NC-UV60

Visual positioning system

User manual

Catalogue

Summary

The assembly line AI visual board and roll UV printer does not need to print the product positioning frame, and various special-shaped materials are placed on the platform at will for automatic identification, printing and scanning at the same time, saving time and labor costs. Coated white color varnish can be printed at the same time, which can increase the adhesion of the product and solve the pain points such as uneven manual application and sticky dust for a long time, and improve the yield of the product greatly. The accuracy can reach up to 1200dpi, and the color reproduction is high. All-steel integrated structure design make its stability strong. All-in-one multi-purpose. External rewinding fixture to achieve roll-to-roll printing.

Install hardware

2.1 Parameter

NO.	Name	Model	Number	Type	Note
1	Line-scan camera	Custom-made	1	Required	Integrated packaging
2	Camera board		1	Required	Integrated packaging
3	Printer board	Custom-made	1	Required	Included in the printer
4	Capture card	Custom-made	1	Required	
5	Soft cable	Incidental	1	Required	4.5

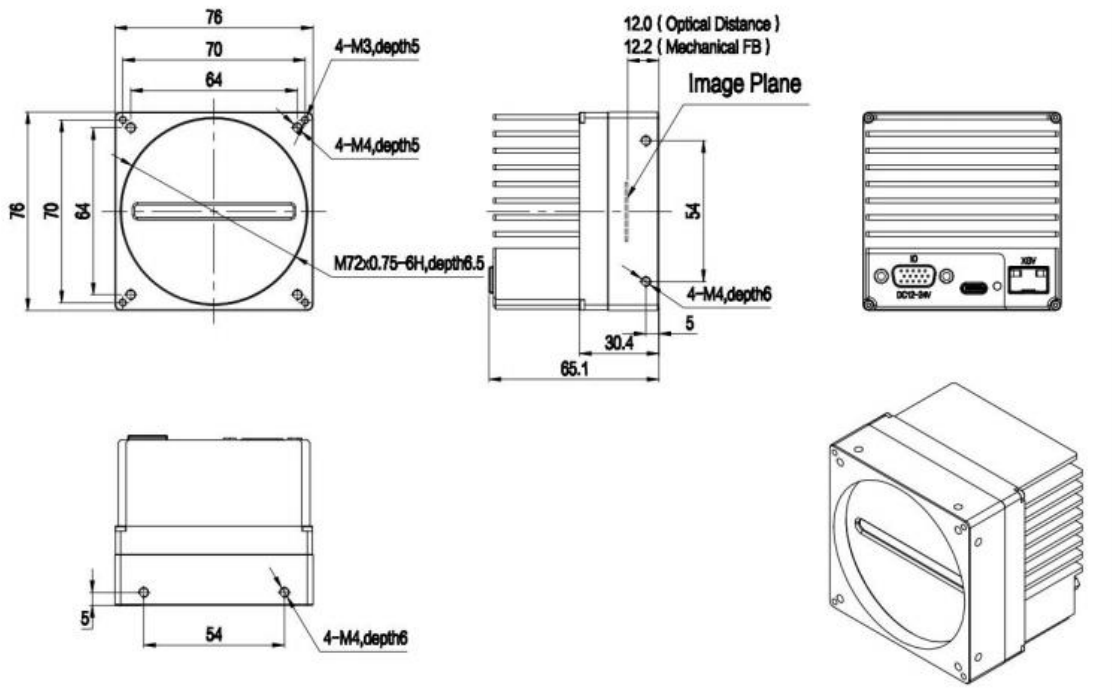
2.2 Feature and parameter of the camera

Feature	Parameter
Model:	PN8KXGV-150KM
Name:	8K 10 Gigabit Ethernet port black and white line scan camera

Sensor:	Global Shutter CMOS
Image mode:	Black and white
Optical size:	57.34mm
Resolution:	8192*1
Pixel size:	7μm*7μm
Maximum linear speed:	149.8 kHz
Pixel bit width:	8 bit
Dynamic range:	≥54.1 dB
Data rate:	1227 MB/s
Trigger mode:	Free-run/frame-trigger mode/line-trigger mode
Exposure control:	Time setting/pulse width control
Exposure time:	1.737μs-63998.613μs（Step length：0.012-0.013μs）
Gain range:	1 / 2 / 3 / 4 / 5 / 6 / 7 / 8x（Imitate gain） 0.1-8.0x（Number gain）
Data interface:	10GigE Vision
Lens interface:	M72*0.75
Power interface:	HD15(Female)
Power configure:	DC12-24V(±10%)1.5A
Power consumption:	9.8W
Shell size:	76.0mm(W)x 76.0mm(H)
Operating temperature:	0-55℃
Storage temperature:	-20-75℃

2.3 Physical feature of the camera

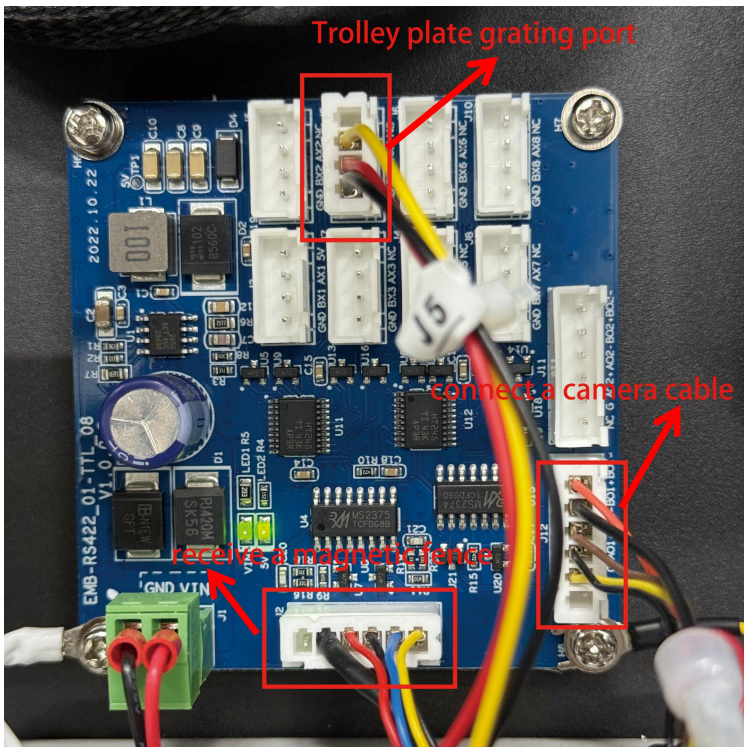
Camera size



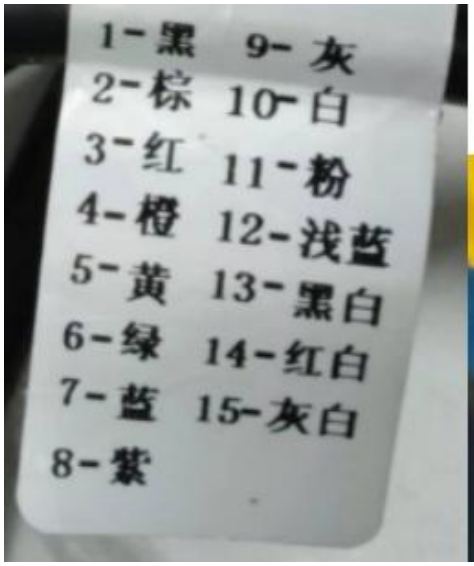
2.4 Electrical characteristics of the camera

