



# Rock wool purification box panel production line

## Technical Plan





## **Rock wool purification box panel production line**

### **1.Foreward**

Rock wool purification box panel is a new generation of decorative wall enclosure material and thermal insulation material. It is the most popular new generation of building materials. It not only has the functions of enclosure, flame retardant, sound insulation and heat preservation, but also can prevent dust and bacteria, has the function of decoration. It is a new wall building material that can integrate enclosure, decoration and heat preservation.

Rock wool purification box panel is a factory manufactured product. Its appearance quality and various physical and chemical performance indexes can be effectively controlled in the factory; Therefore, rock wool purification box panel will be more widely used in medicine, food and building insulation systems.

The continuous production line of rock wool purification box panel is a multi-functional semi-automatic production line integrating many technologies such as machinery, chemical industry, electric control, hydraulic pressure, pneumatic and temperature control. The production formation process is formed by artificially filling the upper and lower surface materials with rock wool core materials, moving forward at a uniform speed through the crawler, where polymerization occurs and then bonded together.

Product sample photos as below:





## **2.Composition of continuous production line of rock wool purification box**

### **panel**

The continuous production line of rock wool purified box panel mainly consists of steel plate hard surface decoiler, forming machine (with filming, front and rear bending and cutting device), box panel conveying system, box panel glue spraying system, glass magnesium panel feeding system, glass magnesium panel cutting system, glass magnesium panel glue spraying system, glass magnesium panel conveying system, box panel turnover system, horizontal traverse, (box panel) feeding deviation prevention device, double belt, double belt heating system, stacking system and other equipments.

## **3. Main features and advantages of production line**

The continuous production line of rock wool purification box panel is a semi-automatic continuous production line integrating mechanical, electrical, hydraulic and HCFC polyurethane chemical polymerization technology, and composed of multiple units. The production line adopts international and domestic advanced roll forming technology, HCFC polyurethane (chemical) foaming technology, composite transmission technology, frequency conversion vector technology and hydraulic control technology. The whole line only needs 10 to 13 operators to operate normally. The production line is characterized by:

1. High degree of automation. The whole machine adopts a complete set of independently developed computer integrated control technology, such as numerical control servo, frequency conversion vector and temperature control. The control system implements distributed control management for each single machine, which is characterized by decentralized control and centralized management. Because it is decentralized control, it can disperse the danger, greatly reduce the danger to the whole system in case of a certain point of failure, and has beautiful overall appearance and convenient operation. The automatic monitoring is realized, which can not only meet the safe operation of the system and ensure various technical indexes of the system, but also realize the automatic control and management of the equipment to the greatest extent.

2. High production efficiency. Its production speed is 3 ~ 6m / min and its annual



production capacity can reach 850000 square meters. (calculated by 300 working days and 10 hours per day per year).

3. The forming edges and corners of box plate shape are small, and the forming fillet can reach R1 2~R1. 5. It can prevent dust and has a more beautiful appearance.

4. The upper and lower belts adopts the form of chain plate (length 1300mm \* width 200mm). Through hot air circulation heating, the upper and lower chain plates can be heated evenly to reach the working temperature of 45 ~ 70 degrees, which can be adjusted, and the temperature control tolerance is + - 3 degrees. The chain plate made of alloy steel plate can be replaced or repaired quickly (interchangeability). The upper and lower belts of conventional equipment are in the form of steel belt, and the heat transfer oil is heated by U-shaped pipe. The heating is uneven and the temperature is uncontrollable. It will affect the curing of the box panel, which will produce marks on the surface and affect the appearance.

5. The upper and lower belts adopt a main drive motor to mechanically ensure the synchronous walking of the upper and lower belts; A guide with a length of 10 meters is installed on the left and right of the belt inlet, and the width is easy to adjust to ensure that the purification panel does not deviate from the left and right.

6. It is easy to operate, adopts the computer integrated control technology with comprehensive functions, and uses the computer man-machine interface to input the operation parameters required by the production line of each functional section on the premise that the raw materials and production of each part are ready. The whole line only needs ten to thirteen operators to complete the whole production and operation process, so as to keep the equipment in normal operation and greatly reduce the labor cost of production management and personnel.

### **3.Production line parameter**

Sandwich panel specification:

Length:	2000--10000 mm
PU sandwich panel width:	1198/1178/978 mm
Purification box panel thickness:	50mm/75mm/100mm



Thickness	Rock wool	Single glass wool	Double glass wool		
100	99	94	89		
75	74	69	64		
50	49.5	44.5	39.5		

**Raw material specification:**

Rock wool raw material: (1000-1800) mm × (40--100mm) × 85mm (L x W x H)

Thickness of steel plate: 0.4 ~ 0.7 mm (no obvious unevenness, concave convex, deformation and side bending of steel plate)

Yield strength of steel plate: 235mpa -- 300mpa

**Production line specification:**

Line speed: 3 -- 6 m / min (adjustable)

Total length of production line: About 75 m

Working height: 1200 mm (plate height)

Effective length of double belt: 24 m (total length 25 m)

Control mode: Imported PLC control is adopted

Total installed power: About 100 kW (excluding electric heating power of 300 kW)

