



## EZCAD3 User Manual

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# Chapter 1 Overview

## 1.1 Introduction to EzCad3 Software

Compared with EzCad2, the new version of EzCad3 is upgraded as follows: 3D projection, wrapping and layered deep carving; dynamic focusing large-format carving—solving small-format lens segmentation carving seam defects; selecting different through external input ports The layer is processed, and the multi-layer processing interface is more novel and friendly; the DLC2-M4 card comes with 4-way extension shaft to realize the expansion shaft splicing and feeding function; realize the dynamic carving flight carving function of the assembly line.....

### 1.1.1 Software Installation

EzCad3 software standard computer hardware required for operation: dual-core CPU, memory 2G, hard disk 10G, dual native USB interface. The computer system software is Microsoft Windows operating system WIN7 64-bit, WIN8 64-bit and WIN10 64-bit. This manual fully states that the default operating system is Microsoft Windows. **Note: It is recommended that the operating system choose Professional or Enterprise Edition.**

EzCad3 software installation is very convenient, users only need to copy the EzCad3.0 directory file on the installation CD directly to the hard disk. Then double-click the EzCad3.exe running software in the EzCad3.0 directory that has been installed. The computer must be authorized before the software runs, otherwise the software will not run normally.

### 1.1.2 Software Features

Table 1.1 Main functions of EzCad3 software

Number	Function Description
1	Free design the processing graphics
2	Supports two-dimensional barcodes such as TrueType fonts, single line fonts (JSF), dot matrix fonts (DMF), one-dimensional barcodes and DataMatrix

- 3 Flexible text processing, changing text in real time during processing, directly reading  
and writing text files and Excel files
  - 4 Powerful node and graphic editing functions for curve welding, reduction and  
intersection calculation
  - 5 Supports up to 256 pens and can set different processing parameters for different objects
  - 6 Compatible with regular image formats (bmp, jpg, gif, tga, png, tif, etc.)
  - 7 Compatible with regular vector graphics (ai, dxf, dst, plt, etc.)
  - 8 Compatible with std, dxf format 3D models
  - 9 Conventional image processing functions (grayscale conversion, black and white map  
conversion, dot processing, etc.) and 256-level grayscale image processing
  - 10 Powerful padding to support multiple fill types
  - 11 Multiple control objects, free control system to interact with external devices
  - 12 View projection carving on 3D model file
  - 13 3D model layered carving
- 

### 1.1.3 Software Interface

**Startup interface:** The interface starts as shown in Figure 1.1, and the software is initialized in the background.



Figure 1.1 Startup interface

**Main interface:** The main interface after the program is initialized is shown in Figure 1.2.

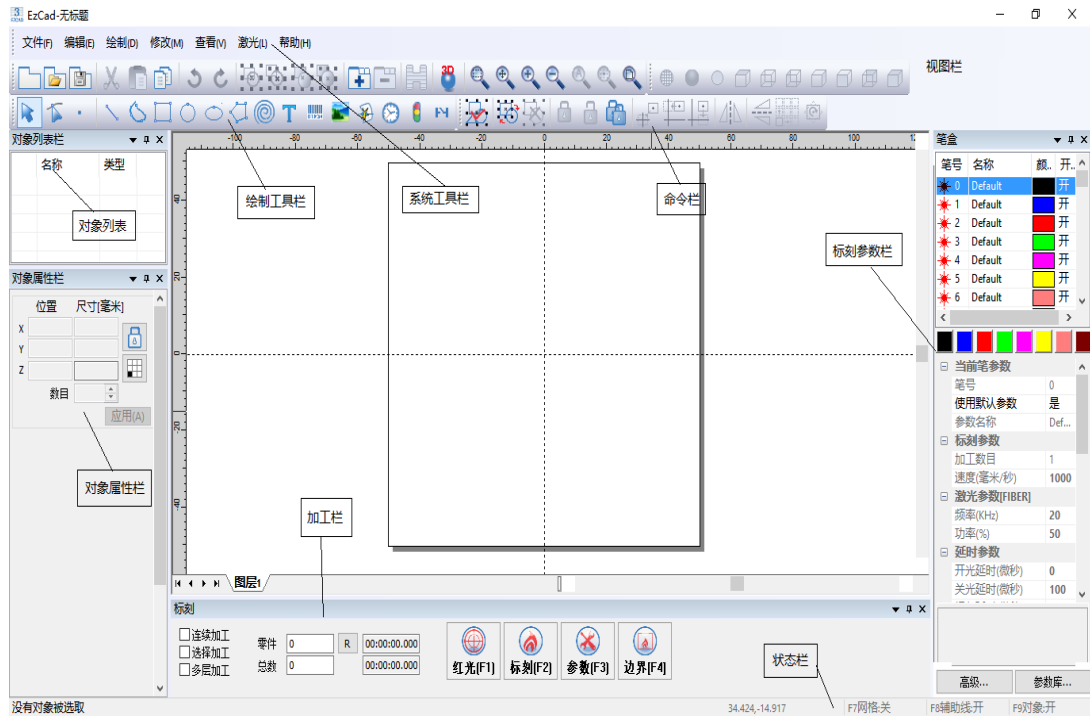


Figure 1.2 Software main interface

## Chapter 2 3D function

### 2.1 3D projection

#### 2.1.1 Introduction

3D projection: Projecting text or vector graphics to a curved surface using parallel rays, and performing focal length adjustment on the surface through software and 3D galvanometer. Figure 2.1 is a diagram of parallel projection, and red is the projected image. The front and back of the projection are observed from the projection direction.

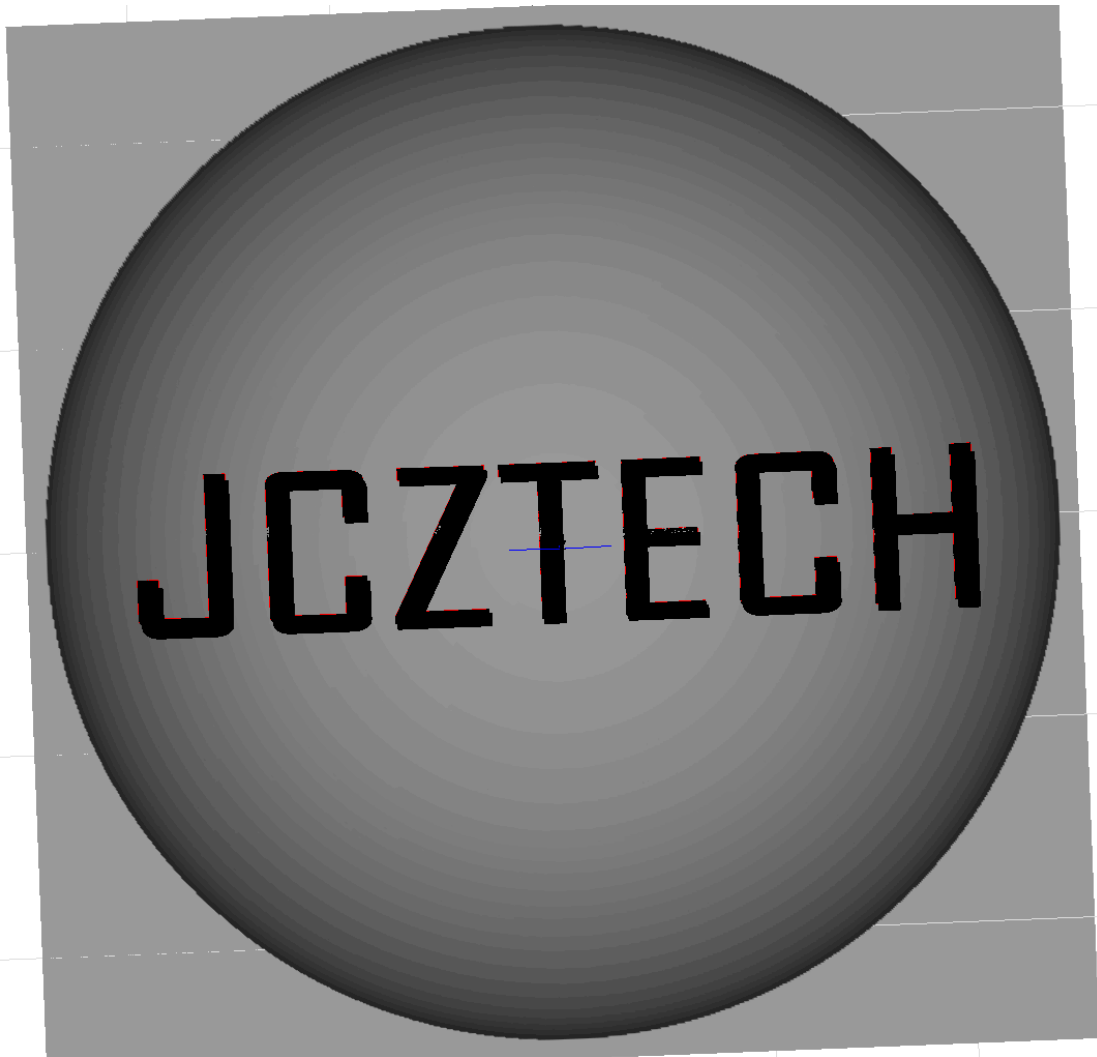


Figure 2.1 Projection Diagram

## 2.1.2 Hardware environment

The hardware environment is consistent with the 3D software. The specific device configuration is shown in Table 1.2.

Table 1.2 Hardware Environment Configuration

Name	Specifications
computer	Dual-core CPU, memory 2G, hard disk 10G, dual native USB interface
operating system	WIN7 64-bit, WIN8 64-bit or WIN10 64-bit
Card	DLC2 carving card
Galvanometer	3D
Laser	Fiber, UV or CO2



## 2.1.2.1 Hardware Manual

The company only provides the control card manual. Since different manufacturers and different types of galvanometers and lasers are very different, they are not introduced here.

As shown in Figure 2.2, only the brief hardware description of the DLC2 card is provided (refer to the DLC2 card hardware manual for detailed functions):

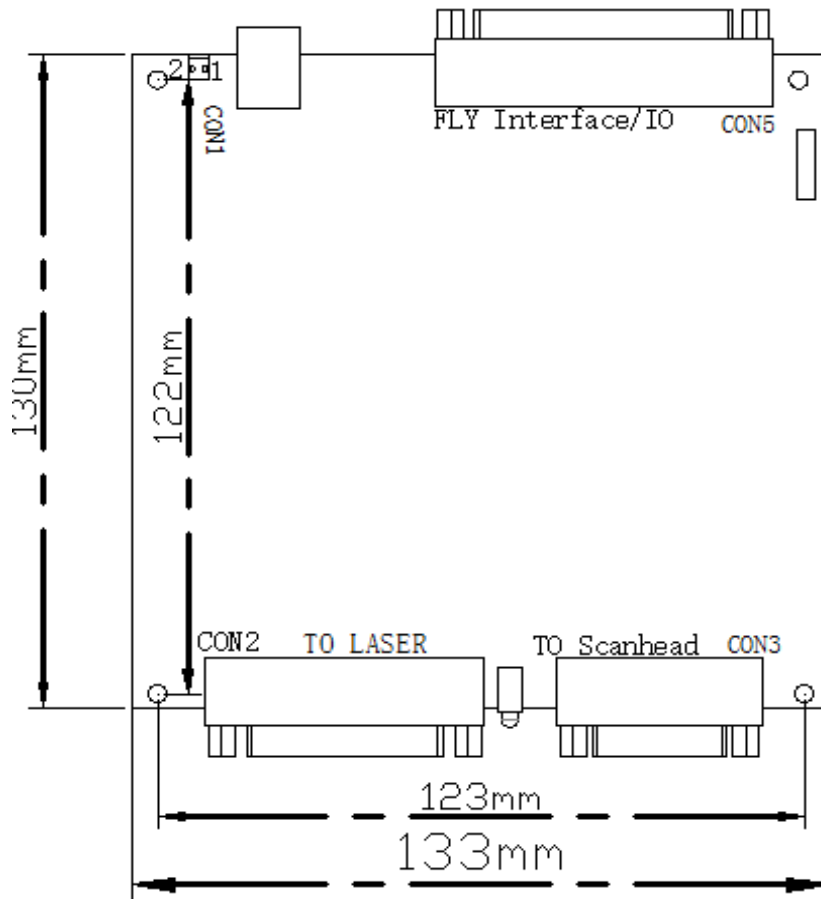


Figure 2.2 Schematic diagram of the DLC2 card

**CON1—Power Supply:** The DLC-2 control card supports wide voltage DC power supply (12V-24V). It is recommended to use 12V/3A DC power supply. The power supply is connected from the CON1 2P green terminal pin. Among them, the power of the card is pin2 near the screen, and the pin1 is close to the USB interface. As shown in Figure 2-3 and Table 2-1 below:

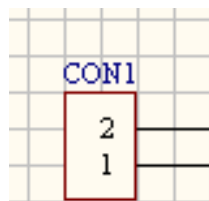


Figure 2.3 CON1 power port

Table 2.1 Power Port Pin Definitions

CON1 PIN	Name	Description
2	VCC	+12V, Positive side of power supply
1	GND	Ground, Negative side of power supply

**CON3—galvanometer interface:** The galvanometer interface (CON3) supports the enhanced XY2-100 data protocol for driving 2D/3D galvanometers. The interface type is 15-pin double-row pin (female, 2.54mm pitch), The definition is shown in Figure 2.4 and Table 2.2.

