

## **Introduction and troubleshooting of single screw extruder**

Recently, I have encountered many customers who inquired about the single screw extruder, so today I write this article to introduce the single screw extruder to everyone. I will discuss the application, component, some common fault of the single screw extruder. I hope it can be helpful to everyone.

### **1. Introduction of single screw extruder**

In plastic extrusion molding equipment, the plastic extruder is usually called the main machine, and the matching plastic extrusion machine is called the auxiliary machine. After more than 100 years of development, plastic extruders have derived from the original single-screw, twin-screw, multi-screw, and even non-screw models. The single screw extruder is mainly used for extruding soft & hard polyvinyl chloride, polyethylene and other thermoplastics. It can process a variety of plastic products, such as blown film, extruded pipe, pressing plate, drawing ribbon, etc., and can also be used for melt granulation. Because of its diversified functions, it has always maintained a pivotal position in the series of extruders.

### **2. Component of single screw extruder**

The single screw extruder consists of an extrusion system, a transmission system and a heating and cooling system.

#### **2.1 Extrusion system**

The extrusion system includes a screw, a barrel, a hopper, a die, and a mold. The plastic is plasticized into a uniform melt through the extrusion system, and is continuously extruded by the screw under the extrusion force in this process.

##### **2.1.1 Screw:**

It is the most important part of the extruder. It is directly related to the application range and productivity of the extruder. It is made of high-strength corrosion-resistant alloy steel.

##### **2.1.2 Barrel:**

It is a metal cylinder, generally made of alloy steel or composite steel pipe lined with alloy steel that is heat-resistant, high compressive strength, strong, wear-resistant, and corrosion-resistant. The barrel and the screw are matched to realize the crushing, softening, melting, plasticizing, exhaust and compaction of the plastic, and continuous and uniform delivery of the rubber material to the molding system. Generally, the length of the barrel is 15-30 times its diameter, so that the plastic is fully heated and plasticized as a principle.

##### **2.1.3 Hopper:**

The bottom of the hopper is equipped with a cut-off device to adjust and cut off the material flow. The side of the hopper is equipped with a sight hole and a calibration metering device.

##### **2.1.4 Die and mold:**

The die is composed of an alloy steel inner sleeve and a carbon steel outer sleeve, and a forming mold is installed in the die. The function of the die is to transform the rotating plastic melt into parallel linear motion, introduce it into the mold sleeve evenly and smoothly, and give the plastic the necessary molding pressure. The plastic is plasticized and compacted in the barrel, and flows into the molding mold of the die through the neck of the die through the porous filter plate along a certain flow path. The mold core and

mold sleeve are properly matched to form an annular gap with a decreasing cross-section, so that the plastic melt is in a continuous and dense tubular coating is formed around the core wire. In order to ensure that the plastic flow path in the die is reasonable and eliminate the dead angle of the accumulated plastic, a shunt sleeve is often installed. In order to eliminate pressure fluctuations during plastic extrusion, a pressure-equalizing ring is also installed. The die is also equipped with a mold correction and adjustment device, which is convenient to adjust and correct the concentricity of the mold core and the mold sleeve.

## **2.2 Transmission system**

The function of the transmission system is to drive the screw and supply the torque and rotate speed required by the screw in the extrusion process. It is usually composed of a motor, a reducer and a bearing.

## **2.3 Heating and cooling system**

Heating and cooling are necessary conditions for the plastic extrusion process to proceed.

### **2.3.1 Heating system:**

Now the extruder usually uses electric heating, which is divided into resistance heating and induction heating. The heating sheet is installed on the body, neck, and head. The heating device externally heats the plastic in the cylinder to heat it up to the temperature required for the process operation.

### **2.3.2 Cooling system:**

The cooling device is set to ensure that the plastic is in the temperature range required by the process. Specifically, it is to eliminate the excess heat generated by the shear friction of the screw rotation, so as to prevent the plastic from decomposing, scorching or shaping difficult due to excessive temperature. Barrel cooling is divided into two types: water cooling and air cooling. Generally, air cooling is more suitable for small and medium extruders. For large extruders, water cooling or a combination of both cooling methods are used; screw cooling mainly adopts central water cooling to increase the solid conveying rate of materials, stabilize the amount of glue, and improve the quality of the product. However, the cooling at the hopper is to strengthen the conveying effect of solid materials and prevent the plastic particles from sticking and clogging the material opening due to heating, and to ensure the normal operation of the transmission part.

## **3. Common fault of the single screw extruder**

The single screw extruder is a kind of common plastic machinery equipment. During the daily operation of the extruder, various failures of the extruder will affect the normal production of plastic machinery. Below I will analyze the common fault of the extruder.

### **3.1 Main motor current is not stable**

- Reasons:
  - (1) Uneven feeding.
  - (2) The main motor bearing is damaged or poorly lubricated.
  - (3) A certain section of the heater fails and does not heat.
  - (4) The screw adjustment pad is wrong, or the phase is wrong, and the components interfere.
- Solutions:
  - (1) Check the feeder and troubleshoot.
  - (2) Overhaul the main motor and replace the bearings if necessary.
  - (3) Check whether each heater is working normally, and replace the heater if necessary.

- (4) Check the adjustment pad and pull out the screw to check if there is any interference in the screw.

### **3.2 Main motor can't start**

- Reasons:
  - (1) There is an error in the driving procedure.
  - (2) There is a problem with the main motor thread, whether the fuse is burned.
  - (3) The interlocking device related to the main motor works.
- Solutions:
  - (1) Check the program and re-operate in the correct operating sequence.
  - (2) Check the main motor circuit.
  - (3) Check whether the lubricating oil pump is started, and check the status of the interlocking device related to the main motor. The oil pump can't be turned on, and the motor can't be turned on.
    - (4) The inverter's induction current has not been discharged, turn off the main power supply and wait for 5 minutes before starting.
    - (5) Check whether the emergency button is reset.

### **3.3 The die is not smooth or blocked**

- Reasons:
  - (1) A certain section of the heater does not work, and the material is poorly plasticized.
  - (2) The operating temperature is set too low, or the molecular weight distribution of the plastic is wide and unstable.
  - (3) There may be foreign objects that are not easy to melt.
- Solutions:
  - (1) Check the heater and replace it if necessary.
  - (2) Verify the set temperature of each section, negotiate with the technician if necessary, and increase the temperature set value.
  - (3) Clean and check the extrusion system and the die.

### **3.4 The main motor starting current is too high**

- Reasons:
  - (1) The heating time is insufficient and the torque is large.
  - (2) A certain section of the heater does not work.
- Solutions:
  - When driving, use the handwheel, if it is not easy, extend the heating time or check whether each section of the heater is working properly.

### **3.5 The main motor makes an abnormal sound**

- Reasons:
  - (1) The main motor bearing is damaged.
  - (2) A certain SCR in the SCR rectifier circuit of the main motor is damaged.
- Solutions:
  - (1) Replace the main motor bearing.
  - (2) Check the SCR rectifier circuit, and replace the SCR components if necessary.

Finally, if this article still doesn't solve your questions, you can tell me and we will discuss it together. This is my contact information: +86-17361621611, my name is Amy.