PalletStation

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CONTENTS

1	Intro 1.1 1.2 1.3	duction 1 Overview of Palletizing Workstation System 1 Introduction to Palletizing Workstations 3 Palletizing Workstation Specifications 10
2	Tran 2.1 2.2 2.3 2.4	sportation, installation and use12Size of the Whole Station
3	Palle	tStudio Configuration Process 19
	3.1	Inicialized Basic Configuration
		3.1.1 Language Configuration
		3.1.2 Workstation Configuration
		Start Point Configuration
		Station Speed Configuration
		Software Version
		3.1.3 Pickup Configuration
		Pick Wait Point Configuration
		Pick Point Configuration
		Pick lift Height Configuration
		Suction cup Parameter Configuration
		Box Parameter Configuration
		3.1.4 Pallet Type
		Pallet Type Base Configuration
		Automatic Layout Configuration
		3.1.5 Stack configuration
		3.1.6 Palletizing Configuration
		Waypoint Teach
		Lift Configuration
		3.1.7 Safety Configuration
	3.2	Advanced Configuration
		3.2.1 Pallet Coordinate Offset Configuration
		3.2.2 Lift Configuration
	3.3	Self-Testing
		3.3.1 Reachability Check
		3.3.2 Signal Status
	3.4	System Configuration

		3.4.1 Whole Station Configuration	8
		Current Configuration	8
		Reset System Configuration	9
		Import Configuration	51
		Export Configuration	52
		3.4.2 System Password	53
4	Palle	tStudio Operation Process Description	55
	4.1	Initialization State	55
	4.2	Standby Mode	6
		4.2.1 Status Display Area	6
		4.2.2 Operating Area	57
	4.3	Reset State	51
	4.4	Operational State	56
	4.5	Paused State	57
	4.6	Error State	8
5	Exce	ption Handling	71

CHAPTER ONE

INTRODUCTION

1.1 Overview of Palletizing Workstation System

The DUCO PalletStudio palletizing workstation is an integrated hardware and software solution for box stacking applications that includes DUCO' s high payload collaborative robot GCR25, a palletizing base and a software package for control. Compared to traditional industrial robotic arms, the collaborative robotic arms form a palletizing workstation with a smaller footprint, higher safety, electronic safety fencing supplemented by collision detection of the collaborative robots, and no need for additional fencing for protection, making it more agile. This brochure helps customers to understand this palletizing workstation and provides information on how to set up and activate your palletizing configuration.





Figure 3.1 Schematic diagram of the palletizing workstation (front)

Figure 3.2 Schematic diagram of the palletizing workstation (back)



Figure 3.3 Top view of palletizing workstation

1.2 Introduction to Palletizing Workstations

The palletizing workstation consists of the DUCO-GCR25 collaborative robot, the electrical control cabinet (including the robot controller DC30D-J9), the portable mobile base and pallet positioning system, and the palletizing control system. The overall palletizing workstation can be fully controlled by our control cabinet.



Figure 3.4 Schematic diagram of the components of the Code Multi workstation

1 DUCO-GCR25 Collaborative Robot

The collaborative robotics system consists of the following main components:

- Robot
- Robot control cabinet
- Connection cable
- Software
- Other options, accessories



Figure 3.5 Overview of the robot system

Load (TCP): 25kg
Repeat positioning accuracy:±0.05mm
IP rating: IP54
]

2 Pneumatic suction assembly

a Air tube: Including two $\phi 8$ air tubes for inlet and outlet, the outlet is used to create negative pressure, and the inlet is used to release items.

b Suction devce (including negative pressure sensors): used to suck up palletized items, the sensor will output a high level signal after reaching a certain negative pressure threshold.

c Robot Tubing Kit: The robot tubing kit is designed to hold the cables for the air tubes and negative pressure sensors along the arm so that they do not get tangled in the arm during suction cup rotation to cause risks such as the air tubes falling out.

3 Lifting column (or fixed column): controls the raising and lowering of the robot arm, determines the number of layers that can be palletized, and includes the drive and motor.



Figure 3.6 Schematic diagram of the lifting column

4 Control cabinet components

a DC30D-J9 Controller: The GCR25 is equipped with a controller capable of controlling all the tasks of the overall palletizing station, in the form of a modular workstation in the form of a control cabinet, for rapid deployment and maintenance.



Figure 3.7 DC30D-J9 controller

b Circuit breaker: Circuit breakers can be used to protect circuits and equipment from damage caused by overloads, short circuits and other faults, and to ensure the safe operation of circuits. They can also be used to switch circuits and control the start, stop and operation of various electrical equipment.



Figure 3.8 Circuit breaker

c On-off switch: Controls the up and down power of the whole station. The white arrow pointing horizontally to the left to O means the circuit is closed, and turning the switch to the right by 90° to point to I will turn on the circuit.



Figure 3.9 On-off switch

d Safety sensors (optional) for setting up safety zones: used to ensure that the machine stops when there is a person or foreign object in the designated area, and also to monitor that the robot stops when a person enters the robot' s work area.





e Three-color light with buzzer: Provide present status indication, warning to remind the current status.



Figure 3.11 Three-color light with buzzer

f Drag chains: Regulate the movement of air hoses and robot cables with the lifting column to avoid entanglement and abrasion.



Figure 3.12 Drag chain

g Buttons: physical buttons that control the palletizing workstation, with the specific functions shown in the figure



Figure 3.13 Buttons

1.3 Palletizing Workstation Specifications

Model number	DUCO-PS-0-0	DUCO-PS-80-1		
Working radius	1800 mm			
Maximum pallet size	1200×1200			
Maximum height	1700 mm(Fixed base)	2500 mm(Lifting base)		
Height of lifting column	not have	850 mm		
Maximum lifting height	not have	800 mm		
Palletizing speed packages per minute	6-8 boxes min			
Repeat Positioning Accuracy	±0.05			
Communication method	TCP IP			
IP Class	IP54			
Temperature range	0~55			
Rated power	1.5 kW			
Power supply (of an appliance etc)	100~220 AC			
Weight	522 kg	472 kg		
Area	3320×1665(including extension ro	bd)		

CHAPTER

TWO

TRANSPORTATION, INSTALLATION AND USE

2.1 Size of the Whole Station



Figure 4.14 Dimensional drawing of the whole station

2.2 Transportation of Palletizing Workstations

The palletizing workstation is transported using a forklift truck and the base of the palletizing workstation allows it to be lifted from the left, right and rear directions. The following diagram shows the alignment of the slots and the base and the corresponding dimensions.



Figure 4.15 Alignment of slots and bases and corresponding dimensions



Figure 4.16 Recommended Packing Pose

Tips:

• If the robot is still mounted on a column or lifting post during handling, it needs to be adjusted for attitude, and after the end is turned sideways, the robot arm must be tied up with sturdy packing materials to protect it from potential damage.

• Pallet Applicable Size:

Refer to the standard "GB/T 2934-2007 Intermodal Transportation Flat Pallet Main Dimensions and Tolerances" .

2.3 Deployment Requirements

1 Extension rod assembly (take care that the foot cups are not screwed down too low in advance): the extension rod is used to prevent tipping and to assist in limiting the pallet.



Figure 4.17 Extension rod assembly diagram

When the palletizing workstation arrives, the reach rod will be secured to the inner end. It will be necessary to remove the 8 x M8 screws and then pull out the extension rods and align the holes in the lower end separately to secure them. The final molding is shown.



Figure 4.18 Formed extension rod

2 When placing the workstation, use a flat surface as much as possible. When encountering a non-flat surface, use a wrench to adjust the leveling seat to avoid wobbling.

