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Electric Wheelchairs Powder Powder Coating Line Technical Scheme

– Jinan Shengtai Coating Equipment Co., Ltd.

Technical Agreement

Article 1: General Requirements

1.1 Design Basis

No.	Project Name	Design Parameters
1	Workpiece Name	Metal
2	Workpiece Material	Pipe Fittings
3	Workpiece Size (max)	Comprehensive maximum workpiece size: 1200×800×600 mm (L×W×H)
4	Workpiece Weight (max)	Maximum weight of single–point hanging workpiece ≤ 30kg
5	Design Chain Speed	0.7–2m/min (1–4 m/min frequency conversion speed regulation)
6	Spraying Requirements	Powder spraying, film thickness 60–80um;
7	Conveying Method	Suspension conveying method, double–point or single–point hanging.
8	Oven Heating Method	Natural Gas

9	Control Form	Local Control
10	Workshop Base Temperature	10℃ in winter
11	Project Content	Full set of coating line design, manufacturing, installation, commissioning, training, service

1.2 Building Conditions and Primary Power Source

Category	Project	Content
Workshop Area	Workshop Area	See floor plan
Electrical Conditions	Power Circuit	380V×50HZ×3Φ, three-phase five-wire system, voltage fluctuation: ±10%
	Control Circuit	220V×50HZ×1Φ, voltage fluctuation: ±10%
	Lighting Circuit	220V×50HZ×1Φ
Tap Water	Tap Water	Pressure ⩾ 0.2Mpa, 4-5T/hour

Article 2: Equipment Composition Description

2.1 Process Flow and Process Parameters

No.	Process Name	Process Time (s)	Process Temperature (℃)	Remarks
1	Loading	-	-	-
2	Powder	-	Room	Automatic + Manual

	Spraying		Temperature	Touch-up
3	Curing	1200-1800	180～210	Adjustable
4	Cooling	1200-1500	-	Natural Cooling
5	Unloading	-	-	-

1. When processing thick workpieces, appropriately reduce the line speed and increase the oven temperature to meet product quality requirements.

2. The workshop temperature of 10℃ in winter is used as the design temperature.

2.2 Curing Oven

A. Content Overview

1) The oven is a multi-pass oven, adopting natural gas direct-fired forced hot air circulation mode. The furnace body adopts a rock wool insulation insert plate assembly structure, which can prevent heat bridge loss. The hot air circulation fan is a high-temperature resistant centrifugal fan, galvanized, and the impeller material is stainless steel.

2) The air ducts inside the furnace are made of galvanized steel plates. The unique arrangement of air ducts inside the furnace can make the temperature field in the furnace more uniform and easy to clean.

3) An automatic temperature control system is adopted to control the temperature and display the temperature digitally.

4) The hot air circulation adopts bottom air supply and top air return design to reduce installed power. The air supply pipeline adopts uniform air supply design, and the air volume of each air supply outlet can be adjusted through the air damper.

B. Structural Features and Technical Indicators

Structural Features of Natural Gas Direct-Fired Forced Hot Air Circulation Bridge-Type Oven

The forced hot air circulation oven consists of inlet and outlet bridge sections, furnace body, bottom frame, hot air circulation system, gas direct heating system, exhaust gas discharge device and automatic temperature control system, etc.

The furnace body adopts a modular panel structure, which effectively reduces on-site installation work and heat bridge loss.

The outer wall panel is 0.6 color steel plate, the inner wall panel is 0.6mm galvanized plate, and the thickness of the main insulation layer of the oven is 150mm.

The overall insert plate group is connected as a whole by section steel inner frame, insert plate groove, insert plate cap, etc., and installed on the elevated base.

The oven adopts bottom air supply and top air return mode, and the air damper is easy to adjust.

The air supply pipe adopts uniform air supply design, and each air supply pipe is equipped with a regulating valve plate for easy adjustment, ensuring the uniformity of the temperature field in the furnace.

The circulating fan adopts a special high-temperature resistant, low-noise 4-72 6C centrifugal fan. The impeller, main shaft and bearing of the fan have been specially treated, and the noise is ≤80dB. The impeller and volute of the fan are galvanized, and the motor adopts an extended shaft special motor, which has the characteristics of moderate fan air pressure, small floor space and convenient maintenance.

An independent centralized gas heating chamber with negative pressure circulation structure is provided, which has high heat exchange efficiency and convenient cleaning. The insulation layer of the chamber body is a 150mm sandwich structure, the inner tank is made of SUS304 stainless steel plate, the outer plate is rock wool insulation plate, and a section steel frame is arranged between the inner and outer plates.

C. Main Technical Parameters and Performance Indicators of the Oven

1. Main Technical Parameters

The effective baking time of plastic powder is 20 minutes, and the heating temperature range is room temperature to 180～220℃.

2. Performance Indicators

Heating time: ≤40min (room temperature～210℃)

In the stable temperature area of the oven, the temperature deviation of the upper, middle and lower points within the workpiece height range is ≤±5℃.

D. Electrical Heating Curing Oven Equipment Material Configuration List

Electric Heating Curing Oven Equipment	
Type	Tunnel Through-type
Heating Form	Forced Hot Air Circulation
Design Parameters	Workpiece Size (mm)
Main Dimensions (mm)	L19800*W2900*H2200
Curing Time	20min
Workshop Temp	5℃
Temp. Range	70～210℃
Heat-up Time	≤40min
Heat Output	40×10^4 kcal/h
Temp. Control System	Automatic Temperature Controller
Oven Body	Channel Boxes, Edge Trims, etc.:Galvanized Steel Sheet δ1.0 mm
Outer Wall Panel	A3 Color Steel Plate 0.6mm
Inner Wall Panel	Galvanized Steel Sheet δ0.6 mm
Internal Frame	Structural Steel
Insulation Layer (Thickness 150mm)	Rock Wool (Density 120kg/m^3)
Others	A3 δ2.0～δ4

2.2.6 Suspension Conveying System

A. Content Overview

QXG-200 closed-type suspension conveyor is adopted, with a pitch of 200mm, single-point lifting capacity ≤30kg, double-point lifting capacity ≤60kg; the total length of the suspension chain is about 105 meters, equipped with 1 set of drive, 1 set of tensioning and automatic spray lubrication device to ensure stable operation of the suspension

chain.

