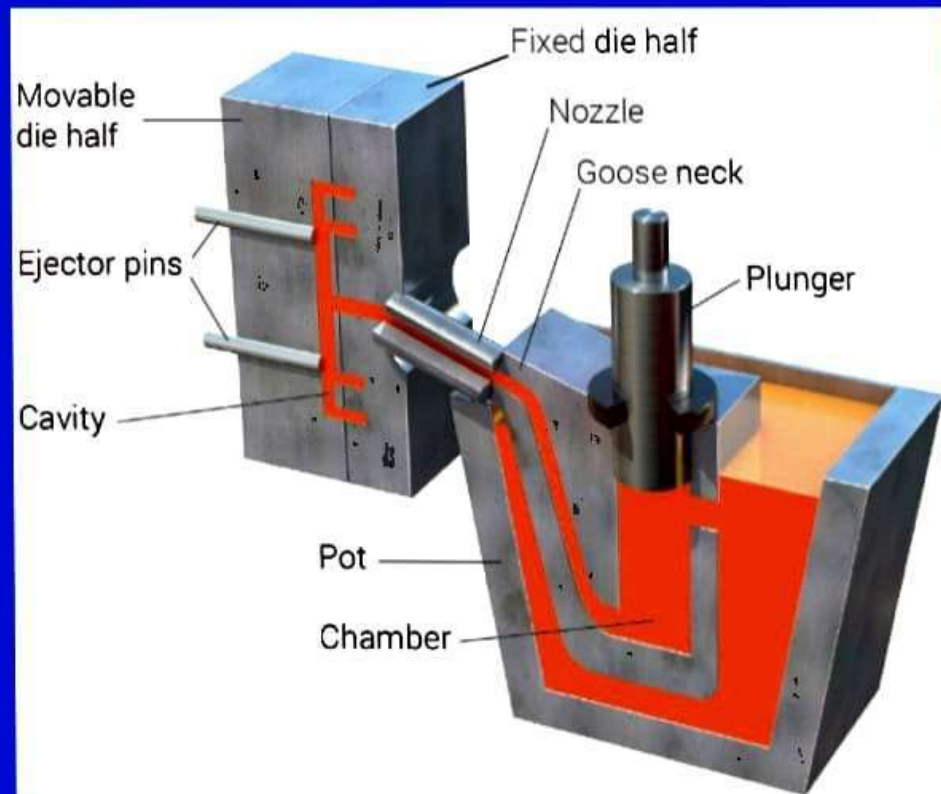




# DIE CASTING

**Die casting is a low cost process which  
converting a liquid prepolymer to a solid  
with desired shape**

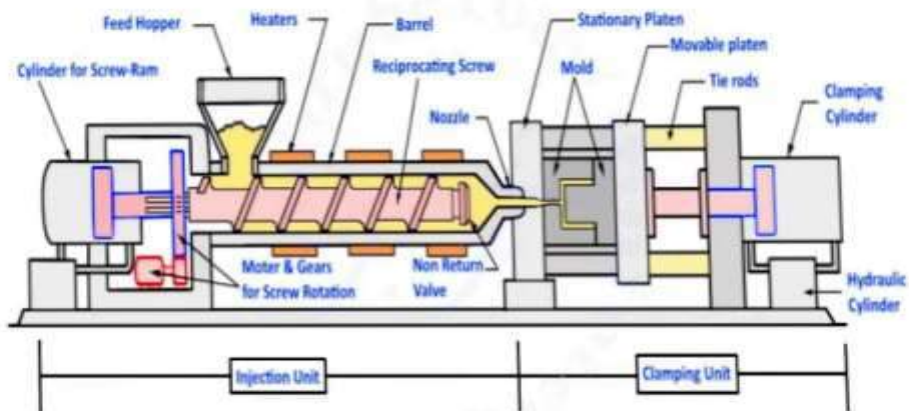
**Sheets,tubes,rods,and the like in limited quantities  
produced by the casting process**



# INJECTION MOULDING

Injection moulding is a manufacturing process for producing parts by injecting molten material into a mould, or mold. Injection moulding can be performed with a host of materials mainly including metals, glasses, elastomers, confections, and most commonly thermoplastic and thermosetting polymers.