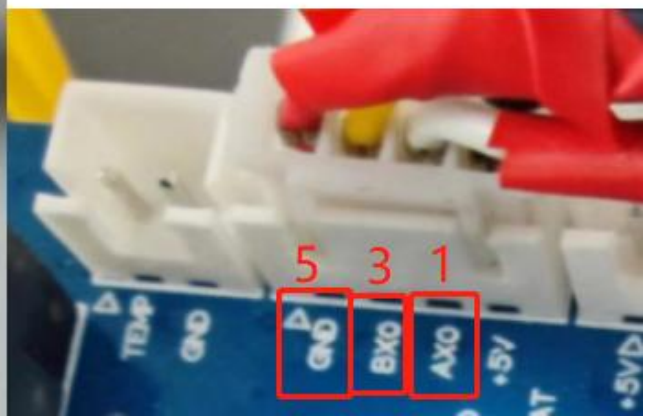
Camera board wiring

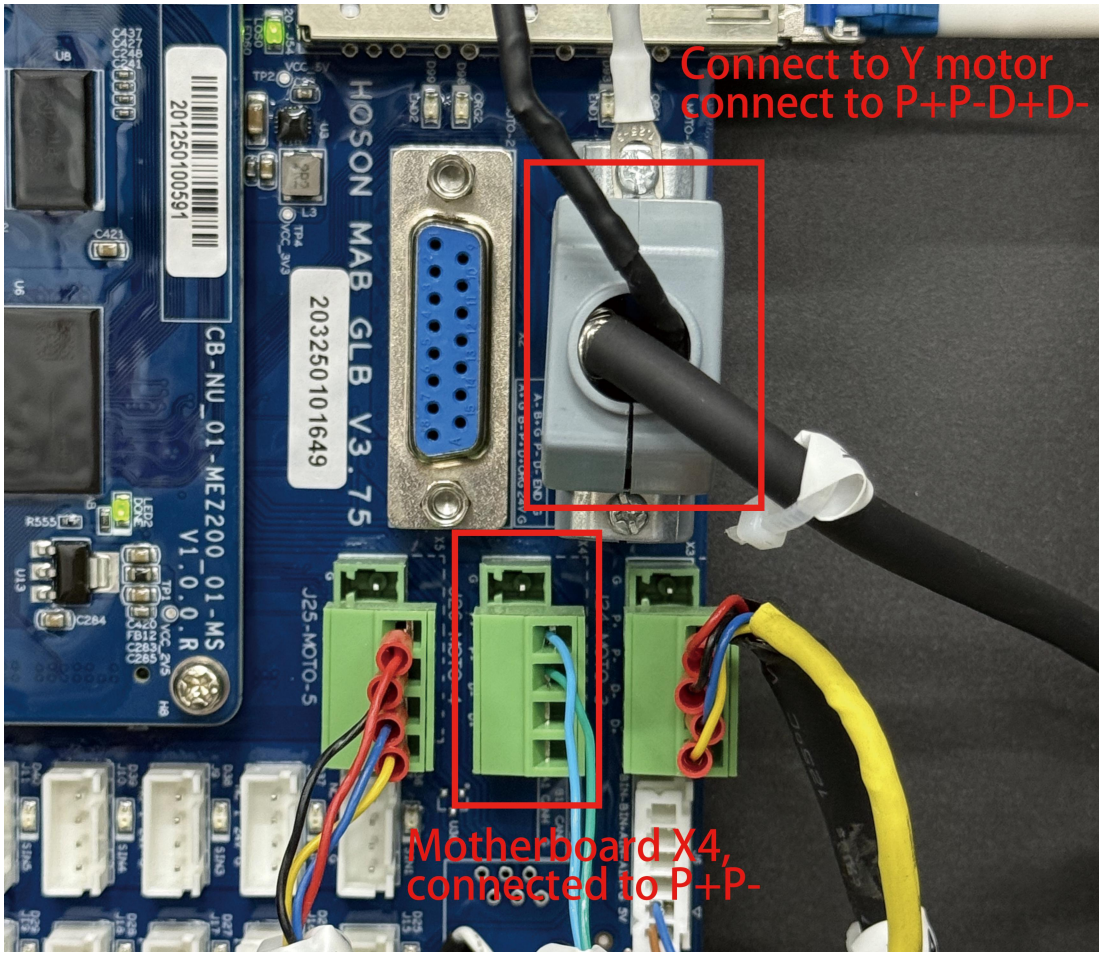
The trigger of the camera is connected to the X4. P+ to camera 6, P- to camera 7



Cart board
AXO connect the camera pins 1
BXO connect the camera pins 3
GND connect the camera pins 5

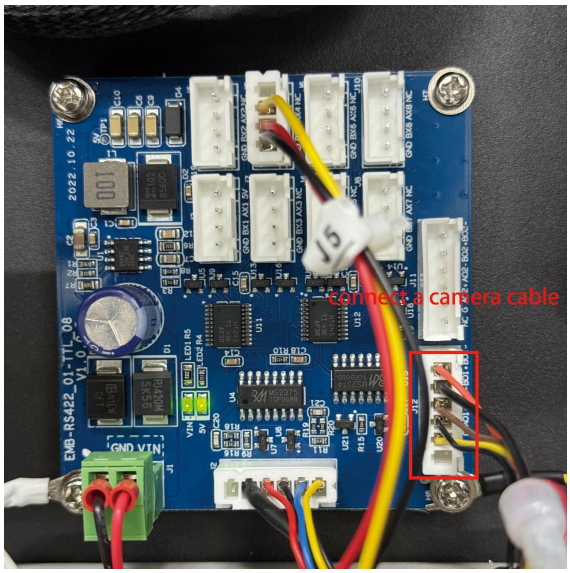






Connect method of the encoder:

The way to connect 1 and 8; connect 5V AXO BXO GND



Then connect the differential to the single-ended small plate

AX+ connect to the camera pins 1 (black)

AX- connect to the camera pins 2 （Brown）
BX+ connect to the camera pins 3 （Red）
BX- connect to the camera pins 4 （Orange）
GND connect to the camera pins 5 （Yellow）
Camera network cable

There are 3 levels of CH button:
The first level indicates 1000-1255 to CH1
The second level indicates 2000-2255 to CH2
The third level indicates L(The light is off) H （The light is on）
Wiring diagram of the computer engine
The green network cable of the camera is plugged into the host capture card

The lens is adjusted to 4.0 and 0.5X180mm

Please pay attention that the camera lens cap is open

2.5 Initial calibration of the camera

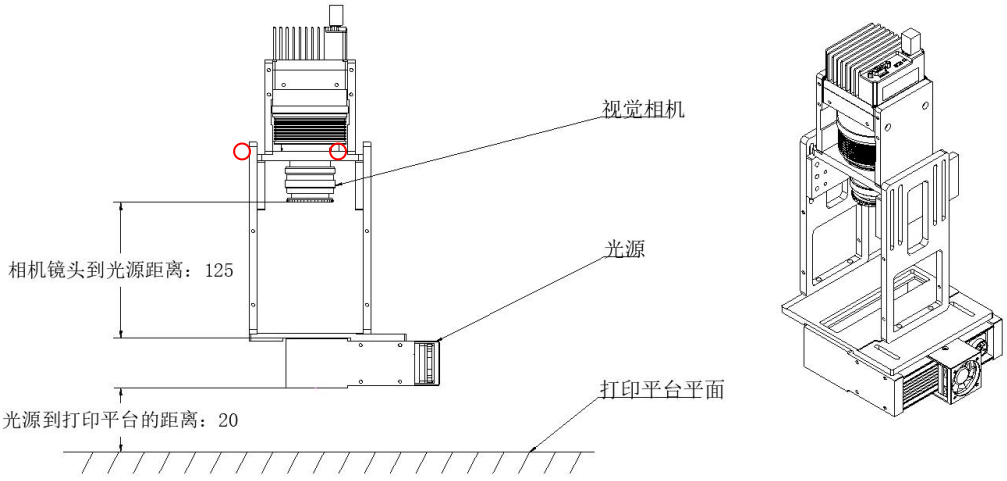
Main points:

Platform level: Calibrate the mechanism platform by the dial gauge to ensure that the level error of the mechanism platform is within 0.10mm;

First, adjust the position of the camera

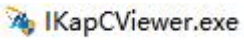
Follow the figure below to install the camera vertically and horizontally with a spirit level (both the light source and the camera should be ensured).

