



Eight-axis Cantilever Intelligent Welding Workstation

Technical Agreement

**SHAANXI JINGTAI COOPERATION LASER Technology CO.,
LTD.**

August 2023





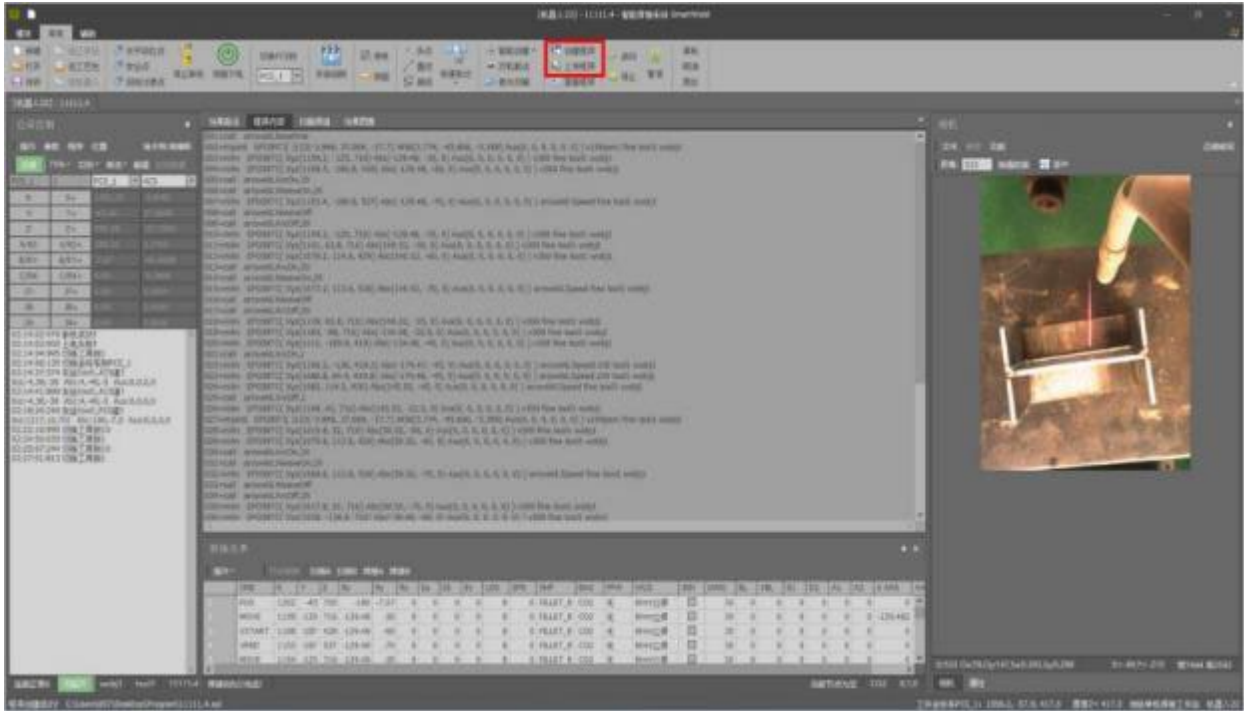
Contents

1. Operating system	4
1.1 System interface.....	4
1.2 Function overview	5
2. Project Scheme	7
2.1 Product type	7
2.2 Working environment and user preparation	8
2.3 Overall layout	9
2.4 Equipment list.....	10
2.5 Equipment configuration	12
2.6 Equipment energy consumption	23
3. Quality control	24
3.1 Control in design stage	24
3.2 Quality control in production stage	24
3.3 Quality control of installation and commissioning.....	25
3.4 Equipment quality requirements in use stage	25
4. Project team.....	27
4.1 Duty responsibilities of project manager.....	27
4.2 Duty responsibilities of technical manager.....	27
4.3 Regular work meeting.....	28
5. Plan project implementation	29
5.1 Regulations on the management of safe and civilized construction sites.....	30
6. Consumable Inspection List.....	32
7. Available Information, Tools, and Accessories.....	34
8.1 Training stage and time	35
8.3 Main training contents	35
9. Acceptance and After-sales Service	36
9.1 Equipment warranty.....	36
9.2 Equipment acceptance and after-sales service.....	36

