EagleWorks 1.0.1

User Manual

A Complete Reference Book For EagleWorks Software





GU Eagle America, Inc. http://www.gueagle.com/

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Chapter 1

Install EagleWorks

Topics:

- Get EagleWorks
- Install EagleWorks Software
- Upgrade EagleWorks
 Software

In this chapter, we'll guide you to install EagleWorks, and get ready to use it with your laser machine.



Get EagleWorks

Before we dive into EagleWorks installation, you need to get it by the following ways.



Figure 1-1: A USB flash drive with EagleWorks software package in it

Note:

The blue license key shown in the picture above is for EaglePrint, please refer to EaglePrint User Manual for more information.

1. Buy laser machine from us

We'll provide EagleWorks along with the laser machine. You can visit *http://www.gueagle.com/laser-machines.html* to get more information about our laser machines.

2. Get updated release from *http://www.gueagle.com/*

If you already have EagleWorks and want to check if there is a new release, please check our website.

Install EagleWorks Software

We'll guide you to install EagleWorks software in this section. Before start, please plug the USB flash drive in or download EagleWorks installation package from *http://www.gueagle.com/*, as described in *Get EagleWorks* on page 8.

Browse to and double click on EagleWorksSetup_[version].exe to start installation, you'll see a dialog shown as below.



Click on Install button to start processing, shown as below.

😚 EagleWorks8.01.25 Install			
Installing Please wait while EagleWorks is being installed.			
Please wait while EagleWorks is being installed. The installation will take several minutes.			
Execute the commands			
Copyright 72013None			
< Back Next > Cancel			

After copying prerequisite files to system, you'll see the setup dialog shown as below.

Welcome to use	
Install USB driver Un	istall USB
Language: Engli	sh 💌
Origin: TopRi	ght 💌
Size unit: mm	•
🗖 Locate install path	
Install	Exit

Tip:

You can change display language of the setup dialog by Language option, shown as above.

If you want to connect to your laser machine by USB cable connection, click on **Install USB driver** button to install USB port communication driver for RDCAM control system. That's not necessary if you plan to connect your laser machine to PC by Ethernet cable.

Tip:

The installer will prompt you to connect RDCAM control system through USB port first, it's safe to ignore it and Windows operating system will install the driver while the first time you connect RDCAM through USB port.

Then, choose appropriate setting for **Origin** and **Size unit** options for your machine and convention, and click on **Install** button to install EagleWorks to your PC.

Tip:

The origin is the resetting position of laser machine, it's usually top-right corner of working area of our machines.

If you check **Locate install path** option in the setup dialog, it will pop up a dialog and help you choose installation path, shown as below.

Browse for Folder	X
Selected Install Path:	
Desktop Desktop Network Difference Dif	
	OK Cancel

When install finished, click on **Exit** button to close the setup dialog.

After installation, you'll find a shortcut for EagleWorks in your desktop, shown as below. Double click on it to open EagleWorks software.



When connect RDCAM control system to your PC by USB cable, you'll see a **FT245R USB FIFO** device in **Devices and Printers** dialog of Windows system, shown as below. That means the USB driver for communication is installed correctly, and the laser machine is ready for receive jobs.



Now, you're finished with EagleWorks software installation, and we'll show you how to use it step by step in following chapters.

Upgrade EagleWorks Software

When there is a new version of EagleWorks, you can download it from *http://www.gueagle.com/*.

Uninstall old version of EagleWorks first, then install the new version, follow instructions in *Install EagleWorks Software* on page 8.



Chapter

2

Using EagleWorks

Topics:

- Get Familiar With EagleWorks
- Setup Device Connection
- Page Settings
- Create Basic Designs
- Import Complex Design
 Patterns
- Review Designs
- Important Concepts You Must Know
- Prepare For Processing
- Generate And Output Data
- Save File
- Summary

In this chapter, we'll show you how to use EagleWorks step by step, from setting up connection with your laser machine, setting up page and creating designs, to outputing data to laser machine.

You'll get familiar with basic functions and operations to finish simple jobs, and we'll cover more advanced parts in subsequent chapters.



Get Familiar With EagleWorks

EagleWorks is a specialized CAD/CAM software, cooperated with RDCAM control system, for laser cutting and engraving processing. You can create simple designs, import complex patterns, set layout, output data and control processing progress, all in it.

Double click on **EagleWorks** shortcut on desktop, you'll see main UI of EagleWorks, shown as below. You can switch language of the UI by click on **Help(H)** > **Language** menu item, then you'll see all available language in the list, click on the language you want to use to finish setting.



Figure 2-2: Main user interface of EagleWorks

Like all CAD softwares, there is a big drawing area in center of the UI. You can find menu bar at the top, status bar at the bottom, and some toolbars around the drawing area in default UI layout. You can hide specific toolbar by unchecking the corresponding item in **View(V)** menu, shown as below. And, you can find CAM functions in right panes, such as processing parameter settings and direct control panel, shown as above.



• System Bar

You can find most commonly used commands on **System Bar** toolbar, below menu bar in default UI layout.

• Draw Bar

You can find commands for creating, editing drawing objects and layout on **Draw Bar** toolbar, on left side of drawing area in default UI layout.

• Cut Property Bar

You can edit properties of drawing objects on **Cut Property Bar** toolbar, on top of drawing area in default UI layout.

• Arrange Bar

You can find commands for controling objects layout on **Arrange Bar** toolbar, such as alignments, spacing and position. It's on top of drawing area in default layout.

• Color Bar

You can set drawing objects to colors in **Color Bar** toolbar, to assign objects to specific layer. It's on bottom of drawing area in default UI layout.

• System Work Plat

There are six setting groups for different aspects of EagleWorks in **System Work Plat** pane, we'll cover them in more details in following contents. It's on right side of drawing area in default UI layout.

Process Control Bar

You can find data output and direct processing control commands on **Process Control Bar** pane, on right side of drawing area in default UI layout.

Setup Device Connection

Before using EagleWorks with your laser machine, you've to setup device connection in **Device** section of **Process Control Bar** pane, shown as below.

		×	
Laser work			
Start	Pause/Continue	Stop	
SaveToUFile	UFileOutput	Download	
Position: Current position			
♥ Path optimize Cut scale ● Output select graphics Go scale ● Selected graphics position Go scale			
Device			
Port setting Device(USB:Auto) 🔹			

EagleWorks uses USB connection by default. You can add LAN connection configurations by click on **Port setting** button, and you'll see a dialog shown as below.

		×
	Machine	COM/IP
	Device	USB:Auto
A	dd Delete	e Modify Exit

Follow steps below to set up a LAN connection with your laser machine.

1. Connect your laser machine to PC by an Ethernet cable.

You can see **Lan ON** status indication on control panel of the laser machine when connection established.

2. Click on **Add** button in dialog above to add a LAN connection port setting, shown as below.

Port setting
Machine name: Device
O USB Port NO: COM3 Test
@ Web
IP: 192 . 168 . 1 . 100 Test
Ok Cancel

You can set a specific name for the machine connected currently, choose **Web** connection type, and specify the IP address of the machine. RDCAM control system use 192.168.1.100 by default, you can check that on control panel of the machine.

3. Set IP address of your PC.

Open network adapter settings window, shown as below.



Right click on the adapter connected to the machine, and choose **Properties** menu item, you'll see a dialog shown as below.

🖟 Local Area Connection Properties	
Networking Sharing	
Connect using:	
Intel(R) 82579LM Gigabit Network Connection	
Configure	
This connection uses the following items:	
Client for Microsoft Networks	
QoS Packet Scheduler	
File and Printer Sharing for Microsoft Networks	
Internet Protocol Version 6 (TCP/IPv6)	
Internet Protocol Version 4 (TCP/IPv4)	
🗹 🛶 Link-Layer Topology Discovery Mapper I/O Driver	
🗹 🛶 Link-Layer Topology Discovery Responder	
Install Uninstall Properties	:07
Description	ALC: NO
Transmission Control Protocol/Internet Protocol. The default wide area network protocol that provides communication across diverse interconnected networks.	Automa
OK Cancel	

Choose Internet Protocol Version 4 (TCP/IPv4) and click on Properties button, you'll see a dialog shown as below.

Internet Protocol Version 4 (TCP/IPv4) Properties			
General			
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.			
Obtain an IP address automatically			
• Use the following IP address:			
IP address:	192.168.1.99		
Subnet mask:	255 . 255 . 255 . 0		
Default gateway:	· · ·		
Obtain DNS server address automatically			
• Use the following DNS server add	resses:		
Preferred DNS server:			
<u>A</u> lternate DNS server:			
Validate settings upon exit			
OK Cancel			

Choose Use the following IP address option, set IP address to 192.168.1.99 and Subnet mask to 255.255.255.0, leave other fields blank, then click OK button to confirm modifications.

4. Go back to EagleWorks **Port setting** dialog, and click on **Test** button, you'll see a dialog told you that port test succeed.

