

GY-FLC300SL

Laser Cleaning Machine User Manual



security information

A. Safety Signage

	May cause severe personal injury or even endanger life.
	May cause general personal injury or damage to products or equipment.

B. Laser Safety Classification

According to Clause 9 of the European Standard EN 60825-1, the internal laser of this device falls under Category 4 lasers. The product emits laser radiation with a wavelength of approximately 1064 nm or 1080 nm, which can cause injury to the eyes or skin when exposed to such light intensity, either directly or indirectly. Although this radiation is invisible, the laser beam can still cause irreversible damage to the retina or cornea. During laser operation, appropriate and certified laser safety goggles must be worn.

	<u>When operating this product, ensure that laser safety goggles are worn throughout the entire process. Laser safety goggles offer selective protection against specific laser wavelengths; therefore, users should select goggles that are compatible with the laser output wavelength range specified for this product. While the laser cleaning machine is powered on, it is strictly prohibited to direct the laser output head toward any person, nor to shine the laser output head onto highly reflective surfaces.</u>
---	--

C.safety signs



Figure 1.1 – Laser marking; Figure 1.2 – Optical fiber bending prohibition marking
Figure 1.1 – Laser marking; Figure 1.2 – Optical fiber bending prohibition marking

D. Electrical Safety

① Please ground the product using the PE wire in the power cord, ensuring a secure and reliable grounding connection.

	Grounding disconnection can cause the product casing to become energized, potentially resulting in personal injury to the operator.
---	---

② Ensure that the AC voltage supply is functioning normally.

	Incorrect wiring or an incorrect supply voltage may cause irreversible damage to the laser.
---	---

1 Preface

1.1 Welcome

Thank you for choosing our GY-FLC300SL handheld laser cleaning machine. This user manual provides important safety, operating, and maintenance guidelines. Before using this product, please read this manual carefully and keep it safely stored. To ensure safe operation and maintain the optimal condition of the product, please adhere to the following precautions and warnings.

This user manual is not a quality assurance document; any corrections to printing errors, modifications to the information contained herein, or improvements to the product shall be subject to interpretation by our company at any time without prior notice; such corrections shall be incorporated into a subsequently published revised user manual.

2 Product Introduction

Laser cleaning is a novel technology based on the interaction between lasers and materials, enabling the removal of contaminants and adhered deposits from object surfaces. Compared to traditional cleaning methods, laser cleaning offers advantages such as being contactless, non-destructive to the substrate, precise cleaning capability, environmental friendliness, and the ability to perform cleaning in real-time; it is particularly suitable for high-speed, online cleaning applications in designated areas.

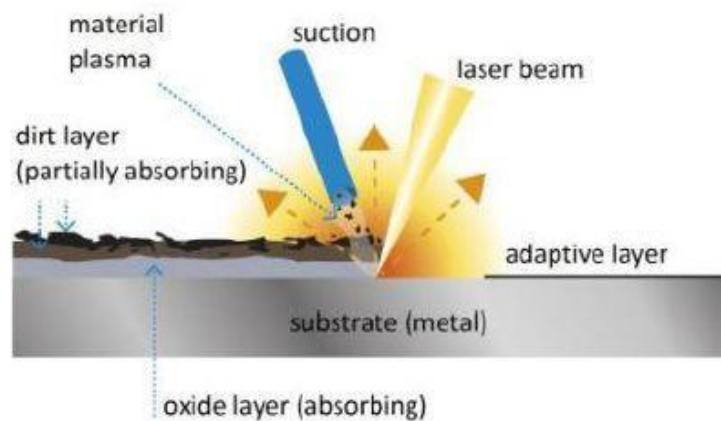


Figure 2.1 – Laser cleaning schematic diagram

The laser cleaning equipment manufactured by our company represents a cutting-edge high-tech solution for surface treatment; it is easy to install, operate, and automate. The operation is straightforward: simply connect the power supply and turn on the device to initiate a cleaning process that requires no chemical reagents, no cleaning media, no dust, and no water. This equipment is capable of cleaning curved surfaces and achieves high surface cleanliness, effectively removing resin, paint, oil stains, dirt, grime, rust, coatings, plating layers, and oxide layers from surfaces. It finds wide application across various industries, including marine engineering, automotive repair, rubber mold manufacturing, high-end machine tools, rail systems, and environmental protection applications.

2.1 Equipment Features and Implementation Standards

(1) Equipment Features

- ◎ Contactless cleaning – does not damage the component substrate;
- ◎ Precision cleaning enables targeted cleaning at specific locations and with precise dimensional accuracy;
- ◎ No chemical cleaning solutions required; no consumables needed; safe and environmentally friendly;
- ◎ Simple operation – can be used handheld or in conjunction with a robotic arm for automated cleaning;
- ◎ Ergonomic design significantly reduces operational physical exertion;
- ◎ High cleaning efficiency, saving time;
- ◎ The laser cleaning system is stable and requires almost no maintenance;
- ◎ Optional mobile battery module;

(2) Product Implementation Standards

Our company has obtained ISO 9001 International Quality Management System certification and has established a comprehensive quality assurance system covering the design, manufacturing, and service of small-and medium-power laser processing equipment.

Our company has established detailed standards covering the work environment and working conditions during the production process, basic technical requirements, cooling requirements, laser radiation safety, electrical safety, testing methods, inspection and acceptance procedures, as well as packaging and transportation. The national standards referenced in these standards include:

GB10320 – Electrical Safety for Laser Equipment and Facilities

GB7247 – Radiation Safety, Equipment Classification, Requirements and User Manual for Laser Products

GB2421 – Basic Environmental Test Procedures for Electronic Products

GB/TB360 – Specification for Test Equipment for Laser Power Energy Measurement

GB/T13740 – Test method for divergence angle of laser radiation

GB/T13741 – Test method for determining the beam diameter of laser radiation beams

GB/T13862-92 – Test method for laser radiation power

GB2828-2829-87 – Batch-by-Batch Periodic Inspection Sampling Procedure and Sampling Tables

2.2 Operating Environment and Related Parameters

Java runtime environment Java	
content	GY-FLC300SL
supply electricity	Single-phase 220 V $\pm 10\%$, 50/60 Hz AC power
Total power consumption	$\leq 1100\text{W}$
operating ambient temperature	$0^{\circ}\text{C} \sim 40^{\circ}\text{C}$
Work environment humidity	$\leq 80\%$
Optical parameters	
Laser average power	$\geq 300\text{W}$
Power instability	$< 5\%$
Laser operating mode	impulse
pulse length	13-500ns
Maximum single-pulse energy	2mJ
Power regulation range (%)	0–100 (Adjustable gradient)
Frequency adjustment range (kHz)	1–4000 (adjustable gradient)
Optical fiber length	5m
cooling-down method	forced air cooling
Cleaning Head Parameters	
Scanning range (length $\times$ width)	0–300 mm, continuously adjustable; Dual-axis support for 13 scanning modes;
Field lens focal length (mm)	210 mm (optional: 160 mm/254 mm/330 mm/420 mm)
Mechanical parameters	
Overall dimensions (length $\times$ width $\times$ height)	Approx. 617 mm $\times$ 469 mm $\times$ 291 mm
Packaging dimensions (length $\times$ width $\times$ height)	Approx. 770 mm $\times$ 570 mm $\times$ 470 mm
Total weight	Approximately 27.5 kg
Weight after packaging	Approx. 50 kg
Cleaning head weight (excluding optical head)	$\approx 1.46\text{KG}$
mode of operation	hand

2.3 Cleaning Head Structure and Dimensional Drawing

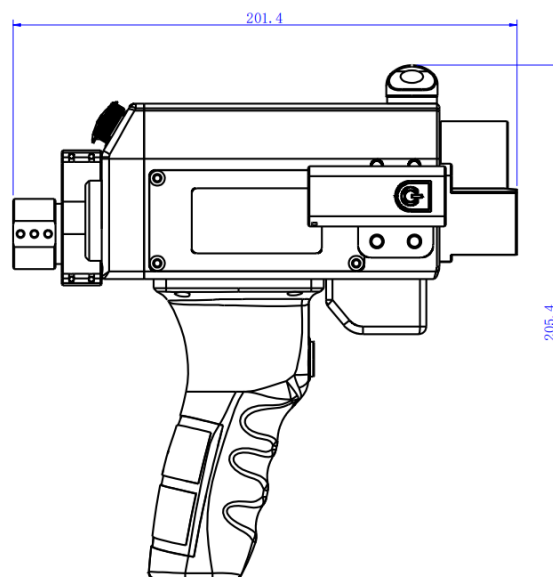
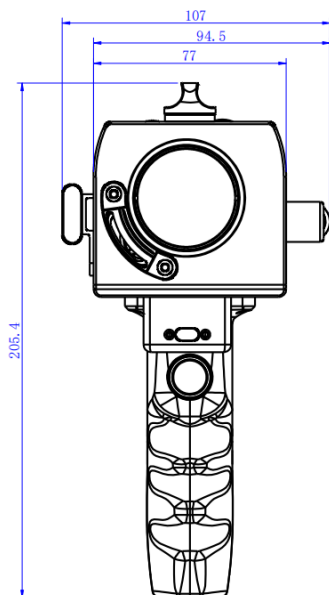


