

Application and performance features

1.1 Application

MY90x2S Twin-Screw Extruder is mainly applicable for processing floating and sinking aquafeed, expanded rice-noodles and some other expanded food.

1.2 Performance characteristics

The extrusion provides for production of many products with great superiority in comparison with other technologies. Because it almost integrates functions of different equipments in a single process when extruding, the procedures of mixing, extruding, cutting, cooking, forming and drying process in a certain degree can be carried out at the same time.

Products processed by twin-screw extruder have a greater superiority in gelatinization, pellet uniformity, smooth surface and formula adaptability than single-screw extruder.

1.2.1 Multi functions of the machine

An unique combined-type screw structure is adopted, and it can produce a wide varieties products only need to change some simple screw configurations or change the processing parameters.

1.2.2 Uniqueness of the product

Other technologies are difficult in producing some feed products or cannot produce products with certain shapes, however extrusion process can produce them easily.

1.2.3 High-quality of the product

This extruding operation is extremely effective in high-temperature and short-period processing. It provides improved nutrition with reducing the influences of anti-nutritional factors in products as well as sterilizing.

1.2.4 Effective utilization of energy

Extrusion can ripen material in a great degree in the cooking process, sufficiently use steam and reduce power consumption, and thus process cost can be saved.

1.2.5 Convenient and precise control system

Adopting the automatic control system can accurately control the flow and flow ratio of all materials, and also the different processing parameters can be recorded for the convenience of future production or providing the basis for adjusting processing parameters.

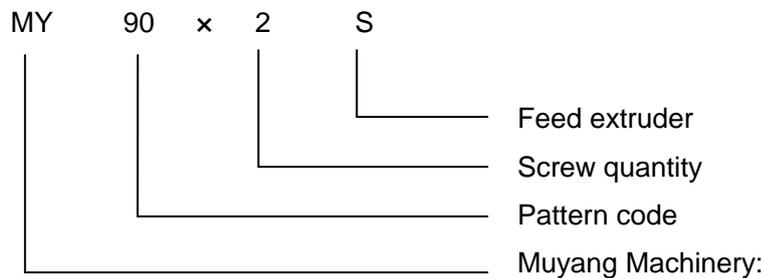
1.2.6 Minimum industrial wastewater

This extruding can effectively avoid industrial wastewater; this is an outstanding advantage for feed manufacturers bearing the increasing pressure for reducing influences of production activities on surrounding environment.

Main technical parameters

2.1 Model description

The model is MY 90x2S Twin-Screw Extruder



Overall structure and working principle

3.1 Overall structure

The extruder is composed of an anti-bridge feeding bin, a feeder, a different diameter cylinder conditioner, the extruding principal machine, a simple pipeline system and an electric control system.

Equipment installation

4.1 Installation of bridge-bridge feeding bin and feeder

One of basic reference data for the control system of the extruder is the material flow rate, and the addition level of water, steam and other liquids in the system shall refer to the material flow rate, therefore the stability of material flow will directly affect that of the whole extruder producing. To ensure stable materials flow, weighing feeding is used in this system, namely, put the whole feeding bin and feeder onto the weighing sensor, so as to form a closed-loop control among weighing sensor, frequency-converted feeder and computer, and then realize feeding.

A basic requirement to the weighing feeding is a flexible connection between upper and lower interface, namely, the flexible connection between bridge-breaking feeding bin and pneumatic gate at upper part of the bin, as well as the flexible connection between feeder outlet and conditioner inlet, canvas is usually used as the material for flexible connection for this two parts.

Installation of weighing sensor is another important factor affecting the feeding. There are generally two methods for sensor installation: hanging installation and supporting installation, which will be used as required in the site. Necessary measures shall be taken to ensure stability of bin body while hanging installation is used. During production of extruder, falling down of materials, when feeding to the feeding bin, will make the whole bin body waggled, the waggling extent and time will closely related to the length of sensor's tie bar. Although the control procedure uses the data prior to feeding for the data in the period of material entering the bin, waggling of the body will be also caused after material enters the bin, the weighing accuracy of sensor will be directly affected, and thus the control procedure will also be influenced, therefore it is required to equip with a limit device at the lower part of bin, and this device shall

not affect weighting. The another method is supporting installation, which will not cause wagging, but the whole bin body tends to translocation, therefore sensor should be fixed on a bracket during installation, and it is required to mount limit blocks at both sides of each ear of the feeding bin, so as to prevent the whole bin body from translocation.