Power Supply: 380V / 3Ph / 50Hz

Control voltage: 24 V/220 V

Air supply pressure: 0.7 MPa (prepared by the Buyer)

## 4. Production process flow:

### Color steel purification box panel:



Steel coil loading - filming - leveling - trimming - punching - forming - cutting and flanging - plate chasing roller table - box panel glue spraying - roller table conveying - frame aggregate - rock wool material (reinforcement, pipe embedding) - box panel 180 °turnover - box plate alignment and cover - horizontal lateral movement - left and right alignment - heating and curing in double belts – output from double belts(3-6mins) - stacking of laminated panel - glue cleaning - packaging - warehousing

### **Glass magnesium plate purification box panel:**

Stacking and feeding of glass magnesium plate -- suction cup suck up plate -- lifting -- traveling and transverse movement -- the suction cup releases the plate and enters the plate chasing roller table -- fixed length cutting of glass magnesium plate (leaving 50mm not cut) -- glass magnesium plate transportation -- glue spraying of glass magnesium plate -- roller table transportation -- frame aggregate placement -- manual placement of glass magnesium plate into the main line -- rock wool material placement (reinforcement, pipe embedding) -- 180 ° turnover of glass magnesium plate -- box panel alignment and cover -- horizontal and transverse movement -- left and right guide -- heating and curing of double belts----- (3-6 minutes) out of the double belt - stacking of laminated panels - glue cleaning - packaging - warehousing



## 5.Introduction of the production line machine

### 1) . Cantilever automatic decoiler (with ultrasonic sensor)

#### 1) Decoiler structure

The decoiler drives the sprocket through the electric motor and the main shaft through the sprocket, so that the steel coil rotates with the main shaft, to achieve the purpose of active uncoiling. The base and frame of the decoiler adopt rectangular tube welding structure to fully ensure the rigidity of the equipment.

The inner support of the decoiler is expanded and tightened by the oil cylinder with rotary distributor, and the steel coil is expanded and tightened through the connecting rod mechanism to make the steel coil firmly fixed on the decoiler frame. The steel coil is fed when the main shaft rotates in the forward direction, and the steel plate is rolled back when the main shaft rotates in the reverse direction.

The pressing mechanism swings the pressing arm through the cylinder. The cylinder rises and the pressing arm is loosened; The air cylinder descends and the pressing arm is compressed. During active uncoiling, the pressing arm must press the steel coil.

#### 2) Coil car (optional)

The lifting trolley drives the sprocket through the hydraulic motor, and drives the traveling wheel through the sprocket, so as to make the trolley walk along the guide rail. The lifting mechanism is the lifting table acted by the hydraulic oil cylinder through the connecting rod to complete the loading and unloading actions. The lifting platform and walking platform adopt the hybrid welding structure of rectangular tube and steel plate, with small and beautiful appearance.

The lifting trolley has random parking when moving laterally and lifting up and down, and self-locking protection when parking.

#### 4、 Future

- 1) The decoiler frame adopts integral profile welding, and the shaft core material adopts high-quality structural steel. After overheating treatment, it can bear the weight of 6 t coil with sufficient rigidity. It is supported by intermediate bracket with other products. It has the advantages of simple and reasonable structure and convenient loading and unloading of steel coil.
- 2) The hydraulic unloading and pressure maintaining function is adopted to realize the automatic



pressure maintaining after the coil is braced tightly, so as to reduce the loss of energy.

3) The lifting trolley is designed with parallel linkage mechanism, which has compact structure and stable operation. The lifting machine is protected by mechanical stop with small impact force.

## 5、 Technical parameter

### 1) Decoiler

Bearing capacity:	maximum 6 t
Decoiling speed:	0 ~ 20 m / min (adjustable)
Inner diameter of steel coil:	φ 508 mm, φ 610 mm (with cushion block)
Loading width:	maximum 1250 mm

### 2) Lifting trolley

Bearing capacity:	max. 10 t
Walking speed:	6 m / min
Lifting stroke:	maximum 500mm
Transverse stroke:	3000mm maximum

### 3) Pneumatic hydraulic

Maximum hydraulic pressure:	16 MPa
Motor power of hydraulic station:	3 kW
Air pressure of air source:	0.7 MPa (provided by the factory)

## 2) Roll forming system

### 1、 Components

The roll forming machine system is composed of filming device, feeding guide platform, leveling device, slitting device, waste edge winding, punching device, roll forming system, cutting and flanging system, roll conveying platform, hydraulic system and electric control system.

### 2、 Main structure

#### (1) Filming device

The device is arranged to improve the forming effect of the panel. It is mainly composed



of film storage device and pressing device. The film storage device is composed of inflatable roller, the film roll is stored on the mandrel, and the pressing device is composed of rubber roller. After the plate and the film enter the rotating rubber roller at the same time, the film is pasted on the steel plate smoothly. The air expansion roller can adjust the film covering resistance to make the film expand tightly and bond closely with the steel plate without large bubbles.



## (2) Feeding guide platform

Left and right guide devices are set at the feed inlet of the main machine. During operation, both sides of the raw material plate enter the machine after being guided by the left and right, so as to keep the raw material plate in the correct position with the roll forming system. The guide position can be adjusted by manual screw mechanism, and the left and right can be adjusted independently.