Figure 2.2 GY-QCFXYP300Max

(1) Overall dimensional drawing



Figure 2.3 – GY-FLC300SL Laser Cleaning Machine Dimensional Drawing

2.4 Configuration List

Table 2.1 GY-FLC300SL Laser Cleaning Equipment Configuration List

name	ts	unit	quantity	remarks
Laser Cleaning Main Unit	GY-FLC300SL	Taiwan	1	
Laser cleaning head	GY-QCFXYP300Max	individual	1	
Process Database	built-in	Set	1	
lasering protective eyeglass	SD-3	Pay	1	

Protective lens cover	43*2	Film	5	
Lens Cleaning Kit	Zeiss	Film	10	

3 Laser Cleaning Machine Installation and Operation

Pre-use precautions:

- Check whether the product's appearance is abnormal or if the output cables are damaged, among other issues;
- Please connect the quick connector correctly according to the label on the control box;
- Please connect the power supply correctly and ensure that the power cord connections are secure;
- Check and ensure that the cleaning head's protective lens is free of any dust or dirt;

3.1 Operating Procedures

Step 1: Remove the handheld cleaning gun, ensure that the button switch on the handle is in the released position, and take off the dust cover from the front end of the laser cleaning gun;

Step 2: Unplug the external power cord to power on the device, then turn on the emergency stop switch;

Step 3: Press the "Start" button – the system will power on and initialize;

Step 4: After the system has started up, complete the laser cleaning parameter settings via the touchscreen interface;

Step 5: After completing the laser parameter settings, press the Laser Enable button on the laser cleaning operation screen (before pressing the button, be sure to confirm that the button switch on the handheld head handle is in the released position);

Step 6: Wear the laser safety goggles, align the gun tip with the workpiece to be cleaned, and press the black button on the handheld handle – the gun tip will then emit light to begin the cleaning process.

Step 7: After use, sequentially turn off the enable button, cover the field lens dust cover, release the "Start" button, turn off the emergency stop switch, return the cleaning nozzle to the main unit storage box, and disconnect the main power supply.

3.2 Software Control Interface

3.2.1 Boot Interface

Upon startup, the system enters the startup waiting interface as shown in Figure 3.1. This interface indicates that the screen and control board are connected. If the connection is successful (the process takes approximately 5 seconds), the system will transition to the operation interface. If this transition does not occur within the expected time, the connection may be faulty. In such cases, power off the system and verify that the connectors are properly and securely installed.



Figure 3.1 Software startup interface

Note: The software interface logo, device model, and company information are customizable. This image is for illustrative purposes only (the same applies below).

3.2.2 Settings Interface

After completing the system initialization, access the operation interface. Before using the cleaning equipment, first click the "Settings" button in the lower-left corner of the interface to enter the cleaning system settings interface, as shown in Figure 3.2. The system settings interface displays the control card version and touchscreen

version number. You can configure parameters such as safety distance, laser type, temperature, single/double-click operation, laser output control mode, and single/double-axis galvanometer switching.



- Auto-off enable: Set the auto-off enable time in minutes. Click to enable until the scheduled time arrives when the laser is off; enabling will cancel.
- Timed laser shutdown: Set the duration for each laser pulse, measured in seconds. The laser will stop emitting when the preset duration is reached.
- Safety distance: The operating range of the distance sensor is set by default to a minimum of 10 cm and a maximum of 50 cm. If the distance is less than 10 cm or greater than 50 cm, the distance detection alarm will not emit any light; however, within the 10–50 cm range, the laser will operate normally.
- Click: The "Clean Head" button fires a laser upon a single click; switching to the "Double Click" mode requires a double click. Dual-axis mode: The cleaning head operates on both X and Y axes; selecting "Dual-axis" for a single-axis cleaning head switches to single-axis mode. Distance measurement: Activates the distance sensor. Mirrors activation: Activates the mirror alarm switch. Chiller activation: Activates the chiller alarm switch; if the equipment lacks a chiller, clicking "Chiller Activation" turns off the chiller alarm.
- X and Y coefficients: Field lens/focusing lens configuration. When the focal lengths or actual working distances of different field lenses/focusing lenses differ, the field lens coefficients can be used to correct the actual scanning width and height. Modification password: 123.

Field lens model	X coefficient	Y coefficient
F160	84	84
F210	110	110
F254	135	135
F330	150	150
F420	195	195

- Language Switch: Set the system language mode. Currently supports 15 languages; other languages can be customized.
- Distance function: Default enabled;
- Temperature setting: Default 50°C;

3.3 Operation Interface

3.3.1 Scanning Method

The operation interface offers 13 cleaning modes, which can be switched (with cyclic switching) by tapping the scanning mode options: straight-line mode, rectangle mode I, rectangle mode II, circular mode, sine wave mode, spiral mode, free mode, annular mode, rotation mode, triangle mode, rotating circle mode, rotating straight-line mode, and linear rotating circle mode.

(1) Linear Mode

In this mode, the scanning method is linear, and the interface is shown in Figure 3.3.

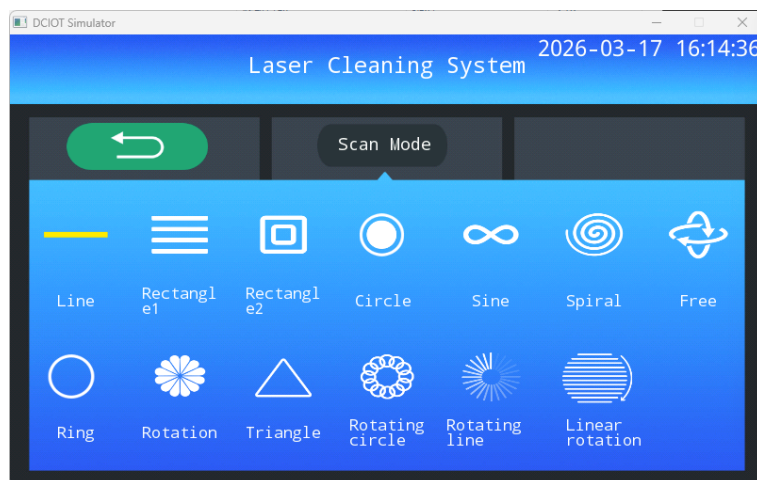


Figure 3.3 Linear scanning mode operation interface

- Laser power: Average output power of the laser, adjustable within the range of 10% to 100%.
- Frequency: Laser pulse repetition frequency adjustable, ranging from 1 to 4000 kHz;
- Scanning speed: the movement rate of the laser spot focused on the workpiece surface; the maximum scanning speed depends on the scanning width.

run-length (mm)	Scan speed (mm/s) (upper limit)
More than 50	50000
40-49	40000
30-39	32000
20-29	16000
10-19	8000
5-9	6000
3-5	4000
1-3	2000

- Scan width: Sets the linear scanning width, ranging from 5 mm to Mx (where Mx value depends on the size of the field lens/focusing lens).

Field View Type	Scanning range Mx (mm)
F160	105
F210	140
F254	160
F330	185
F420	300

- Scan count: Used in special cases. You can set a specified number of scans; after reaching the limit, the light output stops. The default value is 0.
- Enable: After completing the parameter settings, click the Enable button. The system and laser will enter the light-emission preparation state.
- Pulse width: Set according to actual on-site requirements, ranging from 1 to 500 ns;
- Edge coefficient: Edge extinction, which eliminates the intense light at both ends of the laser beam. The default value is 0, with a maximum setting of 2000. Adjust the value according to actual field requirements; 500 is recommended for this function. Password: 123.
- Extinguishing delay: Combined with the edge coefficient, it effectively eliminates strong points on both sides. The default value is 0; it is recommended to set it to 0.5 when using this feature. Password: 123.
- Chiller Alarm: The fault output signal from the chiller is connected to the control card. When an alarm occurs, it is displayed on the interface. For air-cooled equipment, short-circuit this signal to shield it or disable the chiller alarm signal in the screen interface.

(2) Rectangular Mode

In this mode, the scanning pattern is rectangular, with the interface shown in Figure 3.4. The definitions and ranges for power, frequency, pulse width (duty cycle), scanning speed, scanning width, and scanning frequency are identical to those in the linear mode and will not be reiterated here (the same applies below).