It is necessary to pay attention to the position of access door during installation of bridge-breaking feeding bin, and the maintenance platform should be mounted at the lower part of access door while ensuring that the access door can be opened.

4.2 Installation of DDC conditioner

Since the supporting frame for the conditioner is of the welded assembly, deformation may be inevitable during transportation, when the frame is deformed, direct installation without adjusting will cause misalignment of conditioner main shaft and output shaft of gear box, the roller chain coupling will produce noise when equipment is running, and abrasion of coupling gear and chains will be caused, therefore it is necessary to adjust the supporting frame during installation, so as to ensure alignment between conditioner main shaft and output shaft of gear box.

There are also certain requirements to the relative position of two main shafts of conditioner during its installation. Installation can be carried out according to marks at the shaft end, and can also be carried out by self-choosing corresponding position.

4.3 Installation of the principal machine

The principal machine of extruder is the heaviest equipment in the whole system, and also considering the main motor, thus it is demanded highly to the bearing capacity of foundation. The extruder cannot be directly put onto foundation during installation, it is required to underlay a frame, which is made of channel steel according to the size of extruder base, at the bottom of equipment base, and use the expansion bolt to fix with foundation. Ensure the plainness of the whole frame when making the base frame, especially the principal machine base and the motor base must be at the same plane. This is especially important for the extruder with driving device of elastic coupling directly connected with reducing gear box.

Because the main motor and the reducing gear box are directly connected with a drum type coupling, it is necessary to ensure the coaxiality between the output shaft of main motor and the input shaft of the reducing gear box during installation. Comparatively, it is convenient to adjust the position of main motor for adjusting the coaxiality.

The coaxiality between the two shafts can be also ensured by lying channel steel under the extruder.

4.4 Installation of the pipeline system

The installation position of pipeline system should be determined on site, but it cannot be too far away from the principal machine. Too far a distance will cause waste of connecting material of pipelines, and will cause control delay. Allowed by the field installation condition, the optimum position for pipeline system is over against back of the principal machine and conditioner, parallel with principal machine, 1m or so away from the principal machine (with certain space for maintenance), and ensure the position of steam pipeline joint to conditioner on pipeline system is at this side of the conditioner.

For the easy cleaning of floor and facilitating waste water flowing out, the pipeline system should be blocked up about 10 cm when installation. Position of valve wheel should meet the needs for easy operation of each valve on pipelines when installation.

Start and stop of the machine

5.1 Start the machine

1. Well prepare before start-up (water, steam, electricity, raw materials, equipment cleaning, die plate installation, installation and adjustment for cutting device)

2. Operation:

- Preheat the principal machine of extruder;
- Confirm: Switch feeding to "Manual".
- Confirm: Switch steam and water on "conditioner" picture and extruding barrel picture to "Manual".
- Pre-set parameters: output (to pre-set the start frequency of feeder); CV value of water in conditioner (regulate the opening of adjusting valve); CV value of steam in conditioner (regulate the opening of adjusting valve).
- Switch the "Automatic, Manual and Test" to "Automatic" in the "Production Condition" window and then press the button "Start Up".

Action (time order)

- Confirm the DDC conditioner outlet is at the bypass side;
- DDC conditioner motor starts operation, and the star-delta starting process completed;
- Pneumatic gate on the feeding bin automatically opens and feed to the bin, when materials weight reaches to the given upper limit, pneumatic gate will automatically closed (if materials weight in the bin has reached to the given upper limit, this step will be skipped over);
- Feeder operates automatically;
- Motor for bridge breaking in feeding bin operates automatically.

3. When there is material discharged from the DDC conditioner discharging outlet, start-up the water pump motor (the two water pump icons in the "production condition" picture is the control points of the actual working pumps). Start up four water nozzle switches and one steam pipeline switch in "Conditioner" picture.

Note: The way to add water and steam is set the corresponding openings of adjusting valves manually (opening degree 0%~100%).

4. Conditioning the material
5. Start the oil pump motor; At this time the alarm will work—— "set up alarm ";
6. Start up the cutter;
7. Start the main motor. The start up of main motor is divided into two steps: ①Charge up the frequency converter according to the main motor menu. ②Switch the button of "Stop' into "Run".