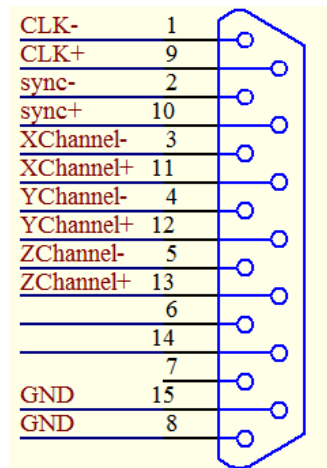


Figure 2.4 Schematic diagram of CON3

Table 2.2 CON3 pin definition

Number	Name	Description
1、 9	clock	Output galvanometer
2、 10	Synchronization signal	data according to the
3、 11	X-axis data	standard XY2-100
4、 12	Y-axis data	protocol
5、 13	Z-axis data	
8、 15	Digital GND	Digital ground
Others	Reserved	Reserved

The universal two-dimensional galvanometer only needs to connect four sets of signals CLK clock, SYNC sync, XChannel, Ychannel and GND for a total of 9 signal lines to work properly. Digital signals are recommended to be connected using shielded twisted pairs.

**CON2—Laser Interface:** The laser interface (CON2 interface) supports all types of lasers, and changes between different types of lasers via Ezcad3 Software > Parameter (F3) laser control settings. **Note: Always turn off the laser power when changing the laser type, then turn on the laser**

power after the setup is complete. The interface type is 25-pin double-row pin (female, 2.54mm pitch).

(1) Fiber mode pin definition:

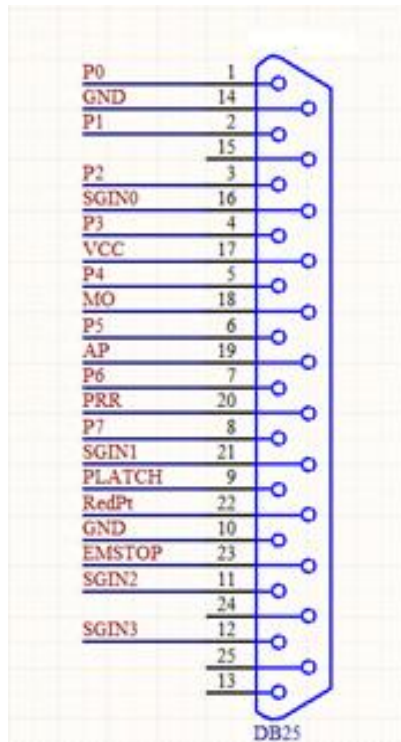


Figure 2.5 CON2—Fiber mode pin diagram

Table 2.3 CON2—Fiber Mode Pin Definition

Number	Name	Description
1—8	P0—P7	Laser power control interface
9	Platch	Laser power latch signal
11、12、16、21	SGIN0—SGIN3	Laser state input signal
18	MO	Laser operation enable output signal
19	AP	Laser on/off light output signal
20	PRR	Repeat the pulse frequency signal. TTL output
22	Red indicator	Laser red light indication signal
23	EMStop	Laser emergency stop output signal
Others	Reserved	Reserved

(2) CO2/YAG mode pin definition:

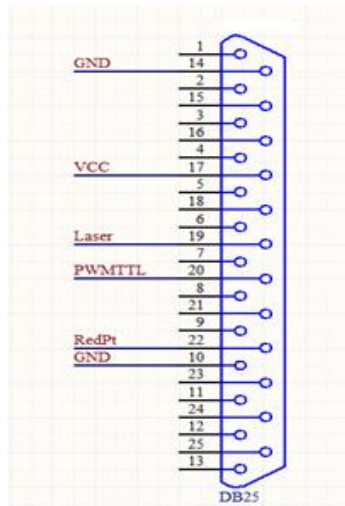


Figure 2.6 CO2/YAG mode pin diagram

Table 2.4 CO2/YAG Mode Pin Definitions

Number	Name	Description
10、14	GND	Control card reference ground
19	Laser	Laser switch signal (shutter signal). TTL output, forming a loop with the GND signal
22	REDPT	Red light indicates the output port. TTL output, reference ground signal is GND
20	PWM TTL	CO2, this signal is used to set the laser power and is used as the Tickle signal output. When the laser type is Yag, this signal is used as the repetition frequency signal for the Q driver.

The flight carving interface/digital input and output interface (CON5 interface, DB37 pin female) are described in detail as follows:

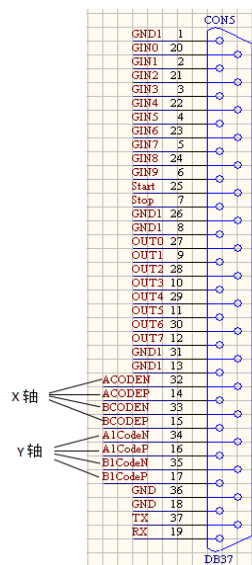


Figure 2.7 Schematic diagram of CON5 pin

Table 2.5 CON5 pin definition

Number	Name	Description
20、 2、 21、 3、 22、 4、 23、 5、 24、 6	GIN0~GIN9	Universal input signal 0~9 input positive terminal, and form a loop with the GND signal
27、 9、 28、 10、 29、 11、 30、 12	OUT0~OUT7	General-purpose output signal, TTL mode, and form a loop with the GND signal
25、 7	Start/ Stop	Reserved
32、 14	ACODEN/ACODEP	Encoder input A-/ A+, connected to the X-axis encoder
33、 15	BCODEN/BCODEP	Encoder input B-/B+, connected to X-axis encoder
34、 16	AICodeN	Encoder input A-/ A+, connected to Y-axis encoder
35、 17	BICodeN	Encoder input B-/ B+, connected to Y-axis encoder
37	TX	RS232 data transmission interface, and form a loop with the GND signal
19	RX	RS232 data receiving interface, and form a loop with the GND signal
36、 18	GND	Ground, and form a loop with encoder signal RX/TX
1、 26、 8、 31、 13	GND1	Form a loop with the input and output signals

**Note:**

(1) The input and output signals of the DLC2 card adopt the isolation chip output, and form a loop with GND1 (PIN1, 8, 13, 26, 31);

(2) The card ground GND (PIN18, 36) is connected to the power ground (CON1, PIN1). When using the encoder interface, form a loop with GND.

**2.1.2.2 Hardware connection**

Take the DLC2 card as an example. The specific hardware connections are shown in Table 2.6.

Table 2.6 DLC2 card hardware connection

Interface	Connection object	Remarks
CON1	12-24V DC power supply	
CON2	Laser	Specific connection reference pin definition
CON3	Galvanometer	Specific connection reference pin definition

## 2.1.3 Software Environment

This software is a green free installation version, which can be used by the company's authorization. If you have any requirements, please contact Beijing JCZ Technology Co., Ltd. directly;

Standard computer system 64-bit win7/8/10, family Chinese version is not fully functional;

Install the operating environment VC2015 and .NET4.0.

### 2.1.3.1 Software Configuration Environment

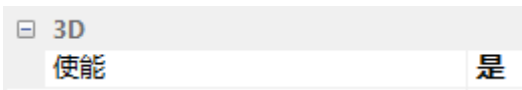


First enter the F3 parameter to enable the 3D function, as shown in Figure 2.8.



Figure 2.8 F3 parameter enable

The function button usage instructions are shown in Table 2.7.

Table 2.7 Function Button Instructions

Button	Function description
	Whether to enable 3D function Set the path: F3 parameter -> 3D -> enable
	Display 3D interface
	Display grid graphics, render diagrams, render

grid graphics or hide 3D models



Display the top, bottom, left, right, front, and rear isometric views



Load STL format 3D model file



Create simple 3D models (simple geometric models such as cubes, inclined planes, cylinders, cones, spheres, etc.)

## 2.1.4 Operating Instructions

The specific steps are as follows:

- (1) Load the 3D Calibration file and enable 3D, as shown in Figure 2.9; adjust the working platform and galvanometer height.



Figure 2.9 Enable 3D

- (2) Draw or import the projection target, as shown in Figure 2.10.

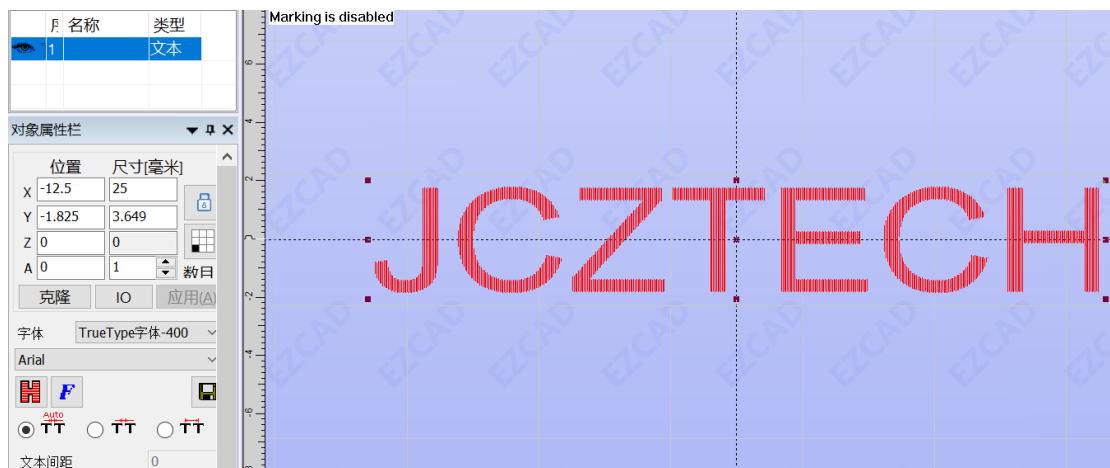



Figure 2.10 Drawing a projection file

(3) Select the projection target, click  to display the 3D function, and import its STL 3D model.

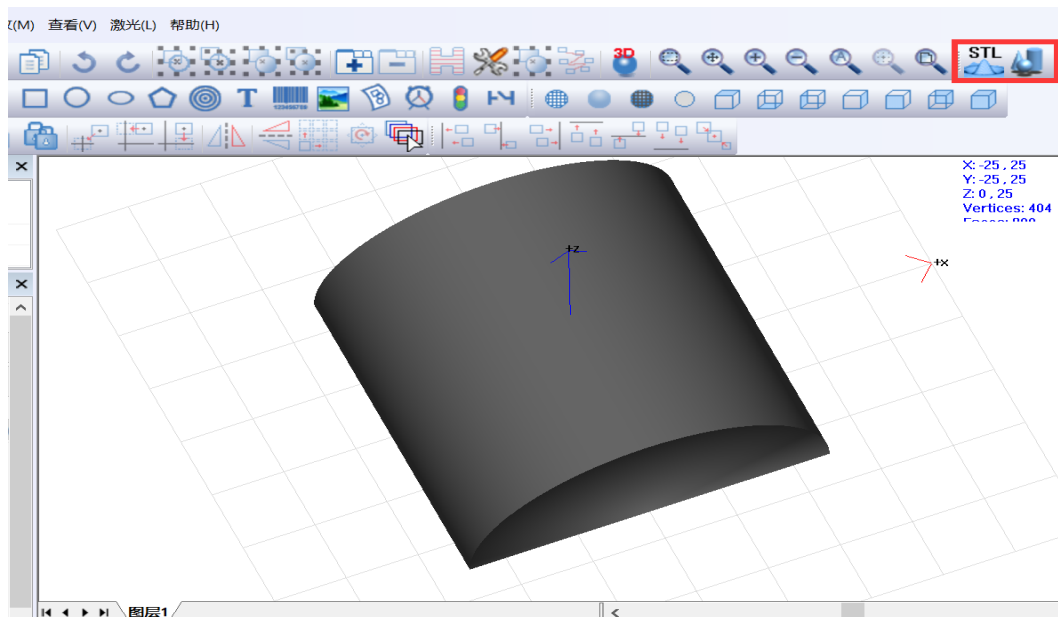



Figure 2.11 Importing the model

(4) Adjust the height of the workpiece so that the same position focus height of the 3D model is consistent with the actual workpiece height.

For example, if the vertices of the cylinder in Figure 2.11 are at  $Z=25$ , the actual height of the workpiece is  $Z=25$ .

(5) Select the content to be projected, click  to select the projection, it is recommended to choose to remove the unintersected curve, set the z limit value and click OK.

(6) After the software is projected, press the “Ctrl” key and the left mouse button to move the mouse to view the projection effect, as shown in Figure 2.12.