1 Turn the upper hexagonal nut clockwise to loosen the leveling feet.

2 Turn lower hex nut clockwise to lower leveling foot cups

3 Turn the lower hexagonal nut counterclockwise to raise the leveling feet.

4 Turn the upper hexagonal nut counterclockwise to lock the leveling foot cups.

If the palletizing workstation is not frequently relocated, it can be fixed to the floor by means of foot positioning points (adjust the foot cups upwards so that the whole base plate lands on the floor). The diagram below provides a reference for the dimensions of the fixing points:



Figure 4.19 Fixed Point Dimension Reference Diagram

At least 2 people should perform the robot installation at the installation site at the same time, otherwise there is a risk of damage to the machine or personal injury, never by a single person.

The robot and the control cabinet are fixed on the base plate as a finished product and should not be disassembled in principle. If necessary, please contact the technical support to operate under guidance, the robot body is heavy and requires at least 4 people to assist in carrying.

3 Air pipe connection: the front reserved air pipe is connected with the air source, diameter $\varphi 10$; The on-site gas source pressure needs to be stabilized at 0.5-0.6Mpa. The threshold value of the digital pressure switch is set as follows:



Figure 4.20 Threshold Setting Reference

4 External 220V power connection: The power cord here needs to be connected to an external 220V power source, please refer to the electrical schematic diagram for details. The switch of the control cabinet will be turned on by default, if there is a need to turn off, remove the left side panel to operate the switch.

2.4 Maintenance

After the completion of equipment commissioning, the maintenance work shall be carried out according to the specified maintenance period.

Maintenance Term Regulations Form

Maintenance activities	Period Mainte- nance	Every 1 month	Every 6month	Every 12 month	Every 36 month
Clean the control box (Replace the filters)	Х				
Clean the lifting column, add lu- bricating oil	Х		Х		
Clean the lifting column and fill with lubricating oil	Х	Х			
Clean the robot	Х		Х		
Check the robot base mounting bolts	Х	Х			
Check the mounting bolts of the robot end wash plate	Х	Х			
Check the robot joint mounting bolts	Х	Х			
Check light strip seals	Х	Х			
Check joint seams for grease spills	Х				
Check the information label and nameplate	Х			Х	
Check the cable harness	Х		Х		
Check robot joint back cover and bolts	Х	Х			
Check the emergency stop	Х	Х			
Check teach pendant 3-position enable switch	Х	Х			
Check control cabinet safety in- puts and outputs	Х	Х			
Check teach pendant cables and conectors	Х		Х		
Check control cabnet fan filter	Х			Х	
Check control cabnet IO terminal block	Х	Х			
Check control cabnet power con- nector	Х			Х	

Period maintenance:

It is referring to the regular implementation of the relevant maintenance. The actual interval depends on the robot's operating period, work environment and sports mode. In general, the shorter the operating period; the more serious the work environment pollution; the more rigorous exercise mode, the shorter the interval of regular maintenance should be.

When performing a job on the maintenance list, a visual inspection must be carried out based on the following points:

- Check the safety device, plug connection and printed circuit board is securely installed;
- Check the label, nameplate is clear and unspoiled;

- Check if the cable is damaged;
- Check the connection of the ground potential equalization lead;
- Check all equipment components for wear or damage.

Lifting column maintenance instructions:

Raise the lifting column to the highest position, clean and check the outer surface of the lifting column to ensure that the surface is free of collisions, pits and other abnormalities.



Figure 4.21 Lifting Column Maintenance Reference

Apply grease evenly as shown in the above figure, and then the column will be slowly lowered to the lower limit, and the maintenance action will be completed after three times of up and down (10mm/s).

Recommended use of food-grade fully synthetic fluorine gre

PALLETSTUDIO CONFIGURATION PROCESS

PalletStudio Configuration Process includes Basic Configuration, Advanced Configuration, Self-Check Test and System Configuration.

- Basic configuration: the basic parameters that must be configured for a palletizing station.
- Advanced configuration: advanced parameters to be configured on a case-by-case basis for the palletizing station.
- Self-test: for pallet accessibility checking and related semaphore status confirmation
- System configuration: clear/import/export system configuration and reset system password

3.1 Inicialized Basic Configuration

3.1.1 Language Configuration

When initializing the configuration, click on "English" in the upper right corner to change the language mode, as in



Figure 5.22 Language Switching Configuration

3.1.2 Workstation Configuration

Start Point Configuration

1 First of all, you should set the Start Point of the robot, click "Teach" to enter the teaching pop-up window, as in Figure 5.23

Station	Start point	Configuration Teach Move Here
Pick Pallet Type	Station Speed	Global Speed 100%
Stack Pallet Safety	Software Version	PalletStudio Version V1.2.2 DUCO Core Version V3.1.0_1128

Figure 5.23 Start Point Configuration

In the pop-up window, perform manual teaching, of which the first column is the joint point movement, the second column is the end six degrees of freedom point movement, and the third column is the elevation

Station Start point Configuration Teach Move Here										
Pick Pallet Type		Robot Jog	×							
Stack Pallet	Jog Speed	100%	•							
Safety Advance Self-Testing System	Joint Joint2 O O	Cartesian Leveling X 0 mm + Y 465.3 mm + Z 2035 mm + RX -90 mm° + RY 0 mm* + RZ 0 mm* + Cancel Record	Lift Home							
Log	Run Mode									

axis point movement. Click "Record" after the teaching is finished, as in 2

Figure 5.24 Start Point Teaching Pop-Up Window

Tips:

- By clicking "Leveling", the attitude parameters RX and RY of the robot end can be adjusted to the level of the end;
- Press and hold on "Home" to lower the elevator shaft position until it returns to zero, release to stop immediately;
- Click "Record" to make this position adjustment effective;
- The subsequent demonstration process can be referred to here, and will not be explained later.
- 3 Click "Move Here" to move the end of the robot to the initial position just taught, as in Figure 5.

25

Station	Start point	Configuration	Teach	Move Here
Pick Pallet Type	Station Speed	Global Speed	100% -	
Stack Pallet Safety	Software Version	PalletStudio Ver DUCO Core Vers	ision V1.2.2	

Figure 5.25 Initial Position Configuration

Tips:

• Pressing and holding "Move Here" will cause the robot to continue moving, releasing it will abort it, and pressing and holding will not work once it reaches the preset point, so please be aware of the risk of collision and interference during the movement process, which will not be repeated hereafter.

Station Speed Configuration

The global running speed of the station is adjusted by means of a slider, as shown in

	Station	Start point	Configuration	Teach	Move Here	
	Pick					
	Pallet Type	Station Speed	Global Speed	100%		-0
	Stack					
	Pallet	Software Version	PalletStudio Ver	sion V1.2.2		
Safety			DUCO Core Vers	ion V3.1.0_1128		

Figure 5.26 Schematic Diagram Of Workstation Speed

Software Version

The current PalletStudio software version and DUCO Core version requirements are displayed here, as shown in Figure 5 .27

Station	Start point	Configuration	Teach	Move Here
Pick Pallet Type	Station Speed	Global Speed	100% -	•
Stack Pallet Safety	Software Version	PalletStudio Vers DUCO Core Versi	sion V1.2.2 on V3.1.0_1128	

Figure 5.27 Schematic Diagram Of Software Versions

3.1.3 Pickup Configuration

The pickup position demonstration involves a pick wait point, a pick lift point, a pick point, and a pick lift height, with the point relationships shown in Figure 5 .28. Among them, the pick lift point is used to set a transition point above the pick point that can avoid the interference of the baffle plate on the box.



Figure 5.28 Plot of Pick Wait Point, Pick Lift Point Vs. Pick Point

Pick Wait Point Configuration

The pick wait point is generally located above the pick lift point, this point is used to wait for the box in place signal to be triggered.