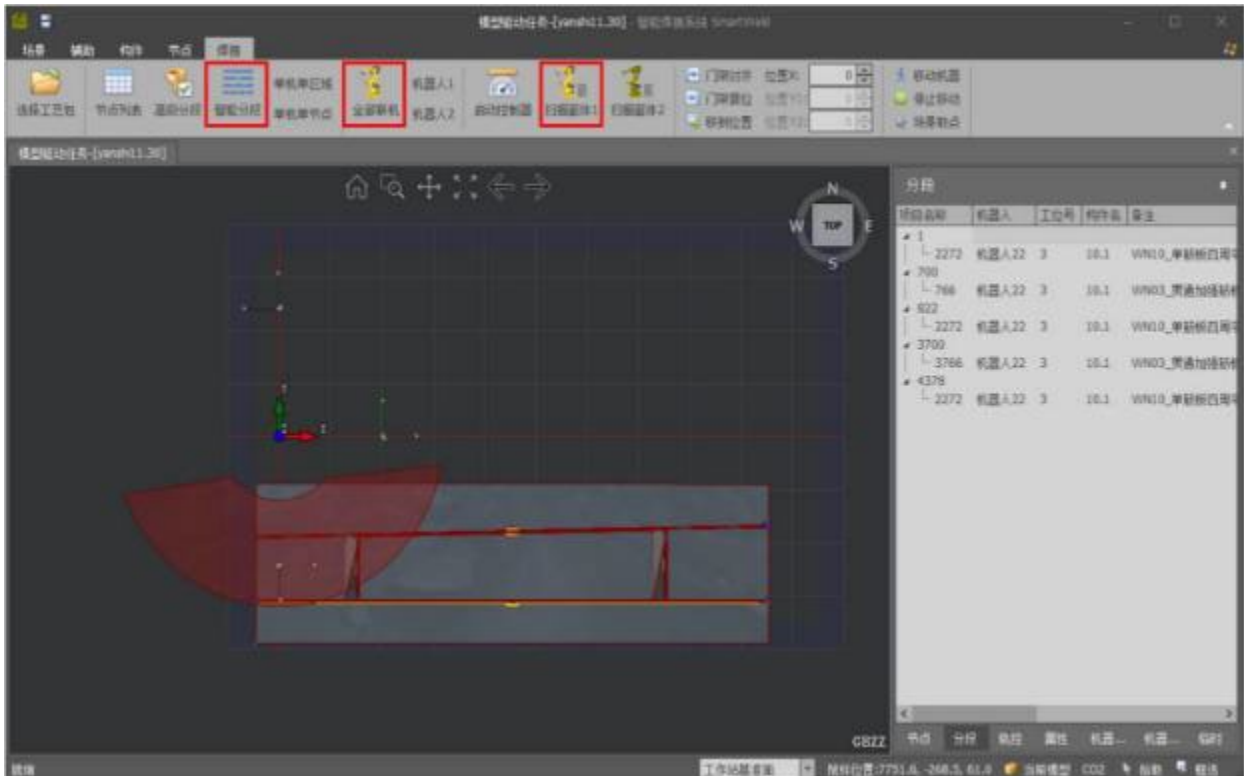


1. Operating system

1.1 System interface



Visual Interaction Interface of Operating System



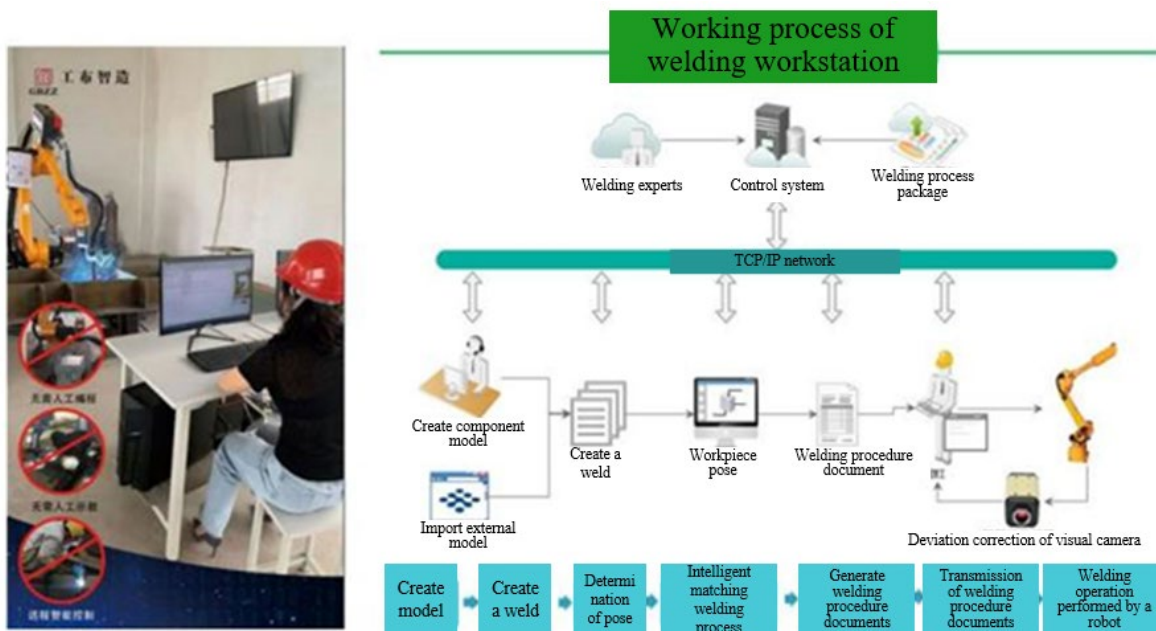
Model Driver Interface of Operating System



1.2 Function overview

The system is a self-developed system with its main function to automatically generate the welding program according to the actual contour of the position in the model by deeply integrating the welding process and then importing it into the 3D model to determine the position of the whole component weld through the visual system.

The software is deployed on the PC system, which can be placed anywhere. Remote control can be realized through TCP/IP protocol, that is, field equipment can be directly operated for welding in the office.



1.2.1 The system can work normally in two shifts every day (8 hours per shift) and maintain stable accuracy;

1.2.2 The design drawings of the workstation have been repeatedly demonstrated and simulated, and the design strength of each component is reliable and easy to assemble and maintain. On the premise of ensuring functions, the appearance is beautiful;

1.2.3 All purchased parts of the workstation equipment are provided by well-known manufacturers in the industry, and the quality of all processed parts has been strictly controlled with standard strength, superior performance and stable movement;

1.2.4 The measurement unit of parts and instruments of workstation equipment and all drawings shall be GB standard; the design, manufacture and materials used for all instruments and parts shall conform to ISO and IEC standards or other equivalent standards;

1.2.5 The parts and components of the workstation are made of high-quality materials, and the selected mechanical and electrical elements are high-quality and reliable products;



1.2.6 The front end of the robot is equipped with an anti-collision sensor, which can stop in time for protection in case of collision. At the same time, automatic wire-cutting system and automatic dust collection system can be configured as required;

1.2.7 Intelligent welding functions such as workstation visual interaction, 3D digital model drive, intelligent planning of welding paths, visual scanning correction paths, matching parameters and automatic creation of welding programs in the process library.



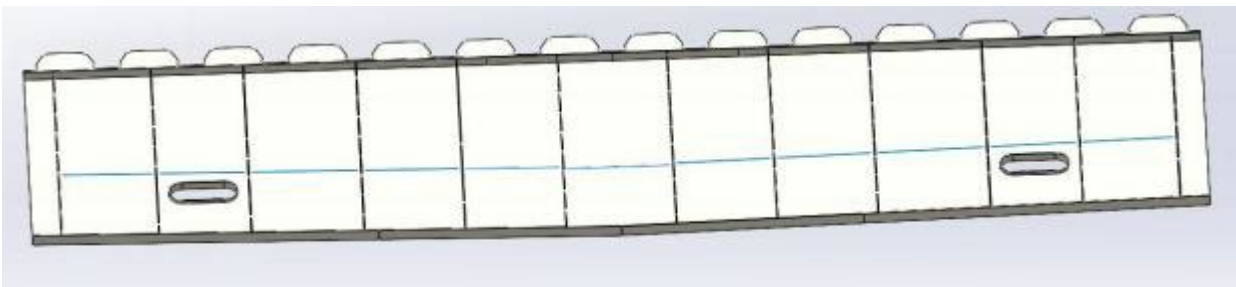
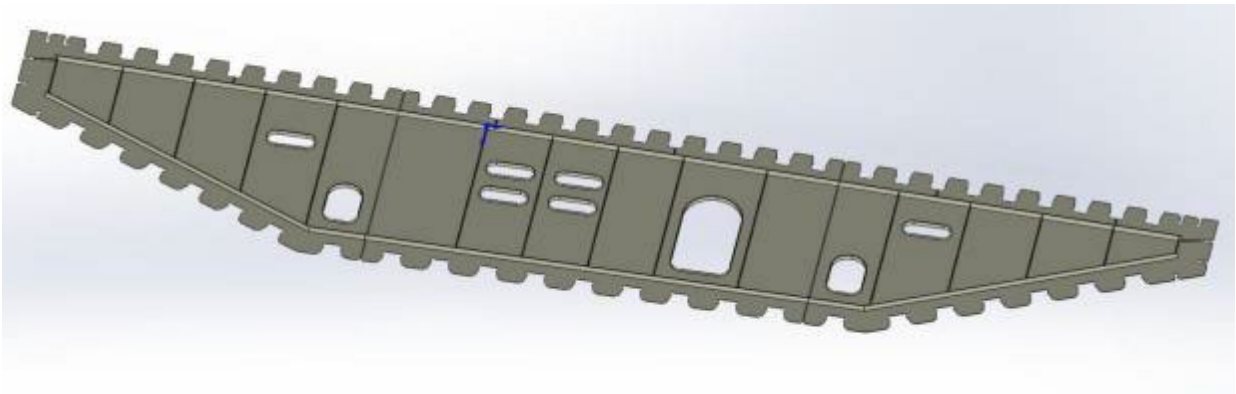
2. Project Scheme

2.1 Product type

2.1.1 Structural dimensions

S/N	Product	Height	Width	Length
1	Bridge diaphragm	Vertical plate height $\leq 0.5\text{m}$	$\leq 3.5\text{m}$	$\leq 12\text{m}$
2	H-shaped steel	Vertical plate height $\leq 0.5\text{m}$	$\leq 3.5\text{m}$	$\leq 12\text{m}$

2.1.2 Photos of typical products





2.2 Working environment and user preparation

2.2.1 Power supply: 380V±10%, 50HZ±2%, 220V±10%, 50HZ. The main distribution box at the wiring point shall be equipped with a leakage protector of more than 125A and reliably grounded. The power distribution cabinet shall be set in the middle of the station; otherwise, the length of cables provided with the vehicle will not be enough;

- a) Foundation works
- b) Primary side wiring materials and works
- c) TN-S grounding system and ground wire

2.2.2 Operating ambient temperature: -10°C~45°C.

2.2.3 Operating ambient humidity: ≤90% without condensation; sufficient light and good ventilation; compressed air pressure: greater than or equal to 0.6MPa.

2.2.4 Compressed air: provide an air source with a pressure of 5-7Kgf/cm², usually 4-5Kgf/cm².

2.2.5 Shielding gas: CO₂, Ar+CO₂ gases or pipelines that meet the national standards and are supplied in a centralized manner shall be provided. The pressure of shielding gas shall be greater than 0.5MPa.