B. Structural Features

1) Main Technical Parameters

Model: QXG–200 type

Chain Pitch: 200mm

Single–point Lifting Capacity: 30kg

Running Speed: 1.5m/min

Speed Regulation Range: 0.7–4m/min stepless adjustable

Working Temperature: 0～210℃

Conveyor Power: 3kw (single machine power)

2) The system includes drive mechanism, weight tensioning mechanism, track, chain, curved track, telescopic track, inspection track, lubrication device, installation bracket, etc.

3) The whole line is equipped with linear drive device and weight tensioning, and the drive is equipped with electrical safety protection. To increase wear resistance, all curved tracks are made of 16Mn material.

4) A lubricating and oiling device is installed at the far end of the oven outlet away from the high–temperature area to ensure that the conveyor chain works under good lubrication for a long time.

5) The conveyor is controlled separately, and emergency stop buttons are set at multiple positions along the line. Emergency stop switches are set at the loading area, unloading area, driver, spraying equipment, etc. After the emergency stop switch is reset, the suspension chain automatically resumes operation.

6) The chain is controlled by frequency converter speed regulation to ensure the balance of the suspension chain drive tension.

2.2.6 Structural Features of Electrical Control System

A. Content Overview

The control system of this coating line adopts section control, mainly composed of curing oven control, conveying system control and other parts, which respectively control the operation status of motors, fans, lighting devices, etc. Operators can operate the operation or stop of all electrical equipment in the whole line and adjust the running speed of the suspension chain in front of the instrument cabinet. When the equipment is abnormal, it can be stopped in time or an alarm signal can be sent.

This system includes all control boxes, control cabinets, wires, cables, conduits, cable trays, etc. in the electrical control.

B. Electrical Control Features

The electrical control is mainly composed of control components such as temperature controllers, contactors, sensors, and the temperature of each point transmitted by the temperature controller. It can control the operation status, temperature of on–site fans and the running speed of the suspension chain.

Curing oven temperature control: Each curing oven adopts a grouped heating control system, and an automatic temperature control system is used to control the temperature and display the temperature digitally.

All electrical components used are products of domestic famous brands or joint ventures. Special key components are of brands specified by the manufacturer to ensure quality and reliability.

All motors are equipped with protection systems such as air switches, fuses, and thermal relays, which can effectively provide automatic protection against short circuits, overloads, etc.

The design and installation of electrical equipment comply with relevant national safety requirements.

Installation Specifications

8.1 Wiring between Control Cabinet and Equipment

1) All wiring is done with metal cable trays and metal pipes, in line with national electrical standards.

2) The pipe lines, pipe openings and pipe connections laid in dusty and humid places shall be sealed.

3) Concealed wire pipelines shall be laid along the shortest route to reduce bends.

4) The wire pipes are arranged neatly with uniform fixing point spacing, no iron filings in the pipes, and the pipe openings are smoothed.

5) The specification of trough–type cable tray meets the requirements and is arranged neatly.

8.2 Control Cabinet

1) All electrical appliances and electrical equipment comply with current national standards and are products of high–quality famous brand designated manufacturers.

2) The terminal block shall be fixed reliably, insulated well, and easy to replace and wire.

3) All electrical appliances shall be arranged neatly, and the specifications of fasteners shall be properly matched.

5) Each electrical appliance can be disassembled and replaced separately without affecting the fixing of other wires and electrical appliances.

6) Moving parts such as contactors have no jamming, and there is no abnormal noise after the armature is pulled in.

7) The buttons operate flexibly without jamming. When multiple buttons are installed, they are color–coded and work reliably.

8) The surface of the control cabinet, platform and box is flat, the joints are uniform, the sealing is good, and the surface paint layer is intact without damage.

9) Necessary maintenance space shall be reserved around the control cabinet, platform and box during installation.

10) The temperature controller is a digital display type, and its set temperature and actual temperature are centrally displayed on the panel of the control cabinet.

11) All control cabinets are equipped with exhaust devices to ensure good heat dissipation of electrical components in the cabinet.

Large Cyclone PP Plate Spraying Booth

1) Working Principle

This is a new type of economical quick color change system. It takes about 30 minutes to clean the spraying booth and complete the color change.

It is equipped with a self–cleaning function, a two–stage recovery system of large cyclone + post–filter,

Automatic lifting machine,

Powder supply center with PLC control and cleaning system.

The spraying booth is made of PP engineering plastic plate. The spraying booth is designed with automatic gun openings, 4 gun slots on each side, and the spray guns are arranged horizontally.

The large cyclone adopts European technology, and the single separation rate can reach 95%.

The post–filter adopts rotating vane filter element recovery, with high efficiency and low noise.

The equipment is equipped with automatic recovery and powder sieving system to ensure the normal and pollution–free circulation of powder.

The bottom of the spraying booth adopts a flap mechanism and a pulse air flow automatic cleaning system to ensure the timely recovery of oversprayed powder.

Design Features

Reduce powder consumption and save powder:

Adopt high–efficiency separation large cyclone, the maximum single separation rate can reach 95%.