Turn the four screws in red so that the camera is vertical

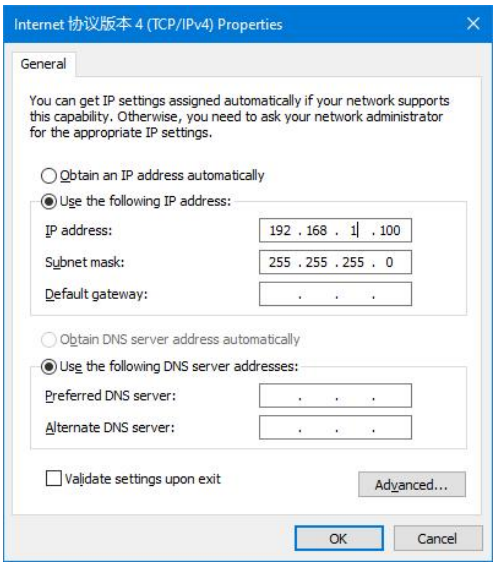


Install the software

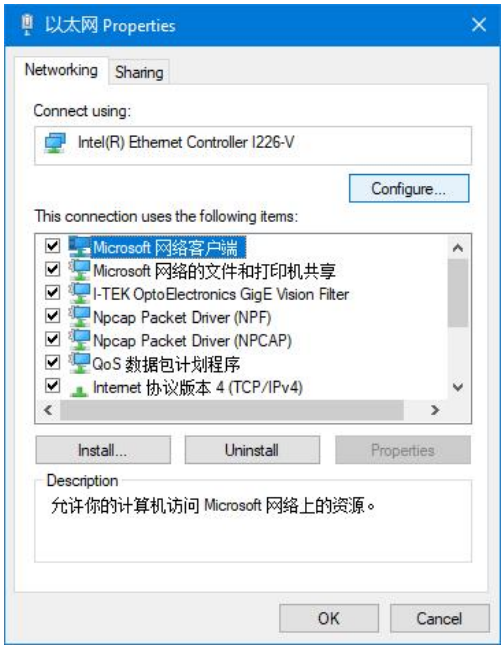
3.1 Install the driver of the camera

Camera driver installation package: IKapCViewer 

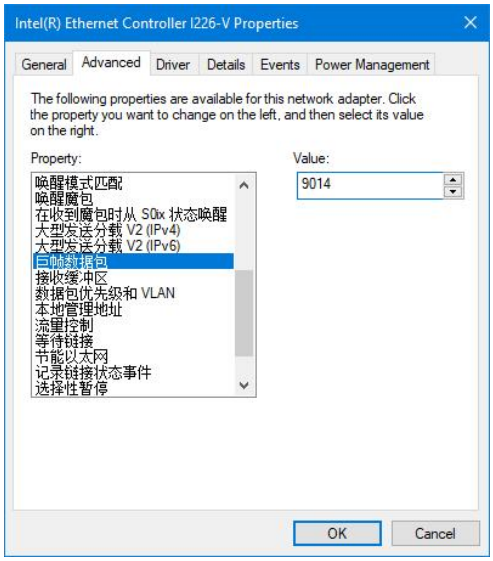
Set the IP address and connect the camera， ip address is 192.168.1.100（The only IP address. Pay attention that it is the network cable that connects the camera light source）



Click to configure it in Internet Properties



Find out Jumbo Frame Package in Advanced，turn it to 9014。



Please refer to camera installation, camera software function introduction, camera software calibration introduction, and other related information<<IKapCViewer User manual of the software.pdf>>、《PL4KGV-68KT Operation instructions V1.2.pdf》

3.2 Install the software

Extract the package to a file directory

List

NO.	Software mode	Tool name	Type	Notes
1	Built-in tools of the camera	IKapCViewer	Necessary	IP setting、camera calibration
2	Scan and print tool	PrintExp_V5.7.9.3.46.LSSD_20250224	Necessary	

For the first time, please run it in right-click administrator mode;

PrintExp_X64.exe

Make sure the IP address of the printer is set correctly, please refer to the UV60 machine manual for specific installation steps;

3.3 Install RIIN

For the first time, please run it in right-click administrator mode;

RIIN.exe

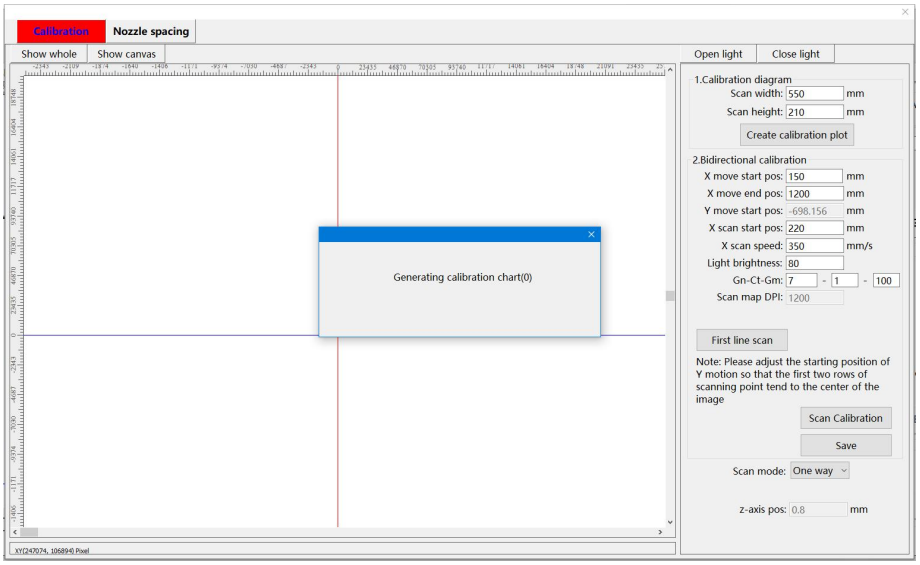
Add printer mode, please refer to the UV60 machine manual for specific installation steps;

Camera calibration

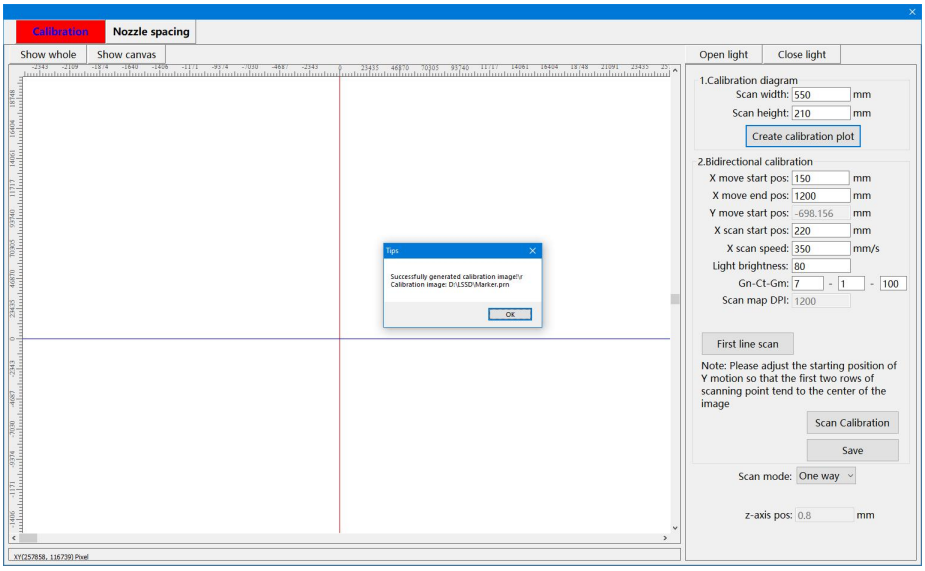
4.1 Generate the calibration graphic

Switch to [Visual Printing] and click [Camera Calibration] to pop up the camera calibration interface.

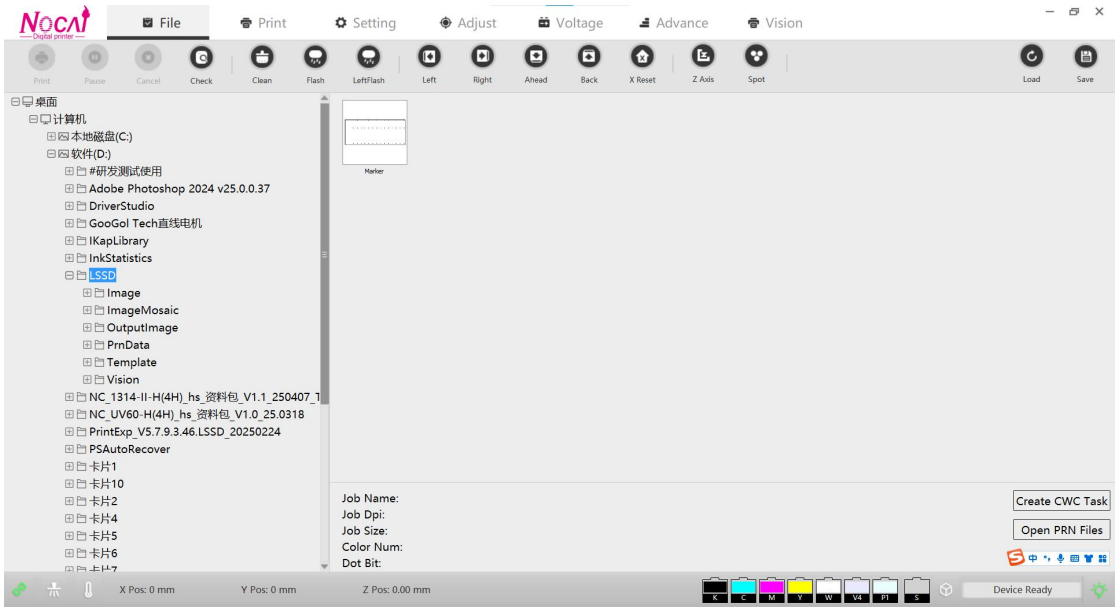
Set the width and height according to the size of the machine, and click [Generate calibration image] to generate a calibration map with the specified width and height