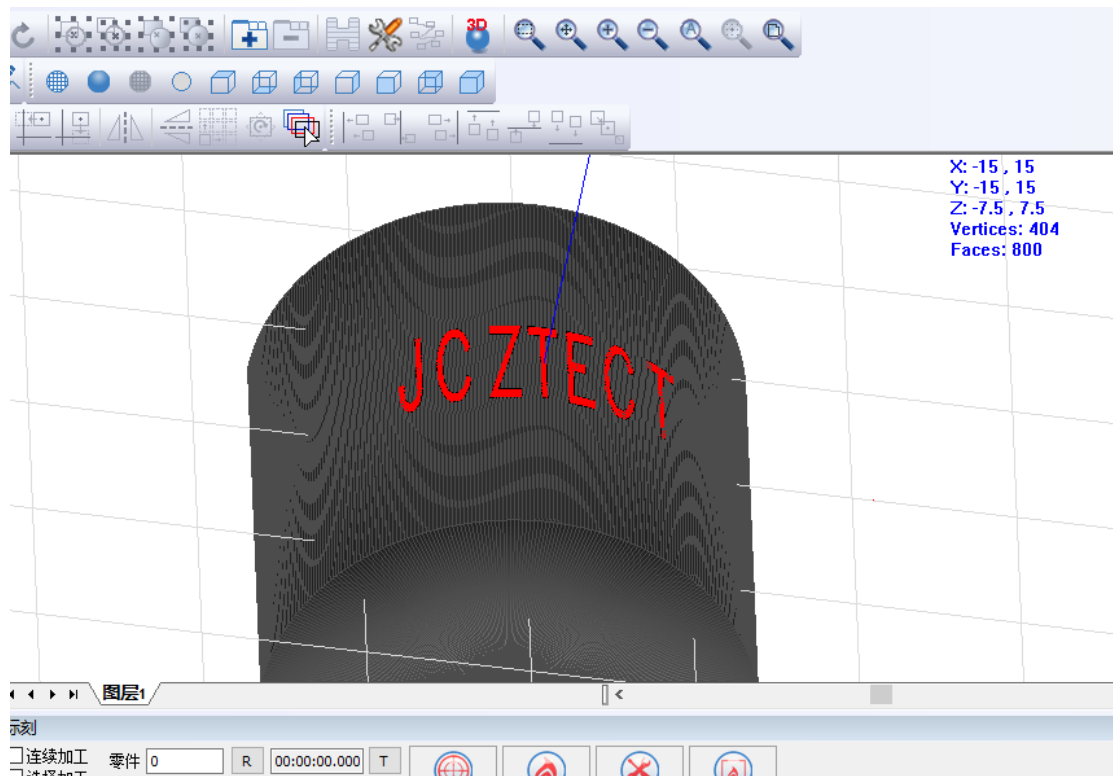


Figure 2.12 Projection effect

(7) Click the “carving” icon to project the surface carving of the workpiece.

## 2.1.5 Case / sample

## 2.1.6 Summary of common problem

**Projection of upper and lower surfaces:** When the upper and lower surfaces are projected, the projection setting interface selects the “lower surface” projection, and the “Z limit value” is greater than 0 to project the text object to the lower surface. Otherwise, the upper surface is projected by default, as shown in Figure 2.13.

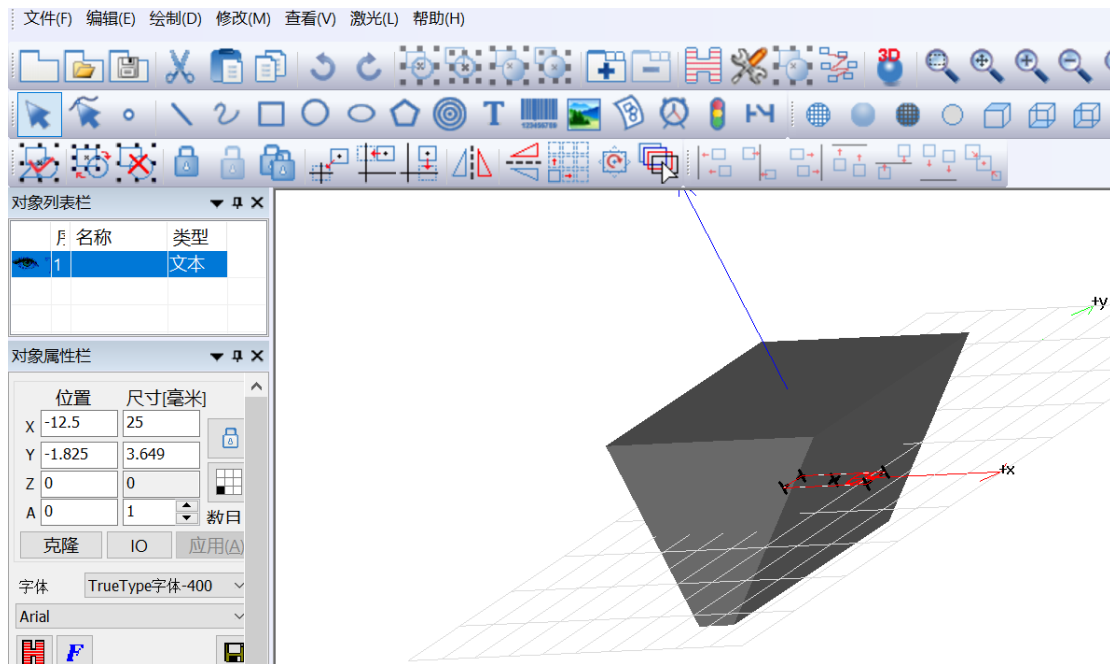


Figure 2.13(1) Lower projection

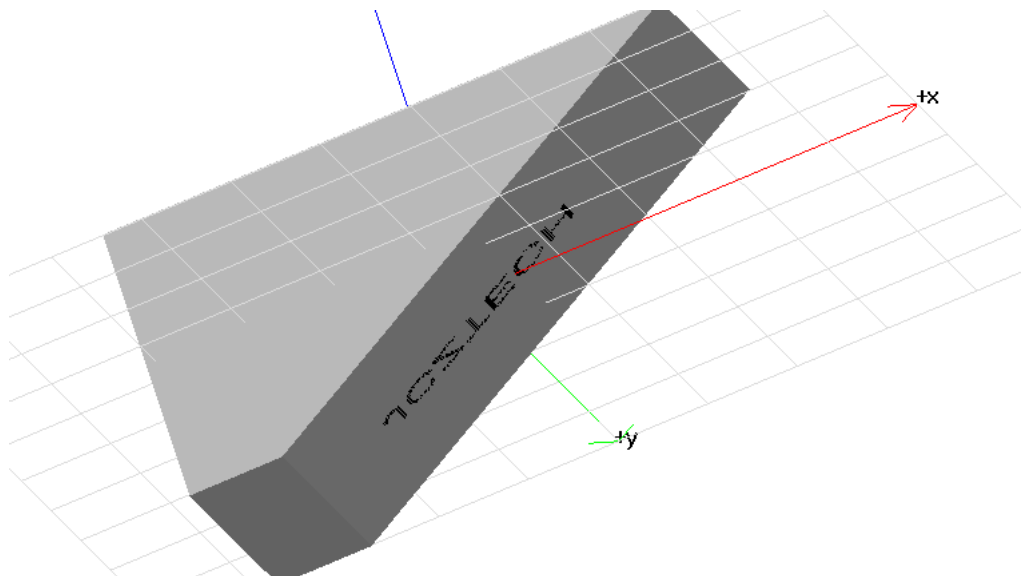


Figure 2.13(2) Lower projection

## 2.2 3D Wrap

### 2.2.1 Introduction

The 3D Wrap mainly projects the text or vector object on the surface by projecting it perpendicularly to the projection surface. Through the software and the 3D galvanometer, the focal length is continuously changed on the surface to realize the surface carving effect. Figure 2.14 shows the parallel projection and red is the projected image. Regardless of the angle of view, the

deformation does not recombine before and after projection. However, if the projected surface is tiled at this time, it will show completely unformed text or vector graphics.



Figure 2.14 Wrap picture

## 2.2.2 Hardware environment

The hardware environment is consistent with the 3D software. The device configuration is shown in Table 2.8.

Table 2.8 Hardware Environment Configuration

Name	Specifications
computer	Dual-core CPU, memory 2G, hard disk 10G, dual native USB interface
operating system	64-bit, WIN7/8/10

Card	DLC2 carving card
Galvanometer	3D
Laser	Fiber or CO2

### 2.2.2.1 Hardware Manual

The hardware manual refers to the projection part of the DLC2 card manual.

### 2.2.2.2 Hardware connection

Take the DLC2 card as an example. The specific hardware connections are shown in Table 2.9:

Table 2.9 DLC2 card hardware connection

Interface	Connection object	Remarks
CON1	12-24V DC power supply	
CON2	Laser	Specific connection reference pin definition
CON3	Galvanometer	Specific connection reference pin definition
CON5	External IO/flyer interface	

### 2.2.3 Software environment

This software is a green free installation version, which can be used by the company's authorization. If you have any requirements, please contact Beijing JCZ Technology Co., Ltd. directly;

Standard computer system - 64-bit win7/8/10, family Chinese version is not fully functional;

Install the operating environment VC2015 and .NET4.0.

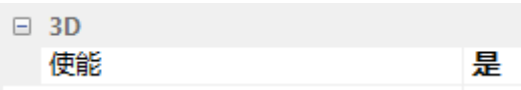





#### 2.2.3.1 Software Configuration Environment

Be sure to adjust the working platform level and 3D Calibration of the device before using the software projection function (the galvanometer has 3D focusing function and utilizes the xy2-100 protocol).

## 2.2.3.2 Software manual (specific functions)



The function button usage instructions are shown in Table 2.10:

Table 2.10 Function Button Instructions

Button	Function description
	<p>Whether to enable 3D function</p> <p>Set the path: F3 parameter -&gt; 3D -&gt; enable</p>
	<p>Display 3D interface</p>
	<p>Display grid graphics, render diagrams, render grid graphics, hide 3D models</p>
	<p>Display the top, bottom, left, right, front, and rear isometric views</p>
	<p>Load STL format 3D model file</p>
	<p>Create simple 3D models (simple geometric models such as cubes, inclined planes, cylinders, cones, spheres, etc.)</p>
<input checked="" type="checkbox"/> 移除未相交线段	<p>Whether to delete the curve that does not intersect the 3D model after projection</p>
<p>z极限值 <input type="text" value="0"/> 毫米</p>	<p>Minimum projection line height when projecting</p>
<input checked="" type="radio"/> 包裹	<p>Wrap the target to a 3D model</p>
<input type="checkbox"/> Y方向包裹	<p>Vertical Wrap priority</p>
<input checked="" type="radio"/> 圆柱包裹	<p>Wrap the cylinder with the diameter parameter</p>
<input type="radio"/> 球面包裹	<p>Wrap the sphere with the diameter parameter</p>
<input checked="" type="radio"/> 旋转体包裹	<p>Rotating the 3D model of the rotating body type</p>

## 2.2.4 Operating Instructions

The specific steps are as follows:

- (1) Load the 3D model. Click  on the icon to select the desired 3D model, cylindrical wrap and spherical wrap without loading the 3D model.
- (2) Create the required carving text or other graphics, click the button  to select the carving target, and select the warp type according to the selected 3D model (the wrap is used for surface carving on common 3D models; cylindrical wrap and rotating wrap are usually used for single The rotary axis is carved; the spherical wrap is usually used for carving the upper surface of the sphere).
- (3) Click the OK button after confirming the warp type.
- (4) Adjust the model position to match the actual workpiece height and confirm that 3D is enabled (F3 parameter setting), confirm that the 3D Calibration file is loaded correctly and the workpiece model is within the valid corrective range.
- (5) After fixing the workpiece, click on the carving to start carving.

## 2.2.5 Case / sample

## 2.2.6 Summary of common problem

## 2.3 3D layered deep carving

### 2.3.1 Introduction

The 3D layered deep carving function is mainly used for 3D model slicing and layering processing. The 3D model is deeply carved or embossed on the blank, and the effect of deep carving and relief can be carved on the commemorative coin.

### 2.3.2 Hardware environment

The hardware environment is consistent with the 3D software. The device configuration is

shown in Table 2.11.

Table 2.11 Hardware Environment Configuration

Name	Specifications
computer	Dual-core CPU, memory 2G, hard disk 10G, dual native USB interface
operating system	64-bit WIN7/8/10
Card	DLC2 carving card
Galvanometer	3D
Laser	Fiber or CO2

### 2.3.2.1 Hardware Manual

The hardware manual refers to the projection part of the DLC2 card manual.

### 2.3.2.2 Hardware connection

Take the DLC2 card as an example. The specific hardware connections are shown in Table 2.12:

Table 2.12 DLC2 card hardware connection

Interface	Connection object	Remarks
CON1	12-24V DC power supply	
CON2	Laser	Specific connection reference pin definition
CON3	Galvanometer	Specific connection reference pin definition
CON5	External IO/flyer interface	

### 2.3.3 Software environment

This software is a green free installation version, which can be used by the company's authorization. If you have any requirements, please contact Beijing JCZ Technology Co., Ltd. directly;

Standard computer system - 64-bit win7/8/10, family Chinese version is not fully functional;

Install the operating environment VC2015 and .NET4.0.



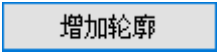


### 2.3.3.1 Software Configuration Environment

- (1) Load the correct 3D Calibration file.
- (2) Load the appropriate 3D model and match the position of the physical placement.

