L4Pro Handheld Laser Marking Machine User Manual

V1.2

Version History

Version Number	Modifications	Modified Date
V1.0	User Manual	2023-7-26
V1.1	Added arc text, repeat (number of times), and arbitrary position printing functions	2023-11-21
V1.2	Change the picture style of Figure 3.2.5.2	2024-6-20

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1. Introduction

1.1 Technical Parameters

Serial number	Parameter name	L4Pro
1	Display mode	5-inch capacitive touch screen
2	Operating system	Embedded Linux operating system
3	Machine language	Chinese, English, Persian, Spanish, Korean, Vietnamese, etc. can be customized as needed
4	Power supply mode	DC7.4V removable battery (9000mAh)
5	Power consumption of the whole machine	About 50W
6	Laser power	5W
7	Laser life	8000 working hours
8	Working mode	Semiconductor laser
9	Laser wavelength	450nm
10	Cooling mode	Air cooling
11	Preview indication	Built-in blue ligh
12	Focal length indication	None
13	Preview indication	Built-in blue light box, content preview
14	Marking range	50*50mm
15	Marking content	Text, numbers, symbols, pictures, QR code, barcode, date, serial number
16	Applicable materials	Wood, carton, some metal and plastic
17	Machine weight	1.1Kg (excluding battery)
18	Working temperature	0~+40
19	Storage temperature	-10~60℃

1.2 Safety Information

This machine must not be used for purposes or materials other than those specified, and must be

operated, maintained, and repaired by personnel familiar with the machine and related fields. Laser beams are dangerous, including their reflectivity, conductivity, and the possibility of producing harmful or flammable fumes. We assume no responsibility for any damage or harm caused by any improper use of this machine. The operator must use the machine in accordance with its designated purpose, other instructions in the manual, and all applicable local and national laws and regulations. During use, you need to pay attention to the operating steps and precautions. Using correct operating methods and maintenance can achieve ideal printing results and improve work efficiency.

1.2.1 Material Safety Information

This machine can be used safely with the following materials: wood, cartons, some metals and plastics.

This machine cannot be used with the following materials or any materials including:

(1) Artificial leather containing hexavalent chromium (Cr), which contains toxic fumes.

(2) Astatine, which contains toxic fumes.

(3) Beryllium oxide, which contains toxic fumes.

(4) Bromine, which contains toxic fumes.

(5) Chlorine, including polyvinyl butyral (PVB) and polyvinyl chloride (PVC, Vinyl, Cintra, etc.), contains toxic fumes.

(6) Fluorine, including polytetrafluoroethylene (Teflon, PTFE, etc.), contains toxic fumes.

(7) Iodine, which contains toxic fumes.

(8) Phenolic resins, including various forms of epoxy resins, contain toxic fumes.

1.2.2 Laser Safety Instructions

This machine uses a visible Class 4 laser, which is the strongest and most dangerous laser available for public use. If used carelessly, it may cause serious property damage and personal injury, including but not limited to the following:

(1) Lasers can easily burn nearby flammable materials. Do not leave potentially flammable,

inflammable, explosive or corrosive materials nearby where they may be exposed to direct or reflected laser beams.

(2) Some materials may generate radiation or harmful gases during processing. Direct exposure to lasers can cause physical harm, including severe burns and irreparable eye damage.

(3) Ensure that there are no air pollutants in the area, as these pollutants may cause serious risks such as reflection and burning.

(4) Use this machine only as described in the Material Safety section of this manual. The relevant printing settings and engraving processes must be properly adjusted for specific materials.

1.2.3 Machine safety instructions

(1) It is strictly forbidden to put any objects with total reflection or diffuse reflection that are not related to the machine around the machine to prevent the laser from reflecting on the human body or flammable items. In case of emergency, the emergency stop switch should be pressed immediately and the main power supply should be cut off.

(2) The environment where the machine is located should be dry, free of pollution, vibration, strong electricity, strong magnetism and other interference and influence.

(3) The machine should be away from electrical equipment that is sensitive to electromagnetic interference, which may cause electromagnetic interference to it.

(4) The laser is an air-cooled laser, the working environment (room temperature) temperature is 0-40 degrees Celsius, and the working environment humidity is 10-95%.

(5) When marking, the operator must wear protective glasses and protective gloves, and no part of the body can touch the marking area.

2. Hardware Introduction

2.1 Main structure

Figure 2.1 Actual picture of laser machine

Main parts::

① Host - includes laser, mainboard, and display screen.

② Battery - provides power for the whole machine.

③ Shade - supports the laser print head, fixes the print focal length, and filters the laser.

④ Fan - quickly exhausts the smoke generated during printing.

2.2 Input Connections

Figure 2.2 Interface diagram 2.2

① USB interface——used for software upgrade and printing external images and data.

2.3 Laser Machine Controls

Figure 2.3 Control buttons

① Power switch: Press the button to turn the machine on or off.

② Main control screen: All software operations of the laser machine are operated on the main control screen (see Chapter 3 for specific settings).

③ Trigger button: When the laser machine software is in the "Preview" or "Print" state, press the trigger button to start printing immediately.

3. Software Usage

3.1 Main Interface

The main interface of the machine is shown in Figure 3.1.1 below
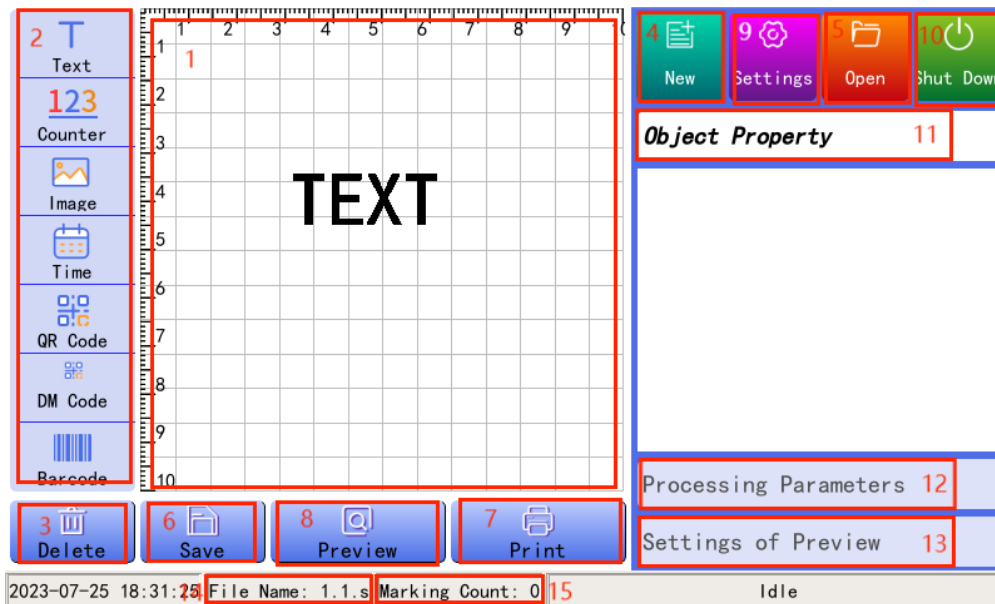
Figure 3.1.1 Main interface3.1.1

1—Information preview area: In this area, you can see the information content currently loaded and ready to be printed. Drag the area left and right to view the information content outside the display area.