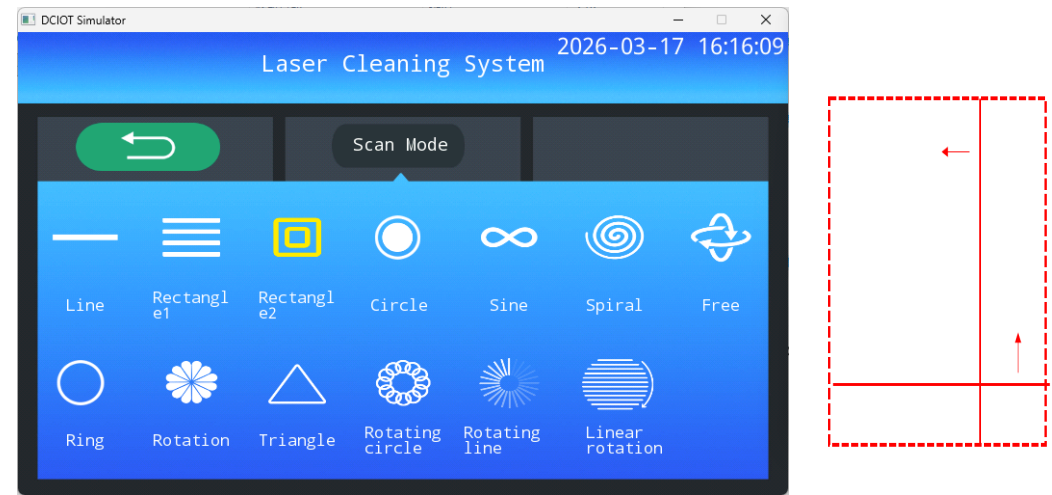
Figure 3.4 Rectangular scanning mode operation interface

- Fill spacing: Sets the laser filling distance within the rectangle (range: 0.01–1 mm), affecting the spot overlap rate along the Y-axis; the default value is 0.1.
- Scan height: Set the scanning height of the rectangle, ranging from 1 mm to Mx (where Mx depends on the field lens coefficient).

Field View Type	Scanning range Mx (mm)
F160	105
F210	140
F254	160
F330	185
F420	300

(3) **Rectangular Two-Mode**

The Rectangular Mode 2 is largely similar to Rectangular Mode 1, with the addition of a horizontal cleaning mode on top of the vertical cleaning feature of Rectangular Mode 1.



(4) **Circular Mode**

In this mode, the scanning shape is circular (as shown in Figure 3.5), with the scanning range defined solely by the circle's diameter and fill spacing.



Figure 3.5 Circular scanning mode operation interface

(5) Sine Mode

In sine mode, the scan waveform is a sine curve, as shown in Figure 3.6. The sine period must be set in this mode—the period of the sine waveform along the X-axis; a smaller value indicates a higher waveform fluctuation frequency, with a range of 1 mm to 100 mm.

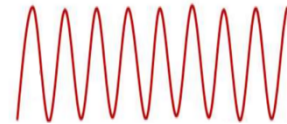
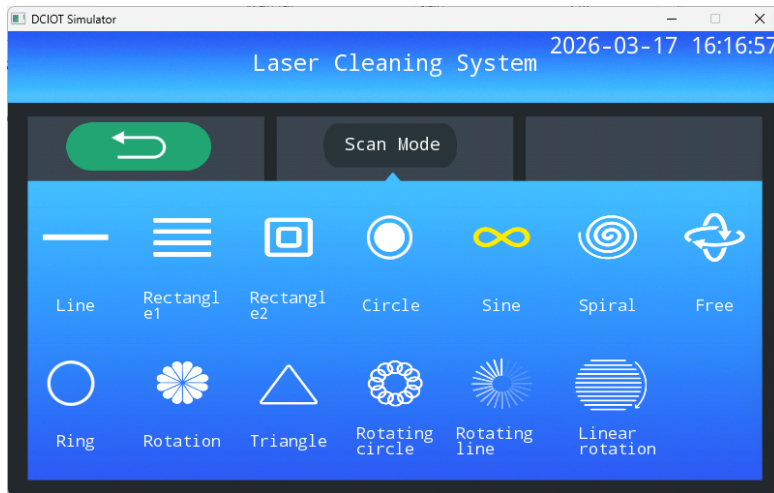


Figure 3.6 Sinusoidal scanning mode operation interface

(6) Spiral pattern

In spiral mode, the scanning waveform is a spiral curve, and the operation interface is shown in Figure 3.7. The parameter settings are identical to those in the sine mode.

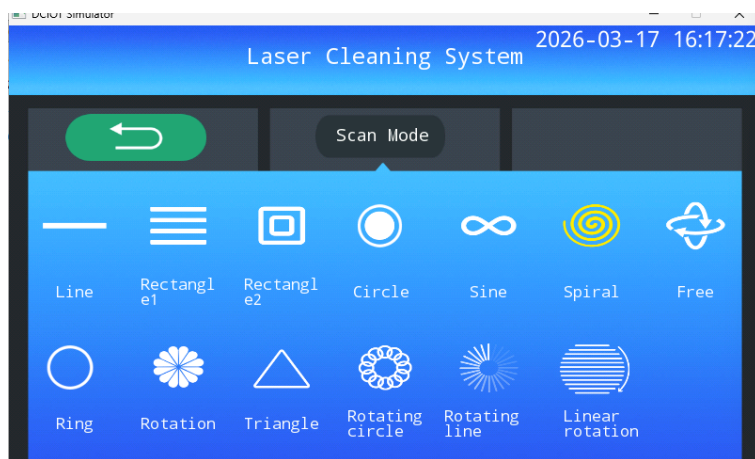


Figure 3.7 Helical scanning mode operation interface

- Number: Number of waveforms in spiral mode, range 1–16;

(7) Free Mode

In free mode, the widths and frequencies of the X-axis and Y-axis motors can be freely adjusted within specified ranges. In this mode, the scanning speed is not constant and cannot be accurately calculated; the scanning waveform may vary in multiple ways. This mode serves as a supplement to the aforementioned five modes, accommodating a wider range of application scenarios.

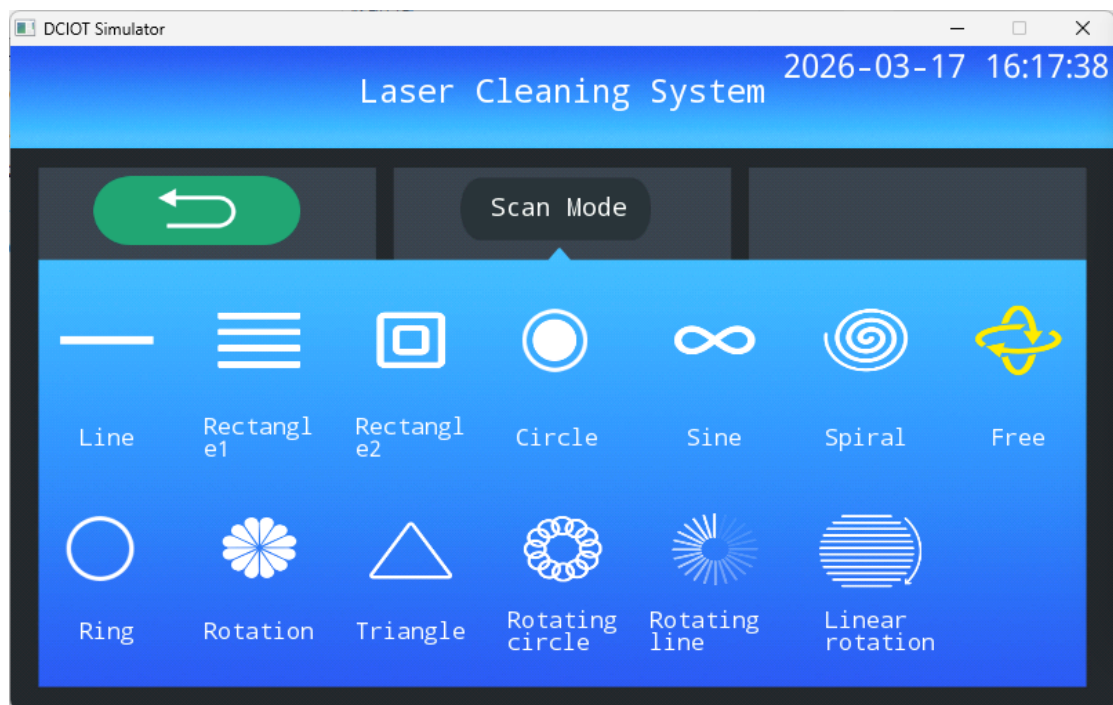


Figure 3.8 Free Scan Mode Operation Interface

- X/Y frequency: less than 100 Hz;
- Scan height: Set the scan height for free mode, ranging from 1 mm to 50 mm.

(8) Circle

This pattern features a gradually inward contracting ring, as shown in Figure 3.9, where the filling interval represents the contraction rate of the ring.