2.2.6 Site preparation:

- a) Before the equipment arrives at the site, the user shall clean up the workplace of the intelligent welding system workstation
- b) Provide gantry installation pads according to the levelness of the site ground
- c) Equipped with a manual welding machine capable of spot welding at any position
- d) Installation of forklift or crane coordination equipment



2.3 Overall layout



Cantilever Layout



Cantilever Case Diagram



Layout Description

- a) The site required for the standard eight-axis cantilever standalone intelligent workstation is 3.5*13 (unit: m).
- b) The standard eight-axis cantilever standalone intelligent workstation includes: 1 set of eight-axis cantilever, 1 set of robot, 1 set of welder, 1 set of welding gun vision and 1 set of operating system (including computer);
- c) The optional auxiliary systems of the workstation include: gun cleaning station (optional), dust collection equipment (optional);
- d) The user is responsible for the arrangement of the workbench frame and the welding layout between the stands

2.4 Equipment list

Equipment list of cantilever eight-axis welding workstation						
Number of workstations: 1						
S/N	Sub-item	Name/description	Unit	Quantity	Brand/ manufacturer	Remarks
1	Robot system	Welding robot	Set	1	EFT	ER10-1600
2		Customized cable	Set	1	EFT	
3		Control cabinet	Set	1	EFT	
4	Welding equipment	Welder	Set	1	Ota	NBC-500RP PRO
5		Customized cable	Set	1	Ota	
6		Welding gun	Set	1	Thelma	Water-cooled welding gun TRM605W
7		Gun cleaning station	Set	1	Thelma	
8	Traveling system	Eight-axis cantilever	Set	1	EFT	GB-DJXB-2Y-13X
9		Servomotor	Set	3	Tama River	
10		Customized cable	Set	3	EFT	
12	Vision system	Full line-of-sight laser	Set	1	JTC	Including vision system software + bracket
13		Computer/console	Set	1	JTC	
14		Intelligent system	Set	1	JTC	



JTCLASER

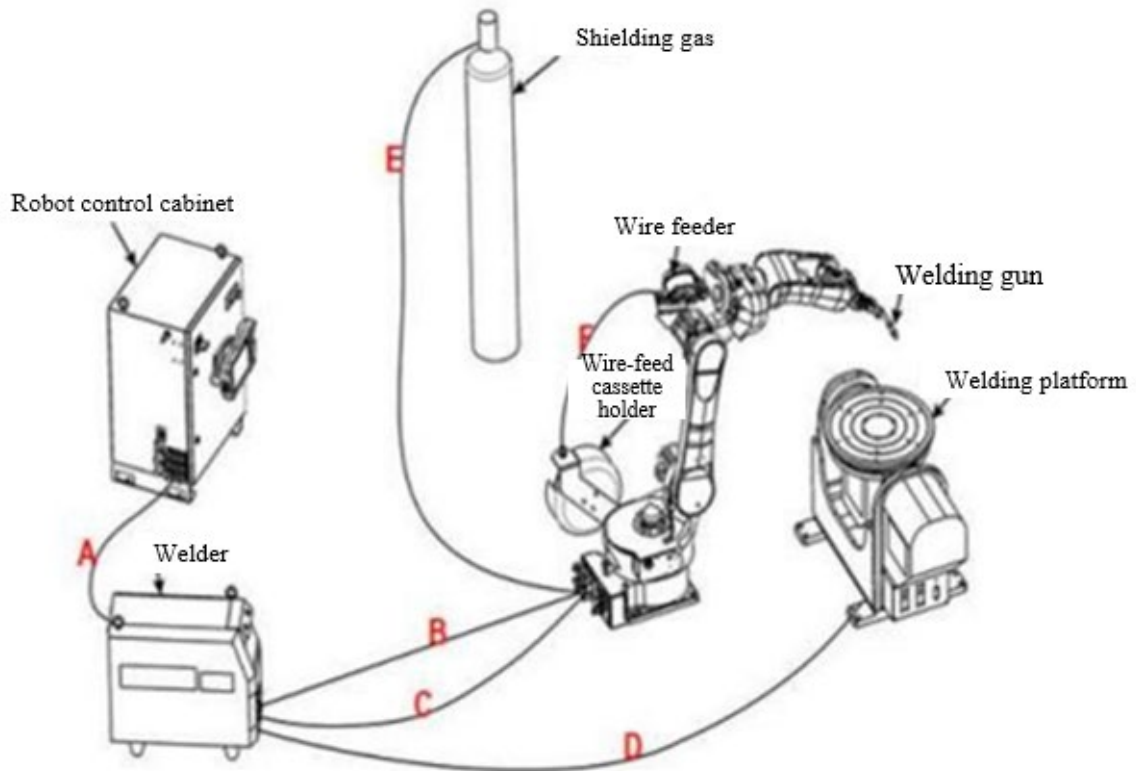
SHAANXI JINGTAI COOPERATION LASER Technology CO., LTD.

<https://lasermanufacture.com>



2.5 Equipment configuration


2.5.1 Basic composition of a welding robot system:



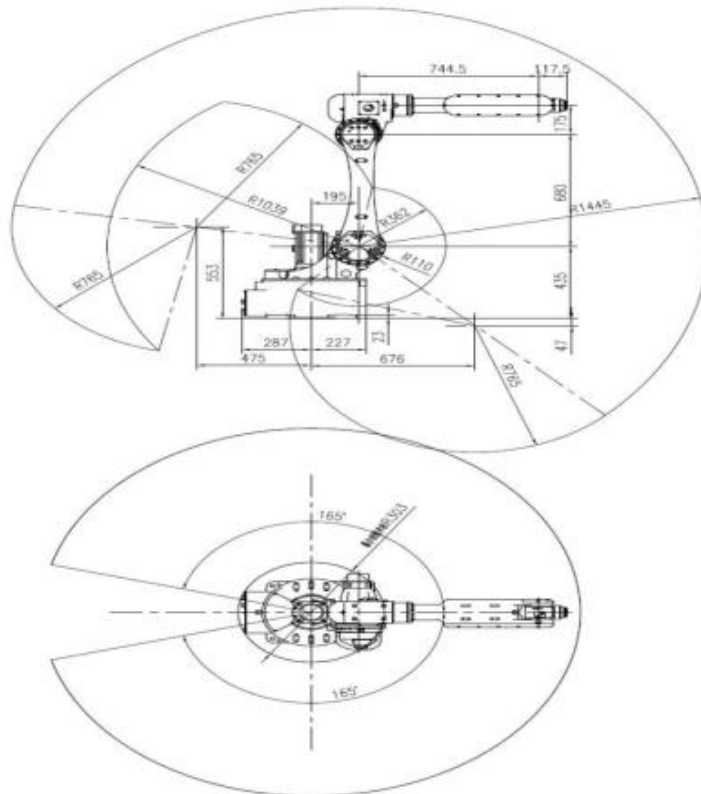
- | | |
|---------------------------------------|---|
| A — welding signal cable | Signal interaction between robot and welding machine; |
| B — Positive cable of welding machine | Positive circuit of welding machine; |
| C — Wire feeder control cable | Interactive signal between a welding machine and wire feeder; |
| D — Negative cable of welding machine | Negative circuit of welding machine; |
| E — Air pipe | pipeline for conveying shielding gas; |
| F-Wire feeder tube | Welding wire delivery pipeline |



2.5.2 Welding robot:

<p>ER-10-1600</p>  <p>最大臂展 1640mm 重复定位精度 ±0.05mm</p> <p>Maximum arm span: 1640mm Repeated positioning accuracy: ±0.05mm</p> <table border="1"> <tr><td>Payload</td><td>10kε</td></tr> <tr><td>Body mass</td><td>185kg</td></tr> <tr><td>Number of axles</td><td>6</td></tr> <tr><td>Body/wrist</td><td>IP65/IP67</td></tr> <tr><td>Control cabinet</td><td>IP54</td></tr> <tr><td>Energy consumption</td><td>3kW</td></tr> </table>	Payload	10kε	Body mass	185kg	Number of axles	6	Body/wrist	IP65/IP67	Control cabinet	IP54	Energy consumption	3kW	Allowable moment of inertia of wrist	Axis J1	20N.m
	Payload	10kε													
	Body mass	185kg													
	Number of axles	6													
	Body/wrist	IP65/IP67													
	Control cabinet	IP54													
	Energy consumption	3kW													
	Axis J2	20N.m													
	Axis J3	10N.m													
	Axis J4	0.625kg.m ²													
	Axis J5	0.625kg.m ²													
	Axis J6	0.2kg.m ²													
	Maximum single-axis speed	Axis J1	170°/sec												
		Axis J2	160°/sec												
		Axis J3	180°/sec												
		Axis J4	330°/sec												
		Axis J5	360°/sec												
		Axis J6	600°/sec												
Motion range of each axis	Axis J1	±165°													
	Axis J2	+80°/-135°													
	Axis J3	+163°/-75°													
	Axis J4	±180°													
	Axis J5	±130°													
	Axis J6	±360°													