Tip:

If you have only one laser machine, the simplest way is to connect the machine to your PC by an Ethernet cable directly.

If you have more than one machine, you can use a wireless router to connect all of them at same time.

- 1. Set different IP address for each machine on panel.
- 2. Set different name for each machine.
- 3. Set corresponding IP address for each machine in EagleWorks.
- 4. Select corresponding port setting when output to each specific machine.

Be ware that you should set all IP address in same subnet with your PC, like 192.168.1.x.

Now you connected your laser machine to PC, and you can create some designs using EagleWorks.

Page Settings

Before creating some designs, you've to check and correct page settings according to RDCAM control system settings of your laser machine.

Click on **Config(S)** > **Page Setting** menu item to open **Page setting** dialog, shown as below.

Page setting				X
Page size			Keyboard	
Page width:	1300.000	mm	Adust distance:	1 mm
Page height:	900.000	mm	Adjust ratio:	10
Head num:	1 -		Adust angle:	1 0
Head space 1:	100.000	mm	Color config	
Head space2:	100.000	mm	Background Wo	rk area Grid
Head space3:	100.000	mm		
Head space4:	100.000	mm		age size:
Head space5:	100.000	mm	•	
Auto fresh page setting Read Clean background Modify size				
Grid				
GridSpace:	50	mm	Ok	Cancel

The best way to synchronize page settings with RDCAM control system in laser machine is to enable **Auto fresh page setting** option and click on **Read** button to accomplish synchronization.



Warning:

You can set page size manually, but you may get unpredictable results if the settings are different with that in RDCAM control system, do it at your own risk.

After synchronizing page settings from RDCAM control system, you can check **Page width** and **Page height** in the dialog.

There're some other useful settings in this dialog. You can enable or disable **Grid** of drawing area, and set **GridSpace** of it. You can set movement step of keyboard moving of drawing objects here. You can set color for background, border of drawing area and line of grid, as you can do in other CAD softwares. And, you can set position of background image, and change size of it.

Now, you got a correct page with settings you prefered.

Create Basic Designs

Now, you can create some basic designs using drawing tools of EagleWorks. You can visit drawing tools by **Draw(D)** menu or **Draw Bar** toolbar.

You can draw points, lines, curves, polygons, rectangles, ellipses and texts in EagleWorks, shown as below.



When drawing line or polyline, you can press and hold **Ctrl** key to get horizontal or vertical line segment. You can draw a polyline using curve tool if you don't hold and drag with control point when clicking on drawing area to add new nodes. To finish polyline or curve, you can right click anywhere in drawing area, or left click on the start point of the polyline or curve to close it, the mouse cursor will change to a bold target sign when you got it.

Left click and drag to create recangle or ellipse. Press and hold **Ctrl** key to get square or circle, press and hold **Shift** key to use the left clicked position as center of the rectangle or ellipse.

When creating text object, after left clicking on drawing area, you'll see a dialog shown as below.

Text					×
 TrueType font: SHX font: 	殖 Tahoma 翻 Fs.SHX	•	Width: Char space:	100 0	% mm
G.U. Eagle Advanced Aut	omation	*	Line space:	0	mm
			Enable variab	le text	
4 Height: 40		+			ancel

EagleWorks support multi-line text, shown as above. You should set font type, **Height**, **Width**, **Char space** and **Line space** for the text. Besides that, EagleWorks supports variable text object, like date and serial number. For date, EagleWorks will generate current date when output; for serial number, EagleWorks will generate new one for each time outputing, according to the rules you set. Please refer to *Create Variable Text* on page 44 for more information.

Usually, you've to change some properties of objects created. First, you've to select the object(s) you want to edit, by left click on it, bounding selection, or click on Edit(E) >Select All menu item to select one, some object(s) in selecting box or all objects. Besides that, you can press and hold Shift key and increase or decrease selection set, or right click on a layer in Work tab of System Work Plat pane to select all objects of the layer.

You'll see eight small grey handle square around selected object(s), and a magenta x sign at center of it, shown as below. You can click on one of them and drag to change size or position of the object(s).



After object(s) selected, all edit and layout functions can be applied on it(them) will be activated, shown as above. You can use them by corresponding menu items, properties in **Cut Property Bar** toolbar or functions on other toolbars, or functions in **Transform** tab of **System Work Plat** pane on right side of drawing area. We'll cover these functions in more details in *More Edit And Layout Functions* on page 39.

Import Complex Design Patterns

The drawing functions in EagleWorks are not very powerful, and maybe you prefer to use your favorite drawing softwares. For complex design patterns, you can create them in 3rd party softwares then import them into EagleWorks. EagleWorks supports almost all popular file formats, like .ai, .dxf, .plt, .dst, etc. Below is a example of .ai file importing.

Tip:

EagleWorks only supports some old versions of .ai and .dxf files. If you can not import these files in some cases, please try to save files in old version and try again.

Click on File(F) > Import... menu item, or click on \bowtie button on System Bar toolbar, and you'll see Import dialog shown as below.

Import			×
Look in: 👔	design patterns	- 🕝 🤌 🛤	•
Name	*	Date modified	
agu_eagle_logo.a	ì	2015/11/2 14:12 ,	Advanced Automation
			Advanced Automation
•	III	4	V Preview
File <u>n</u> ame: gu_ea	agle_logo.ai		😂 Open
Files of type: Supp	orted Files1		▼ Cancel

Choose the file you want to import, you can see preview of the design pattern in right pane, click on **Open** button to finish importing, shown as below.



Note:

For most vector files, design patterns will be imported to corresponding layers according to layer descriptions in file. For some special file types, such as DST/DSB files, all designs will be imported to current layer.

If there is something wrong with the imported design, or some part of original design is not optimized for laser processing, please check import settings first. Click on **Config(S)** > **File Para Setting** menu item to open **File Parameter** dialog shown as below.

File Parameter	- Export Setting:
PLT Precision:	Mark point as zero
DXF Unit: MM	0.0000 0.0000 Get mark point Processing directly while exter Enable counter Reset counter
✓ Import image in AI files ■ Import dst support layer	Export Precision(%): 80
✓ Auto dose curves Close error(mm): 0.1 ✓ Combine lines	Unit type: mm Velocity Unit: mm/s
Combine error(mm): 0.1	Ok Cancel

For .plt file, you should set **PLT Precision** value according to export setting from your drawing software. For .dxf file, please confirm **DXF Unit** option with setting of the drawing software. EagleWorks can automatically close curves with very small gap, or combine adjacent lines which are closed enough between end to end, according to settings of **Auto close curves** and **Combine lines** options. And you can set default position for imported design by setting appropriate **Docking import data** option.

Review Designs

After creating or importing designs, editing them, and adjusting layout finished, you should review all designs to assure everything is ok before generating and outputing data to your laser machine.

It's a basic operation and is very useful to zoom in to a specific part of the whole design to check details, especially for very complex design. There are many ways to do this, choose one according to your needs.

1. Zoom to all objects

Click on Edit(E) > View All menu item, or click on system Bar toolbar, EagleWorks will zoom all objects to fill the view port, example shown as below.



2. Zoom to selected object(s)

Sometimes, you just want to check some selected objects, click on Edit(E) > View Data Frame menu item, or click on button on System Bar toolbar, EagleWorks will zoom selected object(s) to the view port, example shown as below.



3. Zoom to page frame

If you want to check whole page layout, click on Edit(E) > View Page Frame menu item, or click on R button on **System Bar** toolbar, EagleWorks will zoom page frame to view port, example shown as below.



4. Zoom to selected drawing area

Sometimes, you want to zoom to some selected drawing area, with or without object(s)

in it. Click on Edit(E) > View Select menu item, or click on System Bar toolbar, EagleWorks will zoom selected drawing area to the view port, example shown as below.





5. General zoom in and zoom out

Click on Edit(E) > ZoomOut or Edit(E) > ZoomIn menu item, or click on \bigcirc or \bigcirc button on System Bar toolbar, EagleWorks will zoom in or zoom out drawing area around the point you clicked at.

6. Move view port

Click on Edit(E) > Move menu item, or click on R button on System Bar toolbar, then left click on any position on drawing area, hold mouse button and drag to move view port to the position your want.

Besides details of design themselves, EagleWorks can show traveling path of processing

progress. Click on Edit(E) > Show Path menu item, or click on \square button on System Bar toolbar to trigger traveling path display, example shown as below.



Important Concepts You Must Know

So far, you're familiar with some basic and design functions of EagleWorks, but you may have questions about how EagleWorks mapping your designs to laser processing. Before starting preparing for processing and output data in following section, we'll illustrate some most important concepts in this section, to answer your questions, and help you to use EagleWorks properly.

1. Laser processing modes

First of all, you need to get familiar with laser processing modes if you don't, those're what a laser machine can do on laserable materials. EagleWorks supports laser cutting and engraving processing modes, you can find definition of laser cutting on Wikipedia.