## Injection Moulding



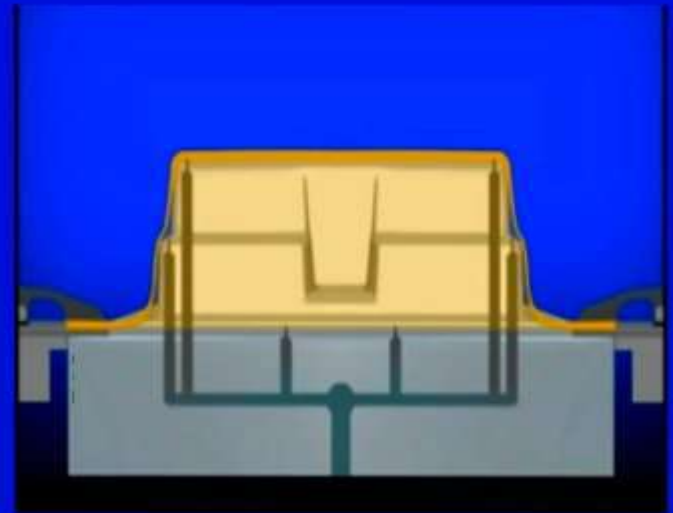


# THERMOFORMING

Thermoforming is a plastic molding technique that results in a variety of highly usable products. During this manufacturing process, thin plastic sheets are heated in order to make them easy to manipulate. Once a sheet reaches a pliable temperature, it is formed over a male or female mold.



**Female**



**male**

# FIBRE SPINNING

**Fibre spinning is a process in which an extruded liquid polymer filament is continuously drawn and simultaneously solidified to form a continuous synthetic fibre. There are three fundamental processes for the manufacture of synthetic fibres:**

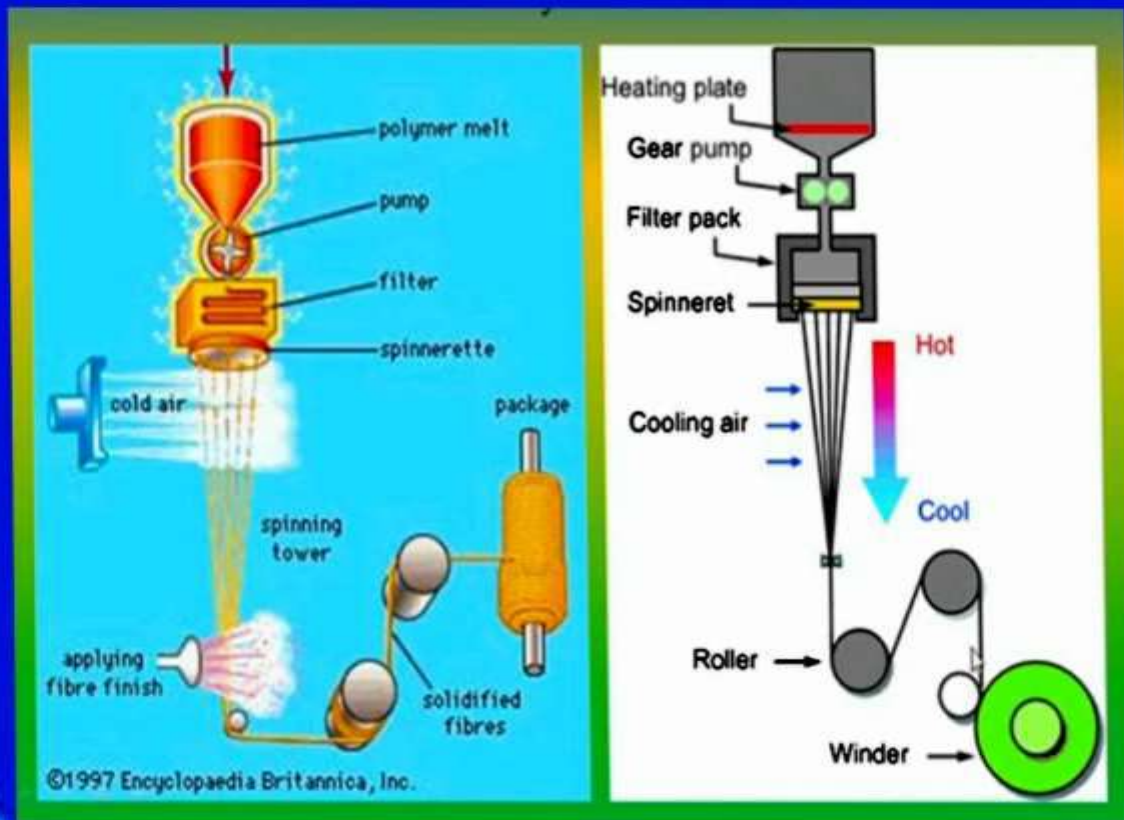
- 1. melt spinning**
- 2. wet spinning**
- 3. Dry spinning**