2—Print content options: Click this button to add print content and display it in the information preview area.

3—Delete button: After selecting information in the information preview area, click this button to delete the selected information.

4—New file: Click this button, the software will close the file you are currently editing and create a new file at the same time. If the file you are currently editing is not saved, the software will prompt you whether to save the file.

5—Open file: Click this button to select the print file saved in the machine.

6—Save file: "Save" saves the drawing being drawn with the current file name.

7——Print button: Print the drawing currently drawn in the information preview area.

8——Print preview: Click this button to display the outline or range of the information to be printed.

9——System settings: Click this button to enter the system settings interface, where you can perform system language, system time, font management, version management, and log management.

10—Power off button: When you need to shut down the machine, please click this button first. After the screen goes out, press the power switch button on the right side of the host to shut down.

11—Object properties: This area displays the relevant properties of the information that needs to be edited.

12—Processing parameters: In this area, you can set and view laser intensity, speed, pen change delay, marking accuracy, and fidelity. For details, see 3.5 Print parameter settings.

13—Preview settings: This area can set the print preview format.

14—File name: This area will display the currently loaded file name.

15—Marking count: Displays the total number of markings of the machine.

3.2 Edit

This chapter introduces the basic operation information of the Job Editor, including the following topics:

　　How to create a new print file

　　How to edit print information

　　How to delete/copy a file

3.2.1 How to create a new print file

After clicking on the main interface, the software will close the file you are currently editing and create a new file, as shown in Figure 3.2.1.1.
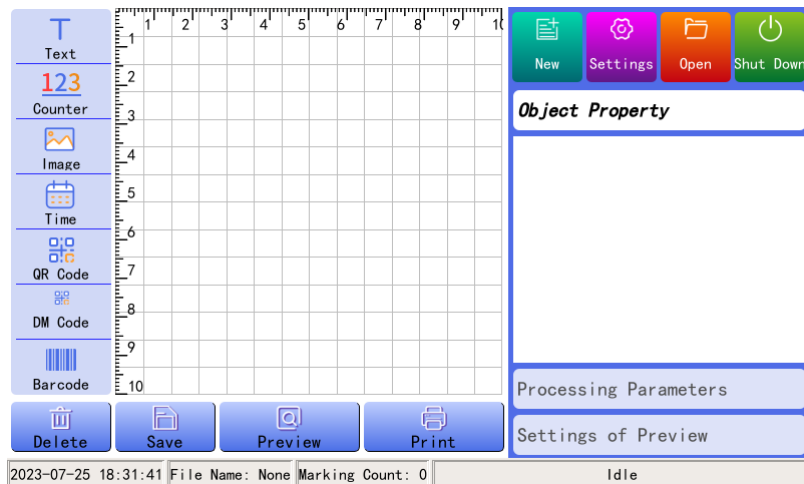
Figure 3.2.1.1 File editing interface

In the file editing interface, you can edit the printing information. The content of the printing information can include "text", "serial number", "time", "picture", "QR code", "DM code", and "barcode".

3.2.2 Text Editing

①　If you need to print Chinese characters (CN), English (EN), numbers, symbols, etc., please click the "Text" button in the "Information Button Area", and a default text entry will appear in the "Information Editing Area", as shown in Figure 3.2.2.1.
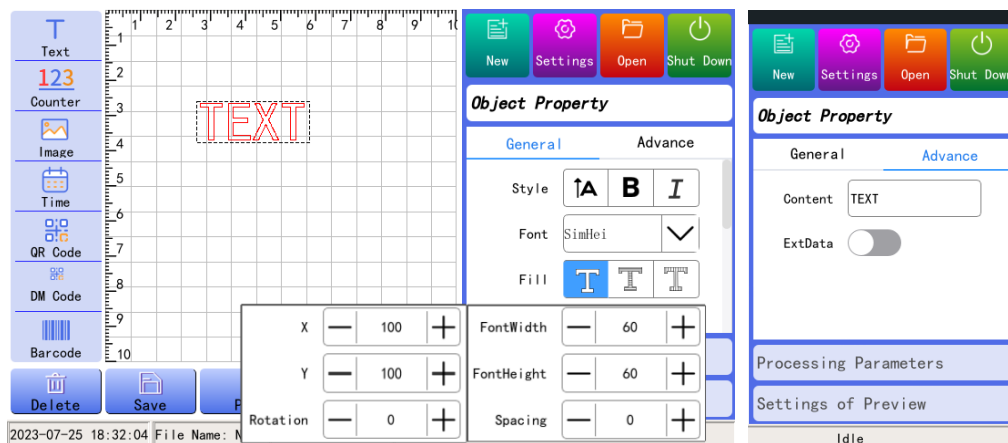

Figure 3.2.2.1 Text Editing

②　Select the item, click the "Content" edit box in "Object Properties", and enter the required information. In the "Object Properties Area", adjust the text item's position, font, height, width, size, spacing, angle, and external properties (see 3.2.9 for details).

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③ Click the button in the Style bar to set the style for the text (vertical alignment, bold, italic, etc.). As shown in Figure 3.2.2.2
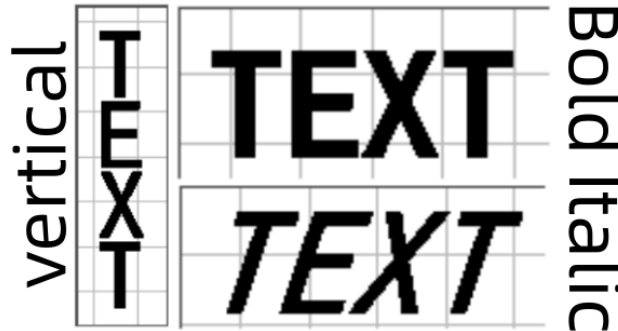

Figure 3.2.2.2 Style settings

④ Click the Fill bar button to set the fill mode and print mode of the entity print (no fill, horizontal fill, vertical fill in order). You can also set the print fill interval, as shown in Figure 3.2.2.3
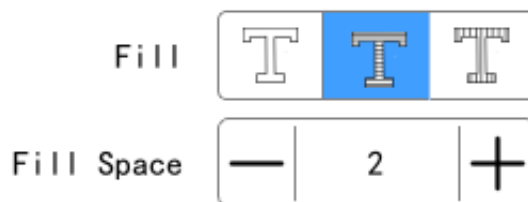

Figure 3.2.2.3 Fill settings

No fill: No fill for the font.