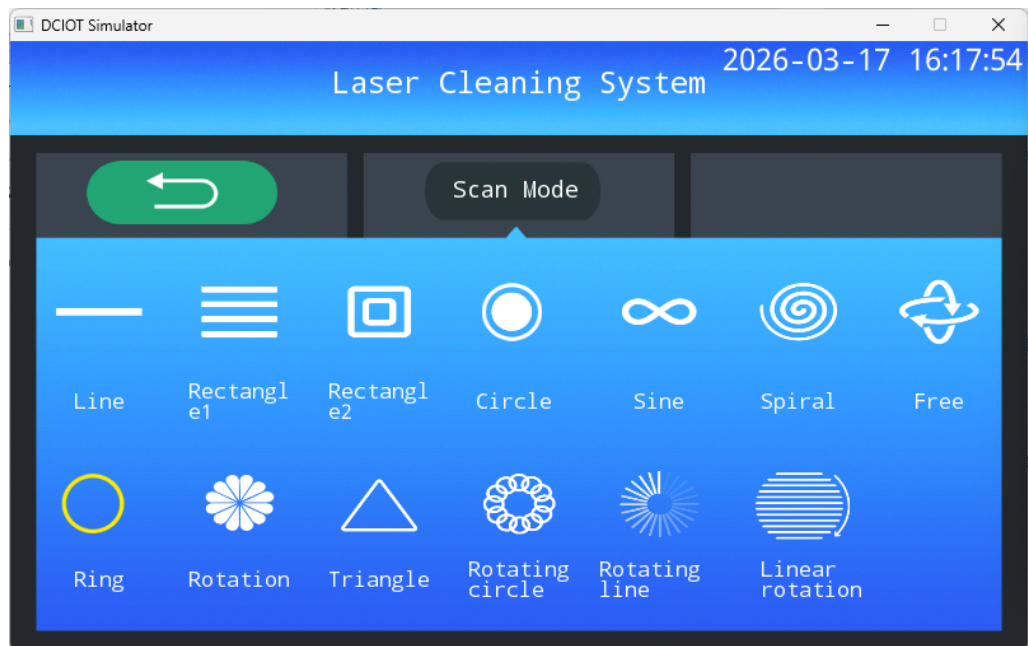
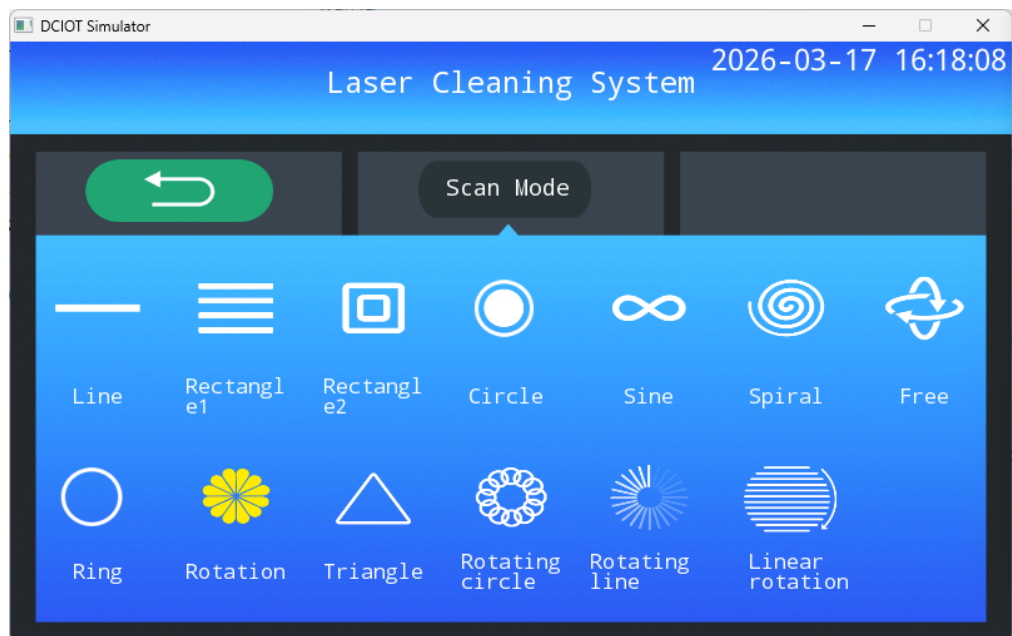


Figure 3.9 Ring Mode Operation Interface

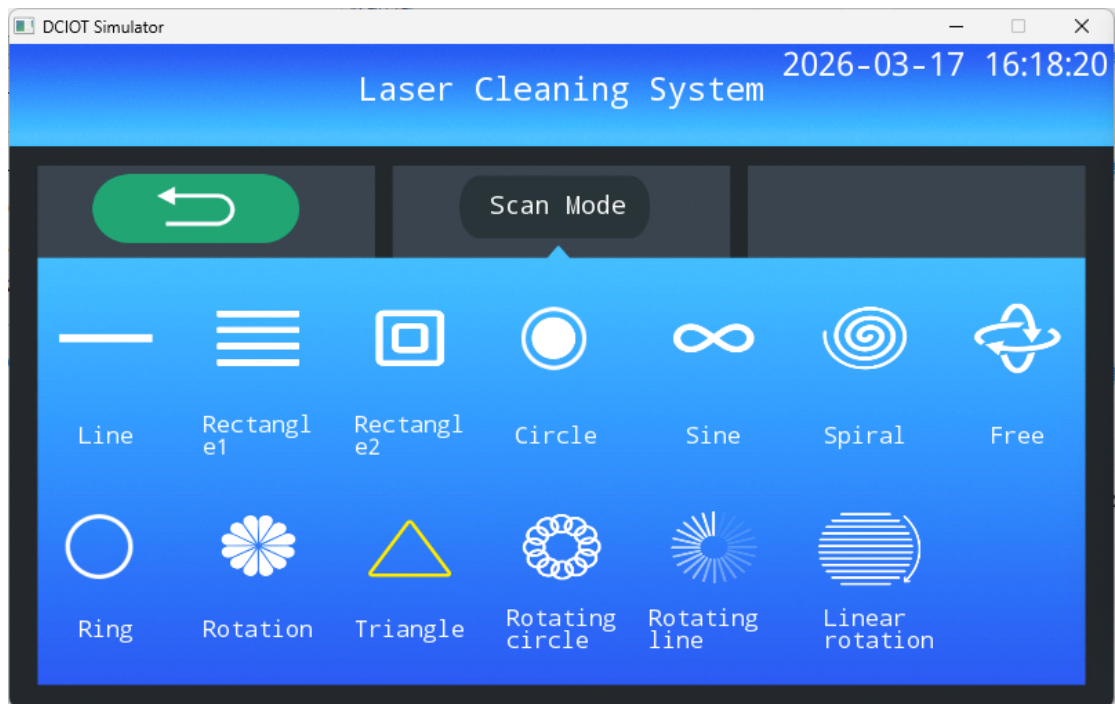
- Edge coefficient: Adjust the inner circle size, range: 0–100%;

(9) Rotation



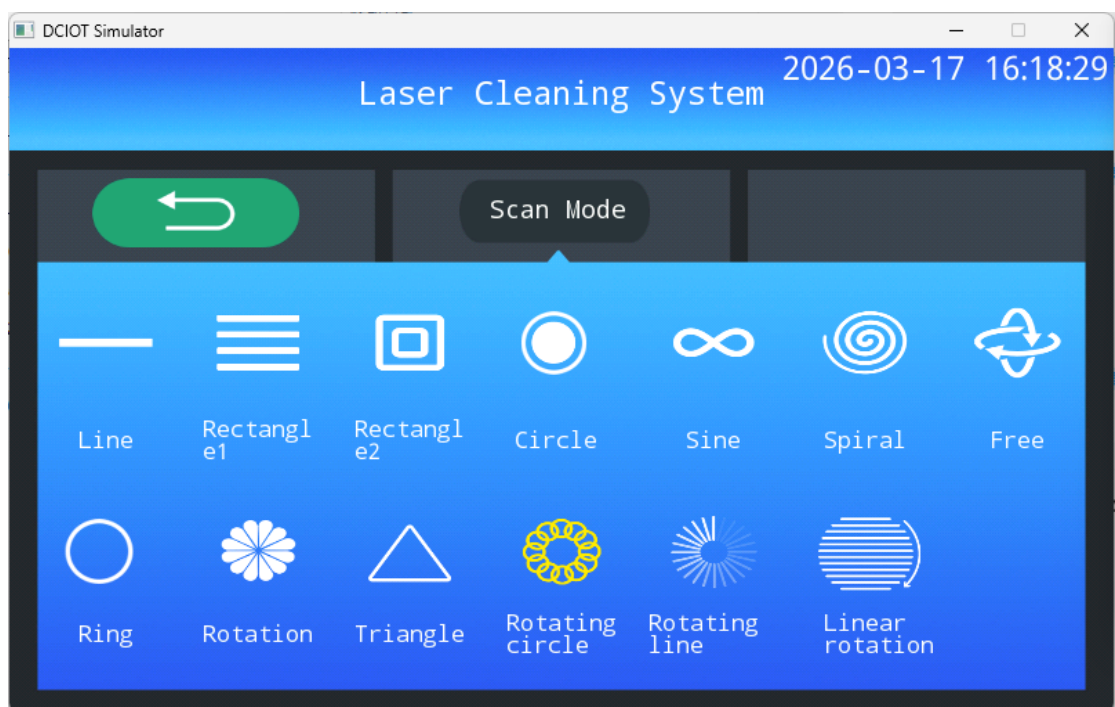
- You can adjust the graph using parameters such as cycle and series;