## (3) Leveling device

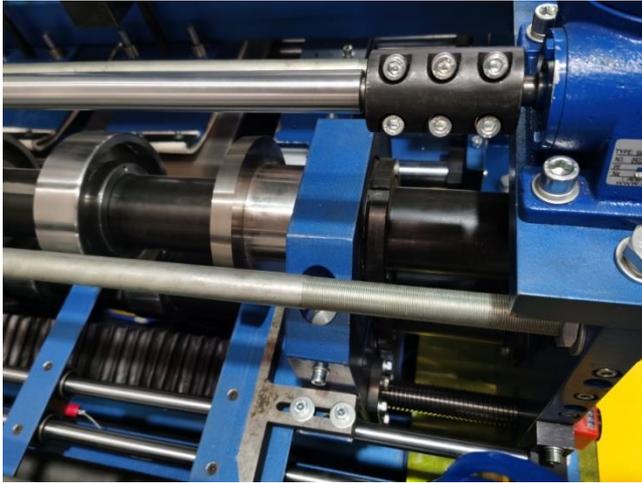
The leveling device is composed of 11 roll leveling roll and front and rear conveying roll. It is mainly used to level the plate coil, which is convenient for the later punching process. The leveling device is equipped with front and rear conveying rollers, and the upper conveying roller is manually controlled by the air cylinder. The conveying and leveling rollers are active. The clearance of leveling roller is adjusted by elevator.

## (4) Slitting and waste edge winding device

The slitting device is composed of an upper and lower slitting knife, a guide and a transverse device. When slitting materials into different widths, it is completed by adjusting the motor to move the slitting knife laterally to the corresponding position. Convenient and fast



adjustment. The width of strip waste edge shall not be greater than 50mm. The waste edge winding is composed of torque motor, winding core and transverse device. It is mainly used to collect the waste edges cut by the slitting device to ensure the sanitation of the site. The waste winding motor matches the slitting speed and is completed by adjusting the torque controller. The rigidity of the winding mechanism can bear 50kg waste.



Slitting device



Waste edge winding device

### (5) Punch device

The device is composed of frame, guiding device, punching die and oil cylinder.

The flat plate is used for punching, and the washed waste slides out from the frame through the funnel, and then is cleaned manually.

The punching die has a positioning device, which can be positioned correctly and easy to change the die.

#### **Main parameters:**

1. The punch die material is quenched with DC53 to reach HRC58-62.
2. The die device at the moving end moves with the sliding plate, and the fixed end does not move. Each set of die can be adjusted horizontally
3. There are four sets of fixed side punching dies, and the dies are replaced with different specifications. One set of molds on the transverse side will not be replaced.
4. The diameter of cut-off oil cylinder is about 80mm.

### (6) Roll forming system



1. The roll forming system is composed of frame, transmission parts and cold forming roller group.
2. The frame is connected after being manufactured in sections, and the profile is welded as a whole.
3. The roller adopts Cr12MoV, which is processed by precision NC after forging and quenching.
4. The roller axle is made of 45 steel, which is quenched and tempered, and its support structure is box transverse type.
5. The reduction motor and gear drive for driving the lower roller set to rotate, and the upper and lower rollers are driven by gear.
6. The gap between the upper and lower rollers is adjusted by manual screw to adapt to the rolling of plates with different thickness.
7. The formed box can be hoisted and replaced.
8. Different specifications are realized by moving the box horizontally.

### **(7) Cut off and flanging system**

The cutting and flanging system is composed of cutting system and flanging system.

1. The column type power frame is adopted, with good overall rigidity, and the power is provided by the hydraulic station of the main machine.
2. The cutting knife adopts pressing cutting, which produces waste. The cutting knives are made of W18Cr4V quenched materials with hardness of HRC58-62.



3. The flanging angle of the flanging system is close to 90 °, and the power is provided by the hydraulic station of the main machine.
4. Complete the production of plates of different specifications through different presser foot arrangement.
5. The clamping of die is completed by oil cylinder.
6. The upper and lower die materials are Cr12 quenched, and the hardness is HRC35-40



## **(8) Roller conveying platform**

It is mainly used to support the finished plate after forming, so as to facilitate the convenient handling of operators. The material supporting device is composed of two material supporting frames with a width consistent with the width of the finished panel and a length of 12m. The frame is welded with square pipe profiles. Several idlers that can rotate freely are set at the top according to the transmission characteristics, and the bottom is composed of adjusting screws to match the plate height within a certain range.

### **Main parameter:**

1. Transmission motor power: 1.5kwx2. (subject to the actual design)
2. Effective width of roll: no more than 1250mm

## **(9) Hydraulic system**

1. Decoiler and rear cut-off bending adopt independent built-in hydraulic station.
2. It consists of motor oil pump, hydraulic valve, pressure gauge, filter, heat dissipation device, etc.
3. The main hydraulic valve adopts Bosch Rexroth.
4. The hydraulic medium adopts 46# anti-wear hydraulic oil.
5. The heat dissipation of the hydraulic station adopts the air cooling principle.