Horizontal fill: The fill line is always filled horizontally.

Vertical fill: The fill line is always filled vertically.

Solid fill: When the fill interval is 1, it is solid fill.

Fill interval: refers to the distance between adjacent fill lines. The larger the value, the wider the distance between adjacent fill lines.

Additional note: The filling effect will also affect the printing method (horizontal filling will print horizontally, and vertical filling will print vertically)

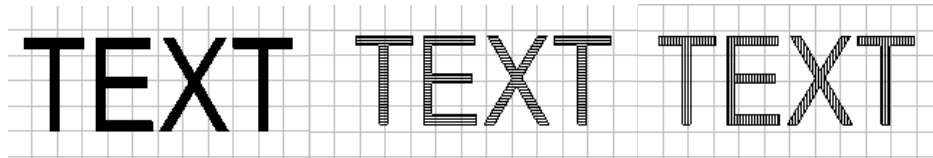The filling effect is shown in Figure 3.2.2.4.

Figure 3.2.2.4 Filling effect

(The left picture shows solid filling, the middle picture shows horizontal line filling, and the right picture shows vertical line filling)

Arc Text: Set arc-style text. Click "Arc Text" to expand the corresponding four control parameters: "Start Angle (StartAngle), End Angle (EndAngle), X Radius (X Radius), Y Radius (Y Radius)", the effect is shown in Figure 3.2.2.5.
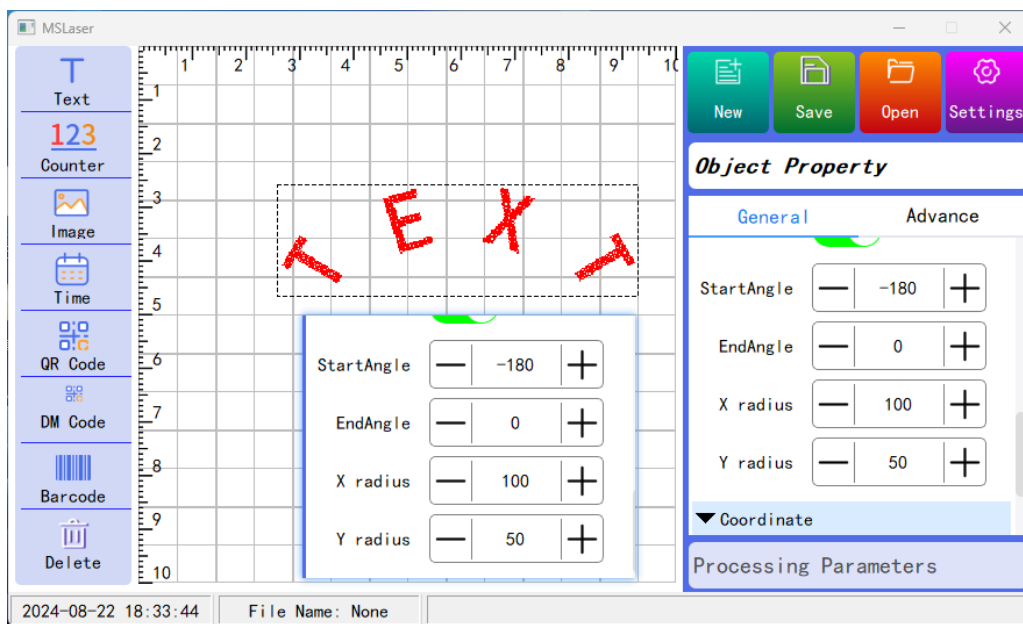

Figure 3.2.2.5 Arc Text Settings

The start angle (StartAngle) and the end angle (EndAngle) indicate the start and end positions of the arc text. The start angle in the figure is -180° and the end angle is 0°.

The X Radius (X Radius) and the Y Radius (Y Radius) indicate the lengths in the horizontal and vertical directions, respectively. The same values indicate a perfect circle, and different values indicate an ellipse
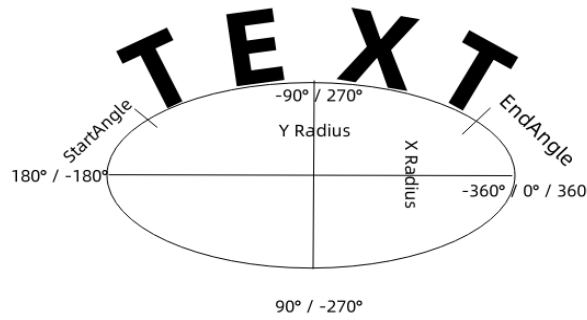
Figure 3.2.2.6 Meaning of arc text parameters

3.2.3 Serial number edit

If you need to print a variable serial number, that is, the count content in the printed information is automatically updated without human intervention, please click the "Serial Number" button, and a default serial number entry will appear in the "Information Editing Area". Select the serial number entry and adjust the position, font, font size and other properties of the serial number entry in the "Object Attribute Area". As shown in Figure 3.2.3.1.
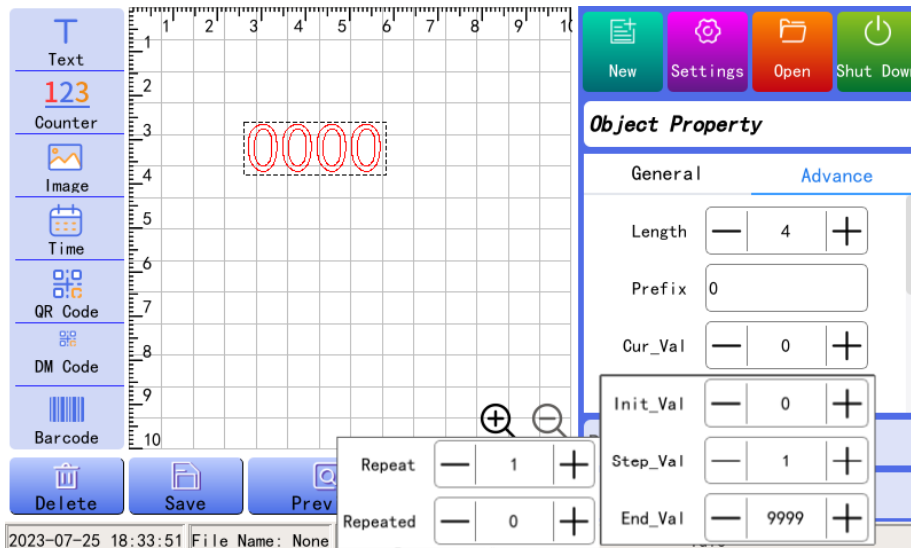

Figure 3.2.3.1 Serial number editing

The serial number can be selected with different fixed digits (high digits are padded with 0) or natural numbers. You can set the initial value, step value, current value and end value of the counter in "Object Properties".

