Lab #1
Introduction to Injection Molding Machine and Remote Control

Objective:

- Study the main components and principles of the injection molding machine.
- Study the remote control client of the injection molding machine.

Equipment:

- Computer: a generic computer with Windows system (Win 7 or Win 10) installed
- IP camera: Panasonic BL-C111
- WLAN: Internet Connectivity
- Microcontroller: Arduino Mega 2560(ATMEGA)
- Injection Molding Machine: Dake

Safety Rules:

1. Turn off power supply BEFORE disconnecting the power line.
2. Don't touch any power source when your hands are wet.
3. Don't touch the equipment as it will get hot and cause burns.

Task 1: Understand the main components of the injection molding machine

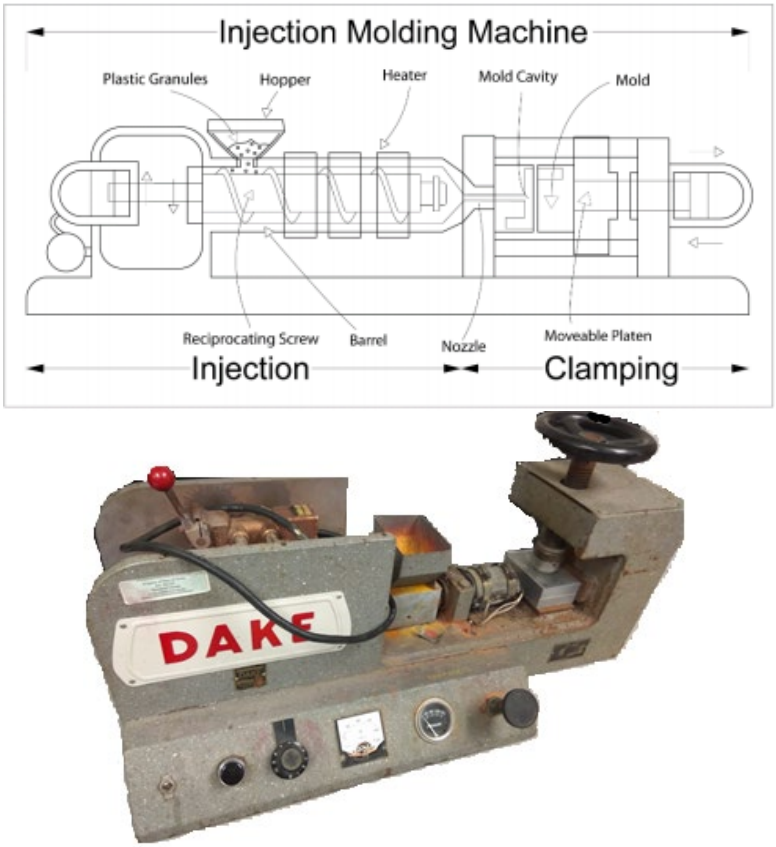


Figure 1: Injection Molding Machine

1. Feeding and heating module: this component consists of a feed hopper followed with a heater that heats the material so that it melts and then feed to mold.
2. Injection module: This is a pneumatic system with a needle valve to control the input pressure. A manual directional valve is connected to a handle, which helps in moving the piston horizontally left and right. This is used in feeding the molten material into the mold when extending.
3. Mold clamp: This is the part that holds the mold in place and helps align the nozzle to the mouth of the mold. The mold clamp has two screws, the vertical one helps secure the mold in place while the horizontal screw is to adjust the mold inlet to the nozzle opening.
4. Front panel: It consists of temperature and pressure control as well as meters for both parameters, and a power indicator light.

Task 2: Study the principle of the injection molding machine

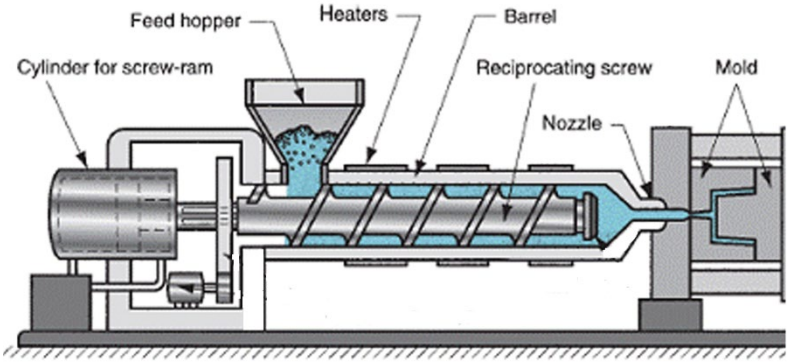
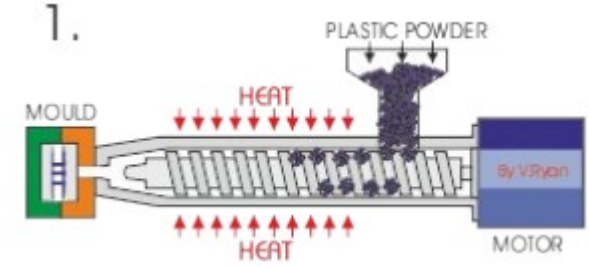
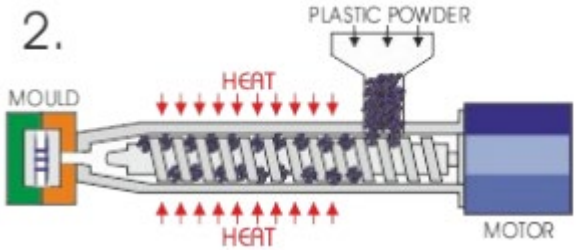