### 2.3.3.2 Software manual (specific functions)

The function button usage instructions are shown in Table 2.13:

Table 2.13 Function Button Instructions

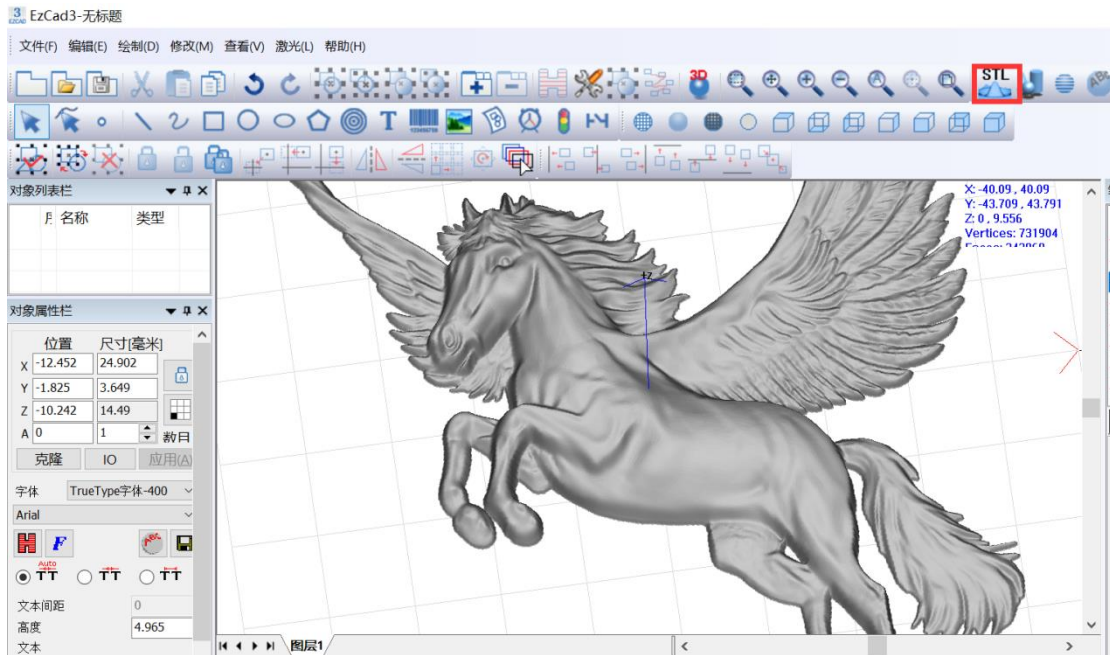
Button	Function description
	The loaded 3D model is sliced and the slice thickness is usually set according to the material type.
	Filling the slice target (the specific fill parameters are adjusted according to the material carving effect and process requirements)
	Add an outer contour to the slice target, changing the fill range to the range between the slice content and the outline, suitable for embossing
	Rotating surface axes for adjusting the 3D model orientation
	Panning surfaces, adjusting model position




### 2.3.4 Operating Instructions

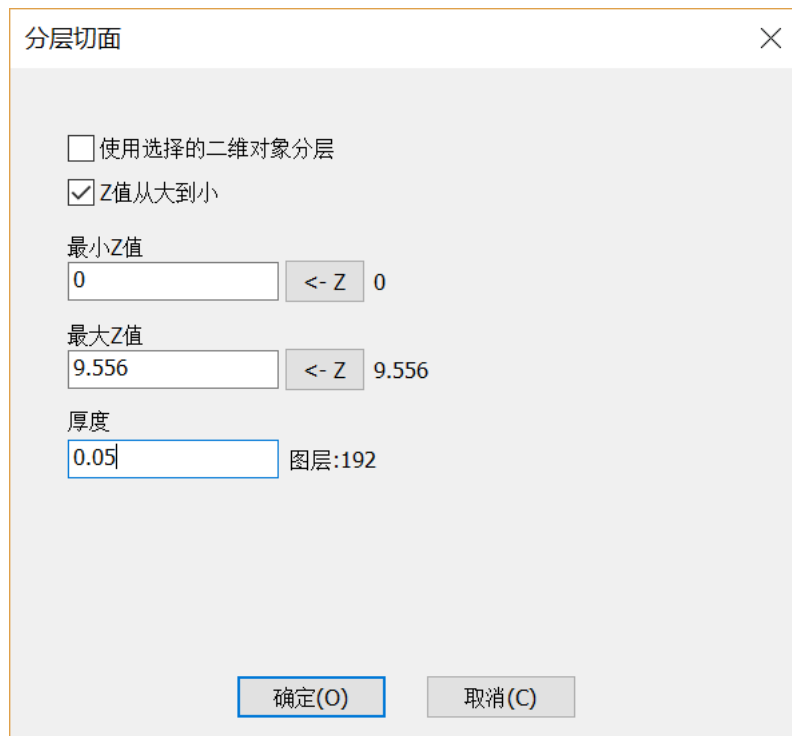
The specific steps are as follows:


- (1) Load the 3D model.



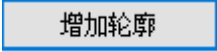



- (2) Use the functions such as  and  to adjust the position of the model. It is recommended to move the model to the center of the workspace. The maximum value of the z value is adjusted to the height of the upper surface of the blank.
- (3) Click  to slice the 3D model according to the specified thickness. It is recommended to slice according to the z value from large to small, and adjust the thickness according to the material and laser energy.



- (4) Click  to fill the slice, the filling parameters are related to the material, and make

specific adjustment according to the actual effect and process requirements.

- (5) Fix the position of the blank, confirm the enabling 3D function, load the correct 3D Calibration file, and the processing range is within the Calibration range.
- (6) Click on the marking button to perform deep carving.
- (7) If embossing is required, draw a flat closed figure (usually a closed figure of the shape of the blank) that is larger than the 3D model plane size in step (4); then click  and click on the blank figure in the workspace. At this time, the curve in the target attribute list disappears, leaving only the slice target; after clicking  proceed to step (5).

### 2.3.5 Case / sample

### 2.3.6 Summary of common problem

## Chapter 3 Dynamic Focus Function

### 3.1 Dynamic focus 2D function

#### 3.1.1 Introduction

The Dynamic Focus 2D function is suitable for large-area flat carving, and the dynamic focusing galvanometer with the corresponding function can greatly increase the carving area.

#### 3.1.2 Hardware environment

The hardware environment is consistent with the 3D software. The device configuration is shown in Table 3.1.

Table 3.1 Hardware Environment Configuration

Name	Specifications
computer	Dual-core CPU, memory 2G, hard disk 10G, dual native USB interface

operating system	64-bit WIN7/8/10
Card	DLC2 carving card
Galvanometer	3D
Laser	Fiber or CO2

### 3.1.2.1 Hardware Manual

The hardware manual refers to the projection part of the DLC2 card manual.

### 3.1.2.2 Hardware connection

Take the DLC2 card as an example. The specific hardware connections are shown in Table 3.2:

Table 3.2 DLC2 card hardware connection

Interface	Connection object	Remarks
CON1	12-24V DC power supply	
CON2	Laser	Specific connection reference pin definition
CON3	Galvanometer	Specific connection reference pin definition
CON5	External IO/flyer interface	

### 3.1.3 Software environment

This software is a green free installation version, which can be used by the company's authorization. If you have any requirements, please contact Beijing JCZ Technology Co., Ltd. directly;

Standard computer system 64-bit win7/8/10, family Chinese version is not fully functional;

Install the operating environment VC2015 and .NET4.0.

#### 3.1.3.1 Software Configuration Environment

- (1) Load the correct 2D dynamic focus and Calibration file.
- (2) Enable the dynamic focus function.

### 3.1.3.2 Software manual (specific functions)

**Dynamic focusing:** Enables dynamic focus and enables dynamic focus by F3 parameter setting.

### 3.1.4 Operating Instructions

The specific steps are as follows:


- (1) Turn on the F3 parameter to enable the dynamic focus function.
- (2) Load the dynamic focus 2D Calibration file (the Calibration method refers to the calibration manual).
- (3) Adjust the work plane to be in the focus plane.
- (4) Draw the carving target and start the dynamic focus carving.

### 3.1.5 Case / sample

### 3.1.6 Summary of common problem

## 3.2 Dynamic Focus 3D Function

Compared with the 2D dynamic focusing function, 3D dynamic focusing adds 3D focusing function to achieve large-area 3D carving; improves carving efficiency and seamless carving compared with 2D splicing.

- (1) Turn on the F3 parameter to enable dynamic focus;
- (2) Dynamic focus 3DXYZ file after loading Calibration (Calibration method reference Calibration specification);
- (3) Open the 3D interface , add the STL file (3D vector model), and import the vector diagram into the 3D coordinate space in Figure 3.1;

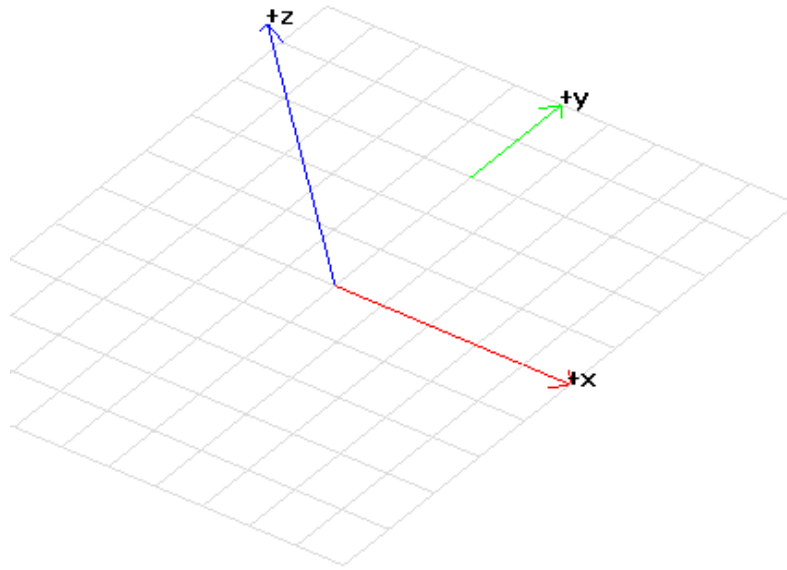


Figure 3.1 3D space

- (4) Match the vector diagram with the real object, confirm the position of the 0 plane, and adjust the focal length of the galvanometer to 0 plane.

Add and carve files. The operation is consistent with the 3D function. The functions of wrapping, projection, deep carving and other functions are the same. The Z-value zoom range of the carving is checked by software to determine that the value does not exceed the Z value range of the Calibration file.

## Chapter 4 Extended axis solution

### 4.1 Rotating body 3D segmentation carving

#### 4.1.1 Introduction

The rotating body segmentation first wraps the object of the rotating body, and then uses the extended axis to divide and carve the object.

#### 4.1.2 Hardware environment

The hardware environment is consistent with the 3D software. The device configuration is

shown in Table 4.1.

Table 4.1 Hardware Environment Configuration

Name	Specifications
computer	Dual-core CPU, memory 2G, hard disk 10G, dual native USB interface
operating system	64-bit WIN7/8/10
Card	DLC2 carving card
Motion control card	9030 motion control card, solid high motion control card
Galvanometer	3D
Laser	Fiber or CO2
Others	Rotary shaft, Drive

### 4.1.2.1 Hardware Manual

Carving card hardware manual refers to the projection part DLC2 card manual; the motion control card takes the solid high four-axis GTS-400 as an example; the terminal card CN1~4 is the axis signal control interface, the terminal diagram and its port definition are shown in Figure 4.1 and respectively Table 4.2 is shown.

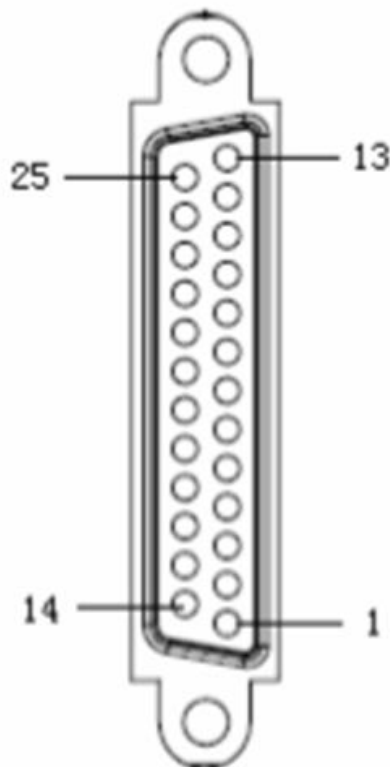


Figure 4.1 Terminal Diagram

Table 4.2 Port Definitions

Pin	Signal function	Description
1	OGND	External power ground
2	ALM	Drive alarm
3	ENABLE	Drive allowed
4	A-	Encoder input
5	B-	Encoder input
6	C-	Encoder input
7	+5V	Power Output
8	DAC	Analog signal output
9	DIR+	Step direction output
10	GND	Digital Ground
11	PULSE-	Step pulse output
12	Reserved	Reserved
13	GND	Digital Ground
14	OVCC	+24V output
15	RESET	Drive alarm reset
16	SERDY	Motor in place
17	A+	Encoder input
18	B+	Encoder input
19	C+	Encoder input
20	GND	Digital Ground
21	GND	Digital Ground
22	DIR-	Step direction output
23	PULSE+	Step pulse output
24	GND	Digital Ground
25	Reserved	Reserved

#### 4.1.2.2 Hardware connection

Take the DLC2 card as an example. The specific hardware connections are shown in Table 4.3:

Table 4.3 DLC2 card hardware connection

Interface	Connection object	Remarks
CON1	12-24V DC power supply	
CON2	Laser	Specific connection reference pin definition
CON3	Galvanometer	Specific connection reference pin definition
CON5	External IO/flyer interface	

The specific connection method between the motion control card and the motor is defined by the solid high terminal card axis signal.

### 4.1.3 Software environment

This software is a green free installation version, which can be used by the company's authorization. If you have any requirements, please contact Beijing JCZ Technology Co., Ltd. directly;

Standard computer system 64-bit win7/8/10, family Chinese version is not fully functional;

Install the operating environment VC2015 and .NET4.0.

#### 4.1.3.1 Software Configuration Environment

- (1) Properly use the 3D calibration file matched with the galvanometer and laser;
- (2) Set the axis parameters correctly. According to the rotating shaft motor and the driver, the number of pulses per revolution, the distance of each revolution, the acceleration and deceleration, the minimum maximum speed, and the split size are set;
- (3) Reasonably select the rotating body model and wrap it.