3.2.4 Time Edit

Time format text is suitable for printing labels such as generation date and effective date. You can also customize the time format and set the effective date (the final printed time is the current date + effective date), as shown in Figure 3.2.4.1.
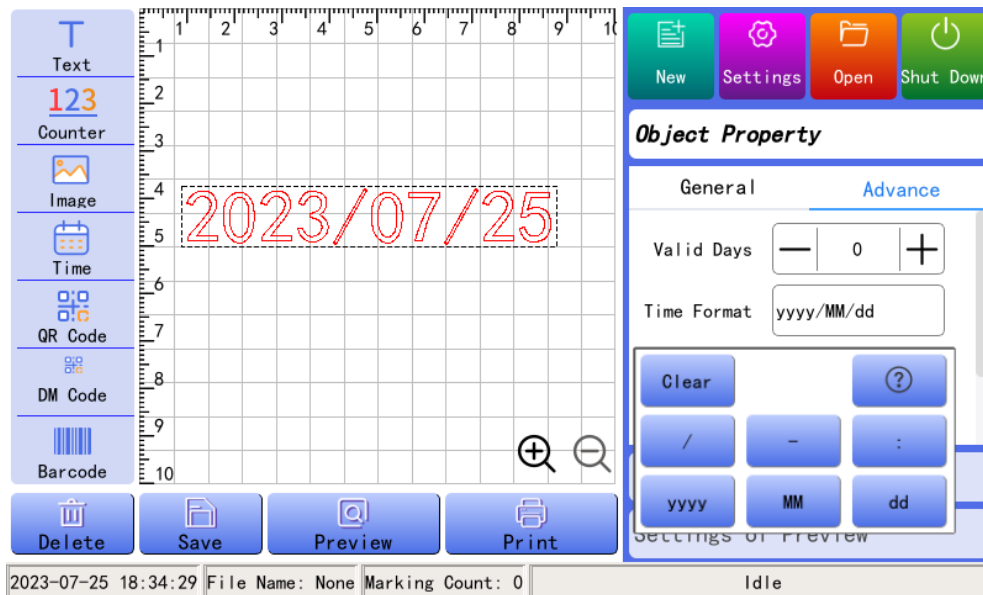

Figure 3.2.4.1 Time Edit

3.2.5 Image Editing

①　If you want to print pictures, please click the "Picture" button in the "Information Button Area", and a default picture entry "IMAGE" will appear in the "Information Editing Area". You can click the button ⬛ in the "Object Properties" to select the picture file you want to print, and adjust the height and width.

（(Insert USB flash drive) Click "Picture" → "Select Picture" → "USB flash drive" → Select file → "Copy to local" → "Local file" (select the file copied to local in the previous step) → "OK" → The white window will display the selected picture → Set the format according to the requirements. The picture editing interface is shown in Figure 3.2.5.1
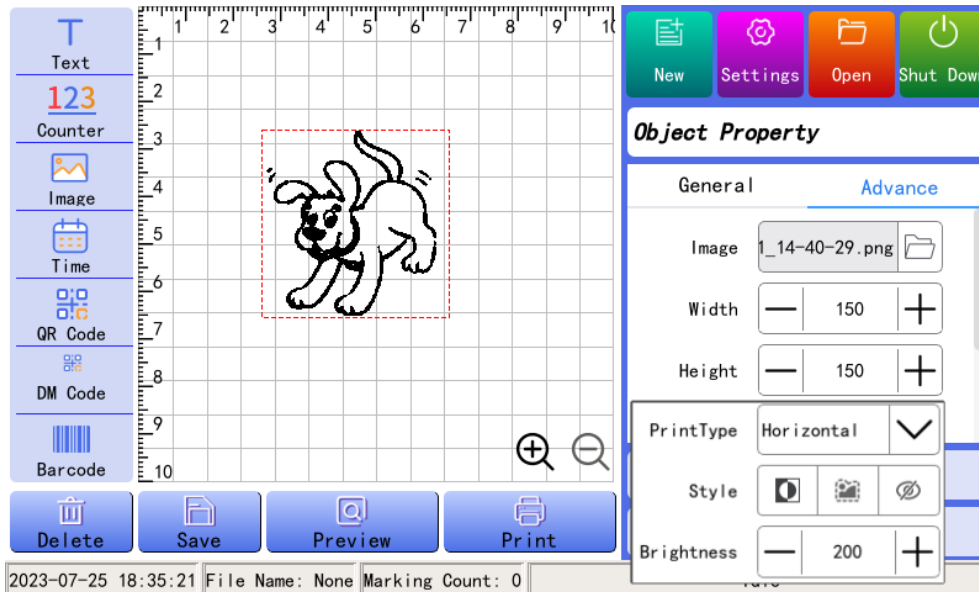
Figure 3.2.5.1 Image Editing

② Click the button [ ] in the Style bar to set the image style (inverse color, outline, and visual grayscale). The style setting effect is shown in Figure 3.2.5.2.
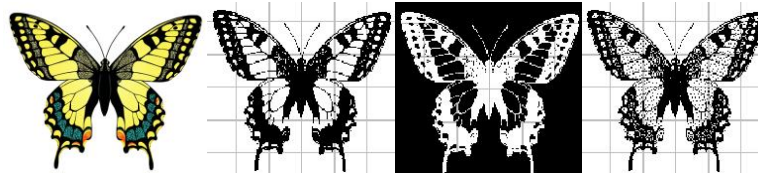

Figure 3.2.5.2 Picture style

From left to right, the styles are original image, no style, inverted color, outline, and visual grayscale

3.2.6 QR code editing

If you need to print a QR code, please click the "QR Code" button in the "Information Button Area" and a default QR code entry will appear in the "Information Editing Area". You can modify the QR code generation rules by adjusting the object properties.

Content: The text data content stored in the QR code.

Scaling: The scaled size of the QR code. The larger the value, the larger the size.

Error correction rate: According to the error correction rate ratio, the QR code can still be scanned normally after being blocked.

Version: The higher the version, the more content the QR code can store and the denser the dot matrix.

Printing method: The laser can be set to print the QR code in a vertical or horizontal manner.

Invert: Invert the QR code color block and add a black border, suitable for whitening on black materials.

External data: Reference external text files or serial port data to generate QR codes. For details, see 3.2.9.