(10) **Triangle**



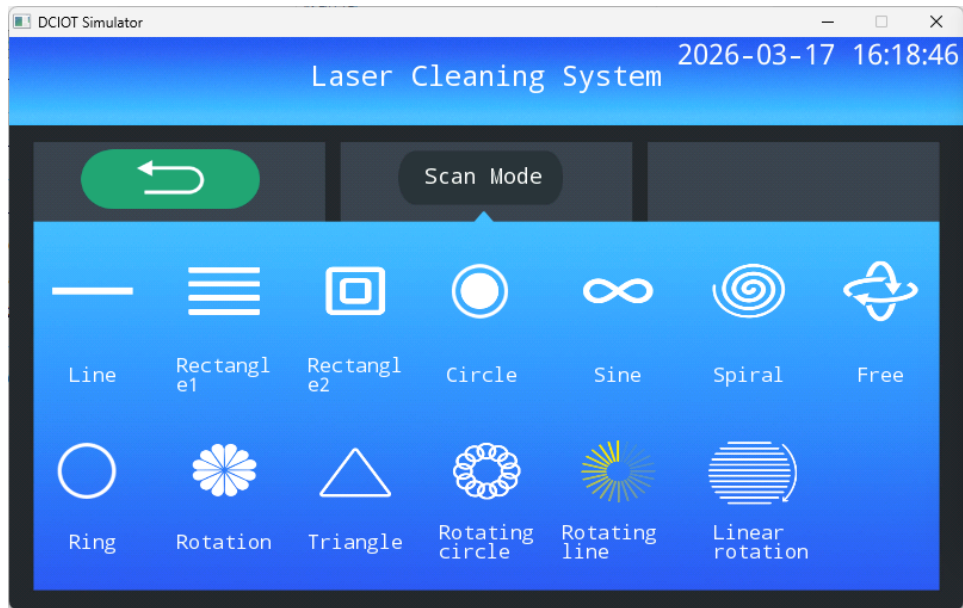
- In the scan parameter interface, adjust the size of the triangle;

(11) **Rotating Circle**



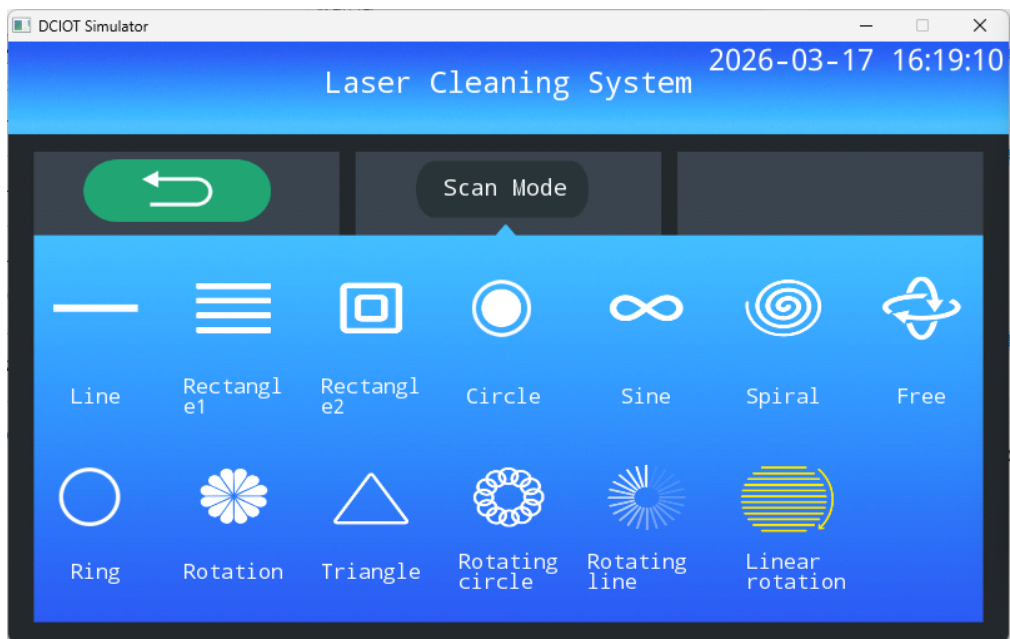
- Multiple circles are interconnected in a 360° loop, with their dimensions adjustable via the scanning interface.

(12) **Rotating Line**



- The endpoints of the straight line segment face the circle center; rotating the segment 360° enables rotational scanning and cleaning.

(13) Linear Rotating Circle

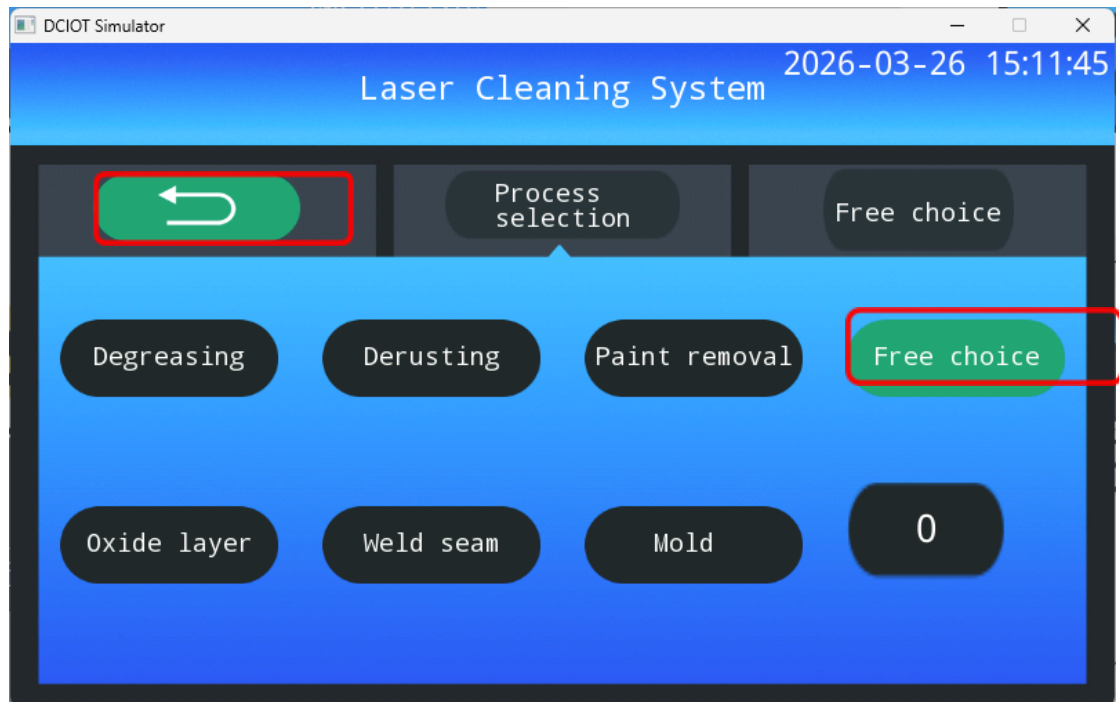


- The line performs multi-angle circumferential scanning; no fill spacing is required in this mode.