Select "Pick Wait Point" \rightarrow "Teach" to enter the teaching pop-up window for adjusting the waiting point for picking up materials at the end of the robot. Teach in the pop-up window (refer to the previous section for the teaching process). As shown in Figure 5.29

Station	Pick	Pick Wait point		Teach)(Move Here	•	
Pick	Workstation	Pick point		Teach		Move Here	•	
Pallet Type Stack		Pick lift height(mm)	-	200	+			
Pallet Safety	Sucker config	Max Waiting time(ms)	-	5000	+			
		Manual		Pick		Release		
	Box config	Length L1[TCP-X](mm)	-	430	+	Y S		x-
		Length L2[TCP-Y](mm)	-	215	+	н		Y+
		Height H[TCP-Z](mm)	-	280	+	12	u	•
Advance		Mass(kg)	-	24	+	The TC	P is	X+ The sucker is parallel and attached in
Self-Testing		Positive(Label)	TCP	-X Positive	~	box	t to the	the middle of the box
System								
Log	Run Mode	2						

Figure 5.29 Configuration Interface of Pick Wait Points

Pick Point Configuration

The pick point is the point at which the end of the robot sucks up the box.

Select "Pick Point" \rightarrow "Teach" to enter the teaching pop-up window for adjusting the pickup point at the end of the robot. Teach in the pop-up window, as shown in Figure 5.30

Station	Pick	Pick Wait point	Teach	Move Here	
Pick	Workstation	Pick point	Teach	Move Here	
Pallet Type Stack		Pick lift height(mm)	- 200	+	
Pallet Safety	Sucker config	Max Waiting time(ms)	- 5000	+	
	Pox config	Length 117/D VI/mm)	- 420	the searce	
	Box comig	Length L2[TCP-4](mm)	- 215	+ X	Y-
		Height H[TCP-Z](mm)	- 280	+ 12 11	
Advance		Mass(kg)	- 24	+ The TCP is The sucker is parallel a the middle of the the middle of the the middle of the middle o	ind attached in the box
Self-Testing		Positive(Label)	TCP-X Positive	box	
System					
Log	Run Mode	2			

Figure 5.30 Configuration Interface of The Pick Point

Tips:

• When teaching the pick point, please note that the position of the suction cups should be placed so that the distance from the suction cups to the upper and lower (left and right) edges of the box are approximately the same, such as Figure 5.31



Figure 5.31 Schematic Diagram of Suction Cup Position

Pick lift Height Configuration

The purpose of setting the pick lift height is to avoid the interference of the baffle plate during the pickup process at the end of the robot by adjusting the pick lift height.

Click directly on the number to activate the keypad for input, or select "+" and "-" to adjust the lifting height (in millimeters) of the robot end to pick up the material. As shown in Figure 5.32:

Station	Pick	Pick Wait point	Teach)[Move Here	
Pick	Workstation	Pick point	Teach		Move Here	
Pallet Type Stack		Pick lift height(mm)	- 200	+]	
Pallet	Sucker config	Max Waiting time(ms)	- 5000	+		
		Manual	Pick		Release	
	Box config	Length L1[TCP-X](mm)	- 430	+	Y T	x
		Length L2[TCP-Y](mm)	- 215	+	н	Y+
		Height H[TCP-Z](mm)	- 280	+	L2 L1	-
Advance		Mass(kg)	- 24	+	The TCP is orthogonal to the	X+ The sucker is parallel and attached in
Self-Testing		Positive(Label)	TCP-X Positive	~	box	the middle of the box
System						
Log	Run Mode	e				

Figure 5.32 Configuration of the Pick Lift Height

Suction cup Parameter Configuration

The Maximum Vacuum Wait Time (ms) is the maximum amount of time that the robot end needs the suction cups to generate enough vacuum while sucking up the box. If sufficient vacuum is not generated within the specified time, a fault is reported.

The max waiting time can be determined according to the actual situation, and the suction cups can be operated manually by clicking on "Pick" or "Release". As shown in Figure 5.33



Figure 5.33 Suction Cup Configuration

Box Parameter Configuration

The box parameters (in millimeters) and the box mass (in kilograms) are adjusted according to the actual situation, where the length L1, length L2, and height H of the box are along the X-, Y-, and Z-axes of the TCP coordinates, respectively.

The box front face (labeling direction) is related to the later stack configuration. If accurate control of the box orientation (pattern side or label side) is required, correctly select the box front orientation (based on the positive and negative directions of the X and Y axes of the end TCP coordinate system) and ensure consistent orthogonality of the box orientation.

Station	Pick	Pick Wait point		Teach		Move Here	٠	
Pick	Workstation	Pick point		Teach		Move Here	٠	
Pallet Type Stack		Pick lift height(mm)	-	200	+			
Pallet	Sucker config	Max Waiting time(ms)	-	5000	+			
Safety		Manual		Pick		Release		
	Box config	Length L1[TCP-X](mm)	-	430	+] _{*•}		Х-
		Length L2[TCP-Y](mm)	-	215	+	X		Y+ Y-
		Height H[TCP-Z](mm)	-	280	+	12	11	
Advance		Mass(kg)	-	24	+	The TCP	is	X+ The sucker is parallel and attached in
Self-Testing		Positive(Label)	TCP	-X Positive	\vee	box	to the	the middle of the box
System								
Log	Run Mod	e						

Figure 5.34 Box Configuration

Tips:

• The suction cup tool coordinate system is orthogonal to the box, as shown in Figure 5.35



Figure 5.35 Coordinate System of Suction Cup Assembly

• As shown in Figure 5 .36, please select the front orientation of the box correctly according to the

following TCP coordinate system



Figure 5.36 Selection of the TCP Coordinate System for the Box Front Orientation

3.1.4 Pallet Type

Click on "Pallet Type" \rightarrow "Open" to access the configuration pop-up window for stacks and layers, as shown in the following figure.

Station Pick	Pallet type tool Pallet type tool	Open
Pallet Type		
Stack		
Pallet		
Safety		
Advance		
Self-Testing		
System		

Figure 5.37 Pallet Type Tool

Pallet Type Base Configuration

As shown in the figure below, it is possible to manually switch the configuration scheme of Pallet types and layers directly

	Pallet Type Layer Stack Config D1(mm) D1(mm) - D2(mm) - 1000 + D2(mm) -
	Pallet Type Config Pallet Generate Auto layout Current Type A Pallet Top margin(mm) - 0
	Bottom margin(mm) - 0 + Left margin(mm) - 0 +
Single Continuous	Right margin(mm) – 0 +

Figure 5.38 Schematic Diagram of Pallet Type and Layer Configuration Scheme

The parameters of the pallet can be adjusted according to the actual situation (in millimeters), where D1 and D2 are the side lengths of the pallet, as shown in the following figure.

D2(mm) - 1000 + of the second	D2
Pallet Type Config	
Pallet Generate Auto layout	
Current Type A Pallet	
Top margin(mm) - 0 +	
Bottom margin(mm) - 0 +	
Left margin(mm) - 0 +	
Right margin(mm) - 0 +	

Figure 5.39 Configuration of Stack

Note: The diagram below shows the side lengths of the stack



Figure 5.40 Schematic Diagram of the Side Lengths of the Pallet Pallet Generate can choose "Auto layout", which is explained in
	Pallet Type Layer	
	Stack Config	
	D1(mm) - 1000 -	
	D2(mm) - 1000 -	+ p1 - 0 p1
		D2 C2 D2
	Pallet Tune Config	
	Pallet Generate	Auto layout
	C	A Dallat
	Current Type	A Pallet V
	Top margin(mm)	- 0 +
	Bottom margin(mm)	- 0 +
	Left margin(mm)	- 0 +
	Right margin(mm)	- 0 +
Single Continuous		
Cancel		Confirm

Figure 5.41 Auto Layout Configuration

The stack configuration allows you to select between stack A and stack B by using the drop-down boxes and to plan the stacks according to the icons at the bottom left, as shown in the following figure

	Pallet Type Layer
	Stack Config
	D1(mm) - 1000 +
	D2(mm) - 1000 + D1
	DS DS DS
	Pallet Type Config
	Pallet Generate Auto layout
	Current Type A Pallet ^
	Top margin(mm)
	Bottom margin(mm) B Pallet
	Left margin(mm) - +
	Right margin(mm) - 0 +
Single Continuous	
Cancel	Confirm