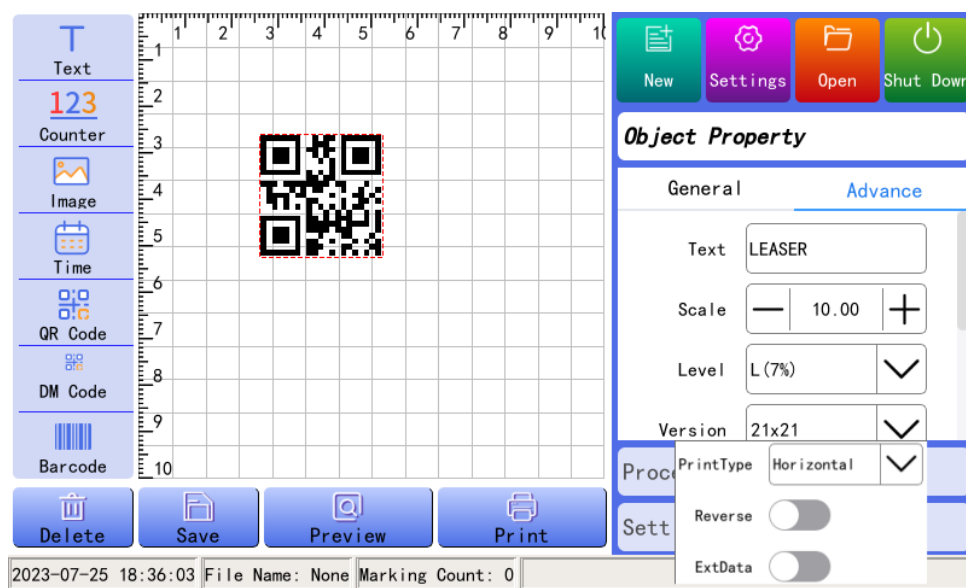The QR code editing interface is shown in Figure 3.2.6.1

Figure 3.2.6.1 QR code editing

3.2.7 DM code editing

If you need to print the DM code, please click the "DM Code" button in the "Information Button Area" and a default DM code entry will appear in the "Information Editing Area". You can modify the DM code generation rules by adjusting the object properties.

Content: The text data content stored in the DM code.

Scale: The scale size of the DM code. The larger the value, the larger the size.

Type: The data format of the DM code to be printed.

Printing mode: You can set the laser to print the DM code in a vertical or horizontal manner.

Display content: Set whether to display the data text content below the DM code.

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Internal data: You can customize a special format data in the program, see 3.2.10 for details.

External data: Reference external text files or serial port data to generate QR codes, see 3.2.9 for details.

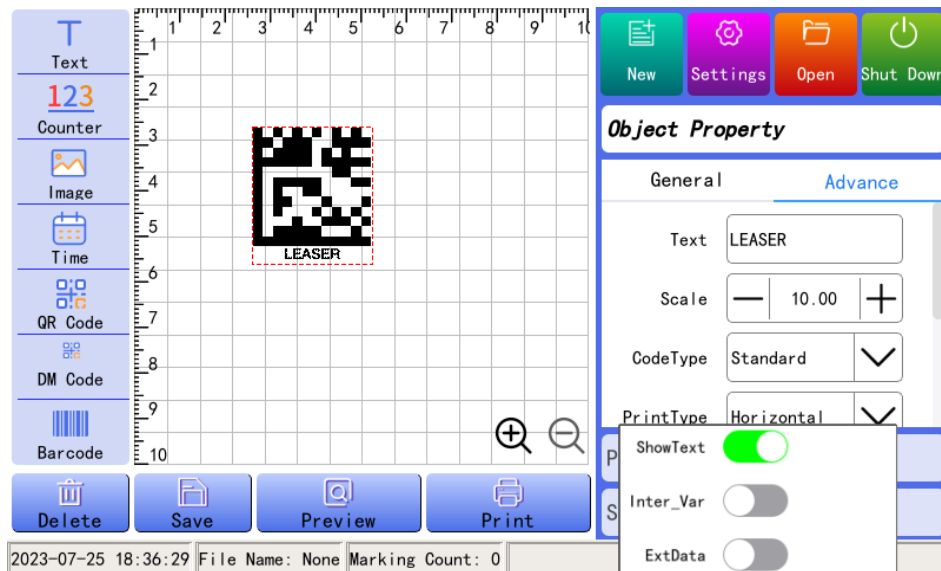The DM code editing interface is shown in Figure 3.2.7.1.

Figure 3.2.7.1 DM code editing

3.2.8 Barcode Editing

If you need to print a barcode, please click the "Barcode" button in the "Information Button Area" and a default barcode entry will appear in the "Information Editing Area". You can select the barcode size through the width and height options, select different barcode types through the barcode type option, and set whether to display the barcode text content.

It should be noted that different barcodes have their own definition specifications. If the edited content does not conform to the corresponding barcode specifications, it may cause the barcode to display incorrectly. The barcode editing interface is shown in Figure 3.2.8.1
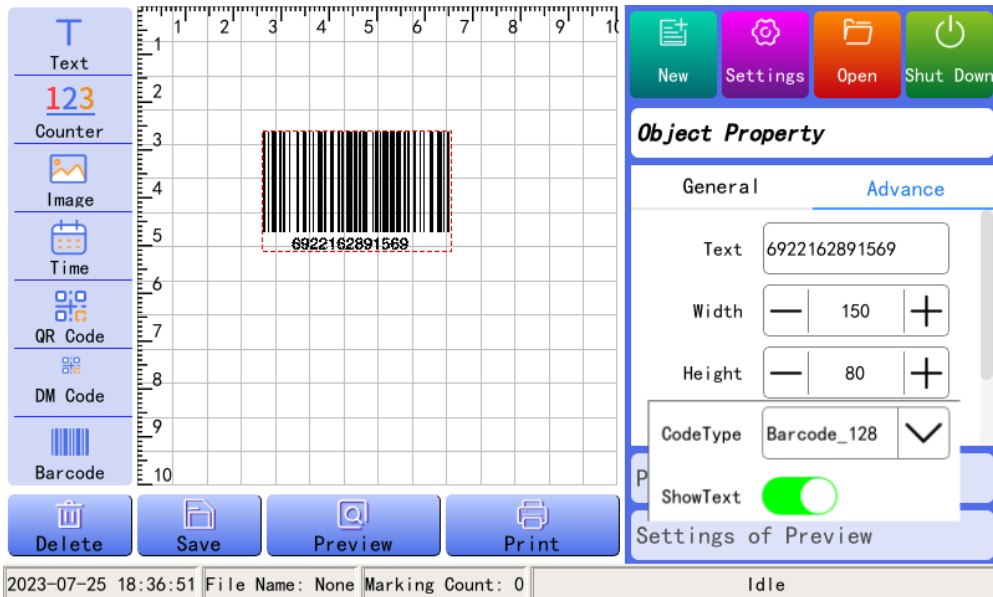
Figure 3.2.8.1 Barcode editing interface

3.2.9 External Data

Currently, the external data option can be enabled in the advanced properties of "Text", "QR Code" and "DM Code". This property supports users to choose to use a custom "text file" or "external serial port device" as a variable data source to achieve dynamic changes in printed content.

