**Molding** is the process of manufacturing by shaping pliable raw material using a rigid frame or model called a mold. Plastics are a popular type of material used in this process.

**Casting** is a manufacturing process by which a molten material such as metal or plastic is introduced into a mold, allowed to solidify within the mold, and then ejected or broken out to make a fabricated part.

**Injection Molding:** Heated plastic is forced by a movable plunger through a nozzle and then into a mold. The material fills the mold and then is cooled.

**Rolling** – Material passes through a series of rollers, reducing its thickness with each pass

**Forging** – Material is shaped by the controlled application of force (blacksmith)

**Extrusion** – Material is **compressed and forced** through a die to produce a uniformed cross section

**Forming**

- Uses force to cause a material to permanently take a shape
- Changes some of the material properties

**SUBTRACTIVE PROCESSES**

**Separating**

Chip forming subtractive processes are a type of separation process where a chip is formed. Good examples of this include cutting with a saw, drilling with a drill, or machining with a mill or lathe

Non-chip forming processes are a type of separation process where no chips are produced examples are stamping or shearing. Some processes use an electric arc to cut material. One such example is EDM (electrical discharge machining.

**Lathes** (TURNING)  A machine for shaping a piece of material, such as wood or metal, by rotating it rapidly along its axis while pressing a fixed cutting or abrading tool against it.

**Milling Processes**

Operations that create flat or curved surfaces by **progressively** removing material

**Drilling Processes**

Operations that create holes
Cutting tools rotate and are fed into nonmoving secured work pieces

**Shearing Processes**
Operations that break unwanted material away from the part

**Abrasive Machining Processes**
Operations in which small particles of materials (abrasives) remove small chips of material upon contact

**Thermal and Chemical Processes**
Operations that cut and shape materials through chemical means

**ADDITIVE PROCESSES**

**Mechanical Fastening**
Use physical force to hold parts together

Mechanical fasteners or part design

**Welding**
Operations that use heat, pressure, or both to permanently join parts

**Soldering and Brazing**
Operation in which metal surfaces are bonded together by an alloy

**Rapid Prototyping**
A group of techniques used to quickly fabricate a scale model of a physical part or assembly using three dimensional computer aided design data.

3D printing
Stereo Lithography
Fused Deposition modeling

Parts are produced directly from software applications

**Joining**
- Examples: Welding, Gluing, Soldering, Prototyping