The prompt box pops up successfully:

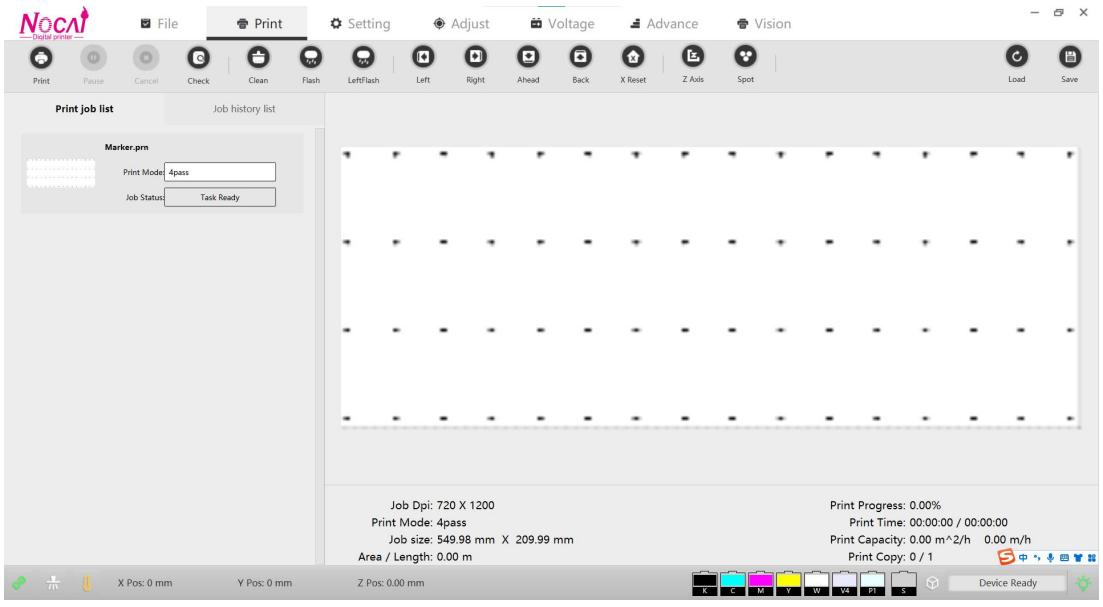


Click【OK】and open the software function list to choose【File】LSSD catalog andchoose the calibration graphic， load the PRN into the print list.



4.2 Print the calibration graphic

Select [Regular Printing], set the white edge, click Print, and type the calibration graphic on the platform (PP paper is laid before printing) until the printing is complet.

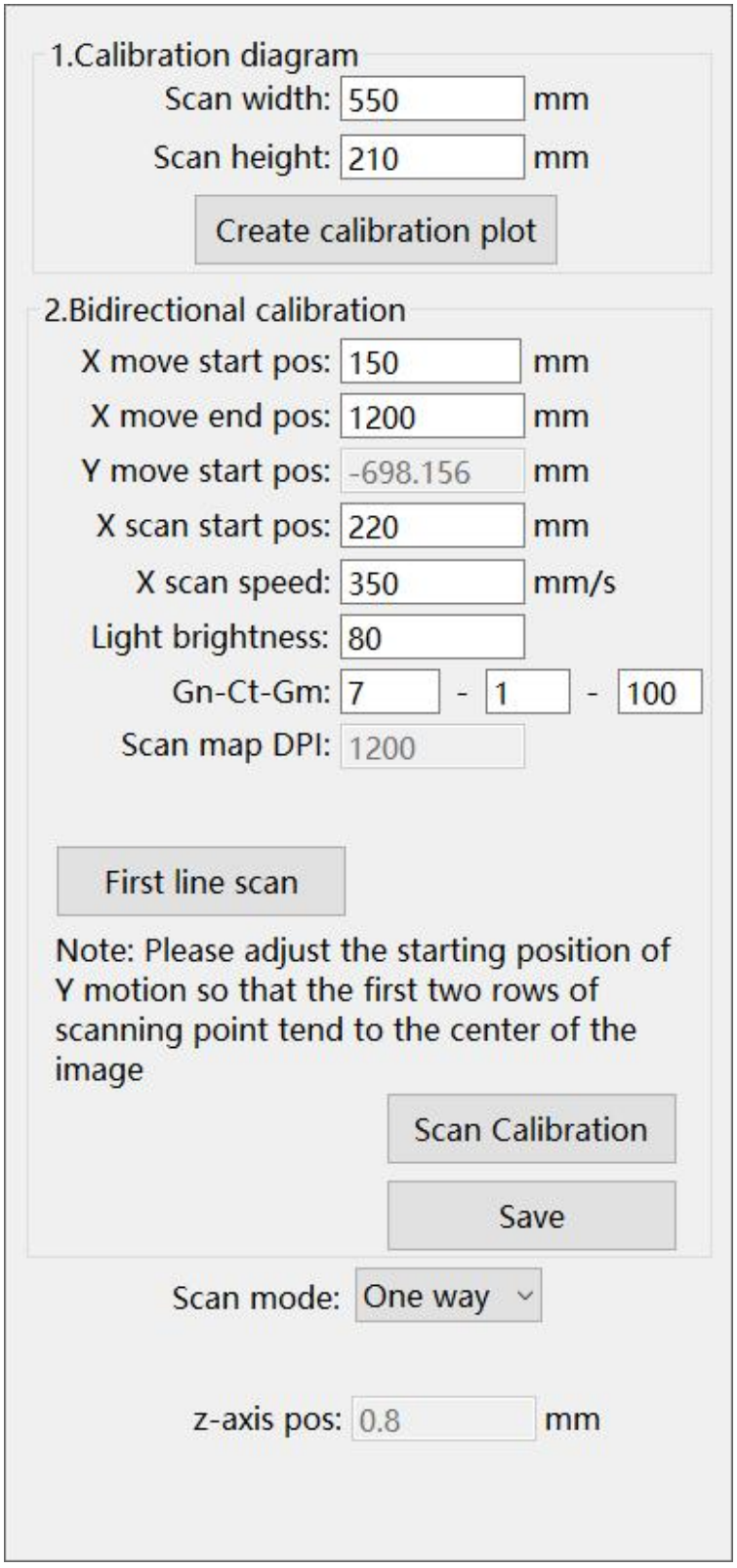


It is ready for calibration after printing.

4.3 Calibration

Turn to【Visual printing】, click【Camera calibration】and the camera calibration interface will appear.

The following parameter:



Parameter description：

- **Start and end position of X motion：** The coordinates at which X starts moving when scanning a row
- **End position of X motion：** The coordinates at which X stops moving when scanning a row
- **Start and end position of Y motion：** The coordinates at which Y starts moving when scanning a row
- **Start and end position of X scan：** The camera starts to scan the position, and when it is in both directions, the forward scan starts to scan the coordinates: X movement starts
- **X scan speed:** The speed at which the cart moves during scanning
- **Source height：** The height of camera source
- **Camera gain - contrast, gamma：** Affects the contrast of the camera when imaging

Notes：

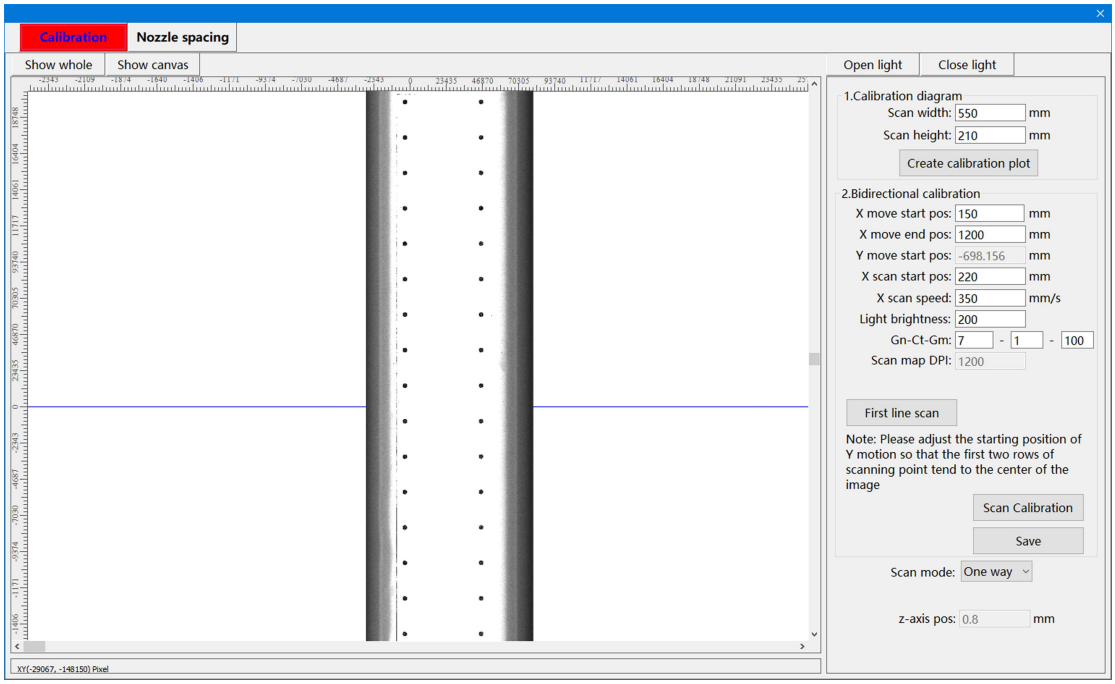
X motion position and scanning position, it is necessary to meet the requirements of the image to display all the horizontal calibration points