## **(10) Electrical control system**

1. PLC control technology is adopted to realize the automatic production of the whole machine.
2. The system provides friendly man-machine interface, which can set batch, workpiece length, quantity, etc.
3. Operation mode: touch screen + button.
4. Encoder counting, with counting and length counting functions.
5. Configure the wireless remote controller of the decoiler and the operation console for cutting and



bending.

6. No less than 20 production orders can be manually entered on the control panel in the automatic control system.
7. The production instructions can be edited by EXCEL of the computer and imported into the control system in the form of documents. The number of imported instructions shall not be less than 100.
8. The electric control cabinet adopts the principle of air cooling and heat dissipation to meet the normal operation of the production line.
9. The running speed of other equipment is related to the running speed of the roll forming machine, and the adjustment of one machine will also change accordingly.
10. The touch screen can be inserted in size, quantity and used for making in advance.
11. Reserve IO port with 10% spare capacity, and reserve memory card and mobile Ethernet interface to facilitate connection with other settings.
12. The fixed length is controlled by the encoder, and the relative position between the notch and the cut-off flanging is the optical braising opposite radiation to assist the positioning of the encoder.
13. The length fixing accuracy requires that the length tolerance is  $\pm 0.35\text{mm}$  (it is unqualified if it exceeds  $\pm 0.5\text{mm}$ ).

### 3) Heating system (Double belt temperature control)

#### 1、Brief





The double track temperature control system adopts hot air circulation heating. After the circulating air is heated by the heating device, it is sent to the heating air duct by the fan to heat the upper and lower track panels moving forward at a uniform speed. The track panel heats the composite plate, which makes the polyurethane foam foaming and curing more stable, the foam adheres more firmly to the surface of the plate, and reduces the spots and bubbles of foam to a certain extent.

The heating form is hot air heating, the heat exchange device is placed above the double crawler, and the upper and lower two separate heating air ducts are used to heat the double belt chain plate traveling at a uniform speed.

The heating mode adopts electric heating, and the power supply (distribution cabinet) is provided by the user.

## 2、 Technical parameter

Working temperature of double belt chain plate: About 65-70 °C (PU)

The heating time for the chain plate (room temperature) to reach the working temperature is about 2 hours

Heating capacity:  $2 \times 150000 \text{ kcal / h}$

Air volume of circulating fan: About  $2 \times 12000\text{m}^3 / \text{h}$

Blower motor power:  $7.5 \text{ kW} \times 2$

Temperature control uniformity:  $\leq \pm 3^\circ\text{C}$

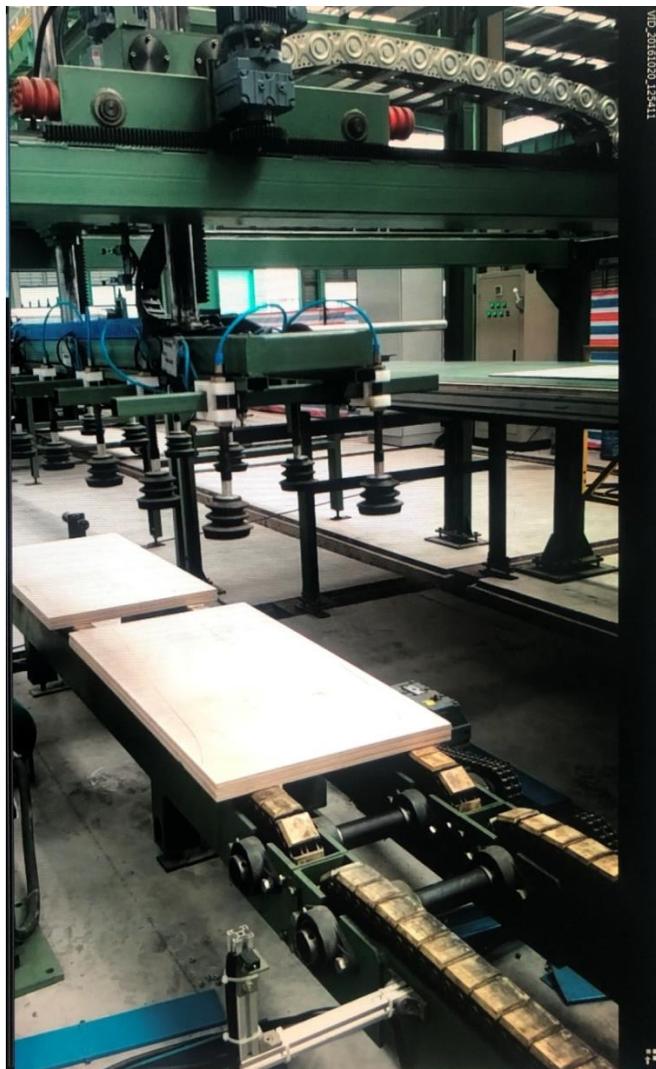
## 4. (Glass magnesium )Feeding system

### 1.Brief

The panel feeding system is mainly used for automatic feeding during glass magnesium plate pre assembly. It is mainly composed of conveying roller table, lifting device, suction cup device, transverse device, electric control device and so on. The conveying roller table conveys the glass magnesium panel into the designated device; The suction cup device grabs the successively reduced glass magnesium panel stacking; The traverse device transports the glass magnesium panel to the conveying roller table of the production line.