Note: In order to prolong the service life of the machine, the idle operation of the principal machine shall be controlled at low-speed operation (lower than 30Hz) as much as possible or the time period for idle operation shall be reduced as much as possible.

8. Switch to "running " till the principal machine is completely started after 10 seconds, then switch the bypass, and add prepared materials into the extruding chamber (before start the principal machine, add some water into the chamber for lubrication);
9. Inspect the current of motor, when the current value larger than the upper limit, the bypass gate will open automatically to discharge feed mash from the conditioner till the current value falls to normal range.
10. Adjust the rotating speed of the cutter according to feed pellet size.
11. Adjust the output (feeding frequency Hz value), water (the opening CV value of adjusting valve), steam (the opening CV value of adjusting) according to the actual production conditions. For floating feed production, it is able to add steam into the extruder barrel.

Note: When the throughput increase is required during production, the water and steam in DDC and expanding chamber will not increase with the throughput in proportion, which needs the operator to adjust the opening of the adjusting valve to achieve desired conditioning effect.

12. Check the material shape routinely and pay attention to the variation of main motor loading.

5.2 Stopping procedures

When materials weight in feeding bin reaches to the lower limit (such as 120 kg, settable) during production, pneumatic valve will open; If material weight doesn't reach to the upper limit (400 kg, settable) in a certain period, the system will give an alarm "material bridge " the bin is needed to knock; If material weight still doesn't reach to the upper limit (300 seconds settable), the pneumatic valve will closed automatically and an alarm is given to indicate that there is no material.

When indication of being no material is given, computer will start timing when material in the feeding bin reaches to the lower limit (such as 120kg, settable), and automatic stop will be implemented after a certain period of time (such as 60s, settable).

Automatic stopping procedures:

Stop bridge-breaking motor and feeder motor;

By pass is started automatically after a certain period of time (such as 60s, settable).

The conditioner is automatically stopped after a certain period of time (such as 300s, settable).

The automatic stop is only feasible for the above-mentioned equipment, other equipments and water and steam stop valve should be stopped by operating personnel according to corresponding requirements.

Under automatic stop process, switch "AUTO" for start/stop in the "production condition" window to "MANU", and then it is possible to stop the machines manually.

Attention points for stopping machine:

1. Generally the stop should be carried out from top to the bottom;
2. It is necessary to open the bypass before stopping principal machine, so as to enable materials flow out from the bypass;
3. In order to prolong the service life of the equipment, it is necessary to reduce the running speed of the principal machine (lower than 30Hz) and then open the bypass.
4. Stop the main motor when material is emptied from the expanding chamber and the extruder is non-loaded
5. When materials in the expanding chamber are emptied, it is advisable to add water in the expanding chamber for soaking, until the die plate is removed, clean the expanding chamber.

Technology requirements

When processing floating aquafeed with an extruder, the homogeneity and granularity of feed mash should be guaranteed. For aquafeed produced by different die hole, the requirements to the granularity of feed mash are different. The minimum requirement of raw material is shown in following tabel:

Die aperture for production Φ (mm)	Max. particle size of mash feed (mm)
1.0	0.2
1.5	0.3
2.0	0.5
2.5	0.6
3.0	0.8
4.0	1.0
5.0	1.2
≥ 5.0	1.2

Ground particle size will directly affect the quality of extruded products. The ground fineness of raw material for aquatic feed is generally controlled to pass 20 mesh (0.85mm) screen. The ground fineness is generally controlled to allow 95% pass through a 60 mesh (0.25mm) screen when the die hole diameter is less than or equal to the 1.5mm diameter.

To ensure the extrusion operation is carried out smoothly, when the basic requirement of the material particle is met, there is one more point needing to be emphasized specially. The fiber raw material in process flow and equipment if not cleaning timely will lead to machine stoppage, especially when producing small pellets.

Maintenance and repair

- 7.1 The equipment should be cleaned for both inside and outside after each shift of production. Clean the extruding chamber and screw with water after each stoppage timely, so as to avoid difficult cleaning after the materials cooling down and agglomerating;
- 7.2 Clean up each matching surface of discharging assembly and cutter after each stoppage, and spread them evenly with vegetable oil before getting off work.
- 7.3 Clean up the spared discharging die in time, and spread or steep vegetable oil on it.
- 7.4 Each shift should check the drum coupling between the main motor and the reducing gear box for normal work. Determine the coaxiality between the output shaft of main motor and input shaft of reducing

gear box with a detector each week. It is required to adjust the coaxiality if it is up to 0.5mm.