① Users can click ⬚ to select a "text file" and set the start line, end line, current line, and whether to repeat to define the print content rules. As shown in Figure 3.2.9.1.
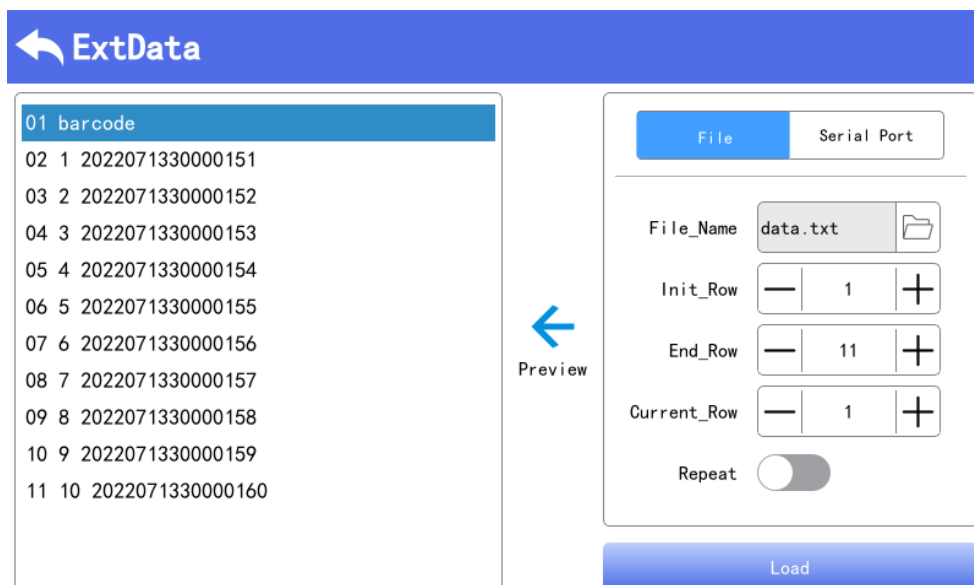

Figure 3.2.9.1 External file data

② Users can select an "external serial port device" as the data transmission source (e.g. electronic scale, computer, barcode scanner, etc.). The system will receive the external device data and update the print content according to the specified communication protocol (see "Serial Port Data Protocol Manual"). You can set the number of cached data or clear the cache in the property bar, as shown in Figure 3.2.9.2.
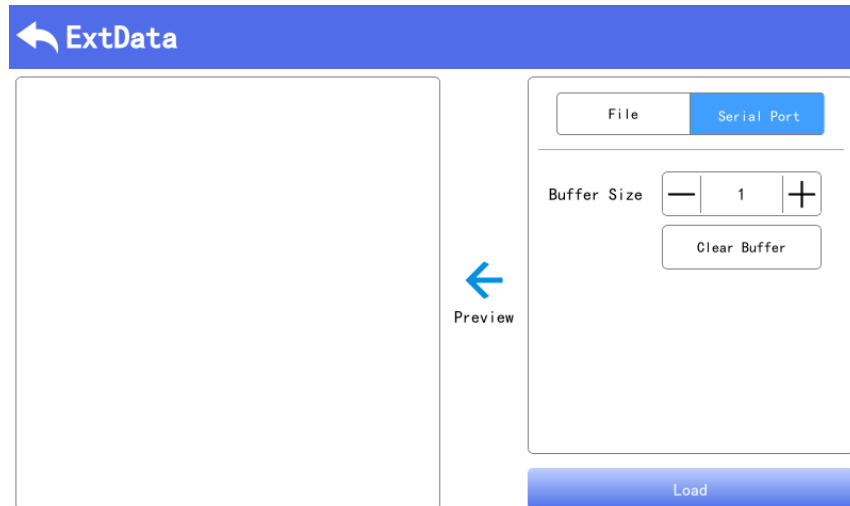

Figure 3.2.9.2 External file data

3.2.10 Internal data

Currently, the internal data option can be enabled in the advanced properties of "DM code". This property supports users to choose to use custom "text", "serial number" and "date" to randomly arrange and combine to form a piece of data as a variable data source, so as to achieve the effect of dynamic change of printed content. As shown in Figure 3.2.10.1.
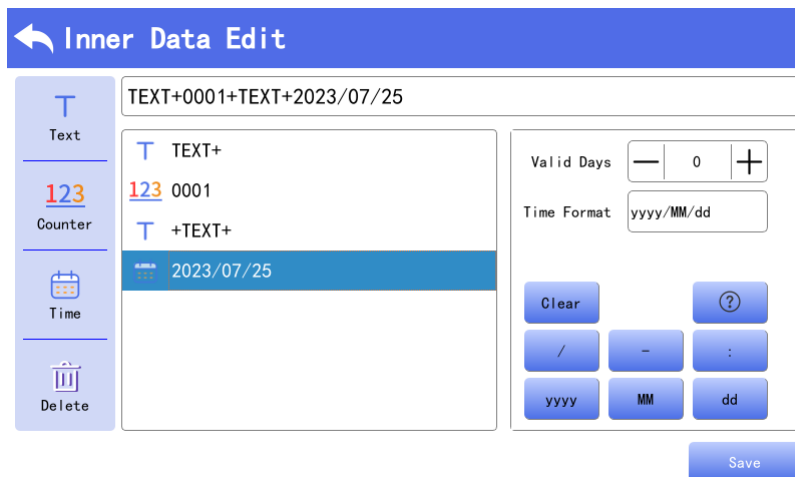

Figure 3.2.9.2 Internal data

3.3 How to edit print information

① Touch the "New" button on the main interface to create a blank canvas.

② Edit the relevant information to be printed on the canvas.

③ After the information is edited, click the "Save" button, enter the file name, and save the file in the local computer.

3.4 How to delete/copy files

Delete files: Click the "Open button" on the main interface to enter the file selection interface, as shown in the figure below. Select the file to be deleted, and then click the "Delete" button to delete the file.

Copy files: Click the "Local" button on the file selection interface to display local related files on the left. Click the file to be copied, and then click the "Copy to U disk" button to copy the local file to the U disk. The same applies to copying U disk files to local. The file selection interface is shown in Figure 3.4.
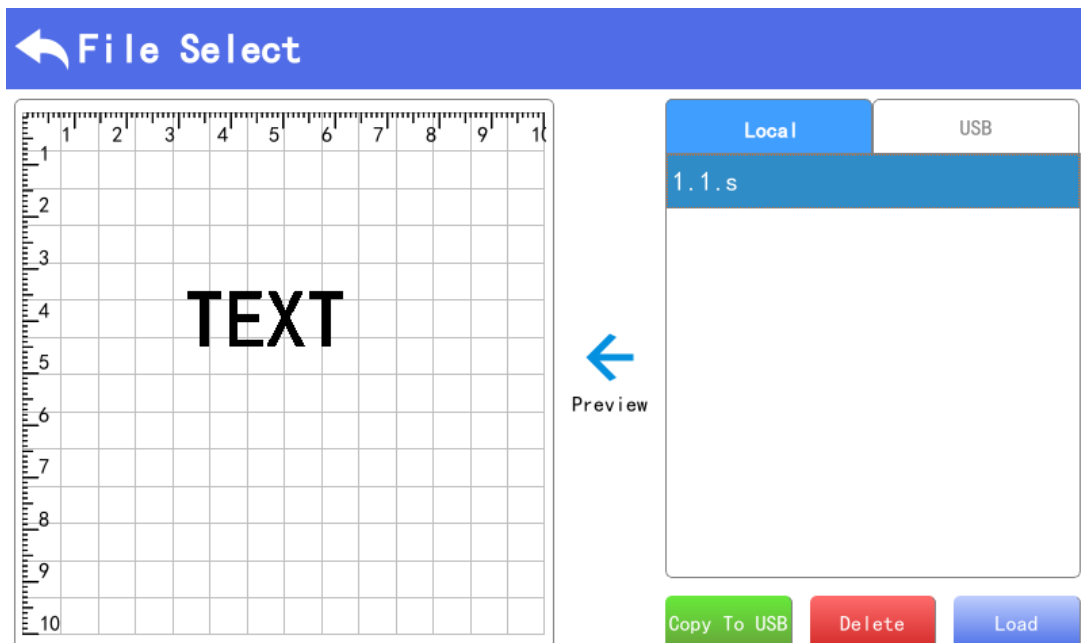