The starting position of the Y movement needs to meet the requirements that the image out of the one row of images can display one group (two columns) calibration points, and try to ensure that the two columns of calibration points are located in the middle of the image

Click【Save】 after setting the parameter

4.3.1 Scan the first line

Click【Scan the first line】to start it, load the scanned images when the scan is complete

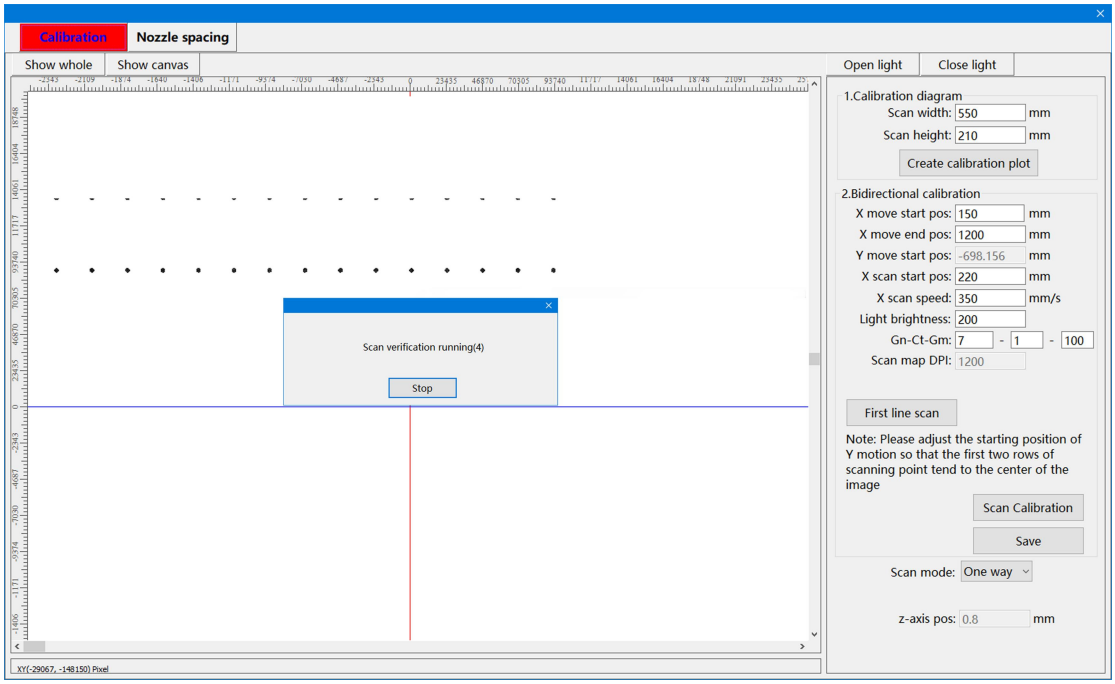


【ctrl/alt+ scroll wheel】to enlarge or reduce the image, 【scroll wheel】move the image, 【click right to move the image】, click the round at the left top, click【left top】. Identify

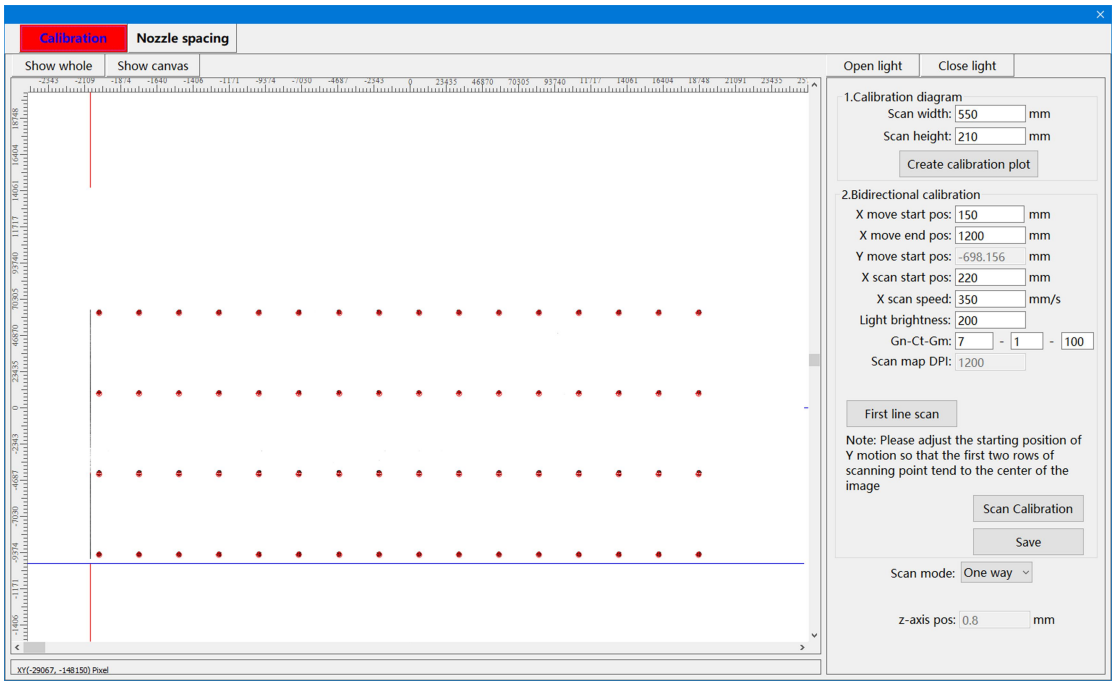
the red cross in the center of the calibration point (i.e., the red circle is displayed in the center of the calibration point).

4.3.2 Test the calibration and save it

The operation area is as the following:



No objects can be placed in the scanning area to interfere with the calibration. Click [Scan Calibration] to scan the whole layout, and display the corrected image after the scanning is completed, calibrated and spliced:



The standard after calibrating: The red cross in the center of the calibration point (i.e., the red

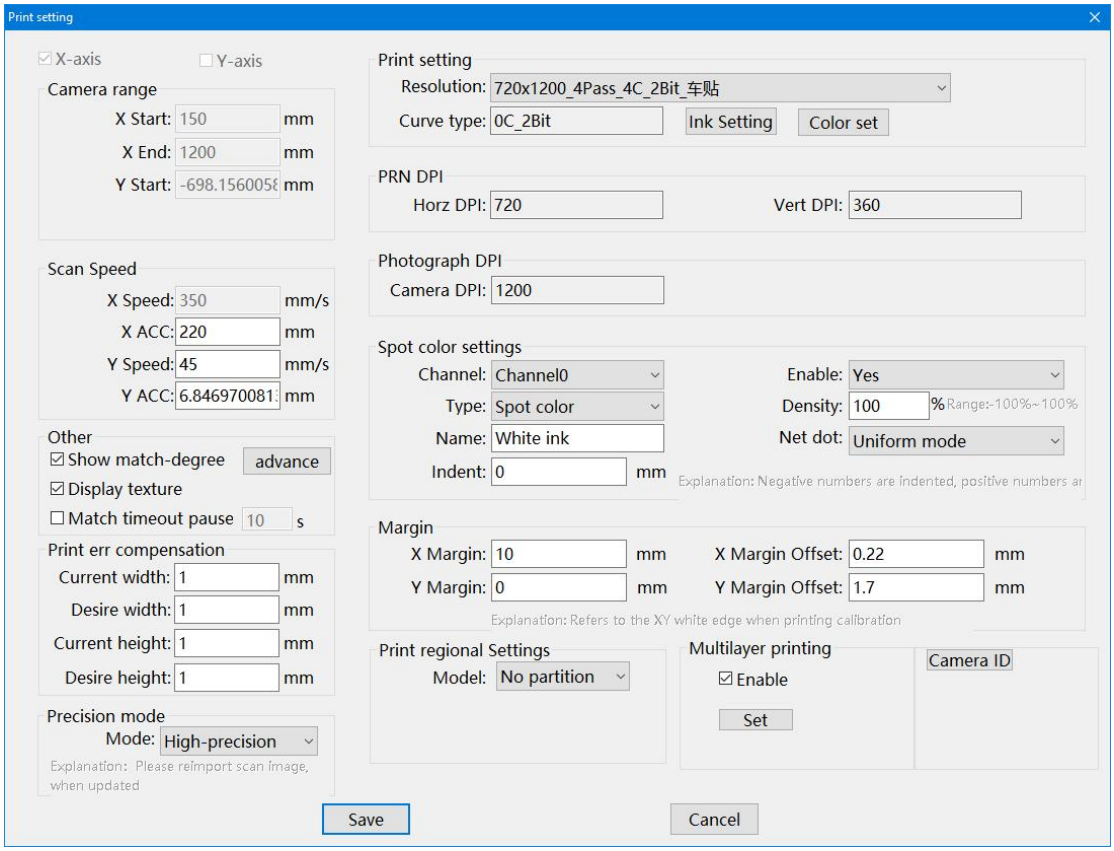
circle is displayed in the center of the calibration point).
After the calibration is OK, click【Save】