7.5 The reducing gear box is lubricated with industrial closed gear oil (GB 5903-1995)L-CKC Grade I, viscosity grade 220.

7.6 Lubricate the feeding conditioner and the bearings of its driving device and other bearings with lubricating grease.

7.7 Designation and code of lubricating grease: 221 lubricating grease (SY1525-82).

New oil for the reducing gear box must be replaced regularly; the first oil replacing should be carried out after one-month operation of the principal machine, and replace once a year since. The used oil must be emptied before replacing new oil every time, empty the residue in the chamber with compressed air and fill in new oil(calculated a per 10hr operation per day), and both over high or low oil level will affect normal operation of the reducing gear box.

7.8 For other bearings, lubricate grease each 48 working hours.

7.9 Lubricate the chain driving mechanism of the conditioner regularly.

7.10 Disassembling the screw sections, and it is not allowed to knock them out heavily.

7.11 Clean the pneumatic valve on the upper part of anti-bridge feeding bin every week, so as to avoid time delay for feeding caused by blockage in this part. Clean the residual material on the cylinder wall of the feeder each week. Clean the residual material in soft joint between feeder outlet and conditioner inlet each week. Clean the water adding and steam nozzle of conditioner each week to keep liquid application smoothly. Dismount the by-pass and clean it once a week, and clean the residual material at the feeding inlet of extruding barrel at the same time.

7.12 Keep the extruder and its surroundings clean.

8 Malfunction and troubleshooting

Malfunction and troubleshooting

Trouble	Causes	Solutions
1. Temperature of extruding chamber fails in meeting the rated temperature required.	Steam conditioning temperature is low. Steam pipeline of Jacket is blocked. The inlet of steam pipeline in extruding chamber is blocked;	Raise conditioning temperature, materials temperature after conditioning is 80°C-90°C; Clean the steam pipeline of jacket. Clean the inlet of steam pipeline in extruding chamber.
2. Temperature of extruding chamber fails in meeting the requirement	Steam pressure is not enough; Steam pipeline is blocked;	Check steam pressure, adjust it normally to 4bar; Clean the steam pipelines;
3. Material surface is coarse with different length after extruding.	Poor conditioning. Part of the die plate holes are blocked; Ground particle size larger than required; Bad quality die plate;	Conditioning the material; Stop production and clean the die plate; Improve grinding effect and achieve fine particles; Adopt the die plate from the regulated manufacturer;
3.Throughput decreases	pressure ring or wear is worn;	a) Replace wear ring or pressure

	Screw head is serious worn.	ring; b) Replace screw head;
4. Material cannot be discharged suddenly after normal operation	Excessive short-time feeding or cut-off feeding; Blocked die holes;	Stop production, check and correct it;
5. Wave type intermittent discharge	Low filling degree of expanding chamber;	Improve the output;
6. Insufficient expansion	Insufficient gelatinization	Improve the output; Improve the conditioning temperature; Improve the jacket heating temperature; Improve the rotary speed of main motor;
7. Excessive extruding	Excessive temperature Too fast rotating speed of main motor Opening area of the die plate does not match the output.	Decrease the temperature. Reduce the rotating speed. Change the opening area of die plate or adjust the output.
8. Over long or short expansion grains	b) Over-high or low cutting speed	Adjust the cutting transmission speed;
9. Poor product formability	Improper raw material formula Over-high or low processing Temperature Unstable feeding Too much or too little moisture contained in product Incorrect cutting speed Blade is worn out Too large ground particles	Change formula of raw materials Recombine the components in machine barrel; Adjust to even feeding; Reduce or increase water or steam addition volume; Adjust the rotating speed appropriately; Replace blade; Smash the raw material more fine to reach the defined granularity.

9 Transport and storage

9.1 Transport

The extruder is suitable for land or water transportation. Attention should be paid to the package and storage marks on the packing box when unloading or loading during transport. To prevent over-turning or heavily pressing the extruder when transport, and the front end of the extruder should be equipped with support when packing.

9.2 Storage

9.2.1 When the machine equipment is to be stored in the open air, the facilities for prevention of rain, sunshine and water accumulation should be available.

9.2.2 The equipment should be stored in ventilated, dry and cool place for long-time storage, and damp proof measures should be taken, the exposed surface without painting should be painted with rust-proof oil.