Laser cutting is a technology that uses a laser to cut materials. Laser cutting works by directing the output of a high-power laser most commonly through optics. A typical commercial laser for cutting materials would involve a motion control system to follow a CNC or Gcode of the pattern to be cut onto the material. The focused laser beam is directed at the material, which then either melts, burns, vaporizes away, or is blown away by a jet of gas, leaving an edge with a high-quality surface finish.

https://en.wikipedia.org/wiki/Laser_cutting

Image shown below is a picture of acrylic cut by laser.



And you can find definition of laser engraving on Wikipedia too.

Laser engraving, which is a subset of laser marking, is the practice of using lasers to engrave an object. The technique does not involve the use of inks, nor does it involve tool bits which contact the engraving surface and wear out, giving it an advantage over alternative engraving or marking technologies where inks or bit heads have to be replaced regularly.

https://en.wikipedia.org/wiki/Laser_engraving

Image shown below is a picture of laminates plate engraved by laser.



You can set processing mode in layer processing parameters dialog, triggered by double click one of available layers in **Work** tab in **System Work Plat** pane on right side of drawing area, refer to *Prepare For Processing* on page 33 for more information.

2. Vector graphics

EagleWorks supports cutting and engraving on vector graphics, depending on processing mode set for the layer of it. You can find definition of vector graphics on Wikipedia.

Vector graphics is the use of polygons to represent images in computer graphics. Vector graphics are based on vectors, which lead through locations called control points or nodes. Each of these points has a definite position on the x- and y-axes of the work plane and determines the direction of the path; further, each path may be assigned various attributes, including such values as stroke color, shape, curve, thickness, and fill.

https://en.wikipedia.org/wiki/Vector_graphics

Example shown below is a logo of G.U. Eagle imported in EagleWorks, there are three layers in the design, black, blue and red. We set processing mode of blue layer to **Scan**, which means engraving. You can see it's filled with blue color, and other objects in black and red are thin outlines.



Figure 2-3: Vector graphics with processing mode set to Cut and Scan

Tip:

By default, objects of layer set to **Scan** mode will not filled with color in display, you have to enable it by clicking on **Config(S)** > **Graph Hatch** menu item.

3. Raster graphics

EaglePrint supports only engraving on raster graphics, you can find definition of raster graphics on Wikipedia.

In computer graphics, a raster graphics or bitmap image is a dot matrix data structure, representing a generally rectangular grid of pixels, or points of color, viewable via a monitor, paper, or other display medium. Raster images are stored in image files with varying formats.



https://en.wikipedia.org/wiki/Raster_graphics

Most images you see on your computer screen, like pictures found on the Web and photos you import from your digital camera are raster graphics, stored in JPEG, GIF, PNG and BMP format, etc. You can import them into drawing software for processing. Image shown below is a picture of Audrey Hepburn.



Engraving with laser is much different with printing with ink, there is no color applied on material, laser express color by etching material in different depth or density. To map color of raster graphics to energy, we have to convert color to grayscale first, then convert grayscale to energy level. There are two way to express enerty level with laser. First, express energy level in laser power directly, and adjust laser power on every dot in real time. In practice, that's very difficult to precisely control laser power at very high rate of change, especially for some kinds of laser, such as CO2 glass laser tube which is widely used in laser engraver. Second, the better choice, express energy level in etching dot density. In practice, you can use halftone, a reprographic dither technique, to simulate continuous tone grayscale through the use of black dots, varying either in size or in spacing, thus generating a gradient like effect, shown as below.



Figure 2-4: Halftone illustration

In figure above, left one show halftone dots, right one show how the human eye would see this sort of arrangement from a sufficient distance.

To improve dither quality to get best result, we recommend using halftone function provided in 3rd-party drawing software. Image shown below is processed wth Adobe Photoshop for example.



Figure 2-5: Picture of Hepburn dithered by halftone method 4. Machine and programmed coordinates

Every laser machine has a virtual coordinates system for it's working area, and you must setup machine coordinates used in EaglePrint according to it, shown as below.



Figure 2-6: Machine coordinates supported by RDCAM control system

RDCAM control system supports standard Cartesian coordinates and it's variants, laser machine manufacture use one of them according to mechanical design. In EagleWorks, you can use **Axis Mirror** options in **System Setting** dialog to setup machine coordinates according to that, shown as below.

Setting	1/				
General settings Sy	stem Info				
Axis Mirror	Laser head				
Axis X Mirror	\odot \odot	۲	Map for	pen axis:	U 🔻
Axis Y Mirror	\bigcirc \bigcirc \bigcirc	0			
Small circle speed	limit		Scanning(F	leverse interv	al
Diameter (mm)	Speed(mm/s)	Sp	eed(m	Reverse	Offset r
1.100	15.00000				
2.100	20.00000				
3.100	25.00000				
4.100	30.00000				
6.100	35.00000				
8.100	40.00000				
	•	•			•
Add	Delete		Add.		Del
				(Close

Besides machine coordinates, you can setup programmed coordinates according to your workpiece to simplize locating progress, shown as below.



Figure 2-7: Programmed coordinates illustration

To setup programmed coodinates shown in above example, first, move laser head to the position on workpiece, it's (320, 300) in machine coordinates in this example. Second, for laser machine equipped with RDCAM control system, press **Origin** button on panel, then control system will setup a programmed coordinates with it's origin (0, 0) set to (320, 300) of machine coordinates. Finally, you've to specify which point on frame of graphics will be mapped to programmed origin, using **Laser Head** option in **System Setting** dialog, shown as above. And you'll see a little green square at the point of all objects' bounding box, shown as below.

- V8.01.25-[F:\Google Drive\WorkingDir/7=Bleagleworks manual\complex_design_patterns.rld]		- • • ×
File(E) Edit(E) Draw(D) Config(S) Handle(W) Tool(D) Model(M) View(W) Help(H)		
🗋 📂 🔐 🗶 🖓 🚳 🚳 🔍 Q. Q. 🔍 Q. 🖾 🐨 🖉 📈 🖬 🖬 🖽 🖽 🖉 🖳 🕎 🐐 🗰 🖊 🖉		
Х (550 mm 1913,73 mm 100 % 通知 O O Process No:1	- <u>↓</u>	
F 740,0 720,0 700,0 680,0 640,0 640,0 60,0		×
· · · · · · · · · · · · · · · · · · ·	^	Work Output Doc User Test Transform
		Cut Yes No
		Cut Yes No
Advanced Automation		
		• III •
		Color
		MinPower(%)-2 30.0
		Speed(mm/s) 100.00
		Priority 1
		Laser1 Laser2
		Num space Dislocation Mirror
		Y: 1 0.000 0.000 H V
At Advanced Automation		Virtual array Bestrew Adjust
	-	×
		Laser work Start Pause/Continue Ston
		SaveToUFile UFileOutput Download
		Position: Current position
		Path optimize Cut scale
		Selected graphics Go scale
		Device
		Port setting Device(USB:Auto)
	+	
*Welcome to use the Laser system of cutting.Propose the display area 1024*768 or higher * L=	0.000m	m X:581.458mm,Y:383.700mm

Prepare For Processing

After design finished, you should review or modify processing parameters, simulate processing progress if necessary, to confirm everything is ok, before output data to laser machine.

EagleWorks supports layered parameter setting, you can specific different layers for objects which should be processed with different settings, like processing mode, laser power, speed, etc.



In exmaple above, there are three layers in design patterns, black for two big eagle words, blue for upper small string, and red for lower small string. You can find layer parameter settings in **Work** tab of **System Work Plat** pane on right side of drawing area, shown as above.

Click on a layer and you'll see quick settings below the layer list, includes laser power, speed and processing priority. Click on an item to change it's value. If your laser machine is equipped with dual laser, you can switch laser power settings by click on Laser 1 or Laser 2 button at bottom.

In layer list, you can see **Mode**, **Output** and **Hide** attribute of each layer. If the **Output** attribute of a layer is **No**, EagleWorks will not generate data for objects in the layer while output data for processing. If the **Hide** attribute of a layer is **Yes**, objects in the layer will be hidden in the drawing area, and EagleWorks will not generate data for them. Double click on **Output** or **Hide** attribute of a layer will switch it's value.

Double click on Layer color or Mode value will open Layer Parameter settings dialog, shown as below.

Layer Par	rameter						U	×
		Para	ameter li	brary			0.000	
	Layer:					Seal:	0.000	mm Advance
	Is	s Output:	Yes	Yes 🔻		Open Delay:	0	ms
	Spee	d(mm/s):	100	100 Default		Close Delay:	0	ms
	If	Blowing:	Yes 🔻]		Laser thr	ough mode
	Processing Mode:		Cut	•	Advance	Through power 1:	50.0	%
	I	Min Power((%) Max	%) Max Power(%)		Through power2:	50.0	%
	☑ 1:	30	30		🔲 Default	Through power3:	50.0	%
	2:	30	30			Through power4:	50.0	%
	√ 3:	30	30			Through power5:	50.0	%
	√ 4:	30	30		1	Through power6:	50.0	%
• •	√ 5:	30	30					
	6:	30	30]		Ok	Cancel

There is a small layer list on left side of dialog, you can switch to the layer you want to review or modify quickly.