4.3.3 Light source control

Click【Open the light source】and【Close the light source】, you can control the light source to turn on and off.

Print setting

Print Settings are used to check and set parameters for visual printing.



- **Direction for scanning**
  Direction: X axis

- **Camera area**
  The camera range is determined according to the calibration parameters and cannot be modified

- **Scan speed**

The X-scan speed is determined according to the calibration parameters and cannot be modified

The XY acceleration and deceleration distance is configured according to the scanning speed of the XY.

The Y-scan speed can be configured as needed

- **Compensation for printing errors**

The printing error caused by the machine can be compensated according to the actual situation.

Compensation calculation method 1: make a diagram close to the width of the machine (such as the width is 2400 mm), use RIIN Printing to generate PRN and print, use a ruler to measure the actual printed size (such as 2399.8), then fill in the actual width of 2399.8 and fill in the expected width of 2400. Height compensation is similar;

Compensation calculation method 2: make a 30 mm * 30 mm circular embedded cross diagram, use RIIN to generate PRN, use continuous drying to make 2400 mm and print; Scan with the camera -- > make a template -- > product verification -- print > so that the leftmost one can be aligned totally, then frame a row (at least the rightmost circular inlay cross), product verification -- > print, check the rightmost offset (e.g. 0.02 mm to the left), then fill in 2400 in the actual width and 2400.02 in the desired width. Height compensation is similar

- **Accuracy mode**

For different products and different modes, please refer to:

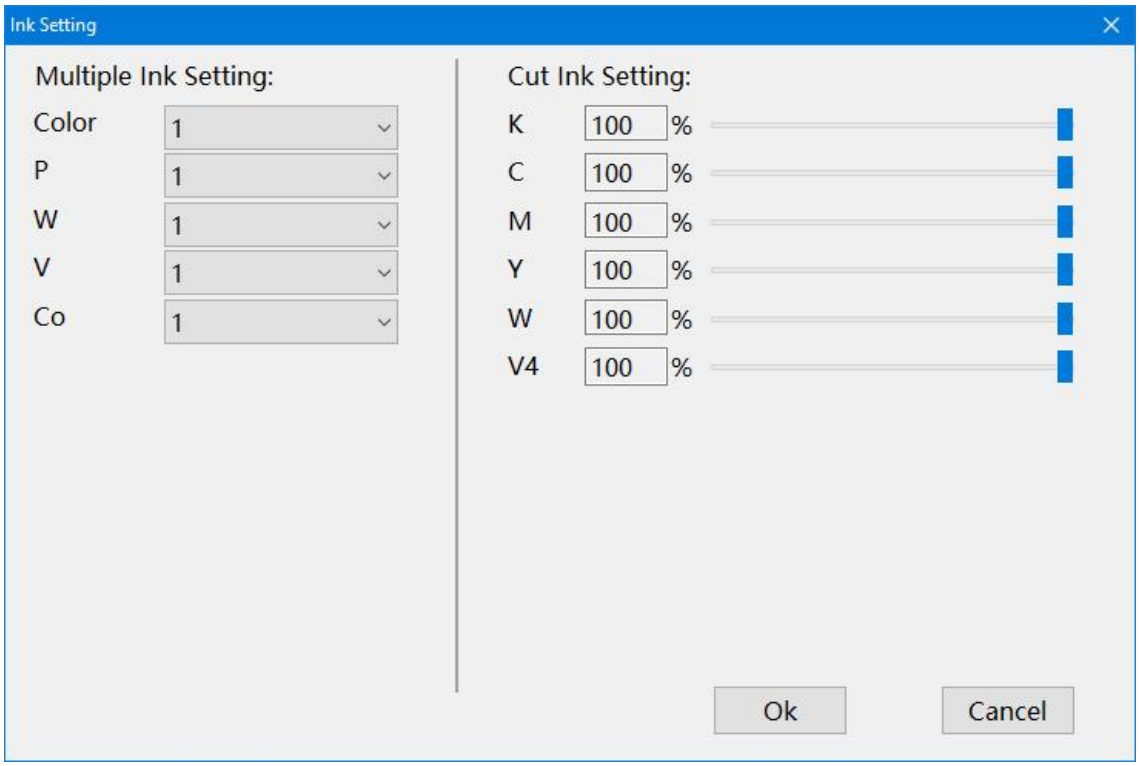
Simple products with no obvious outlines, it is universal, this mode can improve the matching rate, but the accuracy will reduce

For products with clear contours, you can select high accuracy, this mode may reduce the match rate (especially for defective products), you should avoid selecting defective features in order to improve the match rate.

- **Print settings**

The solution needs to be supported by the corresponding curve（Curve storage path：software catalog\RIP_SDK\Printer\HS01\H-DX5(UV)\），Format requirements for naming the curve: All file names in the curve folder must be exactly the same as the folder name, otherwise they will not be recognized.

Ink level settings： The ink volume doubling and ink cut-off control for each color channel during printing, and the number and name of the color channels are determined by the firmware configuration, as shown in the following figure：



- **PRN accuracy**

  The accuracy of the PRN is the accuracy of the curve and cannot be modified

- **The accuracy of taking photos**

  The camera DPI cannot be modified.

- **Spot color setting**

  Set the spot color parameters, including channel selection, enable, type, concentration adjustment, name, outlets, and indentation.

- **White-edge setting**

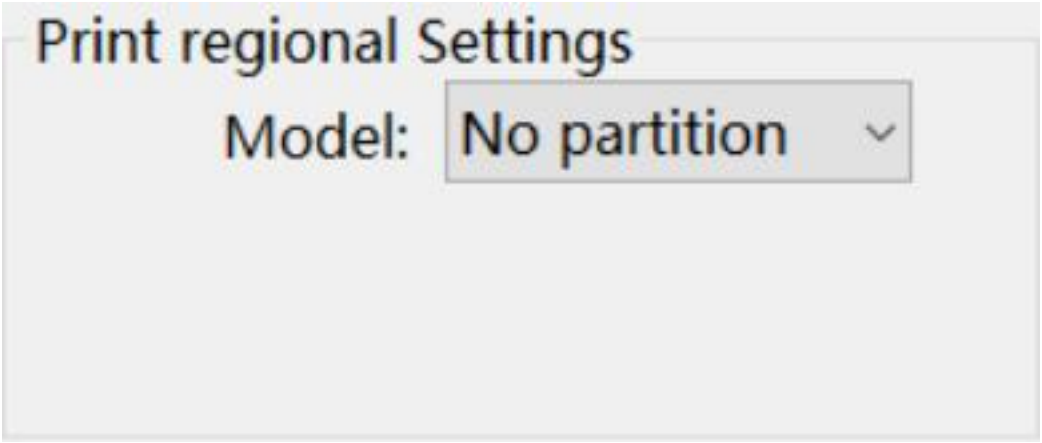
  The XY white edge must be set to the white edge of the printed calibration.

  Note： Due to the delay caused by triggering the photo, if there is an offset after the outline is aligned when making the template, the white edge offset can be tuned finely according to the actual situation, such as compensating for the X white edge offset of 0.22, that is, setting the X white edge to 100.22

- **Print regional settings**

  All templates are matched in the whole region. Default.