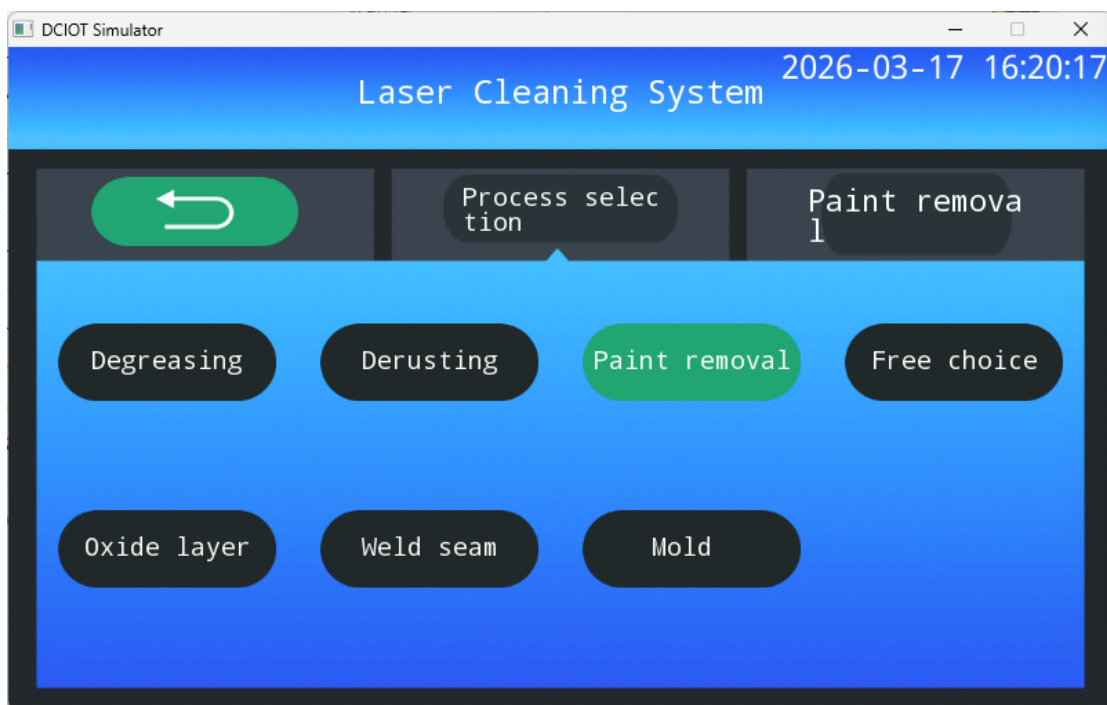
3.3.2 Database

(1) Custom database

Customize cleaning parameters: In this system, there are 100 customizable parameter groups ranging from 1 to 100, with group 1 serving as the default configuration. Groups 2 through 21 support customized parameter labels (in Chinese/English; other languages are not currently supported). By configuring different process group parameters, users can quickly select the appropriate parameter set for specific cleaning requirements, eliminating the need for repeated adjustments.



- Enter the "Process Selection" menu, click the Free Selection button, and enter the custom parameter group in the numeric input field below Free Selection. After adjusting the appropriate parameters based on the actual cleaning condition, input the relevant parameters sequentially, and assign the process tag "wood" to the Process Tag column (currently supports Chinese/English).

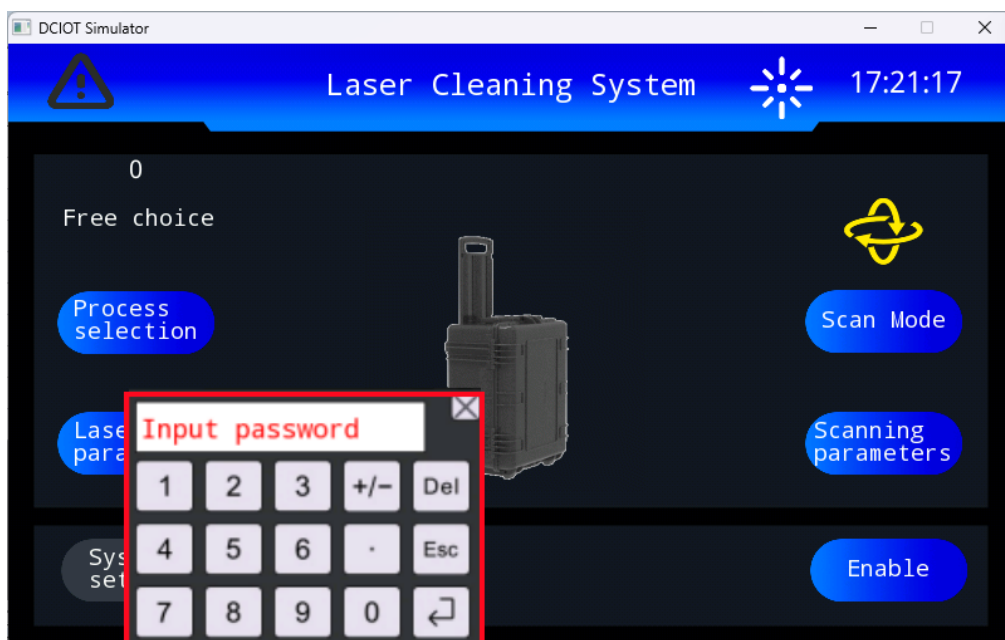


(2) Default Process Library

- The default process library is the system-integrated process database, designed to match lasers of various brands and specifications. By selecting and invoking appropriate parameters, the parameter adjustment process can be significantly streamlined, enhancing equipment compatibility and reducing operational complexity for personnel.
- Number: Select the database ID and retrieve the process data corresponding to the selected number (default: 1); modify the password: 123.
- Step 1: Before using the equipment, verify the laser brand, single-pulse energy, and other parameters according to the data provided by the laser supplier. Refer to the JPT laser example to confirm the relevant laser parameters.

型号		YDFLP-CL-200	YDFLP-CL-300	YDFLP-CL-200	YDFLP-CL-300	YDFLP-CL-300
指标		-1	-1	-5	-5	-10
M ² 典型值		2		5		12
输出铍缆长度	m	5				
平均输出功率	W	>200	>300	>200	>300	>300
最大脉冲能量	mJ	1.5		5		15
频率可调范围	kHz	1-4000				
脉冲宽度	ns	2-500				

- Step 2: After powering on the equipment, enter the laser cleaning system and click the "System Settings" option. The password input window will appear; enter the primary password (123) to access the equipment management interface. Click the laser selection option to enter the laser selection page. Based on the supplier's specifications, choose the corresponding laser model. The selected laser model is displayed in the upper-right corner; the default parameters (rust removal, degreasing) will then be applied, and the system will be ready. (For automatic switching to the default process library, directly click the "Free Selection" button to return to the custom process interface.)



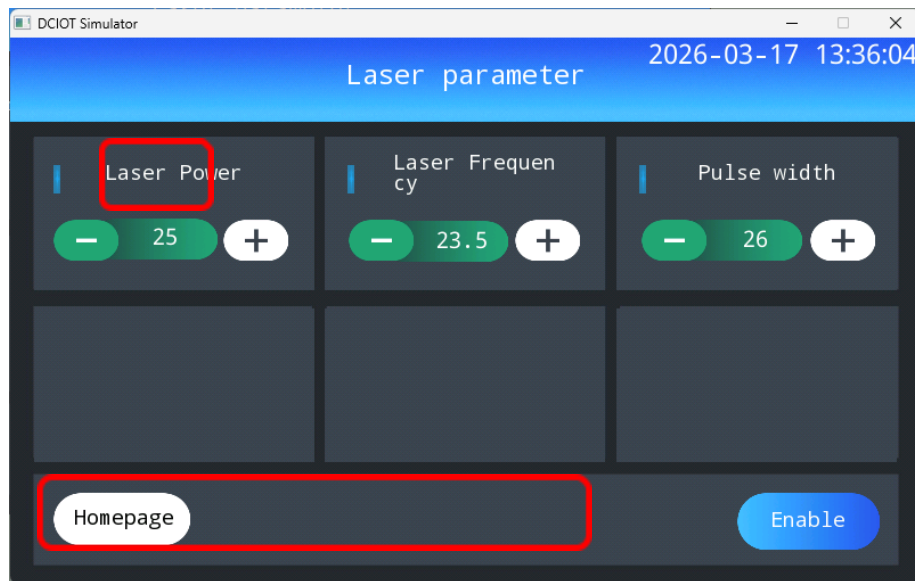


Select the appropriate laser type

- Step 3: Return to "Process Selection". Depending on the workpiece type, click the "De-rusting" button directly; the corresponding process label will appear in the label row, indicating the system-prepared parameters for the de-rusting operation. Return to the "Main Page", click "Enable", and press the light emission button to initiate the de-rusting process. Other default process operations follow the same procedure.