At the same time, in order to ensure the coordination between the feeding speed and the action of the foaming production line, the lifting device adopts frequency conversion control, the beat is adjustable, and an electrical control signal interface is set with the double crawler and the production line. The equipment is equipped with manual and automatic functions. Manual is used for equipment commissioning and trial, and automatic is used for automatic production of the production line. When the equipment fails, the system will give an alarm prompt. At the same time, it has the functions of emergency stop and manual reset.



(Picture for reference only)



## 2. Technical parameters

Conveying specification:

Glass magnesium panel raw material: 1200 / 2400mm × 1000mm × (5-12) mm  
(Length × Wide × High)

Roller table height: about 450 mm

Transverse roller table motor power: 3.7 kw

Maximum load of suction cup: 150 kg

Vertical stroke of suction cup: 1000mm

Electrical control system: PLC program control

### 5) Glass magnesium panel cutting system

#### 1. Function

The glass magnesium panel cutting system adopts hydraulic cylinder herringbone cutter plate for cutting, and the glass magnesium panel is cut off at a fixed length (leaving 50mm not to be cut off), so as not to affect the roller conveying and glue spraying of glass magnesium panel.

### 6) Glue spraying system

#### 1. Function

The glue spraying system adopts two-component glue spraying device of domestic well-known brand. The glue spraying device is used to spray glue on the two inner sides of the upper and lower box plates or the rough edges of glass magnesium plates respectively, so that the plates and rock wool laths are completely bonded.



(Picture for reference only)

## 2. Equipment description

### 2.1 Production process

A. When the equipment is started, the control system will spray glue according to the parameters such as automatic detection of plate width, production line speed and equal area



gluing amount.

B. The roll forming machine is connected with the equipment, and the blanking of the roll forming machine is automatically transported to the conveying line for glue spraying to complete the uniform glue spraying on the panel surface.

C. The panel is transported to the discharge end for manual compound operation.

## 2.2 Equipment feature

A. Conveying line: the speed and position of roller conveying line are controlled by frequency conversion motor

B. Main machine: it adopts digital control such as PLC control system, servo motor, man-machine interface and sensor, which can realize the functions of automatic feeding, heating and mixing, glue spraying, glue flow monitoring, independent setting of glue proportion, automatic alarm of glue proportion imbalance, start and stop the production line, automatic shutdown waiting for panel collision, automatic identification of width, and automatic control of glue output according to different panel width.

## 3. Equipment technical parameters

Glue spraying host: The equipment for measuring and spraying two-component polyurethane glue has the characteristics of accurate measurement, abnormal alarm, simple operation and high degree of automation.

Performance characteristics - Maximum glue output: 4000g / min,

- Flow accuracy:  $\leq 5\%$

- Glue spraying adopts mesh glue spraying according to customer needs

The glue spraying machine can realize various functions, such as preheating, heat preservation and mixing, proportioning, abnormal glue output alarm and so on; Prevent customers from using two-component glue with unbalanced proportion, resulting in product scrapping

The spraying amount per unit area can be adjusted manually, and the precise control of glue



spraying can be realized with the assembly line

- Automatic cleaning of glue and plug.

- Gluing amount per unit area: 100 ~ 500g / m<sup>2</sup>.

-The glue spraying speed is 0-10 meters per minute (which can be changed according to customer requirements).

Feeding part: The special interface device can easily replace the raw material barrel and fasten and seal it. It is equipped with an independent constant temperature rubber barrel to solve the disadvantage of poor glue fluidity in winter. The system is designed with automatic glue adding in case of glue shortage and automatic alarm in case of no glue.

Glue spraying platform conveying line: The speed, start and stop of the conveying line before and after glue spraying are controlled by the host machine.

Length, width and height: (6000x1300x1100mm) x2 sets, controlled by variable frequency motor

Width detection function: Measure the feed width online, and then apply glue automatically according to the width.

Technical parameter

Demand conditions - The maximum glue spraying width is 1.25m, (which can be widened according to customer requirements)