# MELTING SPINNING

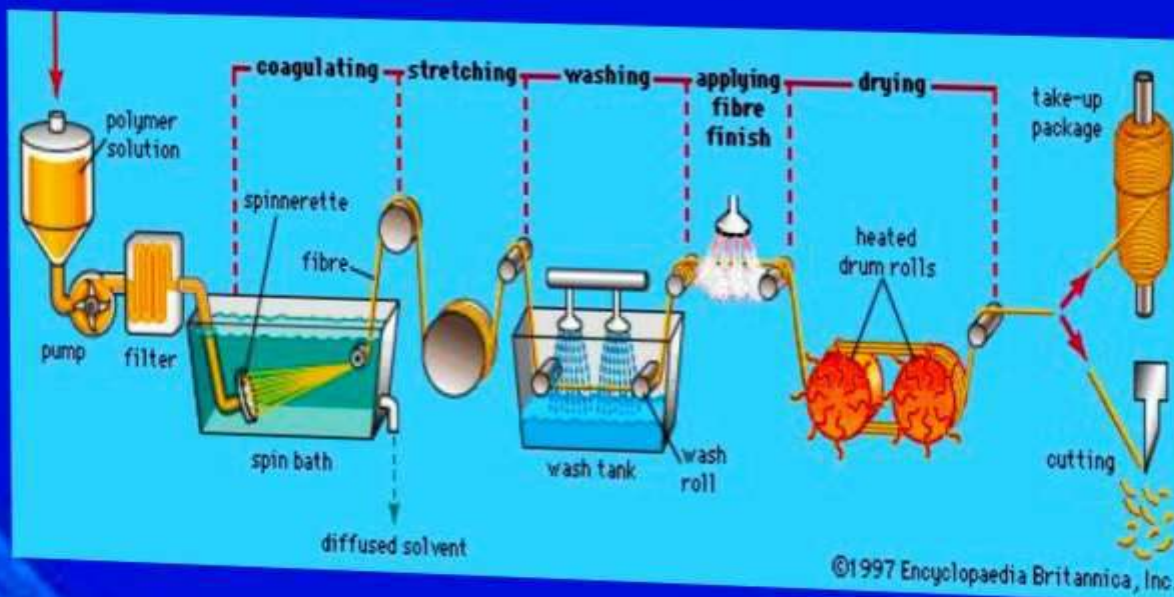
Melt spinning is a metal forming technique that is typically used to form thin ribbons of metal or alloys with a particular atomic structure. ... A typical melt spinning process involves casting molten metal by jetting it onto a rotating wheel or drum, which is cooled internally, usually by water or liquid nitrogen.





# WET SPINNING

**Wet spinning of fiber is a form of solution spinning where polymer powder is dissolved in a suitable solvent and the polymer solution is extruded through spinneret into a solvent-non solvent mixture (coagulant). ... The fiber also coated with a spin finish solution to improve its handlability.**



# DRY SPINNING

**Dry spinning is the fiber formation process that transforms a high vapor pressure polymer solution to a solid fiber by controlled fiber evaporation in the spinline. The key variables in dry spinning are heat transfer, mass transfer and stress on the filament.**





**THANK YOU**

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