Click on **Parameter library** button to open **Parameter library** dialog, shown as below.



You can save parameter set for a specific machine configuration and material combination to library, or load an exist one from it, greatly simplize setup job, especially for new guy using your machine.

The part of top left in Layer Parameter dialog include output, Processing Mode, Speed and exhaust blow control options. For Processing Mode, you can set Cut for cutting, or Scan for engraving. If you check Default option for Speed, RDCAM control system will use speed setting saved in it to processing the job.

The part of bottom left is for setting laser power. For laser machine equipped with dual laser, you can control a laser to work or not by enable or disable it here. If you check **Default** button option, RDCAM control system will use laser power settings saved in it to processing the job.

Tip:

If you use one PC to send same job to several machines with different configuration, like laser with different power, maybe it's better to set appropriate settings inside control system, and check **Default** option for speed and laser power in layer parameters, to use them.

The part on the right is depended on processing mode you set, in dialog shown above, that's for advanced cutting, and we'll discuss them later. If you set processing mode to **Scan**, you'll see dialog shown as below.



Layer Par	ameter							×
		Para	ame	ter library				
	Layer:				Negative En Output direct	Negative Engrave Optimized Scan Output direct Independent out Ramp Effect		
	Speed(mm/s):		10	0	Default	Ramp Length:	0	mm
	If Blowing:		Ye	Yes 🔻		Overstriking:	Un-process 🔻]
	Processin	ng Mode:	Sci	an 🔻	Advance	Scan Mode:	X_swing -]
	Min Power(%) Max Power(%)					Interval(mm):	0.1	Advance
	V 1:	30		30	Default	Enable engrave	circle handle	
	2:	30		30		Maxim diameter:	0.100	mm
	√ 3:	30		30		Alternative circle	0.100	mm
	√ 4:	30		30				J
	√ 5:	30	٦	30	Ĩ			
	√ 6:	30		30			Ok	Cancel

The right part include all settings for engraving. You can control space between every two scanlines by setting appropriate value for **Interval** option. **Scan Mode** will affect scan processing method.

After setup, you can check designs and processing parameters with a simulation. Click

on Edit(E) > Preview menu item, or click on with button on System Bar toolbar to open simulation window, shown as below.



Click on **Simulation** button to start simulation. You can control the progress using **Pause**/ **Continue** or **Stop** button, and you can control simulation speed by adjusting value of **Simulate** option. Right click on simulation area, and click on **Config** menu item, you'll see a dialog shown as below. You can config display options, like line color here.
Configuration	×
Background Back color:	Font color:
Draw color(Power)	
0%	100%
Simulate color(Power)	
0%	100%
Idle color	
Anchor	
🔘 Top left	Op right
Ø Bottom left	Bottom right
	ОК

Generate And Output Data

Now you can generate and output data of designs for laser processing. You can control processing progress directly within EagleWorks, or send data to laser machine as an offline job.

You can find output functions in **Process Control Bar** pane on right side of drawing area, shown as below.

Laser work		1			
Start	Pause/Continue	Stop			
SaveToUFile	UFileOutput	Download			
Position: Current position 🗸					
♥ Path optimize Cut scale ● Output select graphics Go scale ● Selected graphics position Go scale					
Device Port setting	Device(USB:Auto) 🔹			

If your laser machine is connected with PC, you can use **Start**, **Pause/Continue** or **Stop** function to control processing progress directly, or you can use **Download** function to download data of designs to laser machine as an offline job, and control processing progress from the control panel of the machine. If your laser machine is offline, you can use **SaveToUFile** to save data file to a USB flash disk first, then plug the disk in to the machine and copy file to it.

The laser head of laser machine will stay where it is after processing by default, if you want to move it to some predefined position, please choose corresponding option for **Position**. If you choose **Absolute coordinate**, then designs will be processed in position same as drawn in page.

EagleWorks will apply cutting order optimization on your designs by default, if that's not what you want, please uncheck **Path optimize** option, refer to *Optimize Cutting Order* on page 58 for more information.

If you want to output a part of whole designs, you can select the part you want to output first, check **Output select graphics** option, then EagleWorks will only generate and output data of the part to your laser machine.

Before start processing, if you want to confirm the real bounding box of the design on your laser machine, you can click on **Go scale** button, then the machine will drive laser head to show it to you; or if the data is downloaded to the machine as an offline job, you can push **Frame** button on control panel to do that. And you can use **Cut scale** function to cut around the bounding box of the design.

Save File

After following all these steps to create designs and output data to your laser machine, in most cases, you'll want to save designs and related settings to file, and reuse it later. Click

on File(F) > Save or File(F) > Save As... menu item, or click on \Box button on System Bar toolbar, you'll see a dialog shown as below.

ussa Save As					×
Save in: 🎴 eagleworks manual 🔹	G 🤌 📂 🛄 🗸				
Name	Date modified	Туре	Size		
 ▶ design patterns > basic_design.rld ⇒ complex_design_patterns.rld 	2017/10/11 14:46 2017/10/24 9:01 2017/10/11 11:26	File folder EagleWorks EagleWorks	294 КВ 452 КВ		
File <u>n</u> ame: <u>basic_design.rld</u>					Save
Save as type: RLaser Files(*.rld)				•	Cancel

Set a name for the file and click on **Save** button to finish, the data of designs will be saved to a file with .rld extension.

Summary

In this chapter, we got familiar with EagleWorks, and got to know the general and basic steps to use EagleWorks with your laser machine, design, review, setup parameters, generate and output data for laser processing. And we've learned some important concepts about laser processing, to use EagleWorks properly.

In subsequent chapters, we'll dive into these steps and functions more deeply, to explorer more advanced features, handle complex use cases, and use EagleWorks more efficiently.

More Edit And Layout Functions

Topics:

- Edit Drawing Objects
- Edit Curves
- Create Variable Text
- Array
- Modify Design Layout
- Summary

In this chapter, we'll cover almost all edit and layout functions, and discuss some advanced feature in more details.



Edit Drawing Objects

You've learned how to create basic designs and import complex design patterns in *Create Basic Designs* on page 19 and *Import Complex Design Patterns* on page 21, but in real production jobs, usually you have to do some more advanced editings on drawing objects in designs. Some editing operations, called transformations, only change size, angle, etc, and keep basic characteristics of object(s), we'll discuss them here one by one in more details.

• Change size of object(s)

When you creating drawing objects in EagleWorks, there's no way to specify exact dimensions for them, you've to modify it later. For design patterns imported into EagleWorks, you can change their dimensions too.

- 1. After object(s) selected, you can click, hold and drag grey handles around object(s) to change it's or theirs' size.
- 2. If you want to adjust size of object(s) precisely, please select object(s) first, then change width or height of the bounding box in Cut Property Bar toolbar. Click onto maintain the size ratio.
- **3.** There is a same function in **Transform** tab of **System Work Plat** pane, shown as below. You can change size of object(s) like in **Cut Property Bar** toolbar.



The size ratio will be maintained by default, if you want to unlock it, please check **Disproportionate** option. Besides modifing size of object(s) selected, you can create a new copy of it(them), by clicking on **Apply to copy** button. If you change size when copying, the base point of size increasing or decreasing is according to your selection, shown as above.

4. Sometimes, you have several objects, and you want to resize some of them to same size with another one. In this case, you can select the object(s) you want to change first, then select the other one, at last, click on □, □ or button of Arrange Bar

toolbar to set width, height or both of the object(s) same as the one.

• Rotate object(s)

There're three ways to rotate object(s) in EagleWorks, follow steps below to do it.

- 1. After object(s) selected, double click on the center x mark and the four handles at corner of bounding box will switch to rotate mode. Click, hold and drag one of them to rotate the object(s).
- 2. If you want to rotate object(s) precisely, please select object(s) first, then set rotation angle in Cut Property Bar toolbar.
- **3.** There is a same function in **Transform** tab of **System Work Plat** pane, shown as below. You can rotate object(s) like in **Cut Property Bar** toolbar.



This tab provides some more advanced features for rotation. First, you can specify center of rotation by entering coodinates for **Center**. Second, if you want to rotate several objects in different angles but using same rotation center, you can select one of them first, specify center of rotation, and check **Lock rotate center** option, then the rotation center will be maintained in following rotating operations as you wish. Third, you can simply choose center or eight predefined points of bounding box of the object(s) selected as rotation center, by cheking **Relative center** option and specifing the center, shown as above. At last, you can create a new copy of the object(s) selected when rotating, by clicking on **Apply to copy** button.

• Tilt object(s)

There're two ways to tilt object(s) in EagleWorks, follow steps below to do it.