Figure 3.4 File selection interface

3.5 Print parameter settings

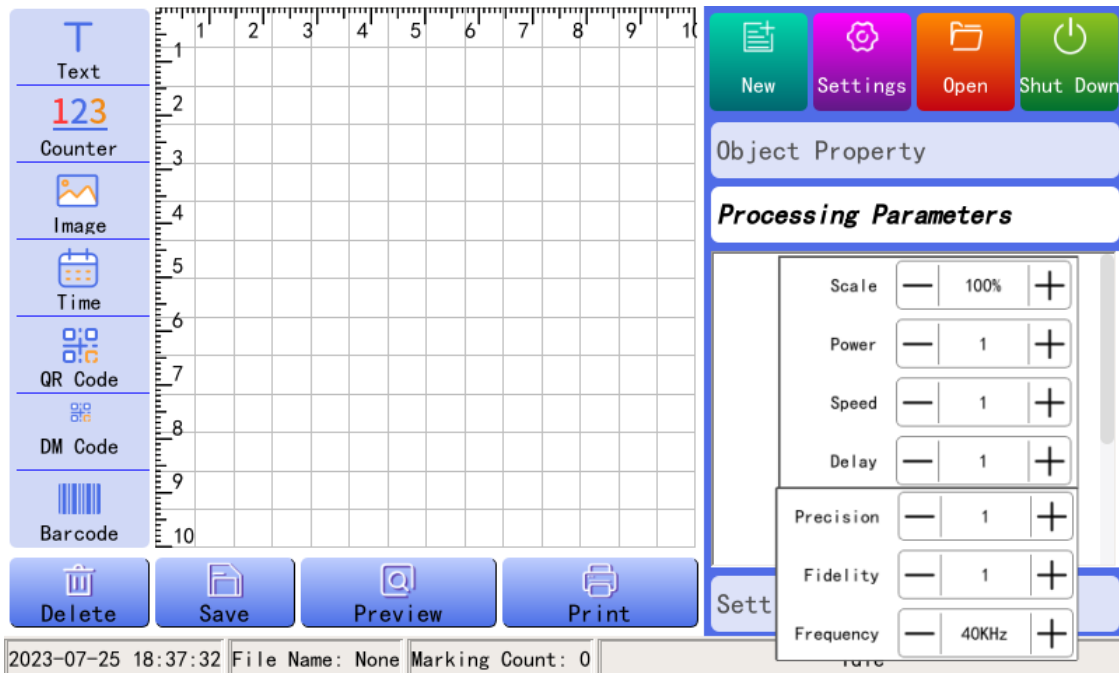Click "Processing Parameters" on the main surface to open the processing parameter interface, as shown in Figure 3.5.

Figure 3.5 Processing parameter settings

Alignment - Center means that no matter where the printed content is on the canvas, it will be printed in the center; Keep in place means that the canvas display is the same as the actual printing position;

Rotation - The same as the angle function in the object properties.

Scale - The overall printed content is scaled proportionally, and can be adjusted to the millimeter level in conjunction with the print content size setting.

Intensity - The intensity of the laser when the laser is turned on during printing. The larger the value, the stronger the laser intensity.

Speed - Refers to the speed of laser printing. The larger the value, the faster the printing speed.

Pen change delay - The actual printed content will be divided into multiple strokes and printed separately by the machine. There will be a light switch interval between strokes. The pen change delay is used to adjust the length of the stroke interval. It is mainly used to solve the problems of tailing, rough edges, etc. that affect the printing quality due to short pen change intervals (too fast light switch).

Marking accuracy - that is, the resolution of printing; the higher the printing accuracy, the higher the density of laser engraving strokes, which is usually used to improve printing quality, but it will also increase the amount of data processing, thus affecting the efficiency of program data processing (slower processing speed), and will also cause a stronger degree of laser impact on the marking

points (greater damage, darker color); in unnecessary cases, the default marking accuracy is usually 2 (lowest value).

Fidelity - the lower the fidelity, the more edge pixels the program will ignore, and vice versa, more edge pixels will be retained; suitable for printing pictures, in unnecessary cases, the default fidelity is usually 1.

Repeat printing - set the number of prints.

Print interval - when printing repeatedly, the interval between two adjacent prints (unit: seconds)

3.6 Preview Settings

Click "Preview Settings" on the main page to open the preview settings interface, as shown in Figure 3.6
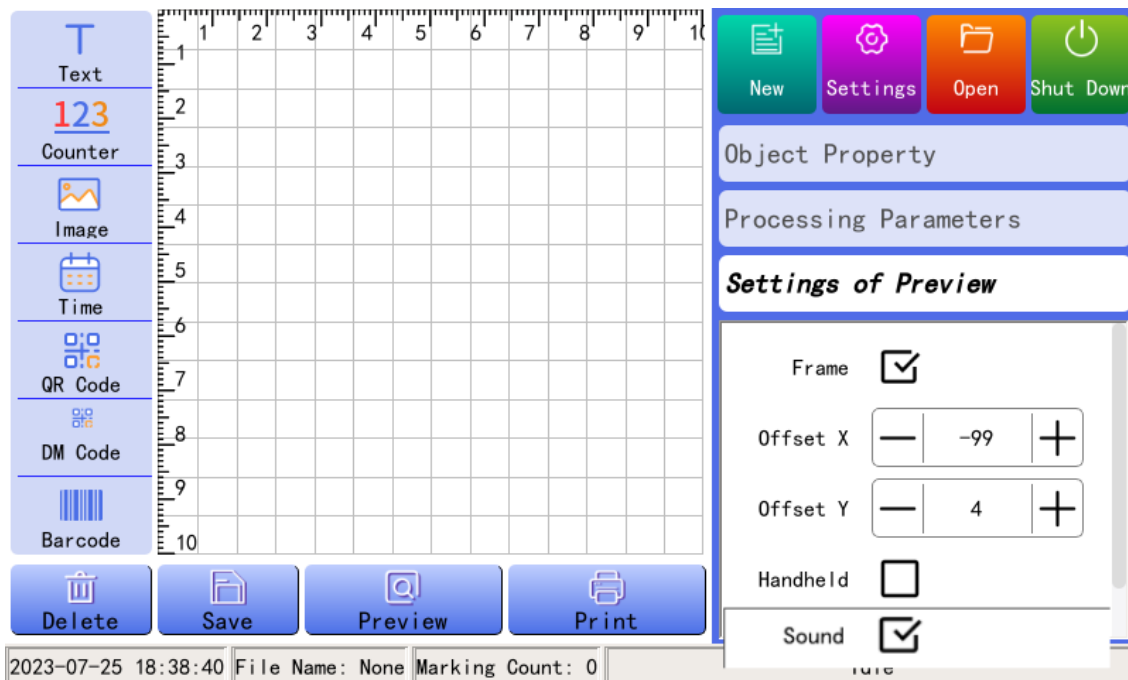

