MOLDING

Francis Dizhgalvis
Extrusion- material being forced through a die to shape into predetermined geometry

- Feed section, screw, barrel, breaker plate (filters out dirt and unfused polymer lumps), die

Figure 13.1 Cross-section of a typical extruder [1].

Simple means to reduce film width

Adjusting screws

Bolts for holding jaws
Flat film & Sheet

Cast - Film Extrusion
Flat film <0.25 mm

Biaxial Orientation
Flat Sheet >0.25 mm polypropylene
Flat film & Sheet Cont.

Extrusion of Flat Film, Sheet, and Tubing

Blown Film Extrusion
Biaxial orientation
for polyethylene
Poltrusion – Continuous molding process resembling the application of Insulation to wire and cable.

Calenders – resemble multi-roll mill (3-5 rolls) with the same rotational speed. Material fed to calender is usually preheated and may come from Internal mixer or extruder.
   a) Single ply sheetings
   b) Applying rubber to fabrics
   c) Double ply sheeting
   d) Profiling – four roll engraving calender
Fibers

- **Fiber** – fundamental unit of textiles and fabrics and can be defined as a unit of a matter having length at least 100 times its width or diameter.

- **Spinning** – term used with natural fibers (since colonial days – so called spinning wheel) referring to twisting of short fibers into continuous lengths.

- **Spinneret** – the element having multiple holes through which a polymer is extruded.
  - a) Melt Spinning – melted feed (up to 2000 m/min)
  - b) Dry spinning,
  - c) Wet spinning
Yarn Stretching

- 4 types of stretching methods.
- a) cold or hot stretching
- b) wet stretch
- c) snubber controlled wet stretch
- d) roll controlled wet stretch
Compression Molding

Flash mold – open with pre-form in place and closed with flash forced out between mold halves. Transfer mold operation – material fed into the pot of the transfer mold and then forced under pressure when hot through an orifice and into closed mold. Part then removed by ejector pins.
Injection Molding

- Accomplishes the cyclic operation by carrying out each step of the molding process in a separate zone of the same apparatus.

- Cross section of a typical screw injection-molding machine.
  a) Screw retracted, b) screw in forward direction
Slush Molding

Plastisol – special heat-convertible liquid category that is made possible by unique properties of PVC
Rotational and Blow Molding

- Rotational molding process
- Vertical wheel type of continuous extrusion blow-machine
Foams

- Production of low density polystyrene foam sheet from tubular film die
  Extensively applied in packaging, picnic coolers, drinking cups, automotive industry
Conclusions

• Many methods possible to choose from
• Well developed methods over the time
Literature