- 1. After object(s) selected, double click on the center x mark and the four handles at center of edges of bounding box will switch to tilting mode. Click, hold and drag one of them to tilt the object(s).
- 2. If you want to tilt object(s) more precisely, please select object(s) first, then use tilt function in **Transform** tab of **System Work Plat** pane, shown as below.

Work Output Doc	User Test	Transform
Skew:		
Horizontal(H)	0	Deg
Vertical(V)	0	Deg
Use anchor poi	nti Apply to ci	руу
	Apply	

You can specify exact tilt angle for **Skew**. EagleWorks uses center of bounding box as tilt center by default, you can check **Use anchor point** option and choose center or eight predefined points of bounding box as center of tilt, shown as above.

• Mirror object(s)

There're two ways to mirror object(s) in EagleWorks, follow steps below to do it.

- 2. There is a same function in **Transform** tab of **System Work Plat** pane, shown as below. You can mirror object(s) like using toolbar buttons on **Draw Bar**.

Work Output Doc	User Test	Transform
Ratio:		
ntal(H)	100.00	%
rtical(V)	100.00	%
Mirror:		
	16	
Disproportionat	te	
	Apply to co	ру
	Apply	

You can mirror object(s) horizontally and vertically at same time by checking the two mirror buttons. EagleWorks uses center of bounding box as mirror center by default,

you can change that and choose center or eight predefined points of bounding box as center of mirror, shown as above.

Moving drawing object(s), which is related to design layout, will be discussed in *Modify Design Layout* on page 47 later. And there is a commonly used function, besides all operations covered above, is deletion. After object(s) selected, press **Delete** key on your keyboard, or click on **X** button on **Draw Bar** toolbar to delete object(s).

Edit Curves

All vector graphics in EagleWorks are composed with line or curve segments, drawn by connecting nodes which can be edited, except point and text objects. Nodes of curves are different with the ones of lines, with additional control points, shown as below. You can change basic characteristics by editing these nodes and control points, which is one of the most important functions in modern CAD softwares.



Figure 3-8: Illustration of nodes and control points of line and curve

Click on Draw(D) > Edit Node menu item, or click on \square button on Draw Bar toolbar to activate node editing tool, you'll see the node editing toolbar appearing on left side of drawing area, and mouse cursor will become a black arrow head. Click on a drawing object to switch it to node editing state, line and curve segments will be turned in to red, and all nodes will be shown as small square handles. Then, click on a node, it will be turned in to green, and, if it belongs to a curve, all control points will be shown as small black suqare handles with blue dash lines connected with the corresponding nodes, shown as above.

After node or control point selected, click, hold and drag to move it, EagleWorks will update associated line or curve segments in realtime. And, there're more editing functions on node editing toolbar, such as add, delete, etc.

• Add a node to line or curve

After lines or curves switched in to node editing state, you can move mouse along with it and you'll see a little curve sign under cursor. Click on the position you want to add a

node, you'll see a big red square sign displayed, then click on 📩 button to add a node at the position.

• Delete a node on line or curve

After node selected, click on = button to delete the node. EagleWorks will update associated line or curve segments with it.

Create Variable Text

We've discussed how to create text objects in *Create Basic Designs* on page 19, and told you that there is an additional function to generate variable text objects, we'll show you more details in this section.

You'll see a dialog shown as below if you check **Enable variable text** option in the text creation dialog.

Text						X
TrueType font:	∄r Tahoma	•][Width:	50	%
SHX font:	🚮 Fs.SHX	*		Char space:	0	mm
G.U. Eagle			^	Line space:	0	mm
			Î		le text	
				Date		•
				default[201710] 12Hour[HH:MM]	17] [04:11]	<u> </u>
				12Hour[HH:MM] 24Hour[HH:MM]	[04:11:36] [16:11]	
				24Hour[HH:MM] American Date[:	[16:11:36] 10/17/2017]	=
				Chinese Date[20 Chinese Date Tir	017年10月1 me[2017年1	7日] 0月17
				Chinese Time[16 European Date]	时11分36利 Time[17/10/2)] 2017p]
				European Date[Week Year[17/1	17.10.2017] .0/2017 16:1	1:36] 🚽
			-	Offset: Da	ay 👻 0	÷
40		•				
Height: 40	mm	Apply		ОК	Ca	ncel

EagleWorks can generate date with some predefined formats in the list shown as above, you can choose appropriate one according to your needs. First, you should choose to generate **Date** in the dropdown list, then choose the format you want to use. If you choose to generate **SerialNO**, you'll see the dialog shown as below.



You can set **Prefix** or **Suffix** for the serial number, and specify start number and increment step according to your needs.

Array

In almost all cases, you will make copies of a design and spread them to fulfill the page, especially for small designs. In EagleWorks, there're two array functions, one will copy and add real drawing objects, like array functions in all drawing softwares; the other special one, called virtual array, just embed a piece of information and display virtual drawing objects.

First, we'll discuss normal array function. Select drawing object(s) first, and click on **Bar** button on **Draw Bar** toolbar, you'll see a dialog shown as below.

Array copy				×
XNum:	1	XSpace:	0.000	
YNum:	1	YSpace:	0.000	Ī
	Bestrew	v	Ok	Cancel

You can set number of columns and rows you want to copy, and set horizontal and vertical

space between objects. Click on button to change the spreading direction of new copies of object. Sometimes, if you want to copy and spread objects to fulfill the page, or fulfill a specific size of area, click on **Bestrew...** button, and you'll see a dialog shown as below.

Bestrewing breadth	J F
X 1300 Y 900 Ok Cancel	

Specify size of area you want to fill, click **Ok** button, then EagleWorks will calculate how many columns and rows to copy automatically according to the size of area and spaces between objects.

You can find virtual array functions in **Work** tab of **System Work Plat** pane, shown as below.

Work	Outp	out	Doc		User	Tes	t	Tra	nsforr	n
Layer			Мо	de		0	Output		Hide	
			- C	ut			Yes		No	
			α	ut		``	Yes		No	
			C	Jt			Yes		No	
									_	_
<				1	11					Þ
Color										
MinPow	/er(%)	r(%)-1 30.			30.0					
MaxPov	wer(%	r(%)-1 30.0		30.0						
Speed(mm/s)	n/s) 100.00)						
Priority		1								
Laser 1	Lase	er2								
-Line/co	olumn	setu	q							
N	lum	5	space		Dislocat	tion	1	Mirro	r	
X: 1		0.0	000		0.000			H	V	
Y: 1		0.0	000		0.000			H	V	
Virtual array Bestrew Adjust]						

Same method to set array parameters, click on **Virtual array** to generate array of objects, shown as below.

Advanced Automation	Advanced Automation
Advanced Automation	Advanced Automation

If you uncheck **Config(S)** > **Show Array** menu item, virtual objects will be displayed as placeholders, shown as below.



If you want to fulfill the page or specific size of area, click on **Bestrew...** button and set size of area as shown above.

Modify Design Layout

Besides editing objects themselves, you'll do more work on design layouts, such as moving, aligning, etc. There're many ways and functions to do that, we'll discuss on them one by one.

- 1. After object(s) selected, click, hold and drag x handle at the center of object(s) to move it.
- 2. If you want to change position of object(s) precisely, please select object(s) first, then change X and Y coordinates of the reference point. You can choose center or eight predefined points around the bounding box of object(s) as the reference point, by

clicking on button on **Cut Property Bar** toolbar, and you'll see a dialog shown as below.



3. There is a same function in **Transform** tab of **System Work Plat** pane, shown as below. You can change position of object(s) like in **Cut Property Bar** toolbar.

Work Output Doc	User Test Transform
Position:	
Horizontal(H)	890.772 mm
Vertical(V)	323.243 mm
	Apply to copy Apply

You can create a copy of object(s) by clicking on Apply to copy button.

- 5. If you have several objects, and want to align them in a specific way, please select object(s) first, then click on a corresponding button on Arrange Bar toolbar, like ^ℝ, according to your needs.

6. If there are more than two objects, and you want to average spaces between them, please select objects first, then click on → or ↓ button to average horizontal or vertical spaces between them.

Summary

In this chapter, we've discussed on all commonly used editing functions, and some advanced ones, such as editing curves and creating variable texts. Then we learnd the array functions of EagleWorks, especially the virtual array feature. At last, we show you the ways to change design layouts. After reading this chapter, you can handle almost all common design tasks, simple or complex, to finish your job.

In subsequent chapters, we'll discuss on some special features which can be applied only on cutting. For engraving, we suggest using 3rd-party softwares like Adobe Photoshop to preprocessing raster images, then import them in to EagleWorks, because same functions in EagleWorks can not generate results as good as them.

Chapter

4

Functions Specific For Cutting

Topics:

- Offset Polygon
- Remove Overlap
- Combine Curve
- Close Curve
- Smooth Curve

In this chapter, we'll discuss some functions specific for laser cutting processing.