The design of the entire powder booth is conducive to improving the powder deposition

rate;

Adopt high-efficiency exhaust fan with high efficiency and low energy consumption;

Easy to clean:

Adopt single-pipe large cyclone two-stage recovery system, which is one of the most rapid recovery systems recognized in China at present.

The lower cone pipe of the large cyclone is connected by a hinge-type quick buckle, which can be moved conveniently and cleaned easily.

PP Powder Booth Equipment Structure

No.	Equipment Name	Item	Specification
1	Chamber Body	Type	Engineering Plastic Plate Welding Combined Type
		Size	L6500×W2000×H3000（mm）
		Material	8MM PP Plate
		Forming Method	Welded Template Combination
		Workpiece Inlet/Outlet Size	W1000×H1800(mm)
2	Automatic Spraying Host	Built-in Type	8 sets (4 sets each front and rear)
3	Lifting Machine	Front/Rear	2 units
4	Powder Supply Center and Recovered Powder	Powder Conveying System	Convey the powder recovered through the fluidization tank and large cyclone separator to the

	Filtration System		powder supply center and back to the powder supply barrel
		1 Set of Powder Supply Barrel	Capacity 60 liters
		Automatic Air Blow Cleaning Device for Powder Suction Pipe and Powder Pump	
		Piston for Clamping Powder Box	
		Pneumatic Piston Lifting Device for Venturi Powder Pump and Powder Suction Pipe	
5	Lighting	LED	6 sets

E7 Manual Basic Parameters

Input Voltage	AC100–240V
Single Unit Input Power	<35W
Oscillation Frequency	18KHZ Sine Wave Pulse
Single Unit Air Consumption	≤0.3m³/min
Size (mm)	48*50*103cm
Weight	34KG
Working Temperature	–20℃–50℃
Control Method	Pressure Regulating Valve Mode Operation

Applicable Workpieces	Suitable for flat workpieces, doors and other workpieces requiring large powder output, such as guardrails, pipes, etc.

E7 Manual Single Gun Basic Parameters

Input Voltage	12VDC
Output Voltage	0–85KV Adjustable
Output Current	0–100uA Adjustable
Protection Level	Moisture–Proof Level
Weight	600g/piece
Size	260*265
Static Wire Length	4.5 meters/piece
First Pass Powder Deposition Rate	For flat workpieces, the powder output is less than 350g per minute, and the first pass powder deposition rate can reach 70%
Nozzle	Flat Nozzle/Round Nozzle/Extension Rod

Single Set E7 Manual Powder Spray Gun Configuration List

No.	Product	Model/Specification	Quantity
1	Host	E7	1

2	Electrostatic Manual Single Gun	E7	1
3	Anti-Static Powder Pipe	4.5 meters	1
4	Wear-Resistant Static Wire	4.5 meters	1
5	Stainless Steel Powder Barrel	–	1
6	200mm Extension Rod with Electrode	–	1
7	Flat Nozzle with Electrode	–	1
8	Powder Pump	E7	1
9	Venturi Tube	E7	3
10	Ground Wire	E7	1
11	Trolley	E7	1

E7 Host Basic Parameters

Parameter	Specification
Input Voltage	AC100-240V
Single Unit Input Power	<50W
Oscillation Frequency	20KHZ Sine Wave Pulse
Single Unit Air Consumption	≤0.3m³/min
Dimensions (mm)	280*175*176mm
Weight	4.2KG
Operating Temperature	-20℃-50℃
Control Method	Pressure Regulator Control
Installation Method	Used in conjunction with system control cabinet

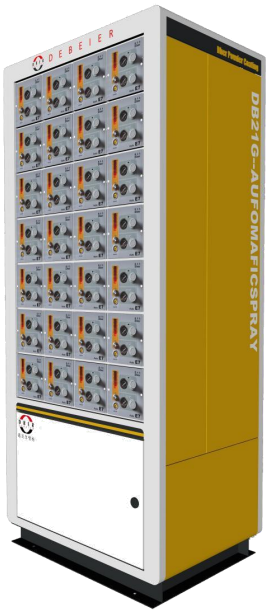
Basic parameters of built-in electrostatic single gun

Parameter	Specification	Remarks
Input Voltage	12VDC	—
Output Voltage	0–100KV, Adjustable	—
Output Current	0–100uA, Adjustable	—
Protection Level	Waterproof Grade	—
Weight	Automatic Single Gun: 610g/piece	Only for automatic single gun
Dimension	Automatic Single Gun Length: 410mm	Length of automatic single gun
Static Wire Length	Automatic Single Gun Vertical Wire: 15meters/piece	Vertical wire for automatic single gun
First–pass Powder Deposition Rate	For flat workpieces, powder output <250g/min, first–pass rate up to 75%	Applicable to flat workpieces
Optional Flat Nozzles	Flat Nozzle 3.0mm; Flat Nozzle 4.0mm	Optional accessories
Installation Method of Automatic Single Gun	Fixed Base Installation; Extended Insulating Rod Installation	Two installation options available
Optional Round Nozzles	Steel Needle Round Nozzle (21.18.15); Plastic Needle Round Nozzle (24.22.20.18)	Optional accessories, different specifications

Powder pump Parameters

Component	Specifications/Features
Pump Body	CNC precision machining ensures concentricity accuracy of air jet nozzle and venturi
Venturi	Made of special engineering plastic, wear-resistant, non-stick
Jet Pipe	Stainless steel gold-plated, wear-resistant
Connection Size	⌀ 11, ⌀ 12
Powder Output Rate	≤550g/min
Check Valve	Uses high-sensitivity check valve to prevent powder backflow
Anti-misconnection Quick Coupler	Anti-misconnection quick coupler for convenient operation
Control Cabinet	
Name	10-Bay Control Cabinet