Motion range parameters





Relevant parameters of robot control system

Functional unit	Specification item	Technical indicators
Main power supply	Rated voltage	Three-phase AC 380V±10%
	Power supply frequency	50Hz~60Hz, fluctuation range: ±5%
	Power of complete machine	3.5kW
Control terminal	24V power output	24V ±5%, 10A
	Digital output	24-channel PNP high-level output (users can use 18 channels)
	Digital input	24-channel PNP high-level input (users can use 16 channels)
	Analog input	Support for adding expansion modules
	Analog output	Support for adding expansion modules
	Auxiliary encoder interface	Support for adding expansion modules
	Communication interface	CAN
Ethernet		1 channel, the interface located in the controller, and it supports TCP/IP, MODBUS_TCP, FINS_TCP and ETHERNET/IP
EtherCAT		1 channel, it supports remote IO module and ANYBUS gateway module expansion.
Outline dimensions of the control cabinet		W555mm×D560mm×H1165mm (excluding aviation plug)
Weight		125kg
Environment	Protection grade of electric cabinet	IP54, cooling unit IP30
	Cooling method	Air cooling
	Installation mode	Vertical placement
	Operation place	Indoor, free of direct sunlight, dust, no corrosive gas, combustible gas, oil mist, water vapor, dripping or salt, etc.
	Ambient temperature	0°C~45°C
	Ambient humidity for use	80%RH without condensation (40°C)



Communication function

Communication function	Available or not	Supplementary notes
MES	√	MES function based on TCP/IP communication, which can read various states of the robot
TCP/IP communication	√	Support SOCKET communication as a server or client, and support free parsing of strings
Modbus-TCP	√	As a slave station (server) of Modbus-TCP, the robot supports data transmission, external startup and status reading
Profibus-DP	X	This model is an RP2 controller without a DP hardware interface
Ethernet/IP	√	Robot as a slave station
Profinet	X	The default configuration is RP2 controller, which needs to be upgraded to RP2-RPO controller
CANopen	√	Support communication of Ota and Megmeet welding machine protocols
EtherCAT	√	Support EtherCAT slave station equipment and ANBUS series gateway to convert EtherCAT communication into other bus protocols
Other	√	Fixed Visual Communication and Conveyor Tracking Visual Communication Based on TCP/IP Protocol

Brand of main accessories

Name	Brand	Use
Reducer	Green	J5, J6 axis
Reducer	Aoyi	J1, J2, J3 and J4 axes
Servomotor	Tama River	Axes J1~J6
Driver	Qingneng Dechuang S7	Axes J1~J6
Controller	ROBOX	
Teach pendant	EFT	



2.5.3 Eight-axis cantilever:

Technical characteristics of equipment (supporting)

Name: Cantilever eight-axis intelligent workstation

Specification and model: GB-XB-2Y-10X

Total power: 18 kW

Positioning accuracy: ± 0.5 mm

Eed load: 10 KG

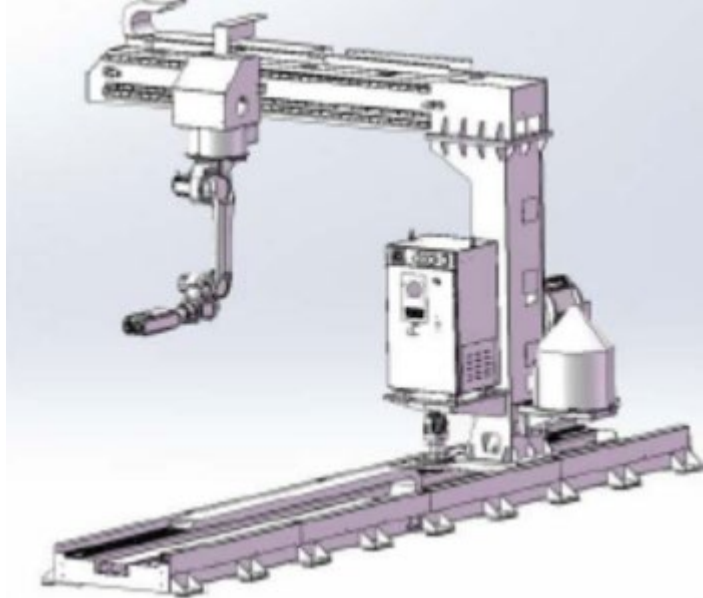
Traveling speed: 15m/min

Walking length in x direction: track length of 10m

Right effect length in Y direction: 2m

Maximum working range: 9*3.5*0.5 (m)

Maximum working depth: 0.5m



The cantilever eight-axis intelligent workstation is suitable for welding, cutting, grinding, and other tasks involving steel structures such as steel beams, steel columns, equipment platform beams, equipment brackets, and box wall columns. In addition to the capabilities of the seven-axis cantilever workstation, it has added adaptability in the single work width direction. The standard workstation can cover workpieces with a width of 3.5 meters and a length of 9 meters.

Name	Cantilever traveling system	Installation environment	Temperature	-10-45°C
Model	GB-XB-2Y-10X		Humidity	20-80%
Structure	Single machine inverted cantilever		Shock	Below 4.9m/s ²
Load	1000KG		Other	No pyrophoric and corrosive gases, liquids; no water, oil, etc.; no close to high-intensity interference sources
Positioning accuracy	± 1 mm			
Number of additional axles	2			
Traveling length in X direction	Track length: 13m		Travelling speed	8M/min
Y-axis width	2m	It can be used to weld workpieces with a length of 12m and a width of 3.5.		



2.5.4 Welding power supply:



Ota NBC-500RP Plus welding power supply:

Digital interface control, which can directly call the welding parameters stored by customers.

The welding spatter is extremely small, and the weld seam is beautiful.

Optimized arc striking, arc stopping and ball removing functions.

Full-digital control system realizes accurate control of the welding process and stable arc length.

Powerful digital error reporting function, and various faults are displayed with error codes.

Equipment parameters

Model	NBC-350RP	NBC-500RP Plus
Rated input voltage/frequency (V/Hz)	Three-phase 380±10% 50	
Rated input capacity (KVA)	14	24
Rated input current (A)	20	38
Rated output voltage (V)	31.5	39
Rated load continuous duty cycle (%)	60	100
Output no-load voltage (V)	101	106
Output current/voltage range (A/V)	60/17~350/31.5	60/17~500/39
Diameter of welding wire (mm)	0.8, 1.0, 1.2, 1.6	
Gas flow (L/min)	15~20	
Protection level of enclosure	IP23	
Insulation class	H	
Outline dimensions L×W×H (cm)	66×32×56	
Weight (kg)	50	55



2.5.5 Water-cooled welding gun

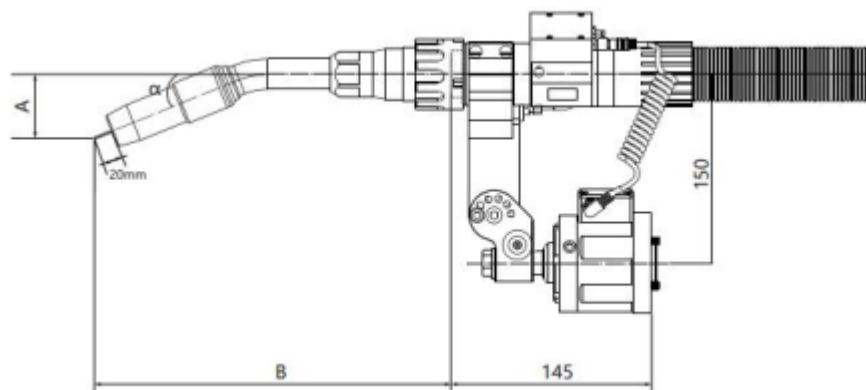
The welding gun is Terma and Apollo robot water-cooled welding gun, which is mainly composed of a water-cooled gun neck and cable. The welding gun innovatively adopts a two-way shielding gas design, which achieves an excellent gas protection effect in welding, greatly reduces the amount of shielding gas, strengthens the cooling effect of the welding gun and prolongs the service life of the contact tip.