Offset Polygon

In some use cases, you have a design with two or more nested graphics. When processing with laser cutting, if you want to avoid conflict between adjacent borders, or reserve a little gap between them, you should shrink inner contour and extend outer contour of adjacent borders in original designs.

EagleWorks provides a convenient tool to help you to do that. Please select object(s) first,

then click on **Handle(W)** > **Offset polygon** menu item, or click on button on **System Bar** toolbar, you will see a dialog shown as below.

Offset poly	×
Offset(mm):	mm 🔲 Delete artwork
) In	O Auto In/Out
Out	🔘 In+Out
	Ok Cancel

You can set offset distance in this dialog. If you check **Delete artwork** option, the original drawing object(s) will be deleted after operation finished. And you can choose to shrink or extend the polygon(s) selected by checking **In** or **Out** option, or do both of them at same time by checking **In+Out** option. For nested polygons, you can check **Auto In/Out** option to let EagleWorks determines if a polygon should be shrinked or extended automatically and smartly, according to it's nest level in design.

Image shown below is a new black polygon offseted from the original red one according to settings in dialog shown above.



Figure 4-9: Illustration of polygon offset function

Remove Overlap

Sometimes, you'll notice there're some overlapped line segments in polygons of imported designs. When cutting, your laser machine will cut at these positions repeatly, and seriously reduce processing efficiency.

Usually, these overlapped line segments are very difficult to find out, EagleWorks provides a special tool to help you doing this job. Please select objects first, then click on

Handle(W) > Delete overlap menu item, or click on ⊨ button on System Bar toolbar, you'll see a dialog shown as below.



You can check **Enable Overlap error** option and set **Overlap error** value to control if the overlapped line segments should be deleted by checking the distance between them and the original line segments.

Note:

It's a little dangerous operation to delete overlapped line segments, because sometimes you have no idea of the designer's purpose and opnions. So, please apply this operation very carefully. We suggest not checking the **Enable Overlap error** option, and let EagleWorks determines what should be deleted automatically.

Combine Curve

Sometimes, there'll be some small gaps between line segments of designs imported to EagleWorks, because some convertsion defects or problems. When cutting with your laser machine, you'll get a result of the workpiece with some little connections with sheet material, and can not take it off.

If that's an error, you should remove these little gaps and connect line segments around them. EagleWorks provides a special tool to help you doing this job. Please select objects

first, then click on Handle(W) > Combine curve menu item, or click on $\stackrel{\text{\tiny bel}}{\longrightarrow}$ button on System Bar toolbar, you'll see a dialog shown as below.

Setting combine error	
Combine error(mm): 5	
Ok Cancel	

You can set **Combine error** in this dialog, and EagleWorks will combine curves if distance between their endpoints is smaller than the value you set. Images below shows two line with 4mm gap between endpoints of them, and we combine them to the new one according to settings in dialog shown above.



Close Curve

Sometimes, there're some curves with very small gaps between start and end points, which supposed to be closed curves. EagleWorks provices a special tool help you resolving this problem. Please select object(s) first, then click on **Handle(W)** > **Curve auto close** menu

item, or click on button on System Bar toolbar, you will see a dialog shown as below.

Setting close error
Close error(mm): 0.1000
Force to close
Ok Cancel

You can set **Close error** in this dialog. EagleWorks will close a curve if the distance between start and end points is smaller than the value you set. Or you can check **Force to close** option to close curves in any condition.

Smooth Curve

Sometimes, curves imported in to EagleWorks is not very smooth, usually happened when import DST files. When cutting with your laser machine, laser head vibrated much more than normal case, and there are more zig zags along with the cutting path.

EagleWorks provides a special tool to help you resolving this problem. Please select

object(s) first, then click on Handle > Curve smooth menu item, or click on \sim button on System Bar toolbar, you will see a dialog shown as below.

Curve smooth	×
Is processing curve	es smooth?
Degree:	Low
Ok	Cancel

There are three preset values for **Degree** option, for controling smooth level applied on curves. Image shown below is comparison of a curve before and after smoothing.





Figure 4-11: Illustration of curve smooth function

If you're not satisfied with the result, you can set **Degree** to **Custom**, then press **Ok** button, and you'll see a dialog shown as below.

Curves smooth
Advanced
Smoothness 30% Fitting smooth Apply FullFrame Ok Cancel

Drag **Smoothness** slider to set custom smooth value first, then press **Apply** button to show the result. EagleWorks will show curves before and after processing for comparision, original is shown in black and processed is shown in red, image shown below is an example.





There are two smoothing methods, if you are not satisfied with the default one, you can check **Fitting smooth** option to active the 2nd one. Image shown below is an example of fitting smooth method.

Curves smooth	<u>x</u>
Advanced	2
Smoothness 100% Fitting smooth Fitting smooth Ok Cance	:

You can check processing result by zoom in and drag display area to view the part your care about. Click on **FullFrame** button to fit curve to whole display area.

After figuring out best suitable parameters and checking processing result, click on **Ok** button to finish operation.



CAM Related Functions And Settings

Topics:

- Optimize Cutting Order
- Limit Speed of Small Circle Cutting
- Engraving Correction
- Check Data Before Output
- Additional Output Settings
- More Settings Of Laser
 Machine
- Using Rotary Unit
- Manage Documents In Laser
 Machine
- Test Basic Movement Functions Of Laser Machine

In this chapter, we'll discuss functions and settings related to CAM, like processing order optimization, laser machine accessary control settings, etc.



Optimize Cutting Order

Order of drawing objects in designs in not very important in CAD softwares, but when it comes to CAM softwares, like EagleWorks in this book, and to laser processing, it becomes very important, maybe the most important factor which affect efficiency.

EagleWorks provides a tool to handle order optimization automatically. It's a function always applied to all drawing objects in designs, so there's no need to select objects first.

Click on **Handle(W)** > **Cut optimize** menu item, or click on **button** on **System Bar** toolbar, you will see a dialog shown as below.

Cutting optimize handle
Order of layer
☑ Inside to outside
Single inner to outer 🔹
Block handle(mm) Height: 50 Dir: Up to bott 💌
Start point optimize V Auto determine start point and direction
Ok Cancel

If you want EagleWorks to processing drawing objects in different layers separately and one by one, please check **Order of layer** option. EagleWorks uses a band based optimization algorithm to optimize order of drawing objects, so the result is high depending on size of drawing objects, intersection between bands, and height of bands used for optimizing. We suggest setting **Height** of bands to the height of a drawing objects unit plus vertical space between rows, if the design is composed of array of the unit. If the design is very big and drawing objects spread irregularly, just remember not to set this value too big, which will dramatically slow down the optimization progress.

Image shown below is comparison of a design which is composed of array of a drawing objects unit, before and after order optimization.





Figure 5-12: Comparision of a design before and after order optimization

To see the order of drawing objects clearly, please switch traveling path display on, please refer to *Review Designs* on page 23 for more information. For complex designs, it's very hard to figure out the exact order of drawing objects, even you've switched the display on. The best way to check the optimization result is using the simulation function, please refer to *Review Designs* on page 23 for more information.

Note:

If the **Path optimize** option in **Process Control Bar** pane is checked, curve optimization will be applied automatically when outputing data or doing simulation, according to settings in dialog shown above. So, if you want to see the original processing order in simulation, please uncheck this option first.

Sometimes, order optimization done by EagleWorks automatically is not very good. In this case, you can adjust the result manully. Click on **Edit(E)** > **Set cut property** menu item, or

click on 🖋 button on System Bar toolbar, you will see a dialog shown as below.



There is big view port on left side and two ordered drawing objects lists on the right. The view port is in view mode by default, means you can navigate and review processing order by some simple mouse operations, like scrolling up and down to zoom in and out, or click, hold and drag to move designs. **ShowPath** option is checked by default, and you'll see

traveling path in the view port. If you navigate to some part of designs, click on \bowtie button to go back to full view the designs quickly.

EagleWorks will give an ordered name for all drawing objects, and show them in an ordered list on left by default. Click on one of them will switch it to selected state, and you can see it's direction and all nodes in view port, shown as below. Click on **Reverse** button

to reverse it's direction. If you want to change it's start node, please click on \sum to switch the view port to edit mode, then double click one of the nodes to change it to the start node.



It's difficult to select the drawing object you want in the list when there are many objects in designs, because you can not distinguish them by name, so the best way is to select it directly in the view port, by clicking on it or bounding selection, then apply the operations you want on it.

If you want to adjust order of a specific drawing object, or some of them, please click on >>> button to move the whole list to the right first, then select the drawing object you want to adjust, and click on i or i button to move it upward or downward. If there're few objects and you want to rearrange all of them, the better way is to click on >> button to move them to the right list one by one. At last, if you want to reverse the order of a whole list, please click on the **ReOrder** button on top of it.