Specifications	600mm*600mm*143mm
Group Control	1 group
Light Curtain Detection	Not Supported
Voltage Stabilization & Filtration	Supported



Name	Specification		Grating detection	Regulated Filter
10-compartment control cabinet	600mm*600mm*143mm	1 group	Not supported	supported

Detailed Components Configuration List

No.	Product Model/Specifications	Quantity
1	Host Unit E7	1
2	Electrostatic Manual Gun E7	1
3	Anti–static Powder Hose (4.5 meters)	1
4	Wear–resistant Static Wire (4.5 meters)	1
5	Stainless Steel Powder Hopper	1
6	200mm Extension Rod with Electrode	1
7	Flat Nozzle with Electrode	1
8	Powder Pump E7	1
9	Venturi E7	3
10	Ground Wire E7	1
11	Trolley E7	1

II. Precautions 1. Proper Grounding

A grounding cable is supplied with the equipment. During installation, the grounding wire

must be connected to the spray booth, and ideally the booth should be connected to a dedicated grounding rod. Workpieces, hangers, and racks should also be electrically connected to the spray booth grounding system to prevent discharge noise caused by poor grounding. 2. Clean Air Supply

All compressed air must be clean, dry, and free of oil and water. It is recommended to use air that has been treated with a refrigerated air dryer. If a standard oil—water separator is used, oil and water must be drained regularly to prevent water accumulation in the powder hopper air chamber, solenoid valves, air hoses, etc., or excessive powder moisture that may affect powder transfer efficiency. 3. Prevent Powder Spitting

If powder spitting is observed (i.e., unstable powder output with large fluctuations), it is usually due to improper adjustment of the conveying air and dosing air. Increasing the conveying air will increase powder output but may cause spitting; therefore, the dosing air should be increased simultaneously to achieve a stable and uniform powder flow. 4. Timely Powder Cleaning

After a period of operation, the powder pump and spray gun should be blown clean with compressed air. 5. Correct Adjustment

The pressure regulators are equipped with a locking mechanism: push in to lock, pull out to unlock. Adjust each regulator knob to an appropriate position (based on satisfactory powder output). If the pressure cannot be increased sufficiently, check the following:

(1) Whether the compressor air pressure is above 5 kg/cm²;

(2) Whether there are air leaks in the air circuit;

(3) Whether the solenoid valve is malfunctioning;

(4) Check if the pressure regulating valve is working properly. When the pressure regulating valve is working properly, it should be easy to adjust. Turn it counterclockwise to the bottom (closed) or clockwise to the bottom (maximum). Do not use too much

force. If the pressure cannot be adjusted, find out the cause, troubleshoot and then use it.

III. Common Faults

Fault Phenomenon	Causes & Inspection Parts	Instructions
Power indicator not lit	Abnormal AC power supply or no connection to the high-voltage controller 1. Check if there is power supply at the socket. 2. Check if the power cord is open-circuited. 3. Check if the 1A fuse is damaged. 4. Check if the connection between the wire and the transformer is secure.	Generally, there is no problem with the wire and the power supply voltage itself.
No high voltage output when triggering the gun while the indicator is lit	1. Gun switch 2. Cable and plug 3. Check if the two wiring terminals of the high-voltage component inside the gun are securely connected 4. Check if the control panel is functioning properly	Do not disassemble or adjust the high-voltage component inside the gun and the control panel inside the machine at will. If there is indeed a problem, please contact the manufacturer first before determining the solution.
Unable to lower the high voltage	Potentiometer damage	Replace it with a potentiometer of similar shape with a resistance of 4.7KΩ.
Weak high voltage with large current indication	When the gun is in a suspended position (not close to any object) but the current indication is large (the light column exceeds half), the causes are as follows: 1. Breakdown and discharge at the front end of the gun shell 2. Water accumulation inside the gun or on the surface of the high-voltage component 3. Malfunction of the high-voltage module	Under normal use, the high-voltage module will not be damaged easily. However, avoid dropping, colliding or breaking it, prevent moisture and water accumulation on the surface, and do not connect it to other instruments for use arbitrarily.

High voltage available but no powder output or low powder output	1. Solenoid valve malfunction 2. Clogged powder pipeline 3. Powder pump malfunction 4. Reverse connection of powder feeding air pipe and powder mixing air pipe 5. No powder or insufficient powder supply 6. Falling–off of the powder suction pipe 7. No fluidization function 8. Air leakage	1. If you can always hear the energizing sound of the solenoid valve coil but there is no powder output, it indicates a mechanical failure of the solenoid valve. 2. The normal resistance value of the solenoid valve is 53Ω.
Electric shock feeling when touching the machine	There are two situations: 1. AC leakage: Prevent AC leakage in the spray booth or control box. 2. High–voltage leakage (the feeling only occurs when triggering the gun): It is essential to connect the grounding wires of the high–voltage control cabinet and the spray booth together and ensure a reliable grounding.	Ensure the grounding wires are properly connected.

Reciprocating Machine Elevator Fault Analysis

I. Starting Operation, Reciprocating Machine Does Not Move

① Check the operating panel of the reciprocating machine. See if the fault indicator light is on and if there is an English fault record displayed in the frequency area (e.g., UC, OC, LU, OU, etc.);

UC, OC: Overcurrent during start–up or operation. Solution: ① Disconnect the three motor wires U, V, W from the frequency converter. Reset or power cycle, then press run again to see if the fault recurs, displaying UC or OC. If the fault reappears, the frequency converter is faulty. After replacing the frequency converter, if operation is normal, the fault is resolved. If the fault still occurs after replacing the frequency converter: 1. Check if the motor insulation is poor, if the motor wires are damaged or leaking electricity; 2. Check if the grid voltage is too low; 3. Check for significant interference. If LU (Undervoltage) or OU (Overvoltage) is displayed, replace the power supply (use a separate power supply) and test multiple times.