Among the icons at the bottom of the left side, "Single/Continuous" determines whether or not the boxes are placed continuously on the layer, the four gray icons with arrows represent the four different box types with different frontal orientations, and "Clear" empty all the boxes placed on the layer. As shown in the figure below

	Pallet Type Layer
	Stack Config
	D1(mm) - 1000 +
	D2(mm) - 1000 + D1
	Pallet Type Config
	Pallet Generate Auto layout
	Current Type A Pallet ~
	Top margin(mm) – 0 +
	Bottom margin(mm) - 0 +
	Left margin(mm) – 0 +
	Right margin(mm) - 0 +
Single Continuous	
Cancel	Confirm

Figure 5.43 Bottom Icon

The upper, lower, left and right margins in the stack configuration are the reference boundary distances (in millimeters) between the box and the outer edge of the stack plate, with positive values being boundary inward expansion and negative values being boundary outward expansion. In the lower Figure 5 .44 the palletized plate configuration is shown as a solid line and the margin reference line is shown as a dashed line

	Pallet Type Layer
	Stack Config
	D1(mm) - 1000 +
	D2(mm) - 1000 + D
	D2 D2
	Pallet Type Config
	Pallet Generate Auto layout
	Current Type A Pallet ~
	Top margin(mm) - 0 +
	Bottom margin(mm) - 0 +
	Left margin(mm) - 0 +
	Right margin(mm) - 0 +
Single Continuous	
Cancel	Confirm

Figure 5.44 Configuration of the Stack Margins

In the layer configuration, it is possible to adjust the tolerance between layers, the number of layers, and the type of stack selected for each layer, as shown in Figure 5.45. When the configuration is complete, click "Confirm".

	Pallet Type	Layer				
	Layer Config	ance(mm)		-	0	+
	Layers Layer No. 7 6 5 4 3 2 1	A Pallet Type	B Pallet	Туре	1	+
Single Continuous						
Cancel					Confi	rm

Figure 5.45 Layer Configuration

Tips:

• The "Layer Tolerance" is a certain height reserved for the box when the robot end is placed on the box, a positive value is the clearance, a negative value will be pressed, please fine-tune according to the actual situation. Below is the diagram for a positive layer tolerance.



Figure 5.46 Layer Tolerance

Automatic Layout Configuration

After clicking on "Auto layout", you can select the type of stack, the alignment mode, the orientation of the front side and the maximum stack height according to the actual situation, as shown in Figure 5.47

	Pallet Type Layer	
	Stack Config	
	D1(mm) - 1000 +	
	D2(mm) - 1000 +	DI 6 DI
		D2 D2 D2
	Pallet Type Config	
	Pallet Generate	Auto layout
	Current Type	A Pallet 🔍
	Top margin(mm)	- 0 +
	Bottom margin(mm)	- 0 +
	Left margin(mm)	- 0 +
	Right margin(mm)	- 0 +
Single Continuous		
		Carlor
Cancel		Confirm

Figure 5.47 Auto Generate Layout

Among the types of stacks,

Cheessboard: The boxes are all placed horizontally or vertically;

Rotary-pattern: Place the box in a swingback fashion in circles;

Crosswise-pattern: Arrange the boxes in columns, vertically and horizontally.

In alignment mode,

Center: the boxes are gathered together and centered;

Stretch: The boxes are spread out with a certain distance between them.

In the frontal direction.

Uniform: the front orientation of the box labels are placed consistently, by column;

Outward: In circles, the front direction of the box label is placed outward.

In the maximum stack height setting,

Automatic: the accessibility check is carried out from the highest height, knowing that all boxes are accessible;

Customize: Start from the given height downwards to find the maximum height that meets the conditions.



Figure 5.48 Auto Layout Configuration Diagram

Tips:

- Automatic Layout uses the stack type selected for the base configuration as the configuration template, and stack B is a 90-degree clockwise alignment of stack A;
- The outer contours of stacks A and B are aligned.

Clicking on "Next" displays the result of the automatic Layout and shows below the number of layers to be selected, the maximum possible stack height and the number of boxes per stack.

In the generated result, the

Number of layers: the number of reachable layers calculated automatically based on automatic or customized heights;

Pallet height: the corresponding stack height is automatically updated when the number of layers is modified;

Boxes per pallet: automatically update the corresponding number of boxes when modifying the number of layers.

ult	-	-	-	•	1	-									
	-	-	-	-	-	-	1	1	1	1	4	_	4	1	_
	-	-	-	-	-	-	►	•	►	•		►	⇒		•
	1	1	1	-	1	-	•			•		•			•
	-	-	-	-	1	1	-1	-1	-1	-1	-1	-	-1	-	-
	-	-	-	-	1	-	•	►	•	•	►	►	►		•
	1						•	•	•	•	•	►	•	•	•
	-	-	-	-	-	-	•	•	•	•	•	•	•	•	•
			Туј	pe A					_	т	ype B	_	-		
	layers	-	- 2	0 +	(Max	20 layer)									
	Pallet Heig	ht 20	00mm												
	Boxes per p	allet 10	80												
														_	
ancel	Р	rev													Con

Figure 5.49 Generated Results of Automatic Layout

3.1.5 Stack configuration

Click on "Stack" and select "ON/OFF" to determine if the pallet configuration is enabled or disabled. If it is not enabled, the pallet will not place any boxes when palletizing. As shown in Figure 5 .50

Station	Left Pallet	Enabled	ON	
Pick	Right Pallet	Enabled	ON	
Pallet Type				
Stack				
Pallet				
Safety				

Figure 5.50 Stack Configuration

3.1.6 Palletizing Configuration

In palletizing, the transition point is the point of attitude position that needs to avoid obstacles and thus be set artificially during the process from the pickup waiting point to the subsequent placing point after the end of the robot picks up the box, i.e., the trajectory flow is as follows:

Pick-up wait point \rightarrow Pick-Lifting point \rightarrow Waypoint 1 (optional) \rightarrow Waypoint 2 (optional) \rightarrow Waypoint 3 (optional) \rightarrow Placet points (automatically generated)

Note: Be sure to teach the transition point in the zeroed state of the elevator.

Waypoint Teach

1 Select "Left/Right Pallet" \rightarrow "Waypoint 1/2/3" \rightarrow "Teach" to enter the transition point teaching pop-up window, as shown below

Station	Waypoint				_	Enable	Lift-Linkage	Pose-Linkage
Pick	Left Pallet	Waypoint1	Teach	Move Here	•	ON	ON	ON
Pallet Type		Waypoint2	Teach	Move Here		ON	ON	ON
Stack		Waypoint3	Teach	Move Here	۰	OFF	OFF	OFF
Pallet	Right Pallet	Waypoint1	Teach	Move Here	۲	ON	ON	ON
Cafety		Waypoint2	Teach	Move Here	۲	OFF	OFF	OFF
Salety		Waypoint3	Teach	Move Here	•	OFF	OFF	OFF
	Attention: 1. Please teach 2. The waypoin GENERATED) 3. Enable: actin automatically. Lift Configura	the waypoint in the at sequence: Pick-W we or not the waypo adjust according to	e home position of the lil ait point -> Pick-Lifting p int; Lift-Linkage: the poir the placement point	t column oint -> Waypoint1 -> It will move up with	• Waypo	ng column; Pc	int3 -> place p se-Linkage: th	oints(AUTO e pose will
Advance	Connect	Status 💿		Height	1	5mm		
Self-Testing	Min Heig	ht 15n	nm	Jog				
System	Max Heig	ht 700	mm				+	Home

Figure 5.51 Illustrative Diagram of Waypoint

2 Select "ON/OF" to determine the Waypoint' s enable, lift linkage, and attitude linkage. Among them, "Enable" represents whether the Waypoint is activated or not, if not, it will not pass through this point; "Lift Linkage" represents whether the robot end will be lifted automatically with the elevator when it passes through this point; "Pose Linkage" represents whether the robot end will follow the placed box when it passes through this point or not. "Posture linkage" represents whether the robot end will automatically adjust its posture after passing the point based on the placed box. As shown in the following figure