Tip:

If you want to change direction of a specific drawing object only, you can click on Edit(E) > Set Cut Direction menu item, select the drawing object and double click on it to finish the job.

If you want to change start node of a specific drawing object only, you can click on Edit(E) > Set Cut Direction menu item, select the drawing object and double click on the node to finish the job.

Limit Speed of Small Circle Cutting

In some cases, there're a lot of small circles in your designs, with some large graphics. To achieve best cutting quality with efficiency at same time, you should set high cutting speed in layer parameters, and enable **Small circle speed limit** option in system setting dialog shown as below.

Setting		
General settings	System Info	
Axis Mirror	Laser head	
Axis X Mirror	0 0	Map for pen axis:
Axis Y Mirror	00	0
Small circle spe	eed limit	Scanning(Reverse interval
Diameter(mm)	Speed(mm/s)	Speed(m Reverse Offset r
1.100	15.00000	
2.100	20.00000	
3.100	25.00000	
4.100	30.00000	
6.100	35.00000	
8.100	40.00000	
•	111 F	 ₩
Add	Delete	Add Del
		Close

Click on **Config(S)** > **System Setting** menu item will trigger this dialog. EagleWorks provides some default values for a set of circles with small diameter, and you can modify or delete them, or add your own settings.

After this option is enabled, your laser machine will slow down to the specified speed if encountering a small circle, and speed up to layer settings with large graphics.

Engraving Correction

Engraving invovles high speed, dual direction line by line scanning movement, motion system drive laser head moving forward and backward along with X- or Y-axes. In this progress, laser should be triggered simultaneously with position control of laser head. But unfortunately, there must be some little timing difference between these two execution subsystem. Combining with very high speed movements, you will get a swept scanline offsetting a little with the theoretical position. Even worse, in dual directly engraving, there will be offsets in opposite direction between every two adjacent scanlines, and you will see little jags along with the edge of swept image, shown as below.



Figure 5-13: Illustrate reverse interval compensation and offset repay of engraving

In figure above, the black line represents theoretical position of a scanline. The Cyan line stands for real position of scanline swept from left to right, and the green line stands for real position of scanline swept from right to left. In this example, laser was triggered a little late than position control of laser head.

The simplest way to solve this problem is to choose **X_unilateralism** for **Scan Mode** option in layer settings, to enable unidirectly engraving. Every scanline will get same offset like the cyan line shown above, and align accurately with each other.

But in that way, it'll take much longer to finish the job in same condition compare to dual directly engraving, because laser head need to move back to start position after sweeping every scanline and this progress has no contribution to engraving. EagleWorks provides an engraving correction option in system settings to balance quality and efficiency aspects of the progress. Click on **Config(S)** > **System Setting** menu item, you'll see dialog shown as below.

General settings	ystem Info				
Axis Mirror	Laser head				
📝 Axis X Mirror	0 0	0	Map for	pen axis:	U •
Axis Y Mirror	0 0	0			
Small circle spee	ed limit	V	Scanning(F	leverse interv	al
Diameter (mm)	Speed(mm/s)	5	Speed(m	Reverse	Offset r
1.100	15.00000				
2.100	20.00000				
3.100	25.00000				
4.100	30.00000				
6.100	35.00000				
8.100	40.00000				
•	4	•	1		•
Add	Delete		Add.		Del

Check **Scanning** option to enable engraving correction function, and click on **Add...** button to add a correction item for a specific engraving speed, shown as below.

Scanning(Reverse interval)	×
Speed(mm/s):	800
Reverse interval(mm):	-0.5
Offset repay(mm):	0.3
Ok	Cancel

By setting appropriate **Reverse interval** value, EaglePrint will offset even scanlines a little to align with previous odd scanline, like the yellow line shown above, which is aligned with the cyan line after offsetting. You should set different interval values according to engraving speed, because timing difference between laser and position contorl will be a little different, please follow steps below to test and confirm how much interval to set for a specific engraving speed.

- **1.** Draw a rectangle with dimension of 100mm x 40mm, and set **Processing Mode** to **Scan** in layer settings.
- 2. Set Reverse interval value to 0.000mm in system settings, and set engraving Interval in layer settings to a value large enough to seperate adjacent scanlines clearly by human eye, then engrave the rectangle on a paper card.
- **3.** Measure reverse interval between an odd and the adjacent even scanlines, like the cyan and the green lines shown above. If even scanline is on left side of the odd one, use negative interval value, otherwise (laser is triggered a little advance than position control of laser head, happened on some laser machines with CO2 metal laser tube or servo motion system), use positive value. Set reverse interval value and engrave the rectangle on a paper card again, and check if the two adjacent scanlines are aligned accurately. If not, repeat this step until getting result as good as you wish.

Scanlines of engraving will be aligned accurately with appropriate **Reverse interval** setting, but if there is cutting glyphs, scanlines will still disaligned with it, because they're not in their theoretical position, like the black line shown above. You should set appropriate **Offset repay** value to solve this problem, get scanlines in theoretical position like red and orange ones shown as above.

Check Data Before Output

EagleWorks provides a data checking tool to help you find corresponding problems in your designs. Select drawing objects you want to check, then click on **Handle(W)** > **Data check**

menu item, or click on ¹button on **System Bar** toolbar, you'll see a dialog shown as below.

Data check	1005	×	
Check close	Error(mm): 0.01		
Check self-cross			ation
Check cross			ome
Check overlap			
Enable error	Error(mm): 0.01	Check	

Check options you want to check on the objects selected, then click on **Check** button. EagleWorks will show results in right pane, and select all drawing objects with problems, shown as below. Then, you should check them one by one to resolve all problems.

ww V8.01.25-[F:\Google Drive\WorkingDirV [™] 뤒leagleworks manual\basic_design.rld]	
File(F) Edit(E) Draw(D) Config(S) Handle(W) Tool(T) Model(M) View(V) Help(H)	
Data check	
	Ŧ
Auto dose Error(mm): 0.01 Self-cross check end B60.0 840.0 820.0 800.0 760.0 740.0 720.0 700.0 700.0 700.0	×
Check self-cross Check end Not find cross curves	Work Output Doc User Test Transform Layer Mode Output Hide
Check cross	Cut Yes No
Check overlap	
Enable error Error(mm): 0.01 Check X	
	· · · · · · · · · · · · · · · · · · ·
	Color
	MinPower(%)-1 80.0
	MaxPower(%)-1 80.0
	Speed(mm/s) 200.00
	Priority 1
	Laser1 Laser2
	Num space Dislocation Mirror
	X: 1 0.000 0.000 H V
	Y: 1 0.000 0.000
	Virtual array Bestrew Adjust
	-
	Laser work
"Welcome to use the Laser system of cutting Propose the display area 1024 768 or higher "	X:801.880mm,Y:376.989mm

Additional Output Settings

There're some additional output settings for accessaries of laser machine in **Output** tab of **System Work Plat** pane, shown as below, we'll discuss about them one by one in this section.

Ena	ble feedin	g			
	Count: 0		Distan	ce: 500.	.000
	Repay: 0	.000	Co	ntroller a	uto repay
Aut	o block		For	ce block	
Angle	repay: 0	.0000	Las	t feed	
Bac	klash reap	y optim			
Pen o	ffset:	Х:	0	Υ:	0
Las	er2 offset	: X:	0.000	Y:	0.000
Pro	cess offse	t: X:	0.000	Y:	0.000
Ena	ble rotate	engrave	e		
	Circle p	ulse: 🚺	000		Help
	Diameter(mm): 2	0		Test

1. Automatic Feeding

If your laser machine has a automatica feeding accessary, you can set corresponding parameters here. Click on **Enable feeding** option and set feeding count and distance, etc.

2. Backlash repay optimization

Please check this option if there is a gap between start and end points of closed figure when cutting.

3. Pen offset

If there is a pen besides laser head of your laser machine, please set pen offset from laser head here.

More Settings Of Laser Machine

RDCAM control system provides many parameters for customizing your laser machine fitting your needs at best, you can check and modify them in **User** tab of **System Work Plat** pane, shown as below.

Wo	rk Output Doc User	Test Transform	
P	rocessing 🔘 Auxilliary 🤅	🔘 Other	
Ы	Cut parameters		
	Idle speed(mm/s)	300.000	
	Idle Acc(mm/s2)	2000.000	
	Start speed(mm/s)	10.000	
	Min Acc(mm/s2)	400.000	
	Max Acc(mm/s2)	2000.000	
	Idle Delay(ms)	0.000 =	
	Acc factor(0%-200%)	80	
	GO Acc factor(0%-200%)	120	
	Speed factor(0%-200%)	80	
	Key setting		
\square	Sweep parameters		
	x Start Speed(mm/s)	20.000	
	y Start Speed(mm/s)	15.000	
	x Acc(mm/s2)	3000.000	
	y Acc(mm/s2)	2000.000	
		450.000	
	100.0 %		
Open Save Read Write			

After connecting your laser machine to PC, please click on **Read** button to get parameters from your laser machine first, and you'll see the **Write** button activated. If you have a parameter file and want to import settings from it, please click on **Open** button to open the file, then click on **Write** button to update settings in the machine. If you made some adjustments on the parameters and want to save them as a parameter file, please click on **Save** button to do that.