#### 4.1.3.2 Software manual (specific functions)

Enable the extended axis:



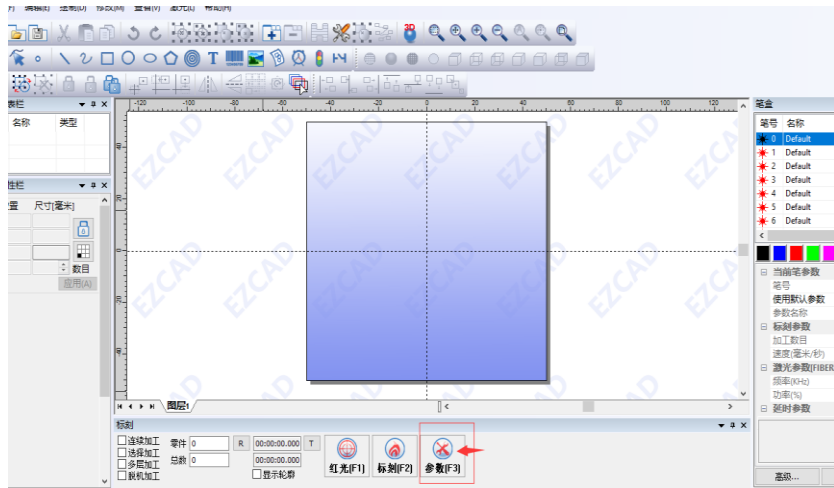


Figure 4.2 F3 parameters

As shown in Figure 4.2, click on the F3 parameter after opening the software, then select the extended axis as shown in Figure 4.3.

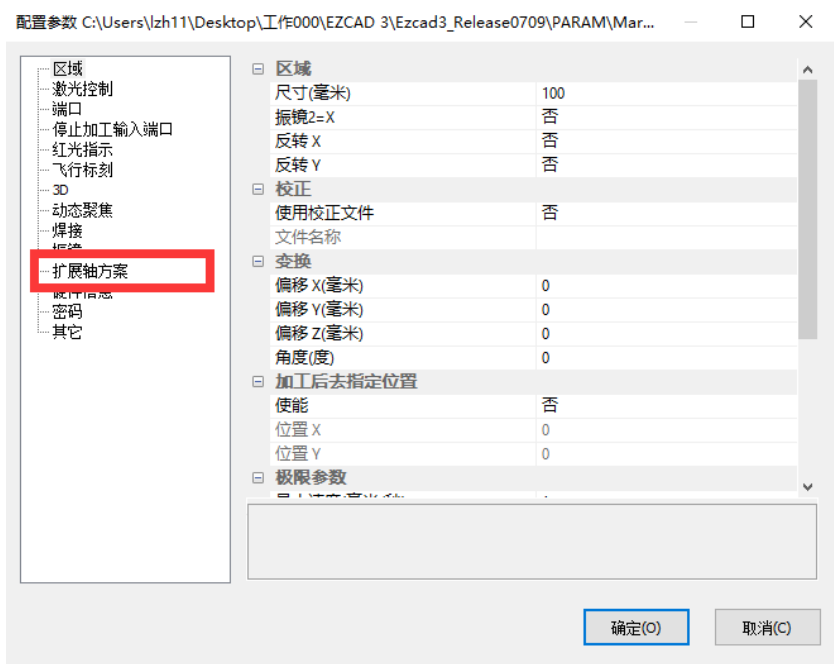


Figure 4.3 Extended Axis

Then enable the corresponding expansion axis according to actual needs, as shown in Figure 4.4.

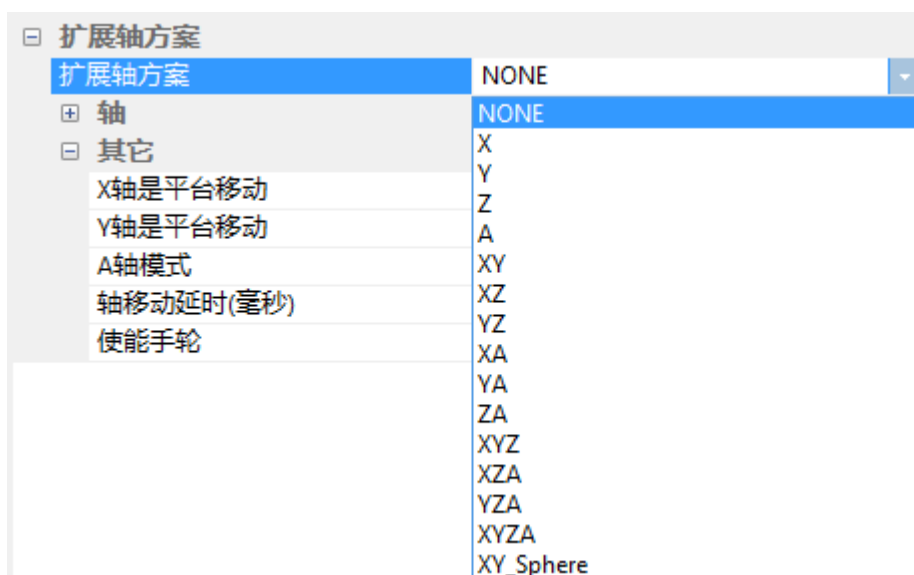


Figure 4.4 Extended Axis Selection

Figure 4.4 shows the expansion axis type selection, which is divided into single-axis, double-axis, three-axis and four-axis. When selecting the corresponding direction expansion axis, the axis control data needs to be set on the control parameters , as shown in Figure 4.5.

反转	否		
共阴极输出	否		
每转脉冲数	10000		
每转运动距离(毫米)	5		
最小速度(毫米/秒)	0		
最大速度(毫米/秒)	100	回零速度(毫米/秒)	100
加速度(毫米/秒 <sup>2</sup> )	100	离开速度(毫米/秒)	1
减速度(毫米/秒 <sup>2</sup> )	100	零点偏移(毫米)	0
反向间隙补偿(毫米)	0	<input checked="" type="checkbox"/> 限位开关 <input checked="" type="checkbox"/> 软限位	
加工结束回起始点	否	<input type="checkbox"/> 其它	
<input type="checkbox"/> 编码器反馈		X轴是平台移动	否
使能	否	Y轴是平台移动	是
跟随误差(毫米)	1	A轴模式	A
<input type="checkbox"/> 零点		轴移动延时(毫秒)	0
使能	否	使能手轮	否
低电平有效	否		
正向回零	否		
寻找索引	否		

Figure 4.5 Extended Axis Parameters

The specific meanings of the extended axis parameters are as follows:

**Reverse:** control the forward and reverse movement of the axis;

**Common cathode output:** Select whether to share the common cathode according to the actual wiring mode, and choose the differential output;

**Number of pulses per revolution:** The number of pulses required to rotate the extended shaft

motor for one revolution. Calculate the number of pulses per revolution X required by the software by the following formula:

$X = (360/N) \times n$ ; among them:

X represents the number of pulses per revolution;

N represents the motor step angle;

n indicates the number of subdivisions set by the driver;

**Movement distance per revolution:** The distance that the extension axis rotates one revolution;

**Minimum speed:** the minimum speed of the axis motion;

**Maximum speed:** the maximum speed of the axis motion;

**Acceleration:** the acceleration of the axis from static motion to maximum speed;

**Deceleration:** the deceleration of the axis from the maximum speed to the rest;

**Backlash compensation:** the compensation of the gap overlap is completed by compensation;

**Whether to return to the starting point after the end of machining:** When the machining ends, the axis returns to the starting position of the movement;

**Zero point:** Enable the zero point search before the first motion of the rear axis, and then no longer need to find the zero point;

**Active low:** the zero signal selects high or low;

**Positive zero return:** the return to zero direction selects forward or reverse;

**Zero return speed:** the speed of the axis movement during zero return;

**Zero offset:** After returning to zero, the offset zero distance when the motion returns to zero;

**Limit switch:** Whether to enable the limit switch, it is necessary to install a limit on the axis;

**Soft limit:** set the range by setting the maximum and minimum coordinates, and the over-range software prompts to exceed the axis motion coordinate;

**Platform movement:** select X and Y direction movements;

**A-axis mode:** When the A-axis is selected for the extended axis, the A-axis motion direction is selected;

**Axis motion delay:** the motion delay time of the axis during machining;

**Select the corresponding expansion axis:** the split parameter shown in Figure 4.6 appears below the software;



Figure 4.6 Split parameters

**Find zero point:** After the zero point is enabled, the software automatically finds the zero point function;

**Set the origin:** set the current coordinate to the origin, and display the coordinates at the current origin when the axis moves;

**Movement step:** After setting the step size, manually click the direction button, the axis will move according to the set step size;

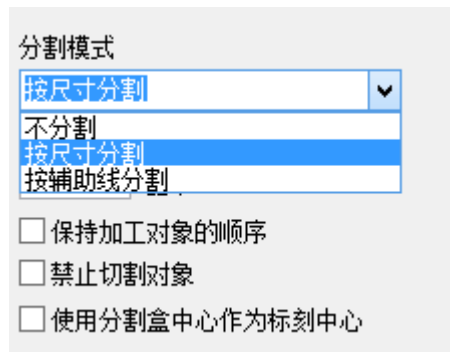


Figure 4.7 Split mode

**Split mode:** When the axis is not split, all the whole objects are carved after the axis moves to the specified position; when the size is divided, the split size is set, and the object is divided and carved according to the split size; when the guide line is divided, the auxiliary line can be dragged to the carved object. The auxiliary line can be placed at random position, and the object is divided according to the auxiliary line when carving;

**Prohibit cutting objects:** the splitting is invalid after selecting to prohibit cutting objects;

**Keep processing object order:** After selecting this item, the software carves the contents of the workspace according to the order in the object list, and ensures that the relative positions

**Use the center of the split box as the center of the carving:** If selected, the software will force the split according to the position of the guide line, and each time the axis moves to the center of the split box for carving.

#### 4.1.4 Operating Instructions

The specific steps are as follows:

- (1) Load the 3D Calibration file and enable 3D, set the extended axis to A axis, set the motor parameters according to the actual parameters of the A axis, and set the maximum minimum acceleration and deceleration speed, zero return parameters, etc. according to the actual motion conditions;
- (2) loading the rotating body 3D model and drawing a carving target;
- (3) wrapping the carving target into the rotating body model by using a rotating body warpping;
- (4) Click the A-axis parameter in the workspace to set the split size (the axis parameter will appear after the carving parameter is pulled up during setup);
- (5) Adjust the position of the shaft so that the axis is parallel to the dividing line and the highest point is directly below the galvanometer;
- (6) Click on the carving.

### **4.1.5 Case / sample**

### **4.1.6 Summary of common problem**

## **4.2 Double rotary axis globe**

The double-rotation axis globe carving carves the entire sphere surface by dividing the entire sphere surface by a two-way rotating axis. The globe is a typical use scene for a double rotating axis.

First adjust the two rotation axis parameters, determine the rotation axis X and Y, and can accurately control the axis movement to ensure the accuracy of the carving accuracy, the position of the double rotation axis must be placed accurately, after the rotation axis clamps the sphere, the 3D galvanometer focus should at the center of the ball, the two rotation axes correspond to the galvanometer X and Y axes, respectively, and are parallel to the galvanometers X and Y, respectively (for example, the rotation axis 1 corresponds to X, and the rotation axis 2 corresponds to Y, and the rotation direction must correspond).

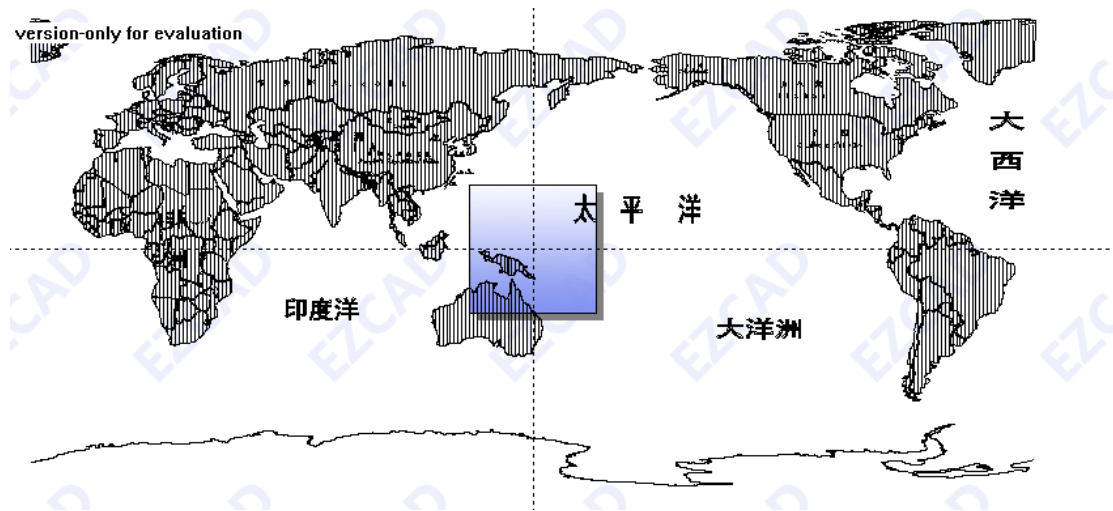


Figure 4.8 Map text

When carving the globe, first load the surface carving of the globe, and then use the extended axis XY-Sphere working mode to perform spherical wrapping on the loading file. At this time, the 3D galvanometer focus is on the center of the sphere, input the correct sphere diameter, and select according to the sphere size and file size. Appropriate segmentation method and carving size, adjust the carving parameters according to the carving speed, and carves after the setting is completed.