- Compressed air source: 5.0 —7.0bar

- electric Source: three phase five wire system, 380V × 50Hz AC

- Maximum power: about 6.0kw



### 3.Configuration table

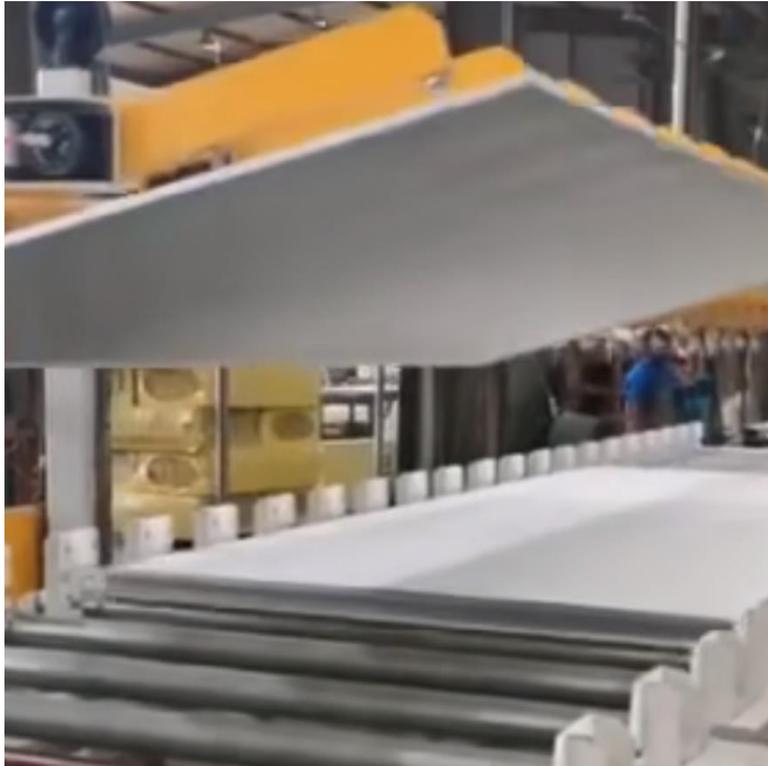
#### A、Glue spraying system configuration:

No.	Item	Brand	Model	Remark
1	Servo motor	Mitsubishi	750W	Main motor
2	System			
3	Pneumatic control system	SMS		
4	Spindle servo	Mitsubishi		
5	Air switch/ Protection system	Schneider		
6	Main electrical circuit components	Schneider		
7	Linear guide rail	Taiwan Shangyin		
8	Sensor	Omron/Siemens		
9	PLC	Mitsubishi		Or same level
10	Monitor	Weiluntong		Or same level
11	Glue pump	Shanghai	9CC/30cc for each	
12	Flowmeter	Shanghai	Customized	Optional

## 7. Box panel 180 °turnover device

### 1.Function

After the glue is sprayed on the inner surface of the box panel, the conveying roller table is sent to the electric turnover device, the suction cup sucked panel is lifted and turned over 180 °, and the box panel is still waiting for the box plate to be transported to the lower part and ready to be combined with the lower box panel.



(Picture for reference only)

## 2. Technical parameters

Turnover device effective length:	10m
Working height :	1100 mm
Motor power:	about 4 kw

### 8) Horizontal conveying roller table

The horizontal conveying roller table directly transfers the sandwich panel after turning over to the double belt.

The front fast roller table is equipped with an optical control positioning mechanism, and the maximum length of the transported plate is 10m. The plates that can be accommodated by the conveying roller table are 2 (between 2.4-4.5m) and 1 (between 5.5-10m).

The traverse device is in the form of rubber chain transmission to ensure that the plate transmission is completely synchronous and will not deviate. The reliability and service life of the



structure are much better than those of the belt conveyor.

### Technical parameters

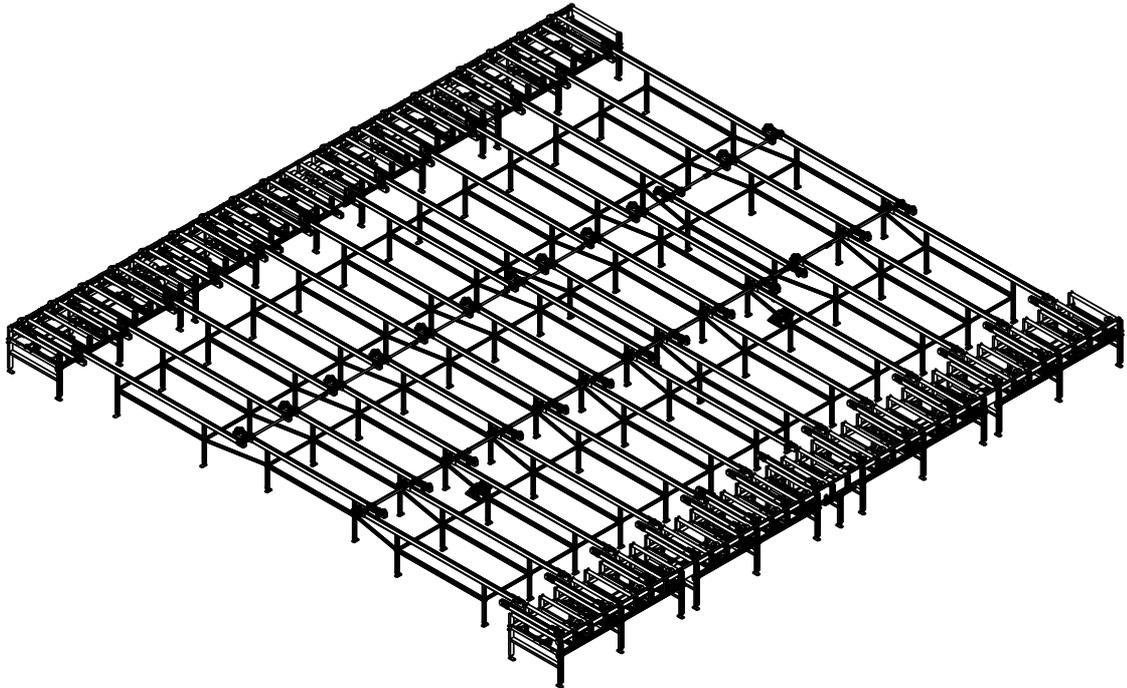
The maximum conveying speed of roller table is 15 m / min (with variable frequency speed regulation)

Length of front conveying roller table: 11m

Conveyor plate length: 2.4-10m

Length of rear conveying roller table: 11m

Center moment of front and rear roller table: 5m



## 9) Double belt system

### 1.Function

The main function of the upper and lower belt is to overcome the foaming pressure



produced by polyurethane foaming, make it solidify and form, and determine the thickness of composite plate and the speed of production line. As a movable mold for continuous operation, double belt need to avoid plate deformity and surface scratch and ensure high-quality composite panels.