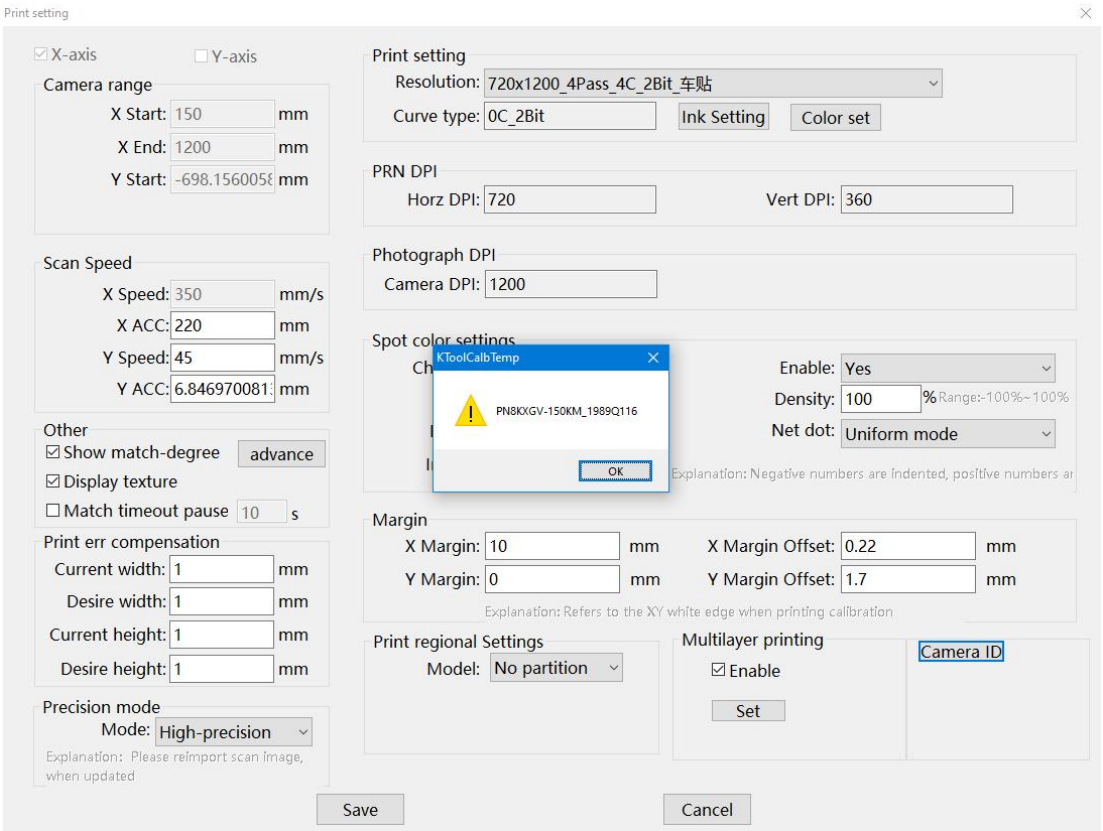
  Standard partition divides the scanning area into areas with the same size as the specified number of rows and columns



Click【Save】after setting.

- **Register the camera**

After obtaining the ID, the corresponding camera ID registration authorization bin file can be put into the root directory of the control software.

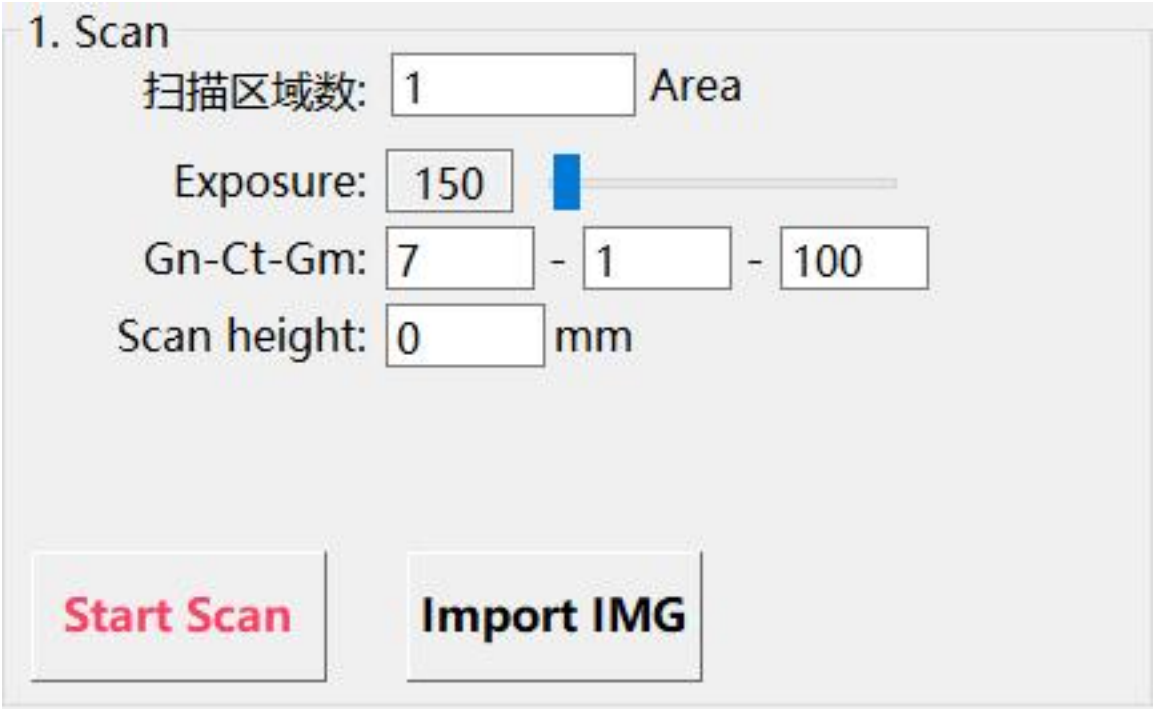


5.1 Scan

Scan the material:

1.Fill in the [Printing Height] according to the height of the material and save it, and confirm the height of [Scanning and Correction];

（If necessary， the cart can be moved out to the top of the material in advance to confirm the safe height of the printhead；）



- Scan area

  The current scan height is divided into 1 area

  The scanning area can be selected according to the placement needs of the product, which saves scanning time.

- Exposure value

  Adjust the brightness of the camera, the adjustment value range: 1~255. When you create a new template, this parameter is saved to the template.

- Camera gain

  Adjust the camera contrast from 1-32. When you create a new template, this parameter is saved to the template.

- Scan height

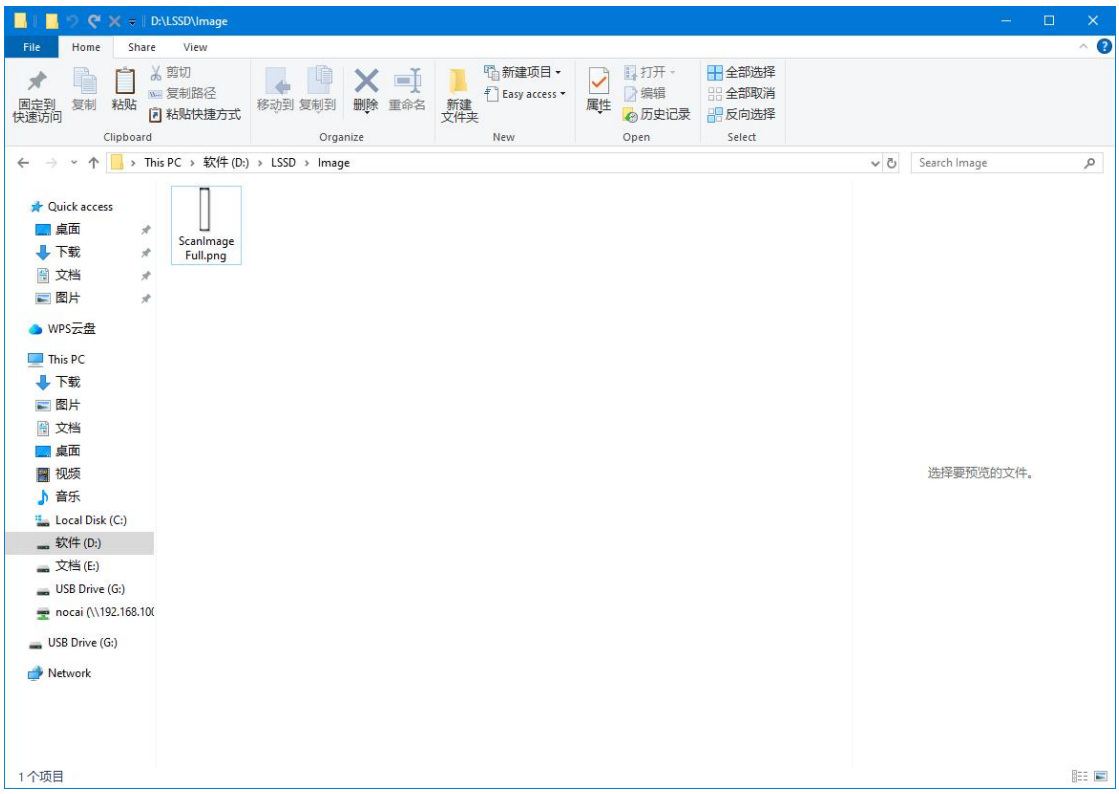
  Record the height of this time. When you create a new template, this parameter is saved to the template.