Parameter name	Parameter
Cooling mode:	Liquid-cooled
Rated current value:	500A CO2/mixed gas
Temporary load rate of welding gun:	100%
Diameter of welding wire	Φ1.0~Φ1.6mm
Optional gun neck angle:	16°, 22°, 45°
Optional neck length:	See the following table

Gun neck size parameters

a	A	B	Gun neck angle	Gun neck No.
22°	52.35	287.5	22°	TRM651W-22
22°	52.35	387.4	22°	TRM651W-22L
45°	114.57	254.6	45°	TRM651W-45
45°	114.57	354.6	45°	TRM651W-45L
45°	114.57	414.6	45°	TRM651W-45L1
45°	116.6	554	45°	TRM651W-45L3





2.5.6 2D vision line laser

■ Product description

The structured light 3D camera uses MEMS coded raster structured light to scan, and reconstructs the real three-dimensional point cloud data of an object according to a binocular image restoration algorithm. Meet the 3D vision application requirements of industrial high-resolution and submillimeter measurement. The equipment has the advantages of small size, large depth of field, high measurement accuracy, low cost and simple operation. It can be applied to biometric identification, industrial automation, robots, 3D object reconstruction and other scenarios.

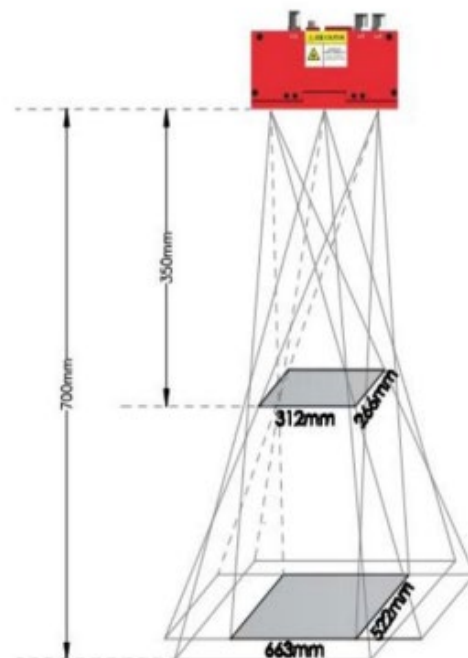
■ Product photo



■ Specifications






Parameter	Haotian PDN0700
Light source	850nm
Recommended working distance	350mm-700mm
Near-end field of view	260mm×312mm
Far-end field of view	522mm×663mm
Z-axis accuracy	0.1mm
Resolution	1280×1024
Acquisition time	0.8-13s
Scan mode	Single/continuous scan
Triggering method	Soft
Point cloud format	PCD, PLY, TXT
Image type	Grayscale map, depth map
Data interface	GigE
Power consumption	5.9W@12V
Weight	606g
Outline dimension	136×64×52.5mm ³
Operating temperature	0-50°C

■ Schematic diagram of scan range






2.5.7 Gun cleaning station (optional):

	Technical parameters:					
	Input air pressure	Oil-free dry compressed air, 5.5-8bar				
	Operating temperature	-5°C to +50°C				
	Air consumption	About 10L/S				
	Pneumatic motor	About 650pm and the maximum torque is 8N.m				
	Control voltage	24VDC				
	Control current	I _{max} =0.15A				
	Capacity of anti-splash bottle	500ml				
	Wire cutting capacity	- Solid wire: max. 1.6 mm - Flux cored wire: max. 3.2 mm				
	Cutting time	About 0.5 seconds				

Introduction to product features:

1. The clamping device can accommodate the nozzle with a maximum diameter of 32mm, without replacing the positioning V-block;
2. The high-precision and cost-effective pneumatic motor can remove splashes that are difficult to remove, which is not afraid of overload and has a long service life;
3. The nozzle clamping cylinder is designed with a return delay, and the reamer returns only after separating from the welding gun nozzle to effectively avoid damage to the welding gun caused by early return of the clamping cylinder;
4. Special filtering components effectively filter oil, water and impurities in the gas circuit, which improves the service life of the equipment as a whole;
5. Clean the gun and inject oil at the same position to reduce downtime.



Functional description

- a) Clean up the splashes stuck in the gas protective sleeve of the welding gun generated by the welding robot during automatic welding operation to ensure long-term unobstructed gas, effectively block air from entering the welding area and improve weld quality;
- b) Clean up the dust generated by welding fume on the contact nozzle;
- c) Clean the gas outlet hole on the adapter pipe;
- d) Spray gun cleaner on the protective sleeve to reduce spatter adhesion to the nozzle and contact tube and increase durability.
- e) Reduce the workload of operators;
- f) Prevent the welding quality from being affected by inaccurate manual cleaning;
- g) Prevent the insulation sleeve thread between the protective cover and the main body connection pipe from wearing due to repeated manual cleaning and disassembly to prolong the operation time and reduce the cost;
- h) Prevent maintenance failure due to gas protection device misalignment and gas deviation caused by thread wear.



2.5.8 Dust removal equipment (optional)

HXYD-GD300 (High negative pressure purifier)

Brand name	HXYD-GD300
Air processing capacity	318m ³ /h
Ash removal method	Pulse ash removal
Material of filter material	Polyester fiber + PTFE film
Air suction port	1 pc.
Maximum negative pressure	32000Pa
Separation efficiency	99.90%
Filtered particles	0.3 μm
Motor power	3.0Kw
Voltage	380V
Filter area	8 m ²
Life	5,000 hours
Sution	Φ51mm/Φ38mm
Length of suction arm	Customized according to customer requirements
Outline dimensions of the machine	620*660*1100mm
Noise	72±10
Filter cartridge brand	Import
Ash removal method	Automatic ash removal
Motor brand	Well-known Chinese brand



Purpose: 1. Single-station manual dual-shield welding;
 2. Single-station grinding and dust removal;
 3. Single-station robot welding.

Equipment features:

- ◆ Compact design, small footprint and easy to move.
- ◆ The filter element is made of new nanofiber material, and the surface is coated with film; the smoke filtration efficiency reaches 99%
- ◆ Vortex fan has the features of low energy consumption, high wind pressure, strong wind force and stable operation.
- ◆ Pulse automatic dust removal, constant air pressure and thorough cleaning.

Integrated design of gun neck dust removal (schematic diagram):



Advantages:

- The dual-lumen endotracheal tube can optimize the gas circulation environment and improve the gas flow rate;
- Ultra-long service life of consumables;
- Better dual-channel water cooling effect;
- Higher welding capacity;



JTCLASER

SHAANXI JINGTAI COOPERATION LASER Technology CO., LTD.

<https://lasermanufacture.com>

The integrated design of high negative pressure dedusting equipment has a better dust removal effect and greatly reduces the possibility of interference with other equipment.