## 2.Components

The double belt is mainly composed of upper and lower steel belt, transmission mechanism, side guide device and hydraulic system.





(Picture for reference only)

### 3. Main structure

The main body of the upper and lower belt of the double belt are welded from the large-size box column frame, taking full account of the rigidity of the machine. All the joints of the frame are fixed with taper pins, which is convenient for adjustment after leaving the factory. The upper and lower belt plates are composed of a group of chain plates with a width of about 200 mm. These chain plates are connected with wear-resistant bearings to form a high-strength chain drive system. The chain plate adopts the welded structure of atmospheric corrosion-resistant steel, which is assembled after finishing machining on the machine tool to ensure the interchangeability of the chain plate in the future. According to the process characteristics of the workpiece, we adopt the double-sided intermittent weld, construct both sides at the same time during welding, increase stress relief annealing, replace planing with milling, mechanical straightening and fixture correction during assembly, so as to control the error of the main key parts required by this high precision within a certain range, and make the two complete plane sliding plate surfaces very flat, so as to make the composite plate surface flat, uniform thickness and not easy to deform.

The upper and lower belt are driven by frequency conversion motor through gear reducer, and the speed can be adjusted automatically to keep the upper and lower belt



synchronized. The position of the lower belt of the double belt is fixed, and the height of the upper belt can be adjusted by the electronic control hydraulic jack. In this way, the adjustment of the panel thickness in production is very convenient, and the thickness of the sandwich panel can be completely guaranteed to be constant. According to different thickness, install equal height cushion blocks with corresponding thickness on the hydraulic jack. The technology of the upper and lower position adjusting device of the double belt frame has obtained the national patent.

The left and right sides are equipped with side block guide devices with a length of 10m, and the width direction can be adjusted freely to ensure that the purification panel does not deviate when the double belt is running.

#### **4.Feature**

- 1) The upper and lower belt of the double belt are driven by a single motor output drive to ensure the complete synchronization of the upper and lower belt.
- 2) The upper and lower belt are composed of finished chain plates, which are very flat. The special double belt structure design makes the plate surface flat, uniform thickness, not easy to deform, and can avoid plate deformity and surface scratch.
- 3) Each chain plate of the crawler adopts the welded structure of atmospheric corrosion-resistant steel, which is assembled after finishing machining on the machine tool, which can ensure the interchangeability of chain plates in the future.
- 4) The surface of double belt adjusting guide rail is quenched, with high hardness, good wear resistance, not easy to deform and long service life.

#### **5. Technical parameter**

Effective length of upper belt:	24 m (total length 25 m)
Effective length of lower belt:	25 m (total length 26 m)
Working height of lower belt:	1200 mm
Effective width of double belt:	1300 mm
Production panel width:	900 ~ 1200 mm (baffle Guide)
Working speed of single machine with double belts:	2~10 m/min



Distance between upper and lower belt:	10 ~ 200 mm (without formwork)
Flatness deviation (single chain plate) :	$\leq 0.08$ mm
Overall belt surface :	$\leq \pm 0.10$ mm (dynamic dial indicator test)
Chain plate clearance :	$\leq 0.18$ mm
Power of main drive motor:	18 kW (single motor output drive to ensure the synchronization of upper and lower belt)
Motor power of hydraulic station:	7.5 kw

## 6. Work flow

Adjust the height of the upper belt --- preheat the double belt to a proper temperature --- guide and feed the sandwich panel--- enter the double belt cavity --- mix and solidify the glue --- move the double belt trailing template --- keep warm and send out the rock wool box panel

## 10) Stacking system

### 1. Components

The stacker is composed of fast roller table, suction cup parts, traveling crane parts, gantry, etc.

### 2. Function

The fast roller table makes the composite plate quickly separate from the double belt; And transport the panel to the designated position;

The suction cup parts shall be stacked according to the panel category, and the stacked panels shall be neat and beautiful; After stacking, the conveying roller table sends out the panels.

The front roller table is equipped with an optical control positioning mechanism. When stacking short panels with a length of less than 4.5m, they can be stacked together. When they are more than 4.5m, they can only be stacked one by one.

### 3. Feature

- 1) The stacker handling device makes the acceleration and deceleration stable by adjusting the frequency converter. After reaching the predetermined position, it brakes quickly and



positions accurately, so as to stack the workpieces neatly. The technology of the stacker handling device has applied for a national patent.

- 2) When stacking short panels with a length of less than 4.5m, the stacker can stack two plates together, greatly improving the production efficiency.