Station	Waypoint						Enable	Lift-Linkag	e Pose-Linkage
Pick	Left Pallet	Waypoin	tl	Teach	Move Here	۲	ON	ON	ON
Pallet Type		Waypoin	it2	Teach	Move Here	۲	ON	ON	ON
Stack		Waypoin	it3	Teach	Move Here	•	OFF	OFF	OFF
Pallet	Right Pallet	Waypoin	tl	Teach	Move Here	۲	ON	ON	ON
Safety		Waypoin	it2	Teach	Move Here	•	OFF	OFF	OFF
Salety		Waypoin	t3	Teach	Move Here	•	OFF	OFF	OFF
	2. The waypoir GENERATED	nt sequence	Pick-Wait point	-> Pick-Lifting po	oint -> Waypoint1 ->	Waypo	int2 -> Waypo	oint3 -> place	points(AUTO
	2. The waypoin GENERATED) 3. Enable: activ automatically Lift Configura	nt sequence we or not the adjust accor	e waypoint; Lift-I	-> Pick-Lifting po inkage: the point ement point	t will move up with	Waypo	int2 -> Waypo	oint3 -> place ose-Linkage: t	points(AUTO he pose will
Advance	2. The waypoin GENERATED) 3. Enable: activ automatically Lift Configura Connect	nt sequence we or not the adjust accor ition Status	 Pick-Wait point e waypoint; Lift-i rding to the place 	-> PickeLifting po inkage: the point	t will move up with	Waypo the lifti 1	int2 -> Waypo ng column; Po 5mm	oint3 -> place	points(AUTO he pose will
Advance Self-Testing	2. The waypoin GENERATED) 3. Enable: activ automatically Lift Configura Connect Min Heig	nt sequence we or not the adjust accor ition Status ht	 Pick-Wait point e waypoint; Lift-inding to the place 15mm 	 PickeLifting pc inkage: the point 	t will move up with Height	Waypo the liftir 1:	int2 -> Waype ng column; Pe 5mm	oint3 -> place	points(AUTO he pose will
Advance Self-Testing System	2. The waypoin GENERATED) 3. Enable: activ automatically Lift Configura Connect Min Heig Max Heig	nt sequence we or not the adjust accor t tion Status ht	Pick-Wait point e waypoint; Lift- rding to the plac	-> PickeLifting po .inkage: the point ement point	t will move up with Height	Waypo the liftir 15	int2 -> Waype ng column; Po 5mm	oint3 -> place ose-Linkage: t	points(AUTO he pose will Home

Figure 5.52 Illustrative Diagram of Waypoint

Tips:

• Figure 5 .53 is a schematic diagram of the "lift linkage". The left subfigure shows the machine at the transition point. If the lift linkage is not turned on, the end of the robot does not rise when the elevator rises (i.e., as shown in the middle subfigure), but if it is turned on, the end of the robot rises when the elevator rises (i.e., as shown in the right subfigure).



Figure 5 .54 shows the schematic diagram of "pose linkage". The left subfigure shows the teaching state of the machine at the transition point. If the linkage is not turned on, the robot end will not automatically adjust its posture after the placement point when passing through the transition point (i.e., as shown

in the middle subfigure), and if the attitude linkage is turned on, the robot end will automatically adjust its posture after the placement point when passing through the transition point (i.e., as shown in the right subfigure).



Figure 5.54 Pose Linkage

Lift Configuration

The current connection status of the elevator, the minimum/maximum height it can reach and the current height are displayed here, and the configuration of the elevator can be changed by manual adjustment. In this case, "Home" is used to return the elevator to the zero position. As shown in Figure 5.55

Station	Waypoint						Lindute	Lite-Linkage	- Pose Linkag
Pick	Left Pallet	Waypoin	t1	Teach	Move Here	۲	ON	ON	ON
llet Type		Waypoin	t2	Teach	Move Here	•	ON	ON	ON
Stock		Waypoin	t3	Teach	Move Here	•	OFF	OFF	OFF
Dallat	Right Pallet	Waypoin	t1	Teach	Move Here	•	ON	ON	ON
Fallet		Waypoin	12	Teach	Move Here	•	OFF	OFF	OFF
salety		Waypoin	t3	Teach	Move Here	•	OFF	OFF	OFF
	Attention: 1. Please teach 2. The waypoin GENERATED) 3. Enable: acti- automatically.	the waypoint sequence	int in the home p : Pick-Wait point : waypoint; Lift-L	osition of the lift -> Pick-Lifting po inkage: the point	: column bint -> Waypoint1 -> t will move up with	Waypo the lifti	iint2 -> Waypo ng column; Po	oint3 -> place p ose-Linkage: tl	ooints(AUTO he pose will
	Attention: 1. Please teach 2. The waypoin GENERATED) 3. Enable: activ automatically Lift Configura	the waypoint sequence we or not the adjust accor	int in the home p : Pick-Wait point : waypoint; Lift-L rding to the place	osition of the lift -> Pick-Lifting po inkage: the point ment point	: column pint -> Waypoint1 -> t will move up with	Waypo the lifti	iint2 -> Waypo ng column; Pi	oint3 -> place p ose-Linkage: tl	ooints(AUTO he pose will
dvance	Attention: 1. Please teach 2. The waypoin GENERATED) 3. Enable: activ automatically Lift Configura Connect	the waypoint sequence we or not the adjust accornition status	int in the home p : Pick-Wait point : waypoint; Lift-L iding to the place	osition of the lift -> Pick-Lifting po inkage: the poin ment point	: column int -> Waypoint1 -> t will move up with Height	Waypo the lifti	iint2 -> Waypo ng column; Po 5mm	oint3 -> place p ose-Linikage: tl	ooints(AUTO he pose will
dvance If-Testing	Attention: 1. Please teach 2. The waypoin GENERATED) 3. Enable: activity automatically Lift Configura Connect Min Heig	n the waypoint sequence we or not the adjust accor ition Status ht	Int in the home p Pick-Wait point e waypoint; Lift-L ding to the place	osition of the lift -> Pick-Lifting point inkage: the point ement point	: column int -> Waypoint1 -> t will move up with Height Jog	Waypo the lifti	iint2 → Waypo ng column; Pi 5mm	oint3 -> place p	ooints(AUTO he pose will
Advance elf-Testing System	Attention: 1. Please teach 2. The waypoin GENERATED) 3. Enable: actii automatically Lift Configura Connect Min Heig Max Heig	the waypoint sequence we or not the adjust accor ition Status ht	Int in the home p Pick-Wait point waypoint; Lift-L ding to the place	osition of the lift -> Pick-Lifting po inkage: the point iment point	: column int -> Waypoint1 -> t will move up with Height Jog	Waypo the lifti	int2 -> Waypo ng column; Pi 5mm	oint3 -> place p ose-Linkage: tl	booints(AUTO he pose will Home

Figure 5.55 Lift Table Configuration Diagram

3.1.7 Safety Configuration

Currently undeveloped features

Station Pick	Safety Sensor	Sensor Type	Lidar Sensor		
Pallet Type					
Stack					
Pallet					
Safety					
Advance Self-Testing System					
Log	Run Mode	e			

Figure 5.56 Safety Configuration

3.2 Advanced Configuration

3.2.1 Pallet Coordinate Offset Configuration

In order to cope with the problem that the ground on which the pallet is placed is not flat enough, the problem of the box placed at the end of the robot can be solved by setting the offset of the pallet's coordinate system. As shown in the figure below