② Press run. On the operating panel, except for the forward rotation indicator, all other lights are off, and there is no response.

If the run light is off, it means the frequency converter has not received the run command. Check parameter P102 to see if it is set to 0. If not, change it to 0 (control start/stop via the panel), then press run. If it starts normally, it was a parameter setting issue. If there is still no response after adjusting the parameter, and the run light remains off, the run button on the operating panel may be faulty. The operating panel needs to be returned to the factory for repair.

Note: Do not connect the reciprocating machine's power supply to a circuit breaker with a residual current device (RCD/GFCI), as it may trip easily.

II. OL Fault During Reciprocating Machine Operation

OL: Overload. ① Check if P210 (Motor Current) matches the motor's rated current. (Note: For a 0.75KW single–phase motor, the rating is 3.5A). If set to around 2A, it will frequently trip OL. Change P210 back to 3.5A to resolve; this is a setting issue.

② If the setting is correct, after resetting, press the shift key twice on the operating panel. The frequency display will show A0.00. Press run and observe the instantaneous current reading in Amps. Taking a 0.75KW motor as an example, if it runs above 4A for a while and then trips, it is mostly due to mechanical reasons such as poor lubrication of the gearbox, incorrect installation, chain jamming, or spray gun wire entanglement causing excessive load. Check for mechanical faults, including issues with the rubber wheel.

③ If overcurrent occurs sporadically, check if the grid voltage is too low. For undervoltage (LU), check the frequency converter's DC bus voltage (normal value should be between 290–350V) via P005 or by pressing the shift key five times. If the bus voltage during overcurrent is constantly below 280V and fluctuating erratically, contact the manufacturer.

④ If the current instantly surges above 10A immediately upon start–up, it is likely due to a phase loss in the frequency converter or motor. If possible, separately measure the frequency converter and motor for phase loss. If a fault is found, replace the frequency converter or motor.

III. Inaccurate Travel of Reciprocating Machine Spray Gun

① Spray gun moves increasingly downward (or upward) and even hits the bottom (or top).

Positioning: Jog the spray gun to the lowest point (or manually pull it to the lowest point). Press the shift key four times on the operating panel. The frequency display will show a four-digit number XX.XX. Loosen the fixing screw of the right-hand potentiometer and rotate the large gear mounted on the potentiometer shaft until the frequency display on the operating panel shows around 02.00. Then, mesh the two large gears on the potentiometer with the small gear on the gearbox and tighten the screw.

If the elevator's travel is long (exceeding 3 meters), note that the analog voltage value for positioning (refer to P125) should be about 0.2 lower than the P125 setting. After positioning, let the machine run for a while and wait for the spray gun to stop at the lowest point again. Check if the current position on the operating panel is still 02.00. If not, it indicates the potentiometer has drifted and is faulty. Replace the potentiometer and reposition.

② Travel is sometimes inaccurate, or there is hesitation at certain positions. This is likely due to interference. (Various methods for handling interference.)

③ Upon startup, the reciprocating machine directly runs to the top. This may be due to a sudden change in grid voltage. Check the frequency converter's P005; it may be outside the 290-350V range. Use an independent power supply.

IV. During Elevator Operation, It Stops Unreasonably. It Can Run Again After Restarting, with No Fault Display and No Fault Indicator Light.

① Check if the frequency converter fan is rotating. If the fan is clogged with powder, repair the fan or find a way to ventilate and cool the frequency converter.

② Interference (Various anti-interference methods)

③ Voltage/grid fluctuation

V. Anti–interference Methods for Reciprocating Machines:

① The frequency converter's wiring terminals should not be connected to the third wire (ground wire) of the power plug.

② Preferably use an independent power supply for the frequency converter (must be separated from power supplies for devices like electrostatic generators or high–inertia equipment such as welders, air compressors, etc.).

③ Generally, leave the frequency converter's wiring terminals unconnected. Do not connect a ground wire from them to the elevator chassis, to prevent the elevator from being effectively grounded (the clamp on the chassis not being effectively grounded).

④ When the frequency converter is severely affected by electrostatic interference, it is best to ground the frequency converter's grounding terminal separately. Drive the grounding rod into the ground (preferably more than 1 meter deep). Do not share the grounding with the electrostatic generator; keep them apart.