### 4.3 Platform segmentation

The platform segmentation can realize multi-directional segmentation, and realize the platform segmentation functions of the X-axis, the Y-axis, the extended-axis A-axis, and the XY dual-axis by using different extended axis modes, and realize large-area splicing by segmentation. Adjust the accuracy of the platform and use a variety of segmentation functions to achieve efficient, high-quality stitching. The platform splitting and stitching effect is shown in Figure 4.9 and 4.10.

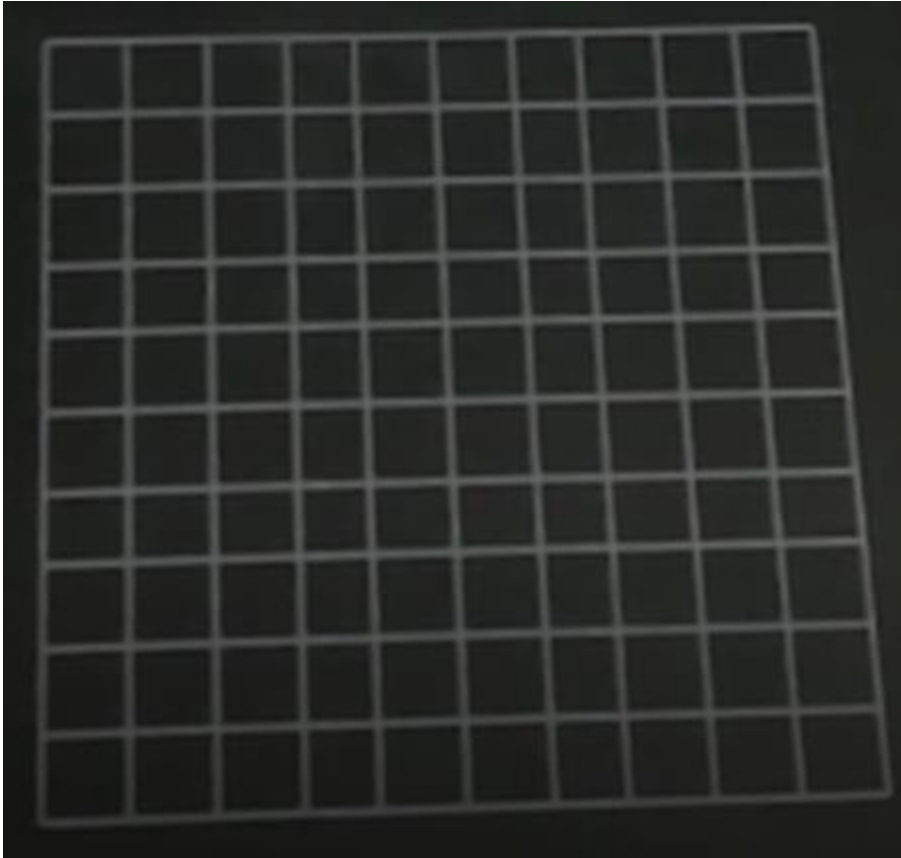


Figure 4.9 Grid stitching effect diagram



Figure 4.10 Vector mosaic effect diagram

# Chapter 5 Flight carving function

## 5.1 Ordinary flight carving

The normal flight carving function is basically the same as the flight carving in Ezcad2, but the function and performance are optimized. The flight carving QR code and barcode application are added to the fast dot and fast wire function. When using, you need hardware connection encoder or hardware to simulate flight carving, open F3 parameters for specific settings, as shown in Figure 5.1.

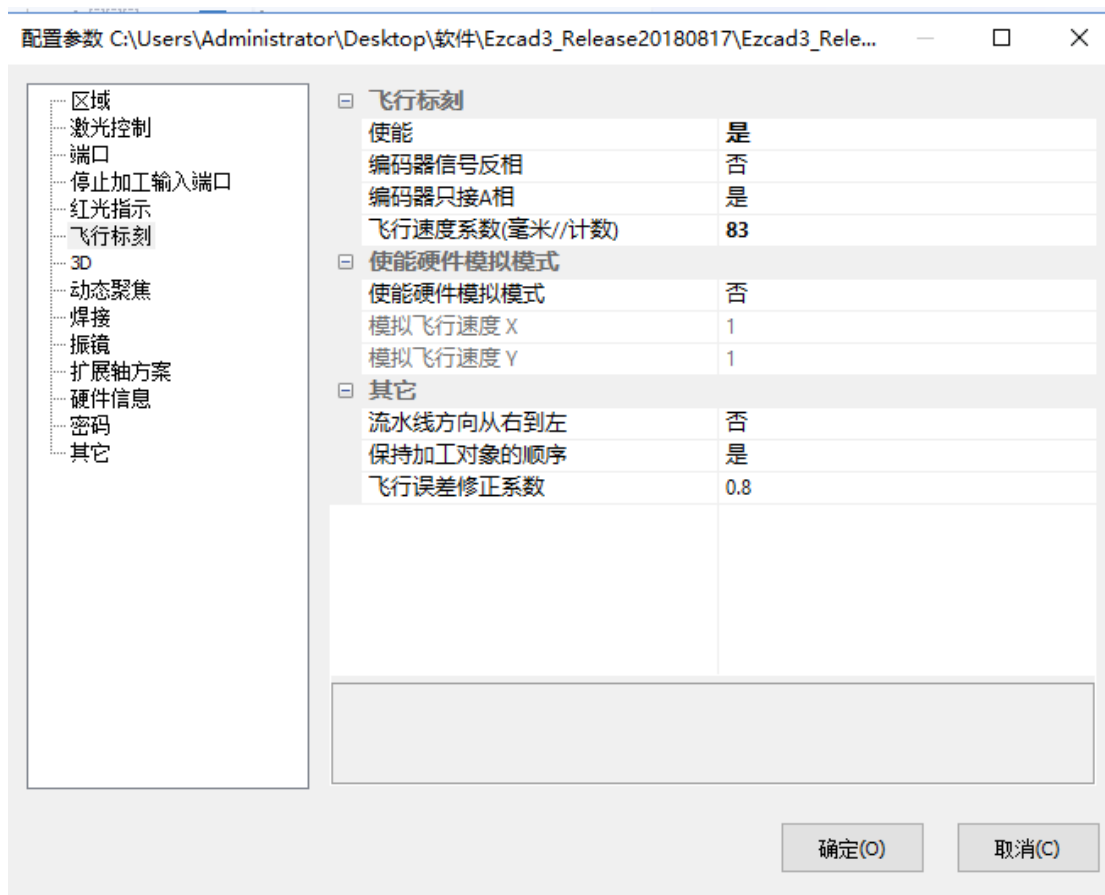


Figure 5.1 Flight Settings

According to the actual encoder and pipeline operating characteristics, detailed parameters such as direction, phase A connection, flight speed coefficient, pipeline direction, hardware simulation enable and so on are set.



## 5.2 3D large format flight carving

### 5.2.1 Introduction

The use of 3D software combines dynamic focusing and flight functions to achieve large-area flight and dynamic focus large-area carving, increasing the range and efficiency of flight functions.

### 5.2.2 Hardware environment

DLC2 card, high speed galvanometer, encoder, laser, etc.

#### 5.2.2.1 Hardware Manual

The hardware manual refers to the projection part of the DLC2 card manual.

#### 5.2.2.2 Hardware connection

Take the DLC2 card as an example. The specific hardware connections are shown in Table 5.1:

Table 5.1 DLC2 card hardware connection

Interface	Connection object	Remarks
CON1	12-24V DC power supply	
CON2	Laser	Specific connection reference pin definition
CON3	Galvanometer	Specific connection reference pin definition
CON5	External IO/flyer interface	

### 5.2.3 Software environment

This software is a green free installation version, which can be used by the company's authorization. If you have any requirements, please contact Beijing JCZ Technology Co., Ltd. directly;

Standard computer system 64-bit win7/8/10, family Chinese version is not fully functional;

Install the operating environment VC2015 and .NET4.0.

### 5.2.3.1 Software Configuration Environment

- (1) Reasonably set the encoder parameters, in which the coefficients, direction, whether only phase A, pipeline direction and other parameters are consistent with the actual encoder and pipeline.
- (2) Correct the galvanometer and load the correct dynamic focus (2D/3D) Calibration file.
- (3) Set the carving parameters reasonably.

### 5.2.3.2 Software manual (specific functions)

Table 5.2 Functional Instructions

Function	Instructions								
<table border="1"> <tr><td>使能</td><td>是</td></tr> <tr><td>编码器信号反相</td><td>否</td></tr> <tr><td>编码器只接A相</td><td>是</td></tr> <tr><td>飞行速度系数(毫米//计数)</td><td>83</td></tr> </table>	使能	是	编码器信号反相	否	编码器只接A相	是	飞行速度系数(毫米//计数)	83	Whether to enable the flight function, whether the encoder is reversed (changing the setting when the speed is negative), whether the encoder is only connected to the A phase (according to the actual setting), and the flight speed coefficient (adjusted according to the encoder properties and the actual carving effect)
使能	是								
编码器信号反相	否								
编码器只接A相	是								
飞行速度系数(毫米//计数)	83								
<table border="1"> <tr><td>使能硬件模拟模式</td><td>否</td></tr> <tr><td>模拟飞行速度 X</td><td>1</td></tr> <tr><td>模拟飞行速度 Y</td><td>1</td></tr> </table>	使能硬件模拟模式	否	模拟飞行速度 X	1	模拟飞行速度 Y	1	Whether to enable hardware simulation flight mode and speed in X and Y directions		
使能硬件模拟模式	否								
模拟飞行速度 X	1								
模拟飞行速度 Y	1								
<table border="1"> <tr><td>流水线方向从右到左</td><td>否</td></tr> <tr><td>保持加工对象的顺序</td><td>是</td></tr> <tr><td>飞行误差修正系数</td><td>0.8</td></tr> </table>	流水线方向从右到左	否	保持加工对象的顺序	是	飞行误差修正系数	0.8	Pipeline direction setting, whether to maintain object sequential processing, flight Calibration factor		
流水线方向从右到左	否								
保持加工对象的顺序	是								
飞行误差修正系数	0.8								
<table border="1"> <tr><td>动态聚焦</td><td></td></tr> <tr><td>使能</td><td>否</td></tr> </table>	动态聚焦		使能	否	Whether to enable dynamic focus function				
动态聚焦									
使能	否								

### 5.2.4 Operating Instructions

The specific steps are as follows:

- (1) According to the actual setting of the pipeline and encoder flight parameters;

- (2) Load the dynamic focus Calibration file (the Calibration method refers to the dynamic focus Calibration specification) and enable dynamic focus;
- (3) Adjust the position and stability of the platform;
- (4) Edit the carving content, debug static (not enabled flight and the pipeline is still) carving effect until the effect is good, then try to improve the carving and jumping speed under the premise of ensuring the effect, reduce various delays (guarantee effect is premise);
- (5) Enable the flight confirmation flight parameters and other settings, set the reasonable trigger port, open the pipeline, wait for the line speed to stabilize, trigger the carving view effect, fine-tune the carving parameters and eliminate the flight speed coefficient;
- (6) The trigger port can be used for normal flight carving.

### **5.2.5 Case / sample**

### **5.2.6 Summary of common problem**

## **Chapter 6 Quick coding function**

### **6.1 Introduction**

EzCad3 adds fast coding function, greatly reducing the carving time of QR code, and is widely used in the field of flight coding.

### **6.2 Hardware environment**

DLC2 card, high speed galvanometer (maximum carving speed not less than 12000), encoder, IPG-YLPM series laser or laser with response time less than 100us.

#### **6.2.1 Hardware Manual**

The hardware manual refers to the projection part of the DLC2 card manual.

## 6.2.2 Hardware connection

Take the DLC2 card as an example. The specific hardware connections are shown in Table 6.1:

Table 6.1 DLC2 card hardware connection

Interface	Connection object	Remarks
CON1	5.5-24V DC power supply	
CON2	Laser	Specific connection reference pin definition
CON3	Galvanometer	Specific connection reference pin definition
CON5	External IO/flyer interface	

## 6.3 Software environment

This software is a green free installation version, which can be used by the company's authorization. If you have any requirements, please contact Beijing JCZ Technology Co., Ltd. directly;

Standard computer system 64-bit win7/8/10, family Chinese version is not fully functional;

Install the operating environment VC2015 and .NET4.0.

### 6.3.1 Software Configuration Environment

(1) Reasonably set the encoder parameters, in which the coefficients, direction, whether only phase A, pipeline direction and other parameters are consistent with the actual encoder and pipeline.

(2) Correct the galvanometer.

(3) Set the carving parameters reasonably.

## 6.4 Debugging instructions

### 6.4.1 Static debugging

Before using the quick coding function, first set the software and understand its purpose.

1. fast dot, fast line function enable settings, as shown in Figure 6.1.