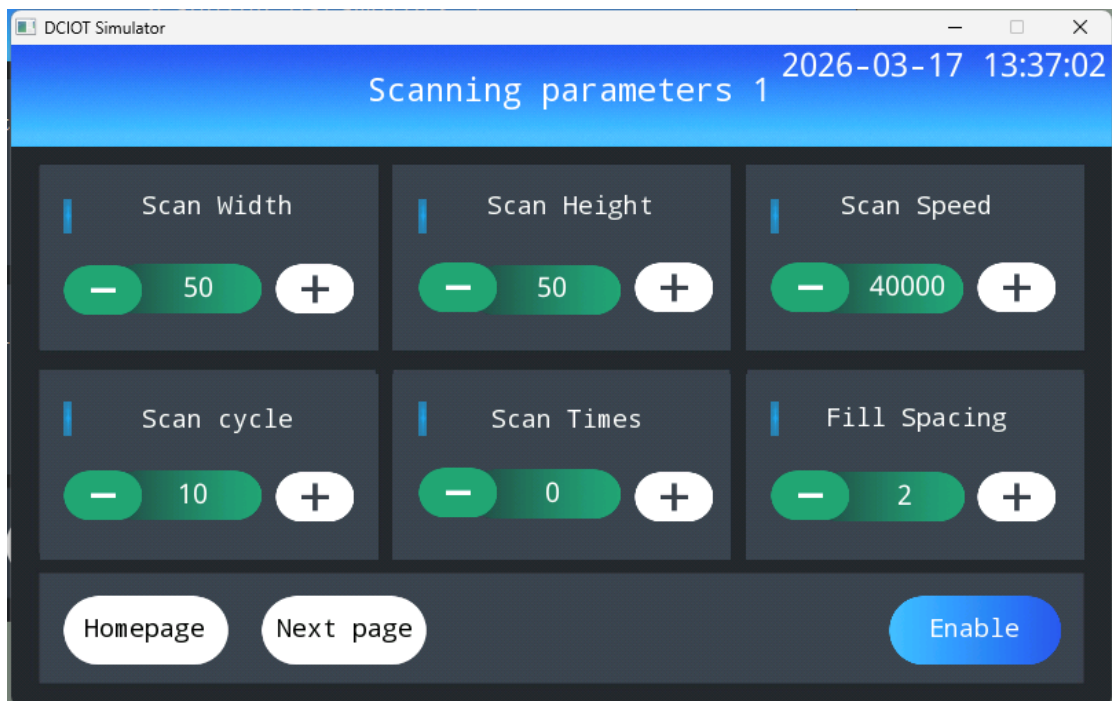
3.3.3 Parameter Settings

(1) laser parameter



- Laser power: Average output power of the laser, adjustable within the range of 10% to 100%.
- Frequency: Laser pulse repetition frequency adjustable, ranging from 1 to 4000 kHz;
- Pulse width: adjustable from 1 to 500 ns;

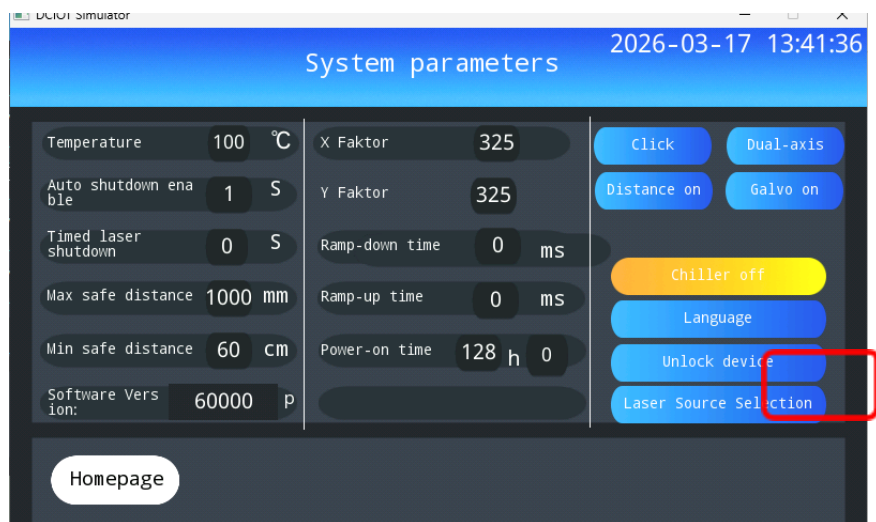
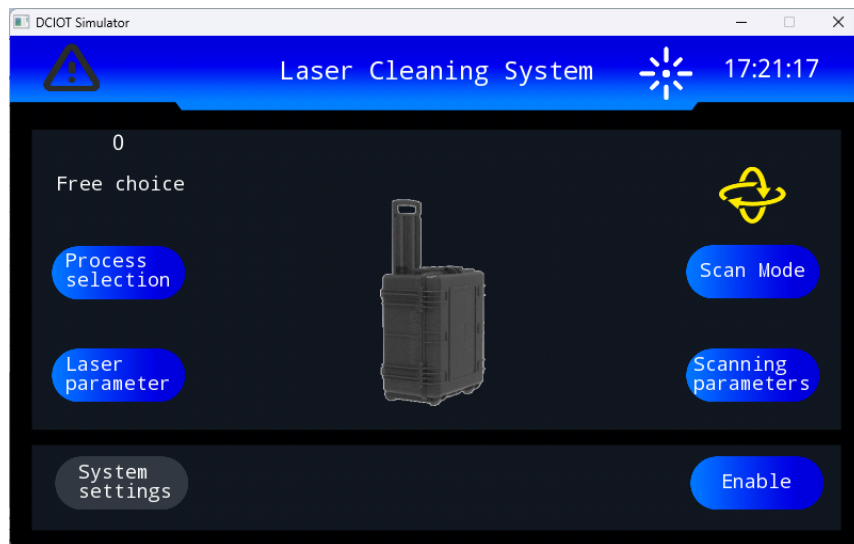
(2) Scan Parameters



- Scan parameters: This interface allows you to set parameters such as scan width, scan height, scan speed, scan cycle, number of scans, and fill spacing.

3.3.4 Decryption and Password Setup

- During the trial period, the phrase "Please activate" appears in the upper-right corner, indicating that the trial has expired and decoding is required.



DCIOT Simulator

Laser Cleaning System

SN 9 1 1 8 6 8 1 9 1 1 1 1 1 6 7 1

KEY

Time: 1 h

Active status Inactive



1 hour (unactivated)



DCIOT Simulator

Laser Cleaning System

SN 9 1 1 8 6 8 1 9 1 1 1 1 1 6 7 1

KEY

Time: 0 h

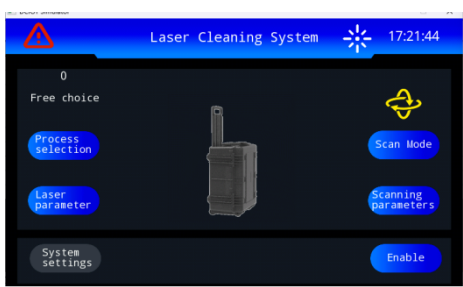
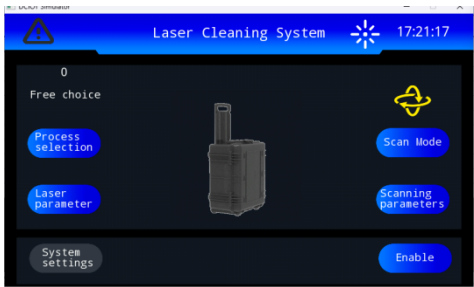
Active status Activate



Active activation status

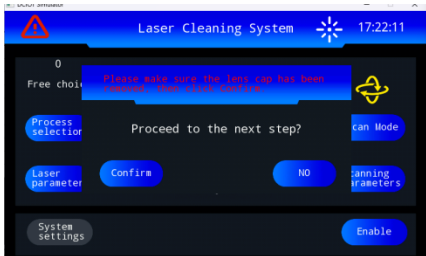
- Users can set a trial period or enable permanent decryption based on the on-site situation.

(12) Others (Light emission step)