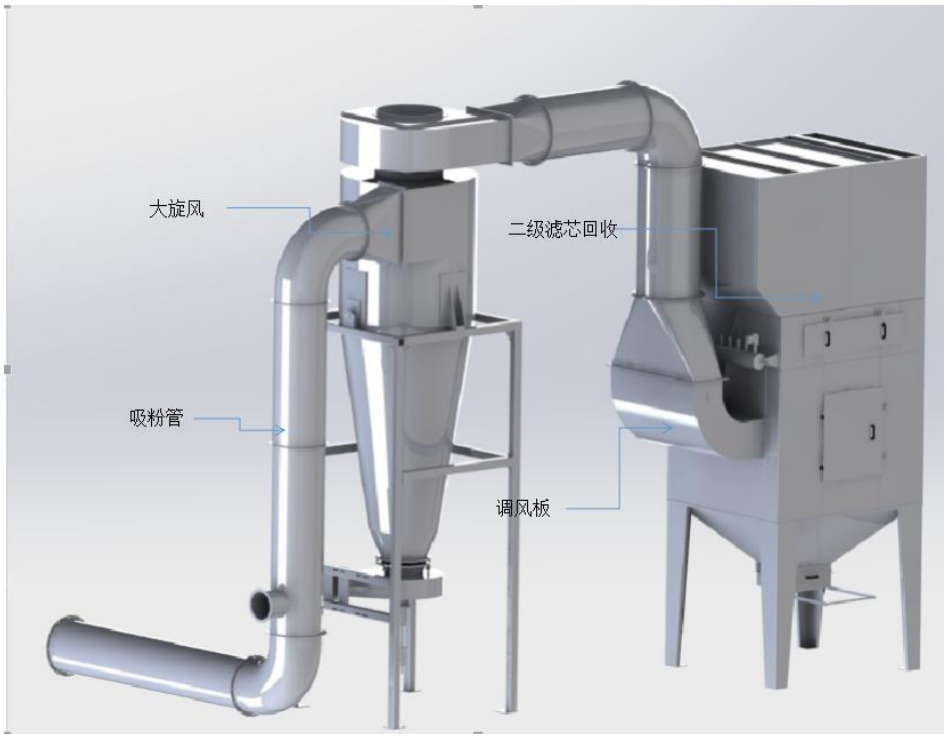
⑤ When interference is severe, use shielded wire for the potentiometer (especially for Sibo 5V potentiometers).

⑥ Change the frequency converter's P115 parameter to 02.

⑦ Do not overlap or knot the cables for the frequency converter, motor, and electrostatic generator; keep them separate.

4 Large Cyclone Recovery System

No.	Name	Item	Specifications
1	Large Cyclone Separator	Made of 2mm cold–rolled steel plate	External powder coating, internal phosphating treatment
2	Powder Conveying Pump	Separated powder recovery device	Complete efficiency, trouble–free
3	Large Cyclone Powder Collection Hopper	Split structure	Detachable bottom surface
4	Connecting Pipe between Large Cyclone and Spray Booth	Flange connection	Diameter: 500mm
5	Cone	Diameter: 1300mm	Height: 5500mm



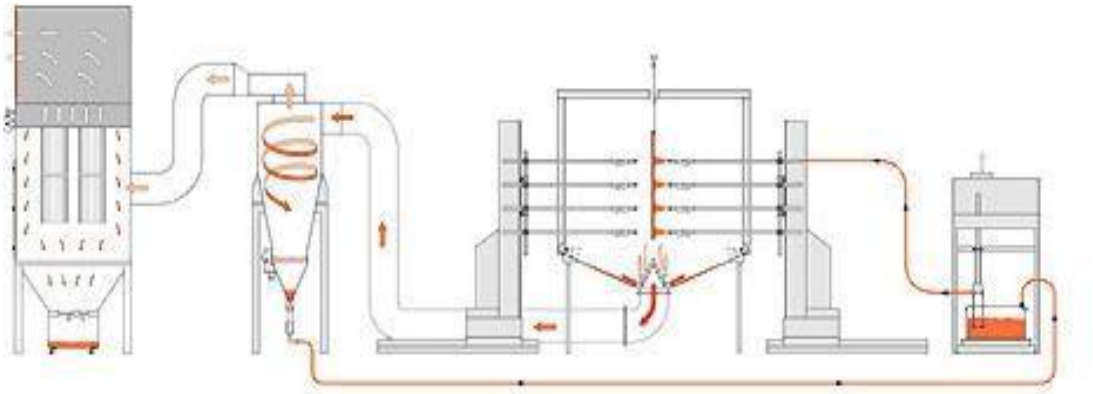
1-2 Secondary Recycling Unit:

1) Relevant Data

No.	Item	Specifications	Quantity
1	Nanometer Coated Filter Element	ф325×600mm	24 pieces
2	Cleaning Device	–	12 sets
3	High–Flow Pulse Cleaning Valve	–	12 sets
4	Ventilation System (Sanyi Fan)	Power: 37KW; Air Volume: 35000m³/h	1 unit

5	High-Density Noise Reduction and Sound Absorption Device	–	1 set
6	Recovery Powder Hopper	–	1 piece
7	Overall Material	2.35mm cold-rolled steel plate, powder coated, bent and assembled	1 unit

Working principle of secondary recycling



● The powder sprayed from the gun that does not adhere to the workpiece is carried by the airflow generated by the fan into the large cyclone separator. Under centrifugal force, the powder is separated and falls to the bottom of the large cyclone. After passing through the powder sieve, the powder is recovered into the powder supply barrel for recycling.

● The fine powder that is not separated in the large cyclone is drawn into the post-filter along with the airflow. This airflow, containing fine powder,

passes through the filter cartridge, becomes clean air, and is discharged into the workshop.

● At regular intervals, the filter cartridge is automatically cleaned by jets of compressed air. The fine powder blown off the filter cartridge falls into the fine powder collection barrel.