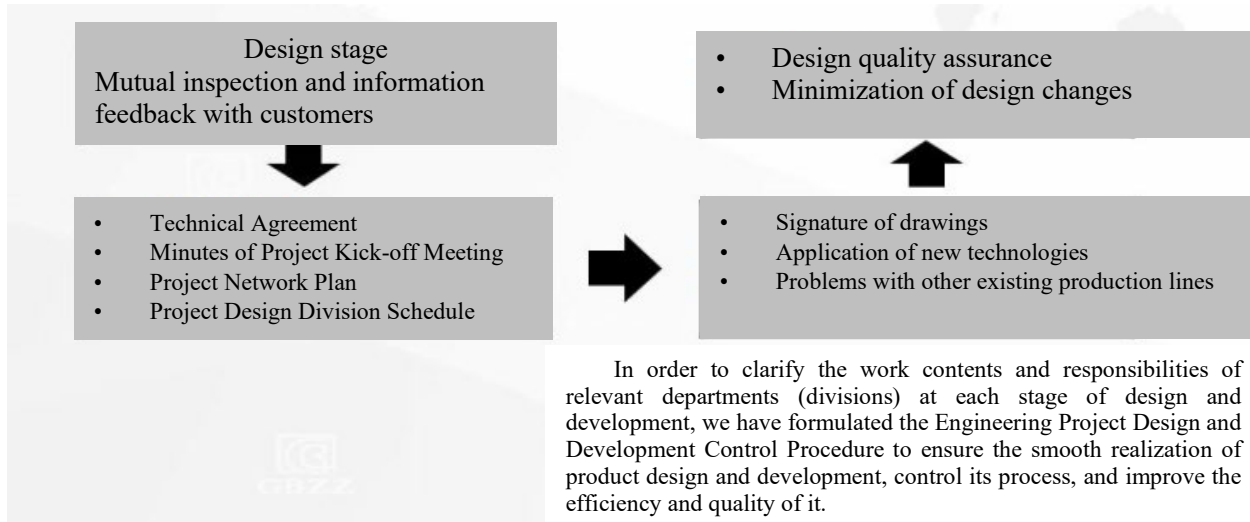
2.6 Equipment energy consumption

Power consumption of a single eight-axis cantilever				
S/N	Equipment name	Equipment power	Quantity of single stations	Total energy consumption kW
1	Welding robot	5	1	16
2	Servomotor	2	3	6
3	Welder	10	1	10
4	Vision, controller	1	1	1
Total				33

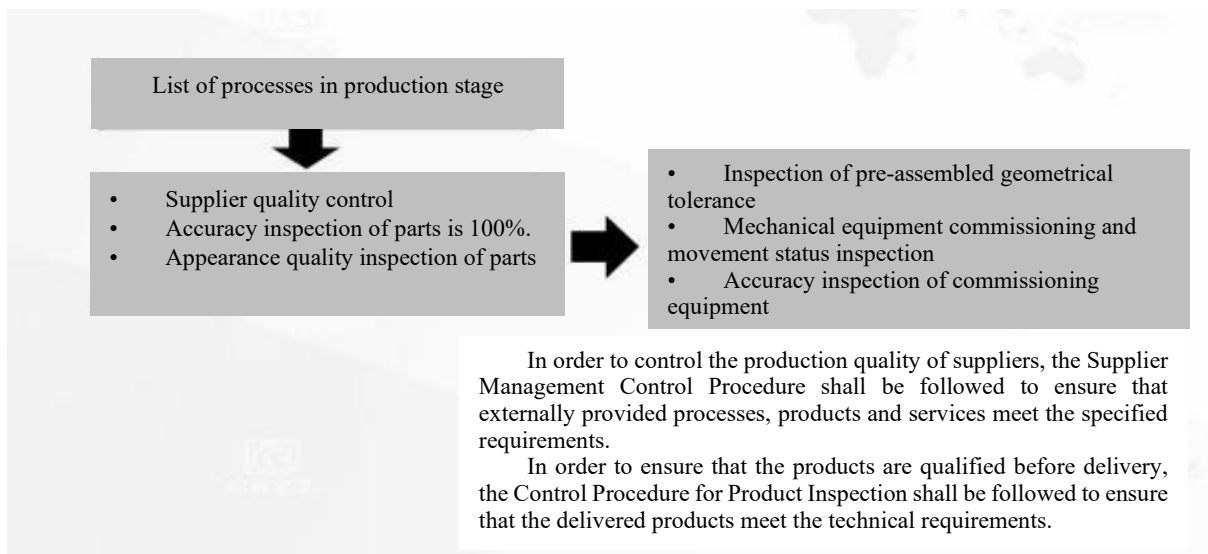


3. Quality control

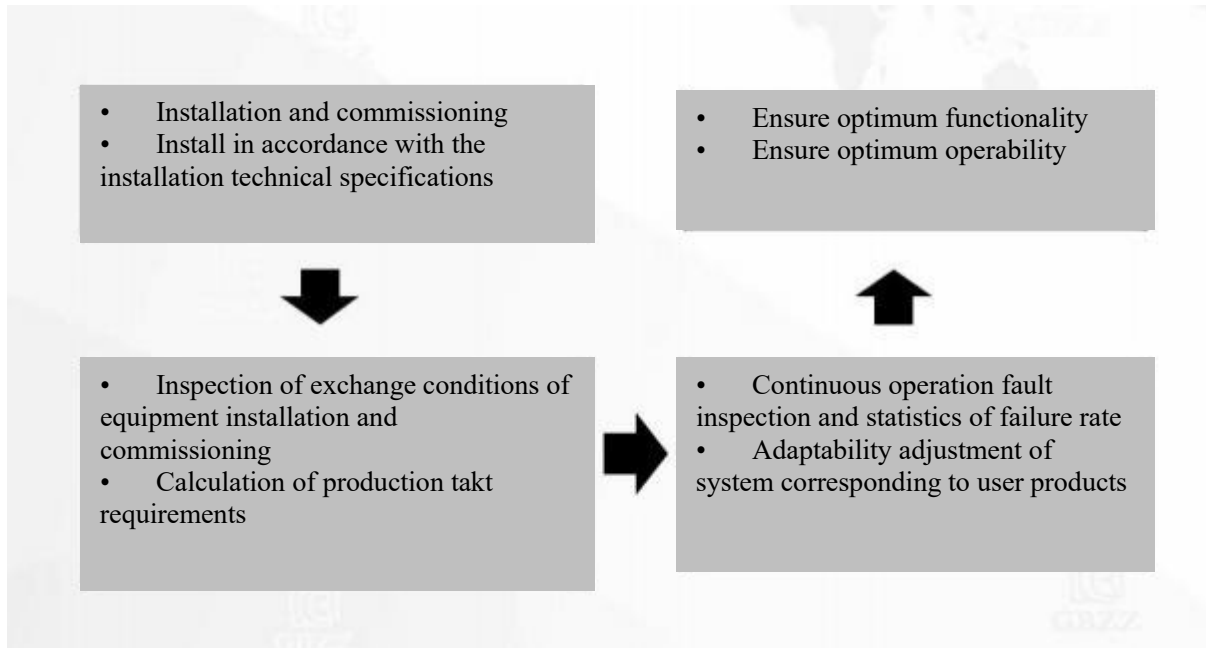
3.1 Control in design stage



3.2 Quality control in production stage



3.3 Quality control of installation and commissioning



3.4 Equipment quality requirements in use stage

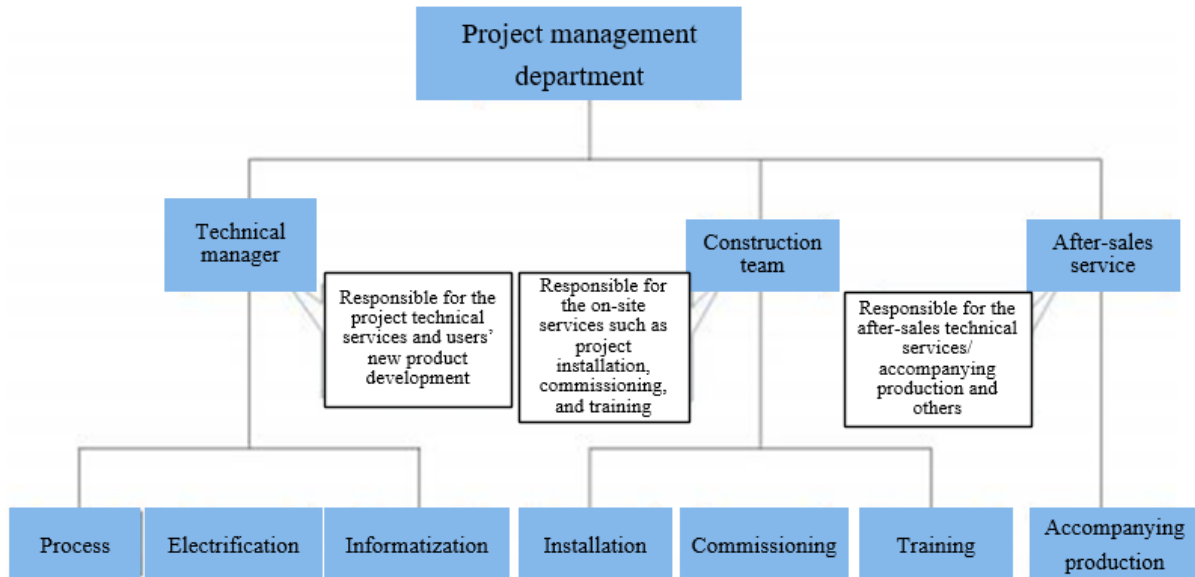
It is generally ensured that the equipment operates normally, the accuracy of the equipment meets the use requirements, and the production takt meets the design requirements. The sub-item quality objectives are as follows:

S/N	Inspection item	Inspection method and standard	Inspection conclusion
1	All components are installed and tightened.	Bolts are fastened, and the network and circuit are smooth.	
2	Robot performance and accuracy	Failure rate and repeated positioning accuracy during commissioning	
3	Anti-collision sensor reliability	Manual simulated crash test	
4	Welding machine stability	The welding output is normal and the weld formation is consistent.	
5	The gun cleaning station is in normal use.	Whether the gun cleaning, wire cutting and oil injection are normal.	
6	The visual system is in normal use.	The data acquisition of the visual system remains stable during the commissioning.	
7	The software is in normal use.	The system drive equipment in normal use.	
8	Installation accuracy	The outline dimension deviation of equipment installation meets the design standards.	
9	Appearance of equipment	The surface coating of the machined part is in good condition.	
10	Brand and technical indicators of parts	The brand and technical indicators match the design selection.	
11	User operation	Be able to operate the equipment normally after training	





4. Project team



4.1 Duty responsibilities of project manager

4.1.1 The first person responsible for the project, mainly responsible for controlling the project plan and overall progress, supervising the implementation of safety measures, and supervising quality control

4.1.2 Participate in the preliminary business negotiations and technical communication of the project, and be responsible for purchasing material brands

4.1.3 Examination of project process and bonus assessment of team members within the project team

4.1.4 Timely report to the project director and project assistant about the coordination and communication of issues with Party A Customer's supervisor

4.1.5 Responsible for promoting project acceptance work and organizing and holding project summary meetings

4.2 Duty responsibilities of technical manager

4.2.1 The project technical manager (control, design, process) is responsible for the feasibility of the project's technical solutions

4.2.2 Responsible for technical communication and signing of technical agreements for the project

4.2.3 Responsible for optimizing technical solutions during the project process, as well as on-site commissioning and technical cooperation

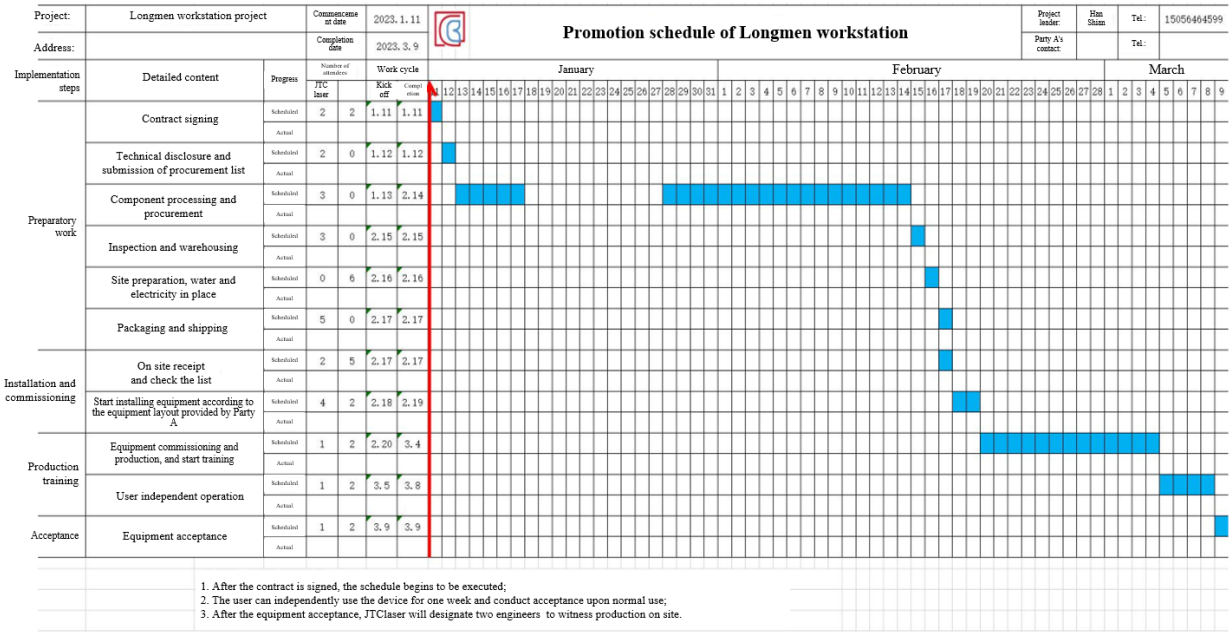


4.3 Regular work meeting

Schedule of daily and weekly meetings on site					
S/N	Time	Time period	Participants	Meeting content	Remarks
1	Before construction in the morning	8:00-8:30	All staff	Today's construction content: pay attention to safety points, regional leaders, and job arrangements	The meeting time should depend on the specific situation and be chaired by the on-site project manager
2	Before duty off in the afternoon	17:00-17:50	All staff	The completion status of today's work plan and the arrangement of the next day's construction content	
3	Every weekend	17:00-18:30	All staff	a. The completion status and existing problems of the week's work, and propose solutions for the problems b. Conduct an early assessment of the various risks that may arise during next week's construction	
The above are the daily and weekly routine tasks in on-site construction process management. The principle of completing the work plan is to "complete the work of the day every day"					



5. Plan project implementation



Plan description

- a) 1 set of intelligent welding workstation is planned
- b) The schedule shall commence preliminary preparation work within 2 days after the contract is signed
- c) The entire project consists of a preliminary preparation stage, a stocking and shipping stage, an installation and commissioning stage, and a training and accompanying production stage
- d) Daily verification of actual progress by the project manager
- e) For key points, the project manager needs to organize a work meeting to analyze progress and issues during the implementation process
- f) After one week of independent operation of the equipment by the user, the project manager will contact the relevant departments of the user for acceptance.



5.1 Regulations on the management of safe and civilized construction sites

5.1.1 Preparation before entering the site

- a) Personnel entering the factory should receive safety and civilized construction education in advance;
- b) Prepare safety helmets, safety shoes, seat belts, and other necessary labor and safety equipment;
- c) Clarify the site and hazardous operations, and prepare fire prevention equipment;
- d) Confirm the number of construction personnel, shift time, and the number of personnel in each shift, and report to the on-site management personnel;
- e) Notify management personnel in advance of the various tools, equipment, and materials that need to be moved in, and notify the factory of the area of the stacking site for management;
- f) Other safety related work needs to comply with the requirements of the construction site.

5.1.2 Entering the site for construction

- a) Construction personnel wear necessary safety equipment such as safety helmets and safety shoes
- b) Construction personnel shall promptly clean the site and keep the construction area clean, tidy, and orderly
- c) Arrange the items used for construction neatly at the designated location
- d) Safety belts should be used when working at heights of more than 2m. Single person operation is prohibited, and there should be operators and assistants. After completing high-altitude operations, carefully inspect and do not leave any debris behind
- e) Follow electrician construction rules; no live construction is allowed to prevent electric shock accidents;











5.1.3 On site management

- a) After the construction is completed, the construction management personnel will inspect and confirm the project
- b) Construction personnel should inspect and keep the equipment and tools used well to prevent them from being scattered and left behind, causing hidden dangers
- c) Place various equipment, tools, and waste materials in designated locations and place them neatly
- d) Clean the site, passages, and entrances, restore all parts to their original state, and provide warnings for dangerous areas



- e) Check if there is any damage to the materials, and if any situations are found, report them in a timely manner
- f) Collective evacuation of construction personnel from the site (ensure 30 minutes of monitoring after the completion of hot work).