Important:

You should read parameters from your laser machine first, then open the parameters file, otherwise, settings from the machine will overwrite parameters from the file.

There're three catagory of parameters, **Processing**, **Auxilliary** and **Other**. In processing parameters, you'll see cutting and engraving parameters which will be applied on all jobs. In auxilliary parameters, you'll see parameters for feeding, resetting and moving around bounding box of designs. In other parameters, you'll see some rarely used and special settings.

Important:

Please do NOT modify any parameter if you don't know what's that mean exactly. If you've any questions, please contact our technicians.

Using Rotary Unit

If there is a rotary unit come with your laser machine, follow steps below to use it with EagleWorks.

- 1. Move working table down enough to hold rotary with work piece.
- 2. Put rotary unit on working table, parallel to X axis beam, then connect signal wire to the black cord on right side of working table, under right Y axis beam.
- 3. Load work piece on to the rotary unit.
- **4.** Move laser head to top of the center axis of work piece, then push the U Unit button down on machine panel (X axis beam can not move along Y direction then).



5. Push Z/U button on panel, move cursor to U move item, then push Left or Right button to check if the work piece can rotate.



6. Open EagleWorks, choose User tab of System Work Plat pane, shown as below. Choose Other catagory, click on Read button at bottom to read parameters from laser machine. Change Enable rotating option to Yes, set Circle pulse to 51200 or 6400 for some new model, set Diameter to diameter of the work piece, then click on Write button at bottom to write parameters to laser machine. Click on Test to check if the work piece can rotate a whole circle correctly at last.

Work Output Doc User	Test Transform		
OProcessing OAuxilliary	Other		
Backlash Y(mm)	0.000 ^		
🖂 Return parameter			
Return position	Absolute Origin		
E Focusing parameter			
Focus depth(mm)	0.000		
Material thickness(mm)	-231145.472		
Enable focus	No		
🖃 Rotating			
Enable roating	Yes		
Circle pulse	51200		
Diameter(mm)	100.000		
Test			
🖂 Wireless panel			
Enable speed shift	No		
Fast moving(mm/s)	200.000		
Slow moving(mm/s)	50.000		
¥			
Open Save Read Write			

- 7. After all steps above been done, move working table up or down to adjust space between work piece and laser head nozzle to get it ready for processing.
- **8.** Draw something or import designs from file, set processing parameters as what you do for normal processing, then download job and start processing.

Manage Documents In Laser Machine

If your laser machine is connected with PC, you can manage documents in your laser machine in EagleWorks. Click on **Read** button in **Doc** tab of **System Work Plat** pane, you'll see the dialog pane shown as below.

	. Dec		
Work Out	tput Doc	User Test	Transform
Number	File Name	Time(H:M	:S:MS)
1	DEFAULT	0:00:00	0:00
2	TEST	0:00:00	00:00
Read	d Pro	Dow	nload
Delet			land
Delet			load
	Dele	ete All	

In this dialog pane, you can choose a file and apply some operations on it. For example, click on **Process** button to process the file, or click on **Delete** button to delete the file, etc.

Test Basic Movement Functions Of Laser Machine

EagleWorks provides functions to test basic movement functions of your laser machine, in **Test** tab of **System Work Plat** pane, shown as below.

Work Output Doc	User Test Transform		
Current Position X=? Y=? Z=?			
Axis Move			
Y+	Offset(mm): 10.000		
	Speed(mm/s): 50		
X- Home X+	Power(%): 0		
Y-	Move from origin		
Continuous moving	If Light		
Z+ Home Z- U-	+ Home U- Focus		
Previous work time	0H:0M:0S:0MS		

You can get current coodinates of laser head, move laser head along an axis, or move laser head back to the origin, etc.

Chapter **6**

Rarely Used Functions

Topics:

- Export
- Image Library
- Capture

In this chapter, we'll cover some functions rarely used.



Export

EagleWorks provide an export function to export vector graphics to .ai or .plt file. Click

on File(F) > Export... menu item or click on a button of System Bar, you'll see a dialog shown as below.

usse Exopt		x
Save in: 퉬 de	sign pattems 🔹 🧿 🏂 📂 🛄 🔻	
gu_eagle_logo	hai	
File <u>n</u> ame:		Save
Save as type: •	ai 🗸	Cancel

Choose file type and specify file name, then click on Save button to export file.

Image Library

EagleWorks provides a function to build and use your own image library. Click on **File(F)** > **Image library** menu item, you'll see a dialog shown as below.

Image library		
Lib name	Preview	Image number: 0
	New lib Del lib	Add Image Del Image
	Import	
	Open lib Save lib	Import
	Import as a whole	
	Exopt options	60.000
	✓ Original size ✓ Lock scale	00.000 00.000
	- courbear	Exopt all

Click on New lib button to create a new image library, you'll see a dialog shown as below.

New library	×
Lib name:	
Lib file name:	
Ok	Cancel

After you create an image library, you can add some images to the library. Select some drawing objects first, then click on **Add Image** button, you'll see a dialog shown as below.

New Image	
Please image name:	
	R
Ok Cancel	

Specify an image name and click **Ok** button to finish. After add some images to the library, you can see them in the preview pane, shown as below.

Image library	111005	
Lib name	Preview	Image number: 1
temp	polygon-[0/9999] 57.893X55.180	
	New lib Del lib	Add Image Del Image
	Import	
	Open lib Save lib	Import
	Exopt options	60.000 60.000 Exopt all

You can import design patterns as a library.

Capture

You can connect some image recording device like a camera or scanner to your PC, and use capture function provided by EagleWorks to get image directly. Click on **Draw(D)** >

Capture menu item, or click on **Solution** of **Draw Bar** toolbar, you'll see a dialog shown as below.

Select Source	×
Sources: Integrated Camera TWAIN 1.603 (32-32) TW-Brother DCP-1618W LAN 3.20 (32-32) WIA-Brother DCP-1618W LAN 1.0 (32-32)	Select Cancel

Choose the device you want to use and click on **Select** button to start to capture something interesting.
Appendix



Appendix

Topics:

- TroubleShooting
- Vendor Settings

In this chapter, we'll guide you to install all software components related to EagleWorks, and get ready to use it with your laser machine.



TroubleShooting

If you have some problem, you should check version of your EagleWorks first. Click on Help(H) > About EagleWorks menu item, you'll see a dialog shown as below, and you can find version information at the bottom left coner.

About	×
Company:	
Tel:	
Fax:	
Addr:	
E-mail:	
V8.01.25	Exit

Vendor Settings

There is a function in EagleWorks, which can be used to read settings from, and write settings to RDCAM control system in your laser machine, commonly used by the manufacture. Sometimes, if there're something wrong with settings of your machine, maybe you have to change some settings following instructions from us, by remote assistant.



Warning: Do NOT change anything without our instructions, that will cause malfunction of your laser machine!

Click on File(F) > Vendor settings menu item, you'll see a dialog shown as below.

Vendor Parameter Password			
Vendor parameter			
Ok Cancel			

Type password in and click on **Ok** button, and you'll see a dialog shown as below.

Vendor para	m Clear info	
Motor		
Other	Dir polarity: Positiv 🔻 Contrl Mode: Pulse +Dir 💌	
Soft PLC	Limiter polarity: Positiv ▼ Step length(um): 6.25000	
	Breadth: 1300.000 mm Enable Limit trigger	
	Home offset: 0.000 mm	
	Jump-off speed: 50.000 mm/s Max Acc: 5000.000 mm/s2	
	Max speed: 400.000 mm/s EStop acc: 10000.00 mm/s2	
	Keying	
	Jump-off speed: 15.000 mm/s 🔲 Invert direction	
	Acc: 1000.000 mm/s2	
	Read Write Open Save	

There're four groups of settings listed on left side, click on one of them to show the corresponding settings. If it's necessary to modify something in settings by yourself, we'll guide you to do that step by step in remote assistant procedure.

Important:

Please reset your laser machine after changing settings!

There're four buttons at bottom, **Read**, **Write**, **Open** and **Save**. First, click on **Read** button to read settings from your laser machine. If the machine is not connected, you'll see an error dialog, please connect your machine and read again. After reading settings successfully from the machine, the **Write** button will be activated. Usually, we'll give you a file to import settings to your machine, click on **Open** button to open the file, then click on **Write** button to update settings in your machine.

Important:

Please be sure reading the settings from your laser machine first! If you open file first, then read settings from your machine, the settings current in your machine will overwrite the settings from the file.



Revision History

Revision	Publication Date	Note
1.0	2017/10/25	Initial version of manual.
1.0.1	2018/12/17	Add content for using rotary unit.

