Engineering Innovation Center
Microcontroller I
The Engineering Innovation Center is a large academic maker space with plenty of tools and equipment. In order to use these items you must have the proper training. This online popup class will teach the basic fundamentals of this tool or piece of equipment.

Injection Molding and Vacuum Forming—will demonstrate the basic procedure of both processes and how to use the corresponding equipment. The key is the right tool for the right job. This class will discuss how to identify and use these tools.
Injection Molding is a process of melting plastic and inserting it into a die to create detailed parts quickly. This process takes plastic pellets, melts then, and then pushes the molten plastic into a die, using this pressure to fill the whole space of the mold.
The current injection molding machine at the EIC is the: Pim-Shooter Bench Plastic Injector (Model 150a)

Injection Molding Machines can be oriented vertically or horizontally.

Parts of the Injection Molder are:
- Lever / Press
- Hooper
- Screw
- Barrel
- Heater
- Nozzle
- Die
Process – Injection Molding

The injection molding process is fairly quick and contains 4 major steps. They are:

- **Plastification** plastic pellets are inserted though the hopper and allowed to melt due to the heater around the barrel.
- **Injection** the screw is moved toward the mold cause thing the plastics to start moving forward and filling the mold.
- **Packing and Cooling** the screw moves even further allowing for the liquid plastic to completely fill the mold and then begin to cool.
- **Demold and Ejection** the mold is released and the final product can be taken out.
Applications – Injection Molding

- The vacuum forming process is used commonly to produce a large volume of smooth plastic parts quickly.
- This method of manufacturing is used to make many unique items.
Material – Injection Molding

• Injection Molding uses thermoplastics due to their ability to be heated and molded easily
• These plastics come in pellet form, making them easily loaded into the hopper
• Thermoplastics such as:
  – Polypropylene
  – Low Density Polyethylene
  – ABS
• Scrap plastic from flash can also be recycled if the pieces are made small enough
Vacuum Forming is the process of shaping plastic by heating a sheet of plastic, draping it over a mold, and using a vacuum to form the plastic tight to the mold.
Equipment – Vacuum Forming

• The current vacuum forming machine at the EIC is the: Centroform EZFORM SV1217
• The vacuum forming machine is connected to a vacuum pump to help pull down the plastic at the end of the process
• Parts of the vacuum forming machine are:
  – Heater
  – Carrier Frame
  – Platen
  – Vacuum Pump
The vacuum forming process 3 major steps. They are:

- **Heating and Placement** plastic is placed next to the heater as it is turned on and sags in deformation. Alongside the part to be molded is placed on the platen.

- **Drop Plastic** the heated plastic is dropped on top of the part on the platen by moving the frame down to the platen.

- **Vacuum** the vacuum is turned on to pull the plastic toward the part and the platen.
Application – Vacuum Forming

• Vacuum Forming can be used for a variety of applications such as
  – Cases
  – Containers
  – Masks
Materials – Vacuum Forming

- Vacuum forming uses sheets of thermoplastics and forms them
- Thermoplastics like:
  - PETG
  - Styrene
  - ABS
  - Acetal
  - Nylon
  - PTFE
- The size of the sheet being used is based on the frame size of vacuum forming machine being used
- Material selection will be based on application of final product.
- As where thickness of the plastic depends on application and level of detail wanted.