Station	Pallet Coordi	nate offset								
Pick	Left Pallet	X(mm)	-	0	+	RX(")	-	0	+	
Pallet Type		Y(mm)	-	0	+	RY(*)	-	0	+	
Stack		Z(mm)	-	0	+	RZ(°)	-	0	+	
Pallet	Right Pallet	X(mm)	-	0	+	RX(°)	-	0	+	2 the
Safety		Y(mm)	-	0	+	RY(°)	-	0	+	
		Z(mm)	-	0	+	RZ(°)	-	0	+	
	Lift Configura	ation								
	Lift Configura	tion t(mm)	-	500	+	The	lift will be	e lifting w	hen palk	et height is higher than the value
Advance	Lift Configura	tion t(mm)	-	500	+	The	lift will be	e lifting w	hen palk	et height is higher than the value
Advance Self-Testing	Lift Configura	tion t(mm)	-	500	+	The	üft will be	e lifting w	hen palk	et height is higher than the value

Figure 5.57 Configuration of the Pallet Coordinate System

Tips:

• The left and right stack coordinate system is shown below



Figure 5.58 Coordinate System of the Left and Right Stack Pallets

3.2.2 Lift Configuration

According to the actual situation by setting the "Auto Lift Height(mm)", to make the box can be automatically lifted when the position of the code is higher than the height. As shown in the figure below

Station	Pallet Coordin	nate offset									-	-	
Pick	Left Pallet	X(mm)	-	0	+	RX(°)	-	0	+	3		1	
allet Type		Y(mm)	-	0	+	RY(*)	-	0	+	1			
Stack		Z(mm)	-	0	+	RZ(")	-	0	+		$\overline{}$		
Pallet	Right Pallet	X(mm)	-	0	+	RX(°)	-	0	+		t."		
Safety		Y(mm)	-	0	+	RY(*)	-	0	+				
		Z(mm)	-	0	+	RZ(")	-	0	+		~		
	Lift Configura	tion	-	500	+	The	lift will b	e lifting w	hen pall	et height is hi	gher than	the value	
	Lift Configura	tion t(mm)	-	500	+	The	lift will b	e lifting w	hen pall	et height is hi	gher than	the value	
Advance	Lift Configura	tion t(mm)	-	500	+	The	lift will b	e lifting w	hen pall	et height is hi	gher than	the value	
Advance Gelf-Testing	Lift Configura	tion t(mm)	-	500	+] The	lift will b	e lifting w	hen pall	et height is hi	gher than	the value	

Figure 5.59 Lift Configuration

3.3 Self-Testing

3.3.1 Reachability Check

The result of the self-test will be displayed here, and if an abnormality is detected (as in Figure 5 .60), the X stack X layer is displayed, and the drop-down box and the layer on the right can be used to view the exact location of the anomaly box. If no abnormality is detected (as shown in Figure 5 .61), the "Abnormal Results" display will be empty.

Station	Reachability Check	Check	•			
Pick		Abnormal Results	左垛 6层	<u>^</u>		
Pallet Type			左垛 1层	-		
Stack			左垛 4层			
Pallet			左垛 5层			
Safaty			左垛 6层			
Salety			左垛 7层			
			右垛 1层			
	Circual Status	Dick Signal	右垛 4层			
	Signal Status	Pick Signal	右垛 5层			
		Sucker-Pick	۰			
		Left-Stack Ready	٠	Right-Stack Ready	٠	
		Left-Stack Full	٠	Right-Stack Full	٠	
Advance		Left-Clear	٠	Right-Clear	٠	
Self-Testing						
System						
Log	Run Mode					

Figure 5.60 Reachability Check (anomaly)

Station Pick Pallet Type Stack Pallet Safety	Reachability Check	Check Abnormal Results	Abnormal Results		
	Signal Status	Pick Signal Sucker-Pick	•		
		Left-Stack Ready	۲	Right-Stack Ready	•
		Left-Stack Full	۰	Right-Stack Full	•
Advance		Left-Clear	٠	Right-Clear	•
Self-Testing					
System					
Log	Run Mode				

Figure 5.61 Reachability Check (normal)

3.3.2 Signal Status

The status signals of the pickups, sucktion cup and pallets are displayed here as shown below

Station Pick Pallet Type Stack Pallet Safety	Reachability Check	Check Abnormal Results	Abnormal Results			
	Signal Status	Pick Signal	۲			
		Sucker-Pick	٠			
		Left-Stack Ready	•	Right-Stack Ready	۰	
		Left-Stack Full	•	Right-Stack Full	•	
Advance		Left-Clear	٠	Right-Clear	٠	
Self-Testing						
System						
Log	Run Mode					

Figure 5.62 Signal Status

3.4 System Configuration

3.4.1 Whole Station Configuration

Current Configuration

Displays the current system configuration. The imported configuration is displayed if an import has been performed, otherwise it is displayed as default. As shown in the following

Figure 5.63

Station	Station Config	Current Config	default
Pick		Reset system config	Reset
Pallet Type		Import config	Import
Stack		Export config	Export
Pallet	System password	Reset Password	Reset
Safety			
Advance			
Self-Testing			
System			
Log	Rup Mode		
Log	Run Mode		

Figure 5.63 Current Configuration

Reset System Configuration

If you need to clear the system configuration, click "Reset" \rightarrow "OK" to clear all the data, as shown in the figure below.

Station	Station Config	Current Config	default
Pick		Reset system config	Reset
Pallet Type		Import config	Import
Stack		Export config	Export
Pallet	System password	Reset Password	Reset
Surety			
Advance			
Self-Testing			
System			
Log	Run Mode		

Figure 5.64 Reset System Configuration1

Station	Station Config	Current Config	default
Pick		Reset system config	Reset
Pallet Type		Import config	Import
Stack		Export config	Export
Pallet	System password	Reset Password	Reset
Safety			
			Warning [©] ×
		Reset will	clear all data, Confirm reset?
		Ca	ancel
Advance			
Self-Testing			
System			
Log	Run Mode		

Figure 5.65 Reset System Configuration2

Import Configuration

You can import the configuration from system storage, removable storage or USB, click "Import" and select the place where you want to import the configuration. As shown in the figure below

Station	Station Config	Current Config	default
Pick		Reset system config	Reset
Pallet Type		Import config	Import
Stack		Export config	Export
Pallet	System password	Reset Password	Reset
Safety			
Advance			
Self-Testing			
System			
Log	Run Mode		

Figure 5.66 Import Configuration Diagram 1

Station	Station Config	Current Config	default			
Pick		Reset system config	Reset			
Palle = Ext	ternal					
St dis	ik1	Name		Туре	mtime	Size
Pa		∎ fold1		Folder	2023-10-31 9:34:25	4 KB
6.		■ folder2		Folder	2023-10-31 9:34:30	4 KB
24		images		Folder	2023-10-31 9:34:34	4 KB
		TEST.psproject		File	2023-12-5 9:37:45	70 KB
Adv Self-1					Cancel	117F
Log	Run Mode					

Figure 5.67 Import Configuration Diagram 2

Export Configuration

You can export the configuration from the system storage, removable storage or USB, click "Export" and select the place where you want to export the configuration, please refer to "Importing Configuration" for the way of exporting files. Please refer to "Import Configuration" for the way of exporting file.

Station	Station Config	Current Config	default
Pick		Reset system config	Reset
Pallet Type		Import config	Import
Stack		Eventeralia	(Trank
Pallet		Export coning	Export
Safety	System password	Reset Password	Reset
Advance			
Self-Testing			
System			
Log	Run Mode		

Figure 5.68 Exporting the Configuration Diagram

3.4.2 System Password

When you need to reset your password, click "Reset" and enter the original password first, then enter the new password you need to change and enter the new password again and click "Confirm". As shown in the picture below

PalletStation

64 - 1 ²	Station Confin	Current Confe	de facilit		
Station	Station Config	current coning	default		
Pick		Reset system config	Reset		
Pallet Type		Import config	Import		
Stack		Export config	Export		
Pallet	System password	Reset Password	Reset	1	
Safety				J	
Advance					
Self-Testing					
Surtem					
System					
Log	Rup Mode				
Log	Run Mode				

Figure 5.69 Reset Password 1

Station	Station Config	Current Config	default	
Pick		Reset system config	Reset	
Pallet Type		Im	Modify password	×
Stack		Ext old		
Pallet	System password	Re: Password		
Safety		Password Confirm		
		Password	Cancel Confirm	
		_		
Advance				
Self-Testing				
System				
Log	Run Mode			

Figure 5.70 Reset Password 2

CHAPTER FOUR

PALLETSTUDIO OPERATION PROCESS DESCRIPTION

The machine system operates in six operating states, namely, initialization state, standby state, fault state, reset state, pause state and running state.