Main Interface Enable Confirmation

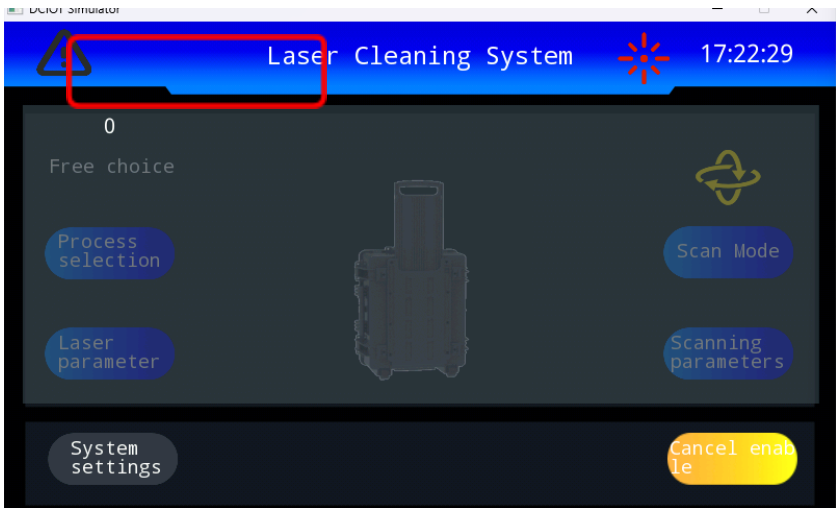
Main Interface Enable Confirmation

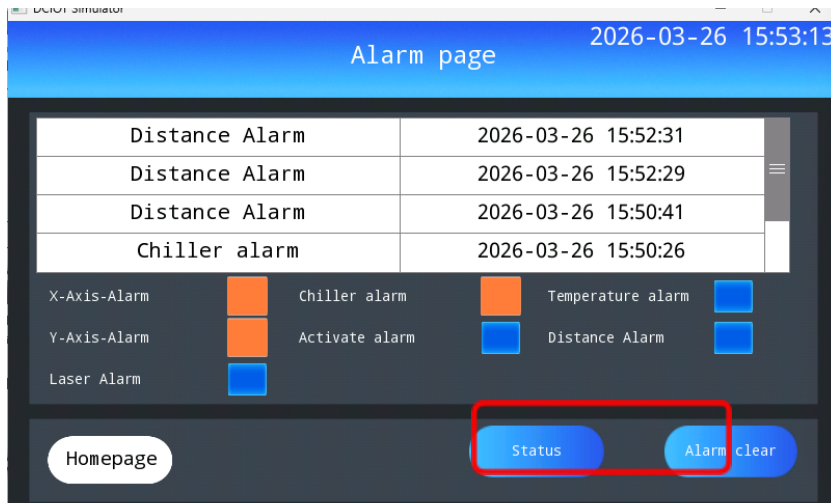


After enabling in Outlight

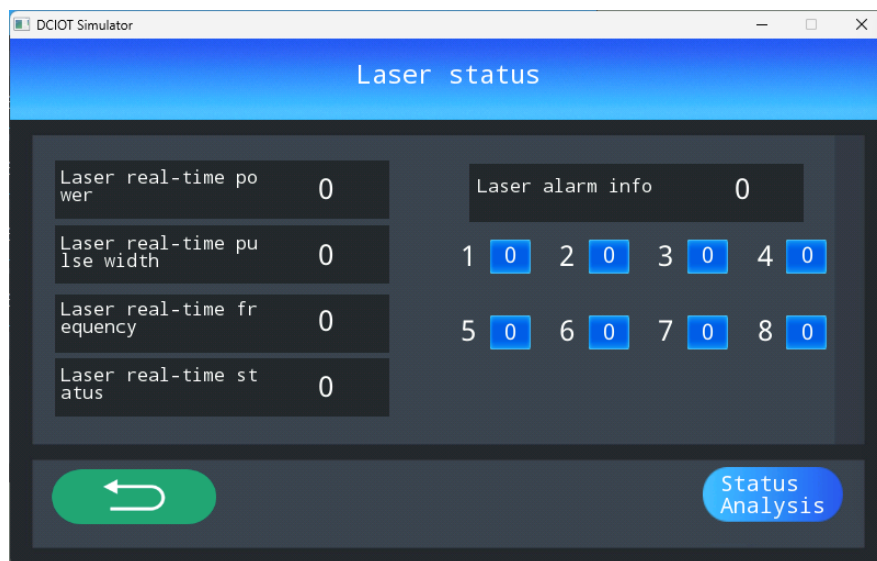
After enabling in

(10) Report to Police





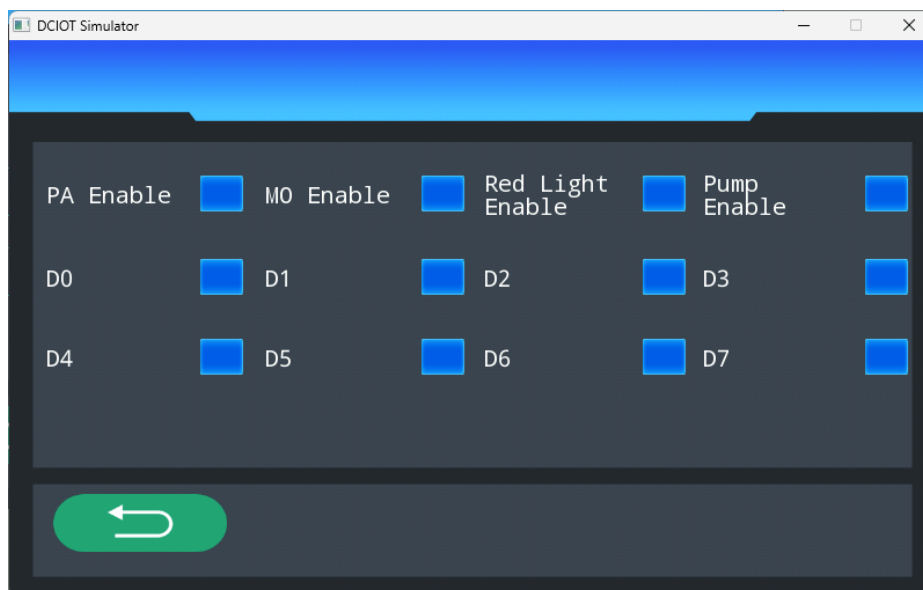
- This interface displays the alarm status of each component: red indicates an alarm, while blue indicates normal operation.



- This interface also allows monitoring of the laser's operating status during light emission, displaying real-time data on laser power, pulse width

frequency, and laser signal condition.

表【1.5】监控信息		
Byte	描述	单位
1	传感器 2 (L_Byte)	0.1℃
2	传感器 2 (H_Byte)	
3	传感器 1 (L_Byte)	0.1℃
4	传感器 1 (H_Byte)	
5	种子源 TEC 温度(L_Byte)	0.1℃
6	种子源 TEC 温度(H_Byte)	
7	二级电流 (L_Byte)	0.1A
8	二级电流 (H_Byte)	
举例：读取激光器的传感器 1		



- The operational status of each laser signal function can be viewed directly on this interface without connecting to the laser.

4. Pre-sales and After-sales Service

4.1 Service Commitment

Our company adheres to a customer-centric approach, thoroughly understanding clients' cleaning requirements, and providing comprehensive, personalized pre-sales and after-sales services including installation, commissioning, training, and maintenance.

(1) Pre-sales Service

Prior to signing the contract, the company provides clients with various production process solutions, along with technical consultation on laser cleaning equipment, sample specimens, and equipment selection services.

(2) Installation and Commissioning

In accordance with the contract, our company will safely deliver the equipment to the user's designated installation site free of charge within the specified timeframe and dispatch a technical service engineer for on-site installation. Once the user has obtained all necessary spare parts for installation and commissioning, the technical service engineer will complete the machine installation and commissioning within two working days for the user's use, ensuring that the installation and commissioning site remains tidy, clean, and well-organized.

(3) After-sales Training

The company provides free technical training. Upon completion of installation and commissioning, technical training is conducted for the buyer's operators either at the buyer's site or at the seller's domestic training and maintenance center, until the operators can operate the equipment normally. The main training content includes the following:

- Basic Principle of Laser Cleaning Technology

- Main Structure of Laser Cleaning Equipment
- Operation and Use of Laser Cleaning Equipment
- Adjustment of laser cleaning process parameters
- Maintenance of laser cleaning equipment

(4) After-sales Commitment

- The device comes with a one-year free warranty (excluding damage caused by human error or fiber optic breakage).
- Free technical consulting services, as well as process and software upgrades;
- Lifelong maintenance service is provided, with costs charged only for spare parts.
- Provide comprehensive software and hardware support throughout your lifetime.

4.2 Limitations of the Warranty

Damages to products and their components (including optical fibers) resulting from tampering, opening, disassembly, improper installation, or modification by personnel other than our company; damage caused by misuse, negligence, or accidents; or damage resulting from use beyond specified parameters, improper installation or maintenance, abuse, or failure to follow the information and warnings in the user manual are not covered by the warranty. The customer is responsible for understanding and following the operating instructions provided in the user manual and operating scope; damage caused by incorrect operation is not covered. Accessories and other components are not covered by the warranty.

Within the warranty period, if the buyer identifies any issue, they must submit a written request within 30 days of discovery. This warranty does not cover third parties (including the specified buyer, end-user, or customer), nor does it apply to parts, equipment, or other products not manufactured by our company.

4.3 Technical Support and Product Maintenance

This product contains no additional built-in maintenance accessories beyond

those provided; therefore, all repairs beyond these accessories must be performed by our company's technical personnel.

If any malfunction occurs during product use, please promptly notify our technical staff for troubleshooting.

All repair and replacement products must be stored in the original packaging boxes provided by our company. Otherwise, our company reserves the right to refuse free repairs for any product damage resulting from improper storage.

Upon receiving our products, please promptly inspect whether the items are intact and complete with all accessories. If any abnormalities are detected, immediately contact the carrier and our company.

Our company will continuously develop new products. The product information listed in the manual may change without prior notice. All technical specifications shall be subject to the contract terms.

The above warranty and service terms provided by our company for the product are for users' reference only; the official service and warranty terms shall be governed by the provisions in the contract.