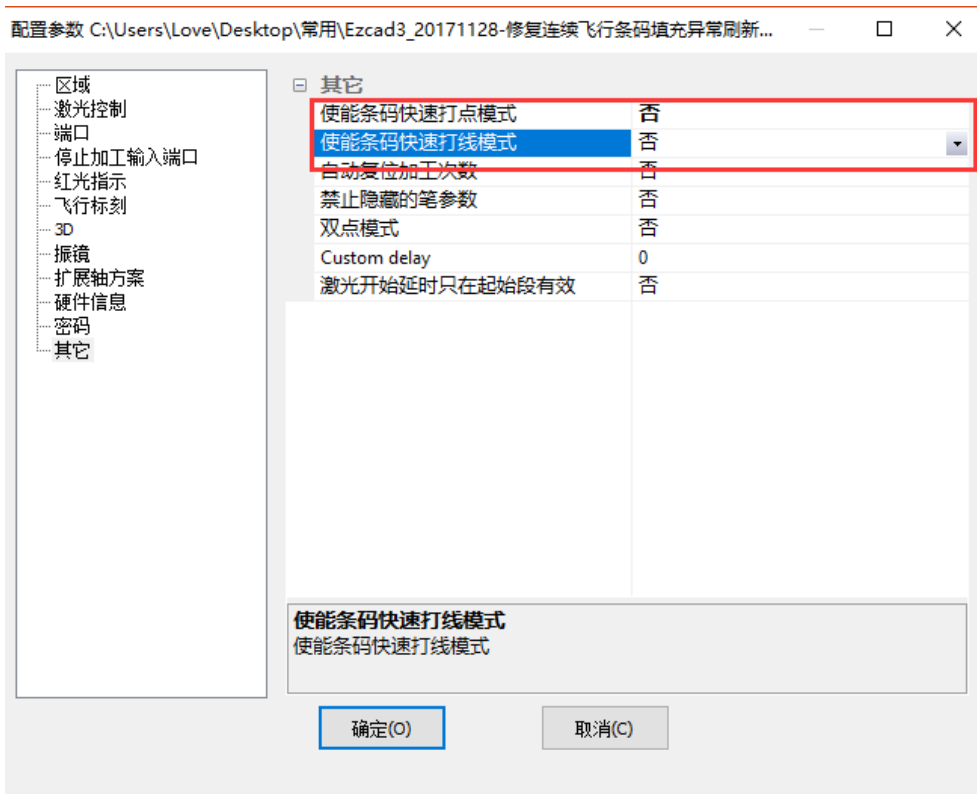


Figure 6.1 Enable fast dot/wire

Click "Parameter F3" to select "Other" and set the desired mode to "Yes".

2. Optimize the parameter display settings, as shown in Figure 6.2.

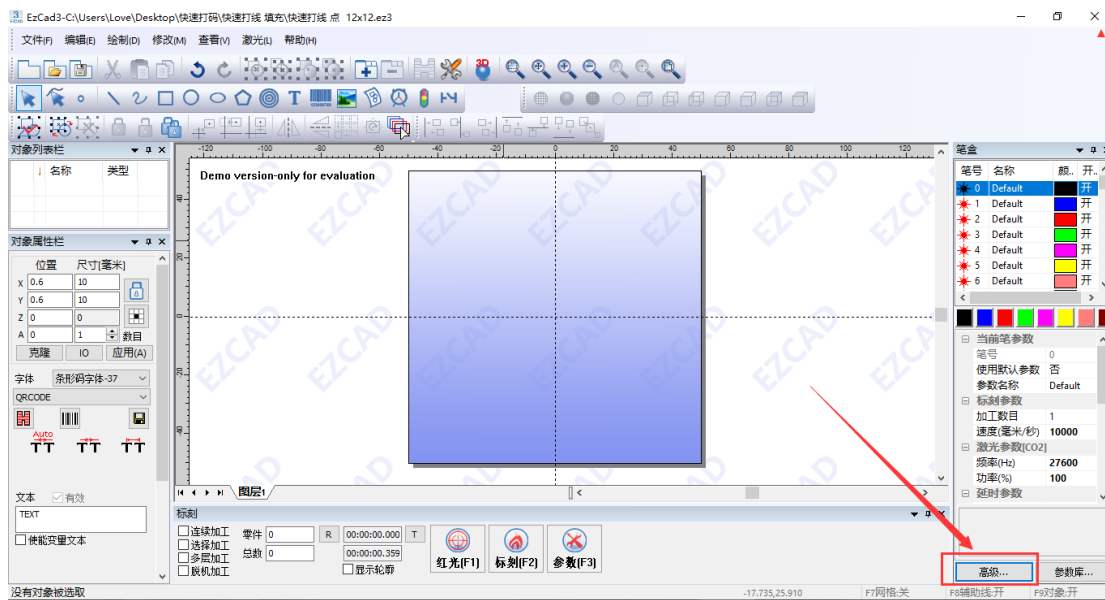


Figure 6.2 Advanced Options

Click "Advanced" under the processing parameters and set "Display Optimization Parameter" to "Yes". After the setting is completed, the "Acceleration Distance" and "Two-way Offset" setting options appear at the bottom of the machining parameters, as shown in

Figure 6.3.

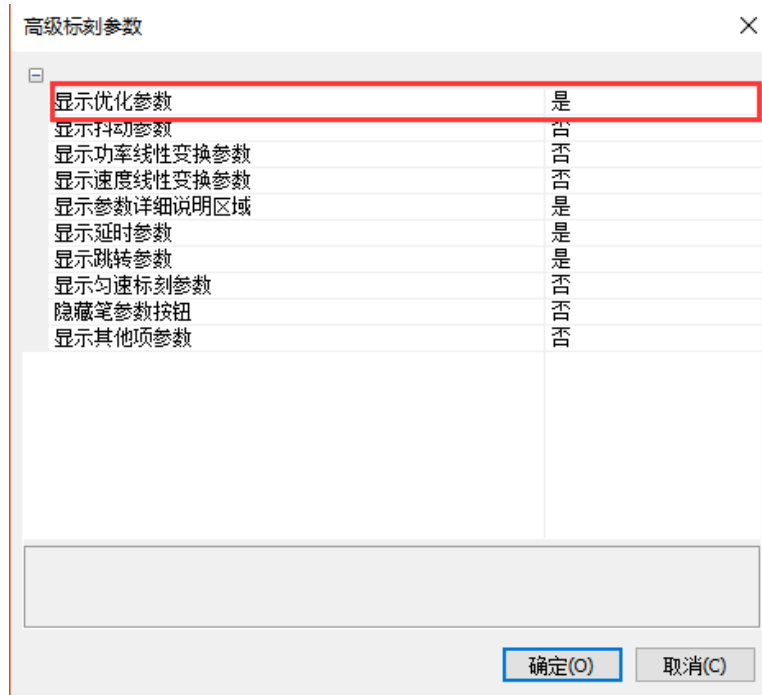


Figure 6.3 Enabling optimization parameters

### 3. QR code property settings


After drawing the QR code, click  the status bar on the left to enter the QR code property settings. The red color is marked as an important setting in Figure 6.4, and will be set later.



Figure 6.4 QR code property settings

**Quick dot:**

**A) Dot matrix mode QR code: QR inverse code**

After drawing the QR code, click to enter the QR code setting and set it to point mode.

Select black and white reverse;

Select dot matrix mode, the number of points is set to 1;

The matrix is set to the minimum size;

Use the status bar to set the code size to the desired value, taking 10x10 code as an example;

Recommended parameters: processing speed: 10000

Jump speed: 14000

Frequency: 24k

Power: 100%

Minimum jump delay: 1

Maximum jump delay: 10

Opening delay: 0

Off light delay: 0

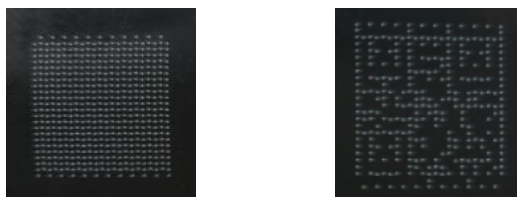
Acceleration distance: 1.8

Two-way offset: 3.4

Appropriate adjustment of frequency and bidirectional offset is required when modifying the QR code size. Smaller sizes require a small increase in frequency and offset distance.

This mode changes the carving speed to have little effect on the overall machining effect, but if the speed is too small, it affects the machining time.

The modification frequency of this mode has a great influence on the processing effect, as shown in Figure 6.5.



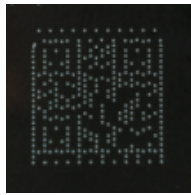
Frequency too small      Frequency is too large

Figure 6.5 Frequency and processing effect

The mode modification jump speed has a significant influence on the processing time, and the speed becomes smaller and longer, but the carving has no effect.

**Switching light delay:** modification has no effect, but setting too large wastes processing time and reduces efficiency.

**Acceleration distance:** If the setting is too small, the arc distortion will appear in the upper left corner of the QR code; if the setting is too large, it will have no effect but waste processing time.



Acceleration is too small (deformation in the upper left corner)



Acceleration is too large or appropriate

Figure 6.6 Acceleration and processing results

**Offset distance:** If the value is too small, the first, third, and fifth... of the two-dimensional code are higher than the second, fourth, and even column points; if the value is too large, the opposite is true.



Offset too small



Offset too big

Figure 6.7 Offset distance and effect

### Quick line:

#### A) Point mode QR code setting and debugging

First enable the quick wire mode in "Parameter F3-Other". After drawing the QR code, set the code to the dot mode within the QR code setting.

Select black and white reverse;

The number of points is set to 1;

The matrix is set to the minimum size;

Set the code size to the desired value in the status bar, taking 10x10 code as an example;

Recommended parameters: processing speed: 12000

Jump speed: 10000



Frequency: 100k

Power: 100%

Minimum jump delay: 1

Maximum jump delay: 10

Opening delay: -5

Off light delay: 20

Acceleration distance: 1.5

Bidirectional offset: 2.2

**Modify the QR code size:** fine-tune the bidirectional offset; increase the size and increase the bidirectional offset to decrease.

**Carving speed:** reducing the carving speed has a great influence on the carving effect. To reduce the speed, it is necessary to appropriately reduce the bidirectional offset distance.

**Jump speed:** The effect is minimal, but too low to increase processing time.

**Frequency:** It is recommended to keep the default value, constant 100k.

**Opening delay:** mainly for the case where the two-way code is not neat inside when the two-way offset has been set. If the number of small dots is set too much, if it is too large, a leak will occur.

**Off-light delay:** Mainly for the two-way code is not neat inside when the two-way offset has been set. If the number of points is too large, the number of points will decrease.

**Acceleration distance:** If the setting is too small, arc distortion will appear in the lower right corner of the QR code; setting too large will have no effect but waste processing time.

**Offset distance:** If the value is too small, the first, third, and fifth... of the two-dimensional code are higher than the second, fourth, and even column points; if the value is too large, the opposite is true.

## **B) Fill mode setting and debugging**

Draw the QR code and fill it. The specific parameters are shown in Figure 6.8.

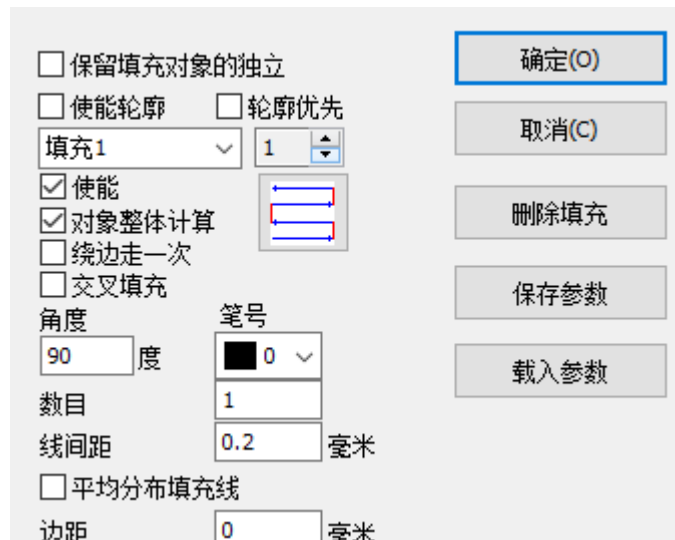


Figure 6.8 Fill Settings

**Take a QR code of 10x10 size as an example:**

Recommended processing parameters: processing speed: 10000

Jump speed: 14000

Frequency: 100k

Power: 100%

Minimum jump delay: 1

Maximum jump delay: 10

Opening delay: -5

Off light delay: 30

Acceleration distance: 2.5

Bidirectional offset: 3.1

**Modify the QR code size:** fine-tune the bidirectional offset, increase the size and increase the bidirectional offset to decrease.

**Carving speed:** reducing the carving speed has a great influence on the carving effect. To reduce the speed, it is necessary to appropriately reduce the bidirectional offset distance.

**Jump speed:** The effect is minimal, but too low will increase processing time.

**Frequency:** It is recommended to keep the default value, constant 100k.

**Opening delay:** Mainly for the two-way code is not neat inside when the two-way offset is set; if the number of small dots is too large, the leak will be generated if it is too large.

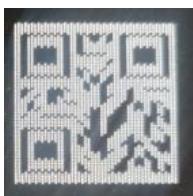


Figure 6.9 Opening delay is too small

**Off-light delay:** mainly for the two-way code inside the two-way code is not neatly arranged when the two-way offset is completed; too large points become more, when too small, the number of points becomes less.

**Acceleration distance:** If the setting is too small, arc distortion will appear in the lower right corner of the QR code; setting too large will have no effect but waste processing time.

**Offset distance:** If the value is too small, the first, third, and fifth... of the two-dimensional code are higher than the second, fourth, and even column points; if the value is too large, the opposite is true.

## 6.4.2 Port Settings

The Ez3 flight carving system cancels the flight carving trigger signal (in8 and in9 of the original Ez2). The trigger flight carving port is directly set to start carving the port, that is, "parameter F3---port". Set the start trigger port to any IN0-2, and then connect the corresponding port according to the card manual, as shown in Figure 6.10.