2.3 Major Equipment Configuration List

2.3.2 Powder Curing Oven Tunnel ———————————————— 1 unit

No.	Equipment Name	Equipment Technical Parameters & Overall Dimensions	Structural Features & Technical Requirements	Quantity
2.1	Drying Tunnel Chamber	Overall Dimensions: 19800×2900×2200mm (L×W×H)	Wall panel: 0.6mm color steel plate for outer wall, 0.6mm galvanized steel plate for inner wall; rock wool insulation with total thickness of 150mm	1 set
2.2	Edge Wrapping	–	1mm galvanized steel plate with powder coating	–
2.3	Natural Gas Heating System	Model: RS44	–	1 unit

2.3.4 Overhead Conveying System ———————————— 1 set

Configuration:

Item	Specifications
Model	QXG–200 Overhead Chain
Drive Device	1 set

Drive Motor Power	3KW
Tensioning Device	1 set, weight-type
Chain	QXG-200
Straight Rail	QXG-200
Curved Rail	QXG-200
Scissor Hanger	QXG-200, pitch 200mm
Hanger Height	600mm
Common Process Speed	2m/min
Adjustable Range	0.7～4m/min
Oil Pan	105m (length)
Secondary Hanger	Responsible by customer (matched according to workpieces)

No.	Equipment Name	Main Specifications	Quantity	Remarks
I	Spraying System	–		
1	Powder Spray Booth	L6500×W2000×H3000mm	1 set	–
2	Spray Booth Chamber	PP plate welding, 8mm thickness	–	8mm thickness
3	Lifting Machine	Stroke: 1.5m	2 units	4 guns per unit
4	Manual Spray Gun	–	2 sets	–

5	Recovery & Filtration System	–	1 set	–
6	Explosion–Proof Lighting	LED	6 groups	–
7	Large Cyclone	–	1 unit	–
8	Large Cyclone Separator	1.8mm thickness, powder coated	1 unit	–
9	Powder Conveying Pump	–	1 unit	–
10	Large Cyclone Powder Collection Hopper	–	1 set	–
11	Connecting Pipe between Large Cyclone and Spray Booth	–	1 set	–
12	Post–Filtration Recovery System	2.35mm cold–rolled steel plate, powder coated, bent and assembled	1 unit	–
13	Coated Filter Element	ф325×600mm	24 pieces	–
14	Cleaning Device	–	12 sets	–
15	High–Flow Pulse Cleaning Valve	–	12 sets	–
16	Ventilation System	Power: 37KW	1 unit	Explosion–proof, Sanyi Brand
17	High–Density Noise Reduction and Sound Absorption Device	–	1 set	–

18	Recovery Powder Hopper	–	1 piece	–
19	Powder Supply Center	–	1 set	–

2.3.5 Electrical Control System ———————————————— 1 set

No.	Name	Quantity	Remarks (Brand)
1	Inverter	1 unit	Delta
2	Main Circuit Breaker	1 unit	Siemens or Schneider
3	Motor Protection Circuit Breaker	Several	Siemens or Schneider
4	Circuit Breaker	Several	Siemens or Schneider
5	Circuit Breaker Auxiliary Contact	Several	Siemens or Schneider
6	AC Contactor	Several	Siemens or Schneider
7	Time Auxiliary Contact	Several	Siemens or Schneider
8	AC Contactor Contact	Several	Siemens or Schneider
9	Buttons & Indicators	Several	–
10	Intermediate Relay	Several	OMRON
11	Instruments	Several	Siemens or Schneider
12	Switching Power Supply	1 unit	Mean Well
13	Warning Light	1 unit	Er Gong
14	Electrical Cabinet (with socket, door light, fan, etc.)	2 units	Dong'an
15	Electrical Cabinet Installation Auxiliary	Several	–

	Materials		
16	Temperature Control Probe	1 set	–
17	Wires	Several	–
18	Cable Tray	Several	–

2.4. Main Energy Consumption Indicators of the Equipment

2.4.1. Energy Consumption Indicators

No.	Equipment Name	Electricity (kW)	Natural Gas (m^3/h)	Compressed Air
1	Curing Oven	9	55	–
2	Overhead Conveyor System	3	–	–
3	Powder Spraying Equipment	40	–	8 kg/cm^2
4	Others	5.5	–	–
5	Moisture Drying Oven	5	11	–
–	**Total**	**62.5 kW**	**66 m^3/h**	–

Note: This table is for reference only. The final design is subject to the specifications of the ShengTai Painting Equipment Technical Department.

2.4.2. Energy Requirements

1. Specification Requirements

1.1 Electricity: 380V±10%, 50Hz. Supply Mode: Three-phase four-wire system or three-phase five-wire system.

1.2 Fuel Oil: #0 Light Diesel Oil, Calorific Value ⩾ 10,200 kcal/kg. (Lower grade may be used in northern regions)

1.3 Fuel Gas:

Calorific Value:

City Gas: ~3,500 kcal/Nm³.

Natural Gas: ~8,550 kcal/Nm³.

Liquefied Petroleum Gas (LPG): ~22,000 kcal/Nm³.

Pressure (for Gas, Natural Gas, LPG): 30 mbar.

1.4 Compressed Air:

Pressure: 0.5 ~ 0.7 MPa

Oil Content: ⩽ 0.1 ppm

Moisture Content: ⩽ 1.3 g/m³

1.5 Water: Pressure: ⩾ 0.25 MPa

1.6 Steam: Pressure: 0.3 MPa ~ 0.4 MPa

The above data represents the maximum installed capacity, not the actual consumption. The final installed capacity for each piece of equipment is subject to the design of the ShengTai Painting Technical Department.