6. Consumable Inspection List

Consumable inspection list										
Thank you for your trust and attention to our company, and I wish your business every success!										
S/N	Product family	Product name	Model	Figure	Unit price (including tax)	Unit	Brand	Recommended replacement time	Remarks	
1	605W vulnerable parts	Contact tip	TRM035-02-12		6.00	Pcs	Thelma	8-12 hrs	Trial 1.2 welding wire	
2		Conductive nozzle holder	TRM045-03		46.00	Pcs	Thelma	1 month		
3		Nozzle	TRM015-42-16c		56.00	Pcs	Thelma	1 month	Adapt to different conductive nozzle holders	
4		Nozzle socket	TRM605w-22-02-ZJ		220.00	Pcs	Thelma	Under normal usage, it usually lasts for 3 months, except for overloading or welding damage due to lack of water		
5		Insulator	TRM605w-22-01		12.00	Pcs	Thelma	15 days		
6		Bent pipe	TRM605w-22L-A		1,850.00	Pcs	Thelma	Normal service life 1-2 years, excluding impact damage and scalding	The degree of the gun stem is different, please confirm	
7		O-ring	TRM605w-22-23		24.00	Set (3 pcs.)	Thelma	1 month		
8		Wire feed soft pipe	TRM152B-12-23		48.00	Pcs	Thelma	1 month		
9		Wire feed pipe joint	TRM605w-22-22		22.00	Pcs	Thelma	2 months		
10		Shunt	TRM605w-22-19		18.00	Pcs	Thelma	60 days		
11		Insulating disc (including screws)	TRM231-C40252 (old)		280.00	Pcs	Thelma	360 days		
12		Insulating disc (including screws)	TRM231-C40252 (new)		280.00	Pcs	Thelma	360 days		
17		Ruiniu line laser glass 1	26*12*1.1mm		2.00	Pcs.	JTClaser			
18		Ruiniu line laser glass 2	26*28*1.1mm		2.00	Pcs.	JTClaser			
19		Wire feeding tube	Wire feeding tube	2m		90.00	Pcs	JTClaser		
20				4m		120.00	Pcs	JTClaser		
21				6m		180.00	Pcs	JTClaser		
22		Wire feeder	Wire feeder	1.2/1.4/1.6		30.00	Pcs	Ota		
23	Teach pendant	Cable	8m		1,200.00	Pcs	EFT			
24		Cable	16m		1,600.00	Pcs	EFT			
25		Screen maintenance	TPU-13-s-65		1,800.00	Pcs	EFT			
26		Teaching pendant membrane			20.00	Pcs.	JTClaser			
27	Camera lens	Lens	MV-LD-4-4M-G		800.00	Pcs	Mind Vision			

28	Point laser	Communication line		100.00	Pcs	Chengtuo		
----	-------------	--------------------	--	--------	-----	----------	--	--

Quotation instructions:

- 1. A single order of over 1000 includes shipping costs;
- 2. The quotation includes 13% value-added tax;
- 3. Delivery method: according to the agreed time;
- 4. Payment method: payment upon delivery;

7. Available Information, Tools, and Accessories

a) Technical information

Factory inspection reports and quality certificates of main components are provided.

One copy of equipment manual, robot programming manual, robot maintenance manual (electrical, mechanical), safety operation procedures, and other related electronic documents are provided. (Paper-based documents are not provided)

Foundation drawings (to be submitted 10 days after ordering, but construction shall take effect after both parties have reviewed and approved the equipment drawings) (electronic version).

The list of spare parts includes specifications, models, names, quantities, and manufacturer names.

b) Accompanying tools and accessories

S/N	Name	Specification and model	Unit	Quantity	Remarks
1	Internal hexagonal wrench	1.5~12	Set	1	
2	USB disk	16G	Pcs	1	
3	Slotted screwdriver		Set	1	
4	Cross screwdriver		Set	1	
5	Wrench	10 inch	Pcs	1	
6	Sharp-nose pliers		Pcs	1	
7	Tape measure	5m	Pcs	1	

S/N	Accessory specifications and models	Unit	Quantity	Manufacturer	Remarks
1	Conductive nozzle TRM035-02-12	Pcs	20	Thelma	
2	Conductive nozzle holder TRM045-03	Pcs	4	Thelma	
3	Sprayer nozzle TRM015-42-16C	Pcs	4	Thelma	
4	Ground rail lubricating oil	Bottle	2		
5	Visual glass	Pcs.	40		

8. Personnel Training

Requirements for Party A's personnel: The technical personnel who receive training must have at least high school education (including high school education) and ensure the stability of the personnel. Number of trainees: 2-3 people/single workstation

8.1 Training stage and time

a) During the on-site installation and commissioning stage of Party A, the technical personnel trained by Party A need to accept the arrangement of Party B and learn about equipment installation and commissioning throughout the entire process.

b) After installation and commissioning, our company will provide centralized 2-3 weeks of training for the technical personnel of Party A, and assess them. A confirmation letter of the assessment results will be issued as a basis for Party A to arrange personnel.

8.3 Main training contents

a) Theoretical knowledge of robots, practical programming theory and operation, daily maintenance of equipment, and troubleshooting of equipment.

b) Theoretical knowledge of welding machines, practical operation instructions, daily maintenance of equipment, and troubleshooting of equipment.

c) Simple theoretical knowledge of other hardware devices, practical operating instructions, daily maintenance of equipment, and troubleshooting of equipment.

S/N	Description of key training points	Planned time (day)
1	Equipment installation - assistance, knowing equipment structure	3
2	Equipment commissioning - learning equipment commissioning knowledge	1
3	Training on safety, maintenance, and other knowledge of workstations	1
4	Preliminary operation training for the operating system	5
5	Training on tool calibration and automatic calibration systems	3
6	Training on welding adjustment of processes, welding machines, and teaching aids	2
7	Model processing, model driven training	4
8	Daily welding quantity assurance training	5
9	Training on common fault handling	1
10	Equipment acceptance	2

9. Acceptance and After-sales Service

9.1 Equipment warranty

a) After the final acceptance of the equipment, the warranty period is generally 12 months, calculated from the date of signing the final acceptance. If the installation and acceptance cannot be carried out in a timely manner due to the reasons of Party A, the warranty period of the equipment shall be calculated from one month after the date of arrival.

b) If any major components are damaged due to quality issues during the warranty period, our company promises to replace them free of charge, and then recalculate the warranty period for the parts. During the warranty period, the seller shall provide equipment maintenance and technical support free of charge. After receiving user notification, the seller must ensure that the equipment returns to normal operation within one week.

9.2 Equipment acceptance and after-sales service

a) After installation and commissioning in the user's factory, Party A shall confirm the integrity of the entire equipment. Afterwards, the training personnel of Party B shall conduct 2-3 weeks of operation training for the operators designated by Party A, and confirm all training items one by one. After the training is completed, Party A shall organize personnel to conduct an acceptance within one week, and it shall be deemed as the final acceptance of the equipment only after being signed by the acceptance representatives of both parties.

b) The company is responsible for providing free after-sales service during the warranty period. Our company promises to provide a 7*24 hour response service, and we will respond to the buyer within 2 hours from receiving the service notice (phone or letter). We provide guidance and troubleshooting for any problems that arise through phone calls, emails, instant messaging devices, etc. For problems that users cannot solve on their own, our company promises that personnel will come to the user's site for maintenance within 24 hours. After the personnel arrive at the site, it is guaranteed to solve the general equipment problems and resume production within 24 hours.

c) Outside the warranty period, the company promises to provide lifelong technical support and guarantee services for the equipment. If there are related software upgrades, our company will also provide free software upgrades for the tenderer. Equipment maintenance outside the warranty period will only charge the cost of hardware materials.

d) The company promises to recommend spare parts manufacturers to ensure that the tenderer can purchase high-quality and affordable consumables and spare parts. We also reserve spare parts and consumables for the tenderer's emergency and temporary use.

Party A:

Authorized representative:

Date: August, 2023

Party B: SHAANXI JINGTAI COOPERATION LASER Technology CO., LTD.