(Picture for reference only)

#### 4 .Technical parameters

Fast roller table motor power 1.5 kW

The conveying speed of fast roller table is 15 m / min (with frequency conversion speed regulation)

Air supply pressure 0.7 MPa



Lifting speed of traveling crane: 15 m / min

Traveling speed of crane: 15 m / min

Suction cup lifting stroke 2600 mm

The movement distance of the beam is about 2500 mm

Crane lifting motor power 7.5 kw

Traveling traverse motor power 0.75 kw ×2

#### Stacking specification

Panel length: up to 10m

Width: 1200 mm max

Stacking height: 2000 mm

### 11) .Control system



The control system is the information heart of the production line. It is the core component to ensure the synchronous operation and matching of each unit system and realize automatic



production. Its control has high requirements, great complexity and convenient operation.

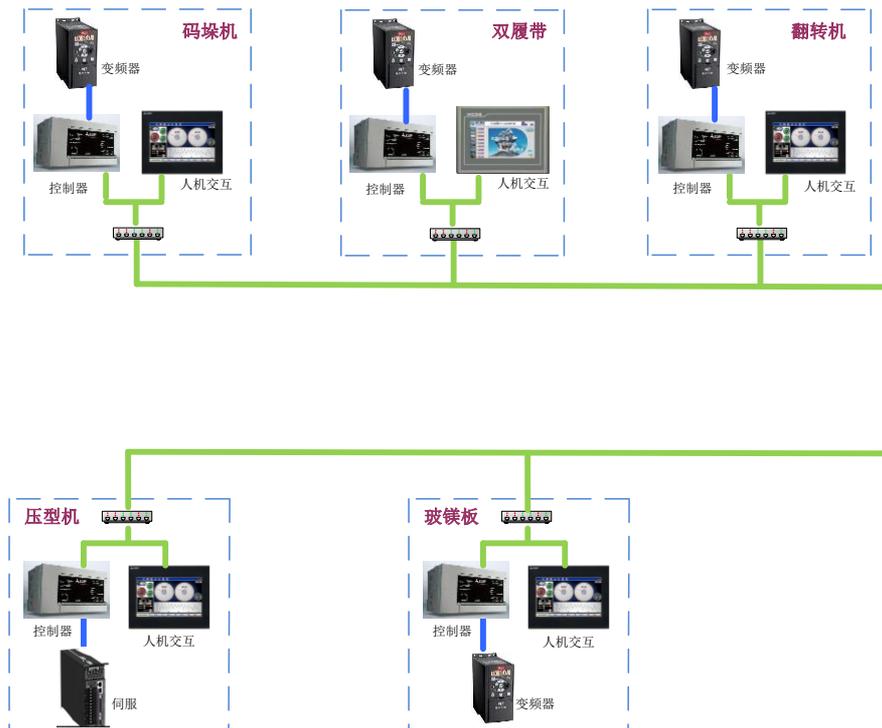
According to the process, function and characteristic requirements of the production line, we have independently developed a set of control system with comprehensive functions, convenient operation and friendly man-machine interface, and developed a set of special application software, so that users can operate only after simple professional training; Truly realize the integration of mechanical, electrical and hydraulic control, and make the complete set of equipment have the characteristics of high degree of automation, good coordination and synchronization between various links.

The software control system implements distributed control management for each single machine, which is characterized by decentralized control and centralized management. Because it is decentralized control, it can disperse the danger, greatly reduce the danger to the whole system in case of a certain point of failure, and has beautiful overall appearance and convenient operation. The automatic monitoring is realized, which can not only meet the safe operation of the system and ensure various technical indexes of the system, but also realize the automatic control and management of the equipment to the greatest extent.

## 1、 Overview

1. The production line control system is composed of upper computer system and lower computer control system, which is independently developed. Each stand-alone machine has an independent control system, and communicates with each other and interlocks safely to achieve decentralized control and centralized management, so as to realize the automatic continuous control and management of the whole production line.

## 2. Topology diagram and description



### 1. Roll forming machine

Enter production parameters in the screen, including length and number of blocks. Combine the requirements of optical fiber cutting and positioning, and ensure the accuracy of optical fiber encoder. The servo motor is used for driving and specification adjustment of the main motor, with accurate positioning and speed adjustment on the screen, which is convenient and intuitive.

### 2. Glass magnesium plate

After the whole stack of glass magnesium panel is manually placed on the conveying roller table, it is sent to the roller table before cutting by the suction cup lifting device. After being transported to the cutting machine, the sensor and encoder are combined to cut the length according to the panel length to ensure the product length.

### 3. Turnover machine

The turnover machine adopts sensor detection and cylinder baffle positioning. After the upper cover plate is turned over, wait until it is above the lower plate roller table. After the lower plate is in place, it is overlapped. After the turning action is completed, the plate needs to be pressed manually.



#### 4. Double belt

The belt speed is set in the screen and adjusted by frequency conversion. The double belt upper computer has the functions of operation monitoring, parameter setting, alarm display and so on.

#### 5. Stacker

Set the number of stacking blocks in the screen and use sensor signal detection. Start the stacking system after the plates from the double belt reach the specified position. When the number of stacking blocks is equal to the set number, manually shovel the stacking panels away.

## **5. Production line profile, layout drawing**