Figure 3.6 Preview settings

Frame Preview - Check the box to enable frame preview mode.

4. System Settings

Click the "Settings" button on the main interface to enter the system settings interface, as shown in Figure 4.1 below.
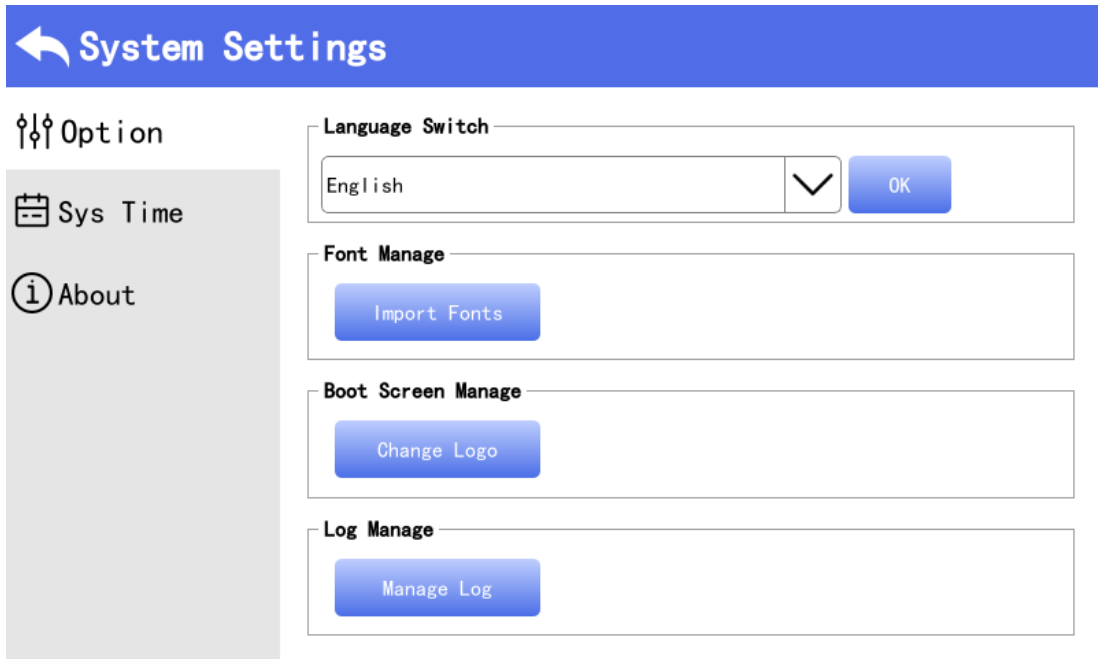

Figure 4.1 System Settings - System Options

System language - Select the corresponding system language in the "System language" drop-down box. After switching, the system will automatically restart. Currently, the machine supports simplified Chinese, English, Arabic, Vietnamese, Korean, Persian, etc.

Voice feedback - After checking, the buzzer will make a "beep" sound to prompt after each print is completed.

Import font library - If the machine does not have the font you need, you can copy the font you need to add to the USB flash drive and insert the USB flash drive into the machine. Click the "Manage fonts" button, select "USB" in the pop-up interface, select the font file and click "Copy to local", and the font can be successfully installed.

Change the boot screen - To change the system boot screen, you need to contact the technician for operation.

Management log - View the system print log for technicians to troubleshoot and maintain the machine.
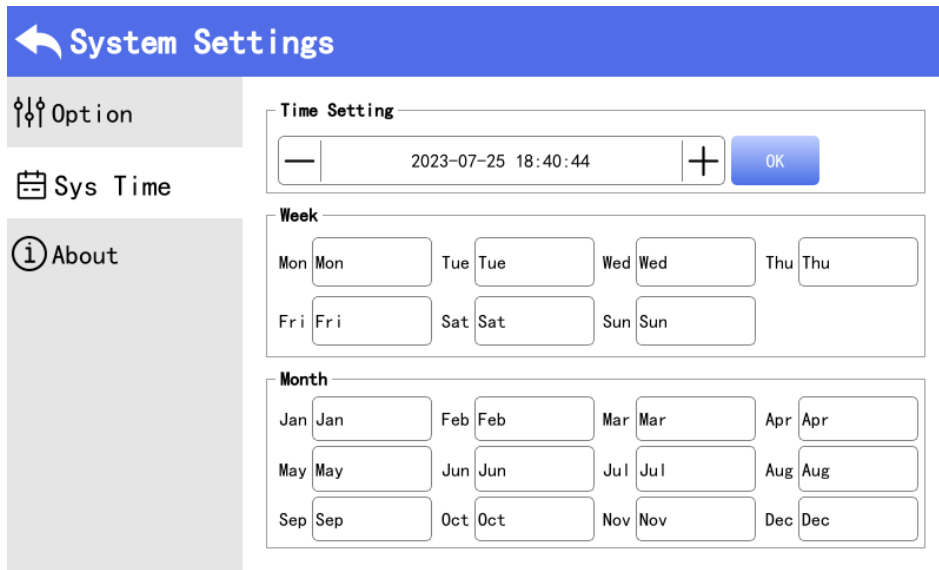
Figure 4.2 System Settings - System Time

System time - Click the field you want to set in the "System time" setting column, and adjust the corresponding content through "+" and "-".

Custom date format - Click in the "Week" and "Month" setting columns to set custom aliases for the week and month, and display them in the "ND" and "NR" formats in the "Date" printing properties.

Figure 4.3 System Settings - About This Machine

About this machine - Version management includes "version upgrade" and "version rollback", as well as the firmware version, the specific version number of the software version, the total number of marking times of the machine, and the reset button.