4.1 Initialization State

In the initialization state, the tricolor light blinks yellow and waits for the system to boot up and complete the initialization, as shown in Figure 6.71



Figure 6.71 Initialization Status Interface

4.2 Standby Mode

After initialization is completed, the system is in standby mode. At this time, the tricolor light blinks yellow and the interface switches to the standby interface. The upper level of the standby interface is the status display area and the lower level is the operation area. As shown in Figure 6 .72

Left Pa	llet	Dash	board	Right Pallet		
Enabled Running Status Current Layer Current Box Clear	Standby 1/7 0/378 Clear Stack	Current Settings: Robot Mode: Mar Star	default nual	Enabled Running Status Current Layer Current Box Clear	• Standby 1/0 0/0 Clear Stack	
Total box Total pallet Average Beat Average time Reset Count	0 0 s/pcs 0 s/pallet Reset	Total box Total pallet Beat-pcs Beat-pallet Reset Count	0 0 pcs/hour 0 pallet/hour Reset	Total box Total pallet Average Beat Average time Reset Count	0 0 s/pcs 0 s/pallet Reset	
PowerOff	Status Lo	og Config		Left Start	Right Start	



4.2.1 Status Display Area

Take the left stack status area as an example:

• "Enabled Status" shows whether the left pallet is currently enabled or not;

"Running status" This is an indication of the operational status of the left palletizer;

"Current Layer" is the layer of boxes currently being palletized on the left palletizer;

"Current box" i.e. the number of boxes being palletized in the current layer;,

"Clear Stack" means that once the left pallet has been palletized and actually cleared, it is necessary to click on

"Clear" to indicate that the left pallet is ready to start a new round of palletizing.

• Overview of the entire workstation:

"Total box" indicates the number of cases that have been palletized so far;

"Total pallet" is the number of stacks that have been palletized so far;

"Average beat" is the average time (in seconds per box) spent on each box in the current palletizing process;

"Average time " This is the average time spent per pallet (seconds/pallet) in the current palletizing process;

"Reset Count" means to clear and reset all the current data of the left pallet board.

In the status area of the "Dashboard", the "Current settings", "Robot mode" and "System status" are displayed. "The current configuration, robot mode, and system operating status are displayed in the status area of the station overview. The "Robot Mode" includes manual and automatic modes. The information displayed in this status area, such as the "Accumulated Case Count," is the average of the left and right stacks.

Refer to the left stack status area for the right stack status area.

4.2.2 Operating Area

If you click "Poweroff" \rightarrow "OK" in standby mode, the system returns to the initialized state.

Left Pa	allet	Dashl	board		Right F	Pallet
Enabled Running Status Current Layer Current Box	• Standby 1/7 0/378	Current Settings: Robot Mode: Man Star	default ual dby		Enabled Running Status Current Layer Current Box	\$ Standby 1/0 0/0
Clear Total box	Clear Stack	Confirm p	Oweroff?	×	Clear Total box	Clear Stack 0
Average Beat Average time Reset Count	0 s/pcs 0 s/pallet Reset	Beat-pcs Beat-pallet Reset Count	0 pcs/hour 0 pallet/hour Reset		Average Beat Average time Reset Count	0 s/pcs 0 s/pallet Reset
PowerOff	Status Lo	og Config			Left Start	Right Start

Figure 6.73 the Interface of PowerOff 1



Figure 6.74 Interface in Powering Off 2

If you click on "Status" in standby mode, the current status signals of the picker, suction cups and palletizer are displayed. As shown in the figure below

Pick Signal	•		
Sucker-Pick	•		
Left-Stack Ready		Right-Stack Ready	
Left-Stack Full	•	Right-Stack Full	•
Left-Clear	•	Right-Clear	•
			_
			Back

Figure 6.75 Interface for Status Information

If you click "Log" in standby mode and select the date, you can view the log of the day's operation. Click "Export" to export the logs of all dates to the local area. As shown in the figure below

L						A .
	23-12-05-14:44:37	info	码垛工作站初始化结果: true			
	23-12-05-14:44:37	info	软件已经初始化了,无需再次初始化			
	23-12-05-14:43:12	info	set_teach_pendant:true, task finish state:4			
	23-12-05-14:43:11	warning	on_message port 7401 recv a error format message:handshake		- 1	
	23-12-05-14:42:34	info	执行关机(shutdown)命令后的结果为: 6			
	23-12-05-14:42:30	info	机器人下使能下电成功。			
	23-12-05-14:42:30	info	机器人power_off 结果:4			
	23-12-05-14:42:30	info	机器人disable 結果:4			
	23-12-05-14:42:06	info	码垛工作站初始化结果: true			
	23-12-05-14:42:06	info	软件已经初始化了,无需再次初始化			
	23-12-05-14:42:05	info	set_teach_pendant:true, task finish state:4			
	23-12-05-14:42:04	warning	on_message port 7401 recv a error format message:handshake			
	23-12-05-14:41:55	info	set_teach_pendant:true, task finish state:4			
	23-12-05-14:41:54	warning	on_message port 7401 recv a error format message:handshake			
	23-12-05-14:17:38	info	SwitchModel model:1 end.			
	23-12-05-14:17:34	info	码垛工作站初始化结果: true			
	23-12-05-14:17:34	info	软件已经初始化了,无需再次初始化			
	23-12-05-14:17:34	info	set_teach_pendant:true, task finish state:4			
			1/5611		_	
	Drov	Next	E 2012 13 05	ort Ra	ck	
	Prev	Next	Expo	Ба	CK	

Figure 6.76 Interface of the Operation Log

If you click "Config "in standby mode, enter "Verify Password" and refer to Chapter 4 for instructions. As shown in the figure below

Left Pallet		Dashboard		Right Pallet	
Enabled Running Status Current Layer Current Box Clear	Standby 1/7 0/378 Clear Stack	Current Settings: Robot Mode: Man Star	default ual dby	Enabled Running Status Current Layer Current Box Clear	Standby 1/0 0/0 Clear Stack
Total box Total pallet Average Beat Average time Reset Count	0 0 s/pcs 0 s/pallet Reset	Total box Total pallet Beat-pcs Beat-pallet Reset Count	0 0 pcs/hour 0 pallet/hour Reset	Total box Total pallet Average Beat Average time Reset Count	0 0 s/pcs 0 s/pallet Reset
PowerOff	Status	og Config		Left Start	Right Start

Figure 6.77 Interface of the Configuration Mode

L	eft F	Pallet			Da	shbo	bard		F	Right P	allet
Enabled Running St Current La Current Bo Clear	tatus yer ix		Standby 1/7 0/378 var Stack	Cun Rob	Current Settings: default Robot Mode: Manual Standby				Enablec Running Current Current Clear	l Status Layer Box	• Standby 1/0 0/0 Clear Stack
Total box				Tota					Total bo		
Please verify th	ne passi	word	0	Iota	al ballet			0	lotal ba	uet	0
1	2	# 3	\$ 4	% 5	^ 6	* 7	8	9	0	:	Esc
q	w	e	r	t	у	u	i.	0	р	î i	i V
	a	s	d	f	g	h	j	k	t ;	i i	i i
Shift	:	z	x	c \	/	b	n	m	< >	?	←
										>	ок

Figure 6.78 Entering the Authentication Password

4.3 Reset State

In standby mode, clicking on "Left/Right Start" will switch to the reset state, as shown in Figure 6 .79 below.