Figure 2 The schematic of the physical system

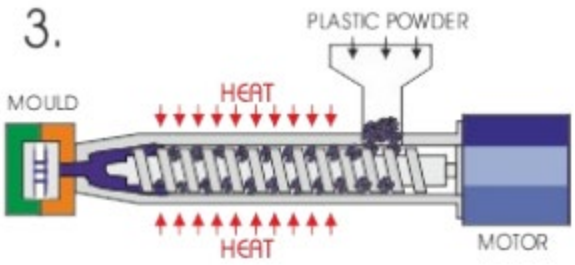
1. Granules of plastic powder are poured or fed into a hopper which stores it until it is needed.



2. A heater heats up the tube and when it reaches a high temperature, a screw thread starts turning.



3. A motor turns a thread which pushes the granules along the heater section which melts and turns into a liquid. The liquid is forced into a mold where it cools into the shape.



4. The mould then opens and the unit is removed.

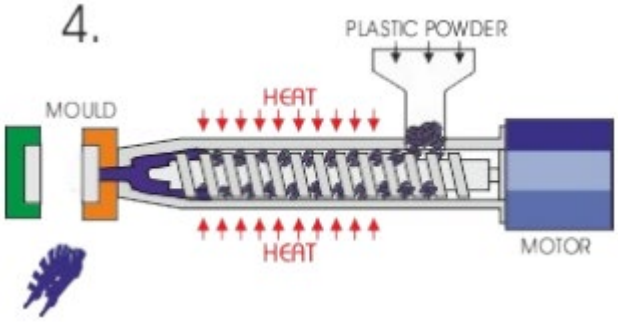


Figure 3 The process of injection

Task 3: The remote-control client of the injection molding machine

1. Turn on the power of the injection molding machine.
2. Open a browser and enter 18.14.19.80.

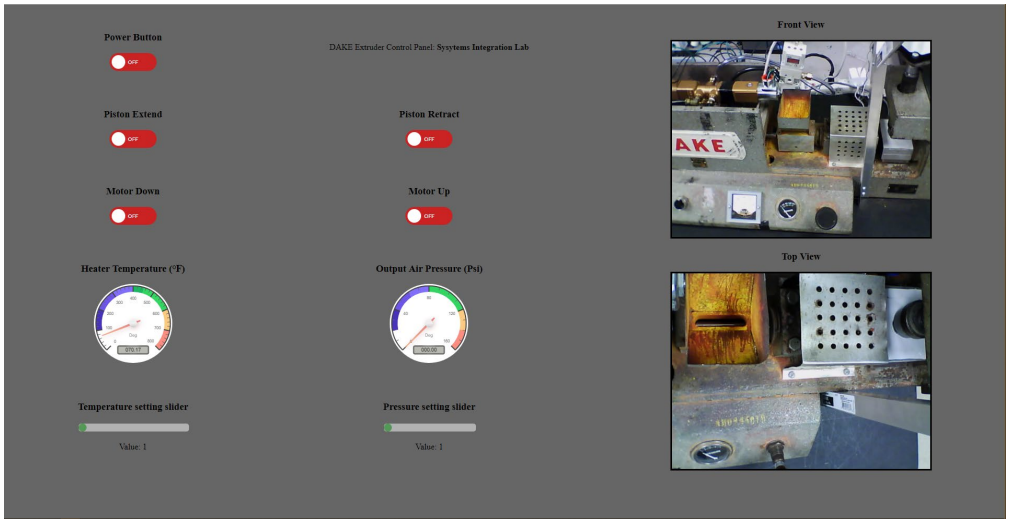


Figure 4 Graphic user interface of the remote control system

3. The user interface features several control switches for power, piston, and motor, along with temperature and pressure monitoring displayed in an analog-like dial similar to the actual physical gauge. There are also sliders to control the temperature and pressure of the equipment remotely. The views from cameras are also inserted into the page.