2.6. Main Purchased Components List

No.	Name	Model	Quantity	Place of Origin
1	Suspended Conveyor	Model QXG–200	1 set	Hangzhou
2	Pressure Gauge	–	1 pc	Wenzhou, Zhejiang
3	Spray Gun	–	10 sets	Deibel E7
4	AC Contactor	–	–	Siemens or Schneider
5	Intermediate Relay	–	–	OMRON
6	Air Switch	–	–	Siemens or Schneider
7	Temperature Controller	–	–	Yudian, Xiamen
8	Oven Temperature Sensor	–	5 sets	Nanjing
9	Frequency Converter	–	2 sets	Siemens or Schneider
10	Buttons, Switches & Indicators	–	–	Siemens or Schneider

Powder Coating Equipment Configuration List

No.	Name	Specification	Unit	Quantity	Remarks
1	Spray Booth	6500*2000*3000	Set	1	–
–	Wall Panel	PP Board	Batch	1	8mm thickness
–	Base	6500*2000*700	Set	1	Square Tube + 201 Stainless Steel
–	Lighting	LED	Set	6	Explosion –Proof
–	Flip Plate	PP	Set	1	–
–	Back Blowing	–	Set	20	–
–	Spray	–	Set	1	–
2	Secondary Recovery	1500*2000*5800	Set	1	2.35mm thickness
–	Filter Element	Φ325*600	Set	12	24 pieces
–	Fan	37kW	Unit	1	Explosion –Proof Sanyi
–	Rotary Vane	Stainless Steel	Set	12	–

No.	Name	Specification	Unit	Quantity	Remarks
–	Connecting Pipe	Diameter 500	Batch	1	1.5mm Carbon Steel
–	Flame–Free Venting	310*240	Set	1	Insured + Certified
–	Single–Phase Flameproof Valve	Φ500	Set	1	Insured + Certified
–	Ash Discharge Valve	300*300	Set	1	Motor Explosion –Proof
–	Pressure Detection	–	Set	1	–
–	Spark Detection	–	Set	1	–
3	Large Cyclone Dust Removal	1500*1500*4900	Set	1	–
–	Cone	Diameter 1300	Set	1	1.8mm Carbon Steel Plate
–	Frame	100*100*2	Set	1	–
–	Powder Return Pump	Stainless Steel	Set	1	–

No.	Name	Specification	Unit	Quantity	Remarks
–	Lifting Device	Including Cylinder	Set	1	–
4	Spraying Equipment	–	Set	1	–
–	Reciprocating Machine	Stroke 1500	Unit	2	–
–	Automatic Gun	E7	Piece	8	Deibel Brand
–	Manual Gun	E7	Piece	2	Deibel Brand
–	Electrostatic Cabinet	E7	Set	1	Deibel Brand
–	Powder Supply Center	ST–8	Set	1	2 Powder Barrels
5	Baking Oven	19800*2900*2200	Set	1	–
–	Rock Wool Board	150mm (Bulk Density 120kg/m³)	Square Meter	215	0.6mm Inner & Outer Layer
–	Support	100*100*2	Batch	1	Galvanized
–	Trough Box, Eaves, etc.	1.2mm Galvanized	Batch	1	Plastic–Sprayed

No.	Name	Specification	Unit	Quantity	Remarks
6	Heating Device	Natural Gas	Set	1	–
–	Burner	RS44	Unit	1	Riello Brand
–	Circulation Fan	7.5kW	Unit	1	–
–	Heat Exchanger	4000*1500*1500	Set	1	–
–	Circulation Air Duct	600*300	Meter	15	–
7	Conveying Device	QXG–200	Set	1	–
–	Chain	QXG–200	Meter	105	Suzhou Origin
–	Track	QXG–200	Meter	93	Suzhou Origin
–	Tensioner	R1500*180°	Set	1	–
–	Drive	3kW	Set	1	Frequency Conversion Control
–	Horizontal Elbow	R1000*180°	Set	1	–

No.	Name	Specification	Unit	Quantity	Remarks
–	Upper & Lower Slope	–	Set	2	–
–	Oil Filler	Automatic	Set	1	Suzhou Origin
–	Casing	–	Meter	1	Suzhou Origin
–	Scissors Hanger + Oil Drip Pan	QXG–200	Pair	525	Spacing 200mm
–	Bracket	–	Batch	1	100*100*2
8	Baking Oven Environmental Protection	10,000 Air Volume	Set	1	15m Chimney
–	Adsorption Box	2000*1100*1300	Set	2	4 Drawers
–	Fan	5.5kW	Unit	1	Sanyi Brand
–	Pipe + Detection Platform	Φ300	Set	1	Galvanized
9	Soaking Tank	3500*1600*1000	Piece	5	–
–	Material	304 Stainless Steel, 2.0mm	Batch	1	–

No.	Name	Specification	Unit	Quantity	Remarks
–	Frame	100*50 Square Tube	Batch	1	–
–	Drain Valve	Stainless Steel	Piece	5	–
–	Overflow Port	Stainless Steel	Piece	5	–
10	Drying Oven	4000*3000*2200	Set	1	–
–	Box Body	150mm Rock Wool Board	Square Meter	60	–
–	Frame	150*150 Square Tube	Batch	1	–
–	Inlet & Outlet Doors	–	Set	2	–
11	Heating Furnace	–	Set	1	–
–	Burner	FS10	Set	1	Riello Brand
–	Circulation Fan	3kW	Unit	1	–
–	Heat Exchanger	3000*1500*1500	Unit	1	–
–	Circulation Air Duct	–	Batch	1	–
12	Control System	–	Set	1	–

No.	Name	Specification	Unit	Quantity	Remarks
–	Spray Booth, Secondary Recovery, Pulse, Discharger, Spray Gun Power Supply, Reciprocating Machine Power Supply, Powder Supply Center Power Supply, Electrostatic Cabinet Power Supply, Back Blowing, Flip Plate		Set	1	PLC Controlled
–	Chain Drive (Frequency Conversion, Emergency Stop)		Set	1	Standard Type
–	Assembly Line Baking Oven (Ignition, Temperature Control, Alarm, Circulation Fan, 5.5kW Environmental Protection Fan)		Set	1	Standard Type
–	Drying Oven (Ignition, Temperature Control, Alarm, Circulation Fan)		Set	1	Standard Type
13	Packaging Cost	–	–	–	–