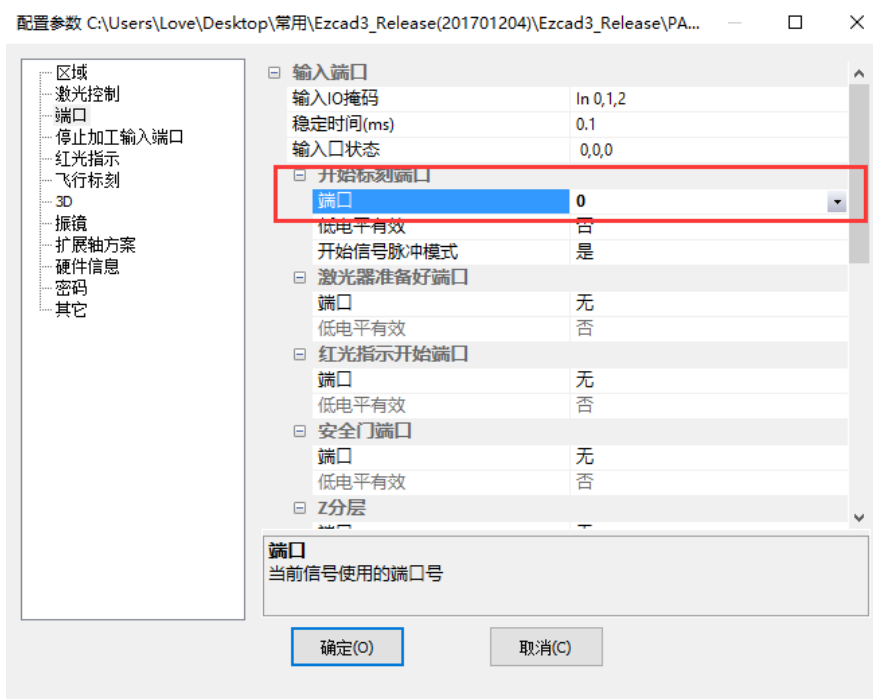


Figure 6.10 Setting the start carving port

## 6.4.3 Flight processing

1. Flight setup: Click on “Parameter F3---Flight carving” , as shown in Figure 6.11.

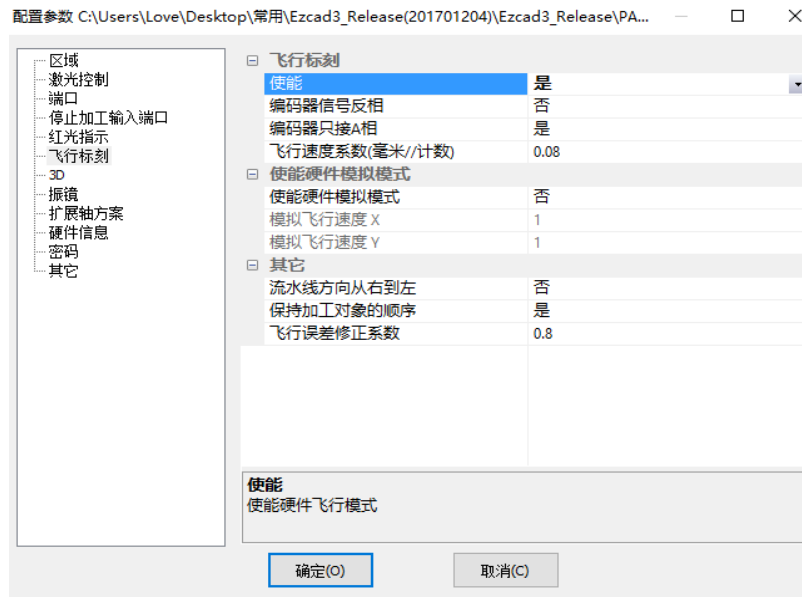


Figure 6.11 Flight Enable

**Enable:** Whether to enable the flight carving function, double-click to change.

**Encoder signal reversal:** The software inverts the received encoder output signal and clicks toggle enable.

**The encoder is only connected to phase A:** it is used when using an encoder with only phase A output.

**Flight speed coefficient:** Since the galvanometer ratio Calibration may have errors, the filled value deviates from the actual calculated value.

**Calculation formula:** flight speed coefficient = encoder speed wheel circumference / encoder pulse per revolution

**Enable hardware emulation mode:** Generate line body speed using analog hardware.

**Simulated flight speed X:** Simulated flight X direction speed.

**Simulated flight speed Y:** Simulated flight Y direction speed.

**The direction of the pipeline is from right to left:** the direction of the pipeline is from right to left.

**Keep the order of processing objects:** the software carves the contents of the workspace according to the order in the object list, otherwise it carves from left to right or right to left according to the position of the object in the workspace; carving order and selecting the

pipeline direction Related.

**Flight error Calibration factor:** Error Calibration in flight.

2. Regional parameter settings

**Area size:** The actual maximum carving range corresponding to the galvanometer.

**Galvanometer 1 = x:** Controls the card galvanometer output signal 1 as the user coordinate system x-axis.

**Galvanometer 2 = x:** Controls the card galvanometer output signal 2 as the user coordinate system x-axis.

**Reverse:** The current galvanometer output is reversed.

**After processing, go to the specified position:** set the galvanometer to move to the specified position after the current object is completed.

**Use Calibration file:** Whether to call the CalibrationWizard program to generate the galvanometer Calibration file.

## Chapter 7 Multi-layer processing

### 7.1 Introduction

The multi-layer processing principle is similar to the multi-text processing in EZCAD2, but it is more flexible and convenient.

### 7.2 Hardware environment

The hardware environment is consistent with the 3D software. The device configuration is shown in Table 7.1.

Table 7.1 Hardware Environment Configuration

Name	Specifications
computer	Dual-core CPU, memory 2G, hard disk 10G, dual native USB interface
operating system	64-bit WIN7/8/10
Card	DLC2 carving card
Number of switches	Multiple

Galvanometer

2D/3D

Laser

Fiber or CO2

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## 7.2.1 Hardware Manual

The hardware manual refers to the projection part of the DLC2 card manual.

## 7.2.2 Hardware connection

Take the DLC2 card as an example. The specific hardware connections are shown in Table 7.2:

Table 7.2 DLC2 card hardware connection

Interface	Connection object	Remarks
CON1	12-24V DC power supply	
CON2	Laser	Specific connection reference pin definition
CON3	Galvanometer	Specific connection reference pin definition
CON5	External IO/flyer interface	

## 7.3 Software environment

This software is a green free installation version, which can be used by the company's authorization. If you have any requirements, please contact Beijing JCZ Technology Co., Ltd. directly;

Standard computer system 64-bit win7/8/10, family Chinese version is not fully functional;

Install the operating environment VC2015 and .NET4.0.

### 7.3.1 Software Configuration Environment

- (1) Load the 3D Calibration file correctly.
- (2) Set the mapping between the layer and the port.

## 7.4 Operating Instructions

1. Set the number of layers: Click the icon in Figure 7.1 to increase the number of layers

required.

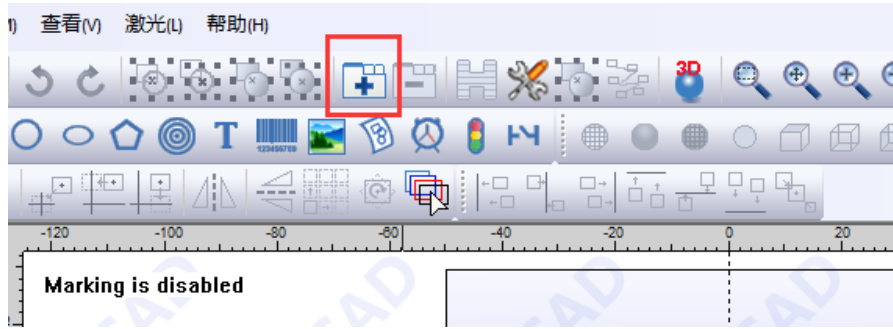


Figure 7.1 Increase the number of layers

After clicking, the number of added layers appears in the lower left corner of the workspace, as shown in Figure 7.2.

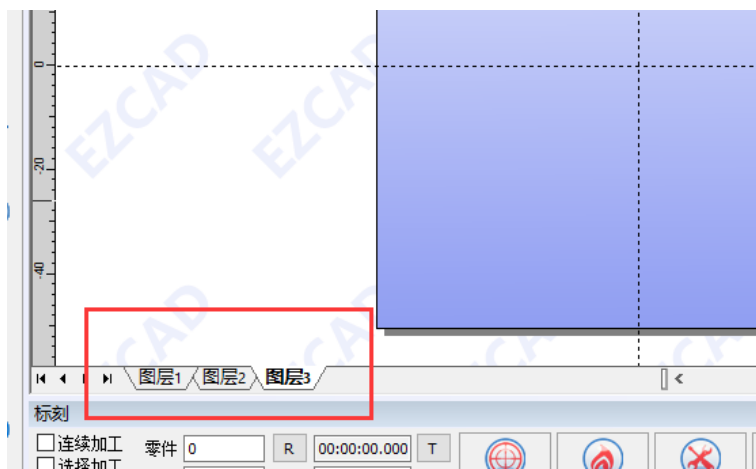


Figure 7.2 Layer display

2. Set the corresponding port of the layer: double-click the layer number to display the interface shown in Figure 7.3.



Figure 7.3 Setting Layer Corresponding Switches

**Set the corresponding switch:** the switch adopts high and low level combination, which is consistent with the binary mode, so as to reduce the control switch as much as possible to achieve more carving content.

3. Processing: Select the continuous mode. At this time, the input port is continuously detected, and the corresponding layer is processed according to the detection level.

## Chapter 8 New Features

### 8.1 Custom Background and Logo Watermark

Modify the Workspace.png in the RES directory of the Ezcad3 software to change the drawing background.

Modify the Background.png in the RES directory of the Ezcad3 software to change the logo watermark.

**Note:** Workspace.png size is adjusted according to the workspace.

The RES folder is shown in Figure 8.1.




Figure 8.1 RES folder



## 8.2 Filling

### 8.2.1 Multiple fills of the same object

EZCAD supports multiple fills for the same object and supports up to 8 fills. First select the fill object, then click the icon  to open the fill interface, as shown in Figure 8.2.

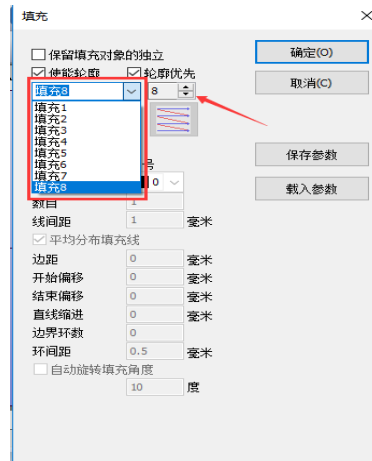


Figure 8.2 Filling interface

First set the number of fills in the position pointed by the arrow, and then set the fill mode in the rectangle.

### 8.2.2 Filling the background

**Example: Fill the rectangle with a spiral:**

- (1) First draw a spiral;
- (2) Then draw a rectangle, as shown in Figure 8.3;

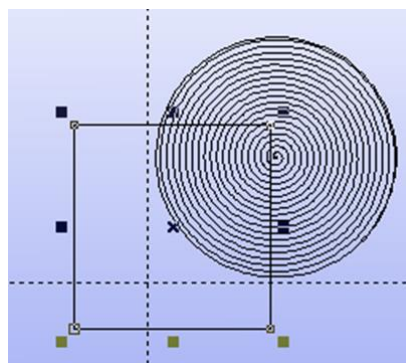


Figure 8.3 Background Fill

- (3) Select the rectangle to open the fill, as shown in Figure 8.4;

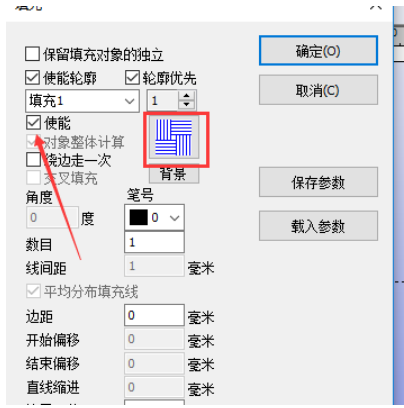


Figure 8.4 Enable Filling

- (4) Select Enable, click the fill type in the rectangle until the display is background (the icon is the same as the rectangle);
- (5) Click on the word “background” below the rectangle to display the interface shown in Figure 8.5.

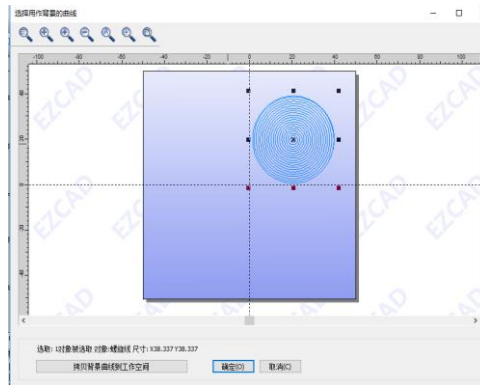


Figure 8.5 Selecting the fill background

Select the spiral click to confirm (if there are multiple images, select the desired fill image and click OK).

- (6) Return to the filling interface and click OK;
- (7) Remove the rectangle to display the fill effect, as shown in Figure 8.6.

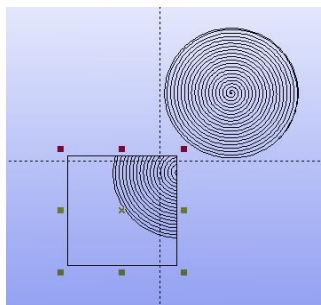


Figure 8.6 Background fill effect

**Note: The filled object and the background object must overlap, otherwise the fill is invalid!**