Left Pallet		Dash	board	Right Pallet		
Enabled Running Status Current Layer Current Box Clear	Standby 1/7 0/378 Clear Stack	Current Settings: Robot Mode: Man Star	default iual ndby	Enabled Running Status Current Layer Current Box Clear	Standby 1/0 0/0 Clear Stack	
Total box Total pallet Average Beat Average time Reset Count	0 0 s/pcs 0 s/pallet Reset	Total box Total pallet Beat-pcs Beat-pallet Reset Count	0 0 pcs/hour 0 pallet/hour Reset	Total box Total pallet Average Beat Average time Reset Count	0 0 s/pcs 0 s/pallet Reset	
PowerOff	Status Lo	og Config		Left Start	Right Start	

Figure 6.79 Reset State

As shown in the following Figure 6 .80, the lower figure shows the state of the robot when it is not reset

1/3 Restore robot state								
Robot state	Sucker State	Robot pose	Lift state					
Power off Please ensure the robot state is Ready	Open	Not Home Position, pay attention to avoid obstacles, and press Home button, Hit the eStop in case of emergency	Not Home Move Lift to Home position Height:-3.267					
Restart Back	Release	Teach Home	Home					

Figure 6.80 State of the Robot When it is not Reset

Tips:

- Robot status: Click "Restart", the status will be normalized after the robot is powered on.
- Suction cup status: Click "Release", the status will return to normal after the vacuum is released from the suction cup.
- Robot pose: first click "teach" to ensure that the robot can avoid obstacles when returning to the initial position, and then click "press and hold to return to zero" to make the robot return to the initial position (in case of emergency, please press the emergency stop), after the robot returns to the initial position, the state returns to normal.
- Lift state: under the premise of ensuring that the robot can avoid obstacles, the state of normalization after teaching the lift to return to the zero position

As you can see below, the lower robot is recovered

Robot state	Sucker State	Robot pose	Lift state
Enabled	Closed	Home	Home
Please ensure the obot state is Ready	Please ensure the box in sucker is Released	Move robot to Home Position, pay attention to avoid obstacles, and press Home button, Hit the eStop in case of emergency	Move Lift to Home position Height:15
Restart	Release	Teach Home	Home

Figure 6.81 Robot State Reset Complete

As shown in the Figure 6.82 below, check that the current actual left pallet and layer number matches the illustration on the left. If not, please reset according to the actual situation:

After the manual handling box is aligned, click "Next";

Alternatively, empty the palletized boxes and click on "Clear" to manual depalletization, then "Next"

2/3 Check Left-Pallet							
Current Layer 1/0 Current Box 0/0	Check whether the current actual pallet and number of layers match the illustration If match, Click Next If NOT match, Perform any of the following reset methods: Method 1: Handle the box manually to keep them matching with the illustration, Click Next Method 2: Clear all boxes on the stack and Click Clear, And click Next						
Back Prev	Clear						

Figure 6.82 Checking the Left Stack Status During Reset

As shown in the following Figure 6 .83, check whether the current actual right pallet and number of layers match the figure on the left. If not, refer to the same procedure for the left pallet. Click on "Continue" after palletizing is complete.



Figure 6.83 Checking the Right Stack Status During Reset

4.4 Operational State

If the reset is completed in the standby state, the system enters the running state. At this time, the three colors are green and bright (blinking for full stacks, and always bright for unstacked stacks), and the interface switches to the running interface. At the same time, the system will continue to check whether the necessary conditions for the current operation are met, and if a fault occurs, it will switch to the fault state, and clicking "Stop" will switch to standby. As shown in Figure 6.84

Left Pa	allet	Dashboard		Right Pallet		
Enabled Running Status Current Layer Current Box Clear	Palletizing 1/7 0/378 Clear Stack	Current Settings: default Robot Mode: Manual Running		Enabled Running Status Current Layer Current Box Clear	Standby 1/0 0/0 Clear Stack	
Total box Total pallet	0	Total box Total pallet	0	Total box Total pallet	0	
Average Beat Average time Reset Count	0 s/pallet Reset	Beat-pcs Beat-pallet Reset Count	0 pcs/hour 0 pallet/hour Reset	Average Beat Average time Reset Count	0 s/pcs 0 s/pallet Reset	
PowerOff	Status Lo	og	Stop		Pause	

Figure 6.84 Running Status Screen

4.5 Paused State

If you click "Pause" in the running state, the system will enter the pause state. At this time, the three-color light flashes green and the interface switches to the pause interface. As shown in the Figure 6.85 below

After clicking "Continue", the system returns to the running state, and clicking "Stop" switches to standby.

Left Pallet		Dashboard		Right Pallet	
Enabled Running Status Current Layer Current Box Clear	Standby 1/0 0/0 Clear Stack	Current Settings: Robot Mode: Mar Pau	default nual	Enabled Running Status Current Layer Current Box Clear	Palletizing 1/5 0/6 Clear Stack
Total box Total pallet Average Beat Average time Reset Count	0 0 0 s/pcs 0 s/pallet Reset	Total box Total pallet Beat-pcs Beat-pallet Reset Count	0 0 pcs/hour 0 pallet/hour Reset	Total box Total pallet Average Beat Average time Reset Count	0 0 s/pcs 0 s/pallet Reset
PowerOff	Status	og Stop	Resume		

Figure 6.85 Interface of the Paused State

4.6 Error State

If an abnormal condition is detected in the standby state, or in the pause/run state, the system changes to the fault state if there is an abnormal safety sensor or an emergency stop. At this time, the tricolor light flashes red and the interface switches to the fault interface. As shown in Figure 6.86

Click "Resume" to return to the running state after confirming that the high-priority faults have been resolved.

If you click "Stop" in the faulty state, it returns to the standby state.

If you select "Restore" in the fault state, the system enters the reset state. After confirming that the reset is completed, the system returns to the operation state.
Left Pallet		Dashboard		Right Pallet	
Enabled Running Status Current Layer Current Box	• Standby 7/8 48/64	Current Settings: default Robot Mode: Manual		Enabled Running Status Current Layer Current Box	• Standby 1/0 0/0
Clear	Clear Stack	V	iew	Clear	Clear Stack
Total box	48	Total box	48	Total box	0
Total pallet	0	Total pallet	0	Total pallet	0
Average Beat	14 s/pcs	Beat-pcs	251 pcs/hour	Average Beat	0 s/pcs
Average time	0 s/pallet	Beat-pallet	0 pallet/hour	Average time	0 s/pallet
Reset Count	Reset	Reset Count	Reset	Reset Count	Reset
PowerOff	Status L	og	Resume		Restore

Figure 6.86 Interface of Errort Status

CHAPTER FIVE

EXCEPTION HANDLING

Summarize problems in the use of palletizing process kits and provide solutions to related problems.

NO.	abnormal phe- nomenon	reason	method settle an issue	note
1	I got a "suck time- out" error when I picked up the box.	 Higher set- ting of suc- tion cup vacuum de- tection switch Vacuum waiting time setting is short, the vacuum degree is not reached during the waiting time There are sealing, problems with suction cups air circuits, etc. Com- pressed air does not meet the require- ments 	 Adjust the suction cup vacuum detection switch Adjust the vacuum waiting time in the suction cup and Check whether there is leakage air circuit Check whether the compressed air meets the requirements 	
2	Frequent collision detection during palletizing	 Inappropriate load settings Collision detection nsitivity is set too high 	 Detect whether the weight setting of the box is correct or not Decrease the collision detection sensitiv- ity on the robot page 	
3	Large deviation when the box is placed for- ward and backward	The suction cup is not in the center of the box when picking up the ma- terial	Check and reset pickup point locations	
4	Robot does not move at the pickup wait	 Failure of the pickup detection photo- electric switch The pickup detection 	 Check for failure of the pickup detection wide switch Check the detection 	
72		switch is far away from the pickup	of Ghapter information tection photoelectric	ception Handling

position and be switch