

Introduction

The extruder is the most widely used piece of equipment for the processing of thermoplastic polymers. It is used to form plastics as well as for the mixing of additives into a neat polymer. The polymer, in pellets or powder, along with any additives is put into a hopper. The hopper allows consistent flow of this mixture into the barrel of the extruder. The screw advances the mix. A combination of screw design and heater bands melts the mix. At the end of the barrel the melt is forced through the die into the desired shape, rod, sheet, etc. The extrudate is cooled via a cooling bath or air.

Start-up

1. **Do not use this equipment without proper training.**
2. **Sign in the logbook.**
3. Area surrounding the extruder should be clean and free of any trip hazards.
4. Sign in to the logbook.
5. Turn on both circuit breakers behind the extruder
6. Turn on cooling water; make sure the tube exiting the extruder is in the drainage pipe and that water is flowing through the tubing.
7. Turn on the two power switches
 - a. On the right side of the control box
 - b. On the front of the control box
8. Set the temperature for each zone using the keypads on the front of the control box.
9. The temperature is registered in degrees Celsius.
10. To double check which keypad controls which zone, trace the wire leaving each zone on the extruder back to the control box. Each wire should be numbered to match the keypad.
11. Let the extruder heat-up for a minimum of 30 minutes for the rod die, 90 minutes for the planar die, to insure the inside of the die is up to temperature.

Performing a Run

1. ***Do not leave the extruder unattended at any time.***
2. Fill the hopper with polymer
3. Pull out the big red knob
4. Turn the black switch to FWD, *you will hear the screw engage.*
 - a. The switch will snap back to the off position.
 - b. ***Never turn the switch to REV.***
5. Use the dial to the left of the red knob to control the speed of the screw
6. Keep the screw at low RPM's (<5) until polymer comes out the end of the barrel
 - a. It should take approximately a minute to move the polymer the length of the barrel.
7. Increase the speed of the screw to desired speed.
 - a. Increasing the rpm's will increase the output, the pressure at the die and potentially the die swell.
8. Push the red knob to stop the screw at any time; *this will not hurt the machine.*

Changing a Die

There are two dies available, the sheet die and the dual nozzle die. The sheet die produces a sheet approximately 3 inches wide by 3 mm thick. The nozzles run from 1mm in diameter up to 5mm in diameter.

1. Heat up the extruder to the processing temperature of the polymer to be used.
2. Disconnect the temperature sensor attached to the right hand side of the die.
3. *Using a hot glove*, unscrew the die
4. Clean out degraded polymer with spatula
5. Insert new die into hole and screw on
6. Reconnect the temperature sensor to the die
7. Allow the die to heat for 30 minutes to insure it has reached the processing temperature

Shutting Down the Extruder

1. Keep the screw turning until polymer stops coming out of the die
2. Fill the hopper with purge material (polypropylene), keeping the temperature the same
3. Allow all the purge material to exit the die
4. Push the red knob to stop the screw
5. Turn off both power switches
 - a. One on the front of the controller
 - b. One on the side of the controller
6. Turn off both circuit breakers
 - a. To the left and right of the extruder
7. Turn off cooling water
8. Place "HOT" sign on the extruder

Trouble Shooting

1. Polymer coming out too viscous
 - a. Increase zone temperatures. The temperature at the die should be the highest temperature. The zone temperatures should decrease as you go from the die to the hopper.
2. Polymer coming out not viscous enough
 - a. Decrease zone temperatures
3. Polymer not coming out of the barrel within a minute of engaging the screw.
 - a. Check to make sure there is polymer in the hopper.
 - b. There may be a blockage in the die, stop the screw and increase the temperature at the die to melt any blockage.
4. Individual zones not reaching temperature
 - a. Make sure wires are properly connected at the control box and at the band
5. Any other problems
 - a. Contact the manufacture – www.cwbrabender.com, 1-201-343-8425