- Start printing

  Start printing.

- Import the graphic

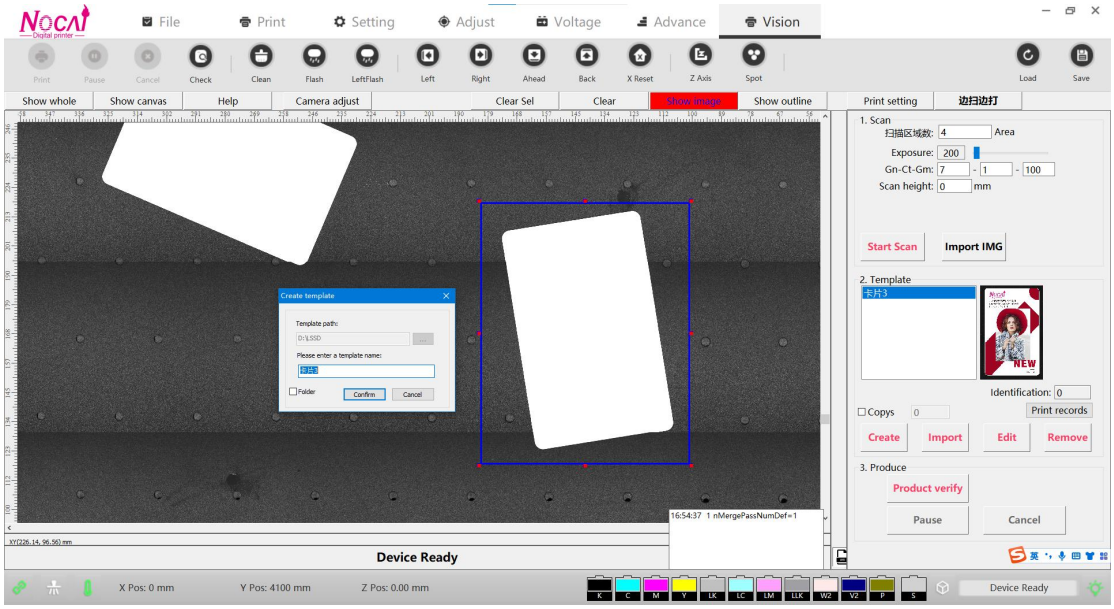
  Open the file interface and select the image scanned previously.



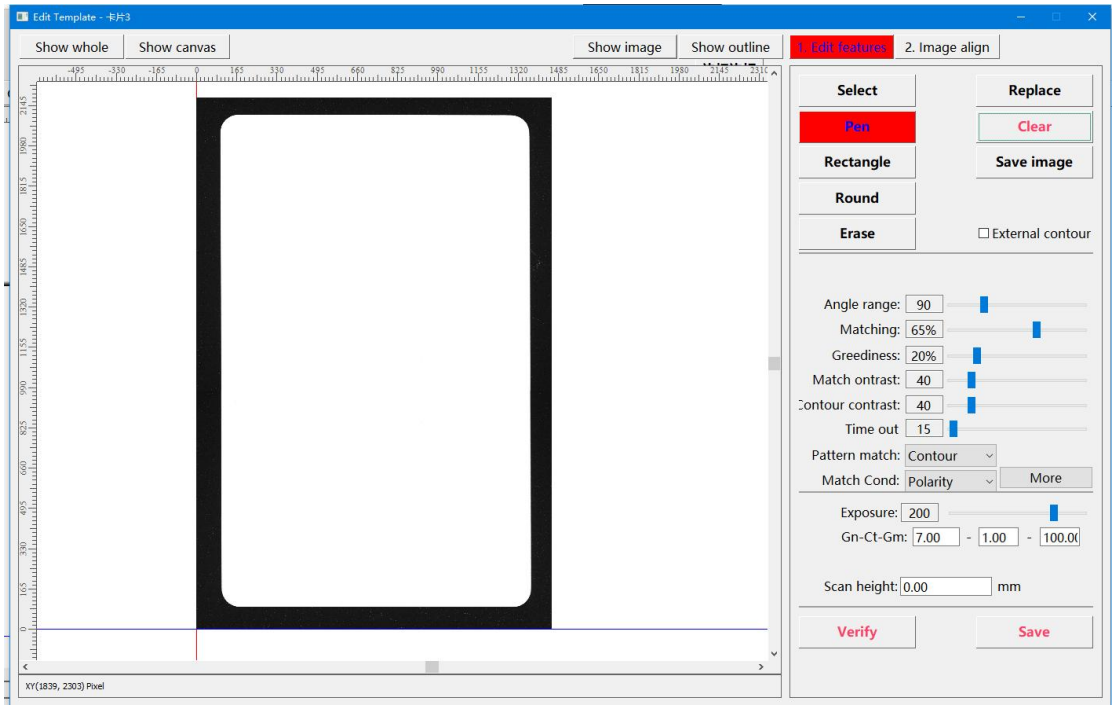
5.2 Template

5.2.1 Create a new template

- [Select Products] Click [New] to pop up the new template dialog interface
- Import the name and click【OK】， it will generate a new template and add it to the template list, select and open the edit template automatically

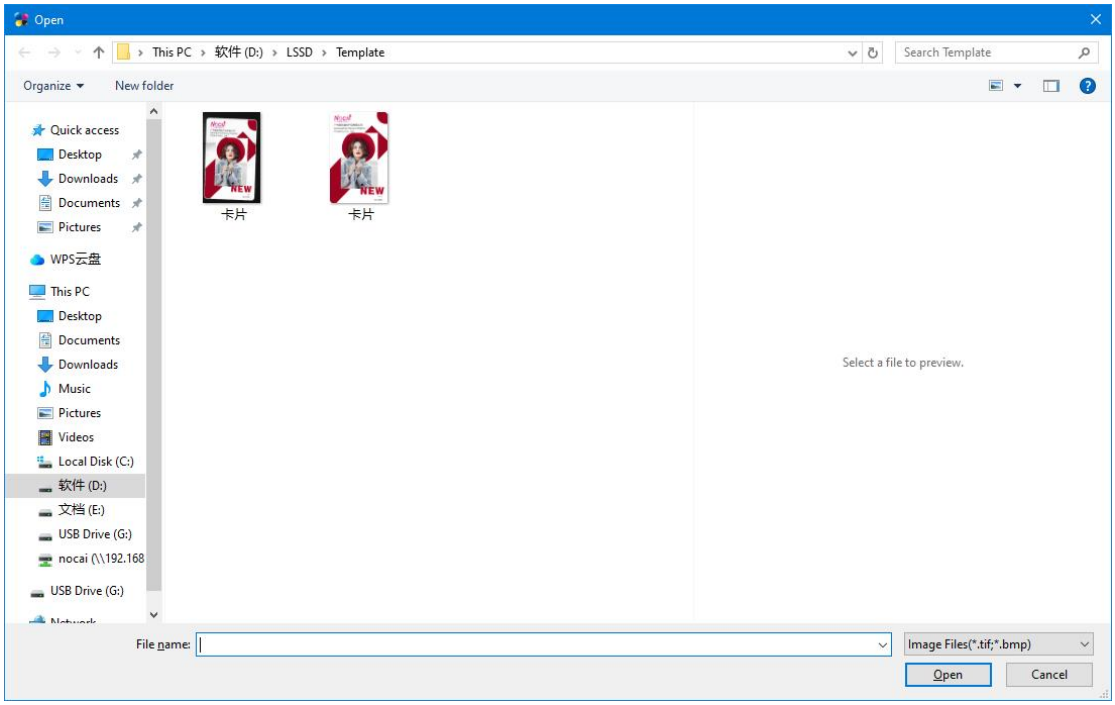


After the new is created, the pop-up window displays the template as follows:

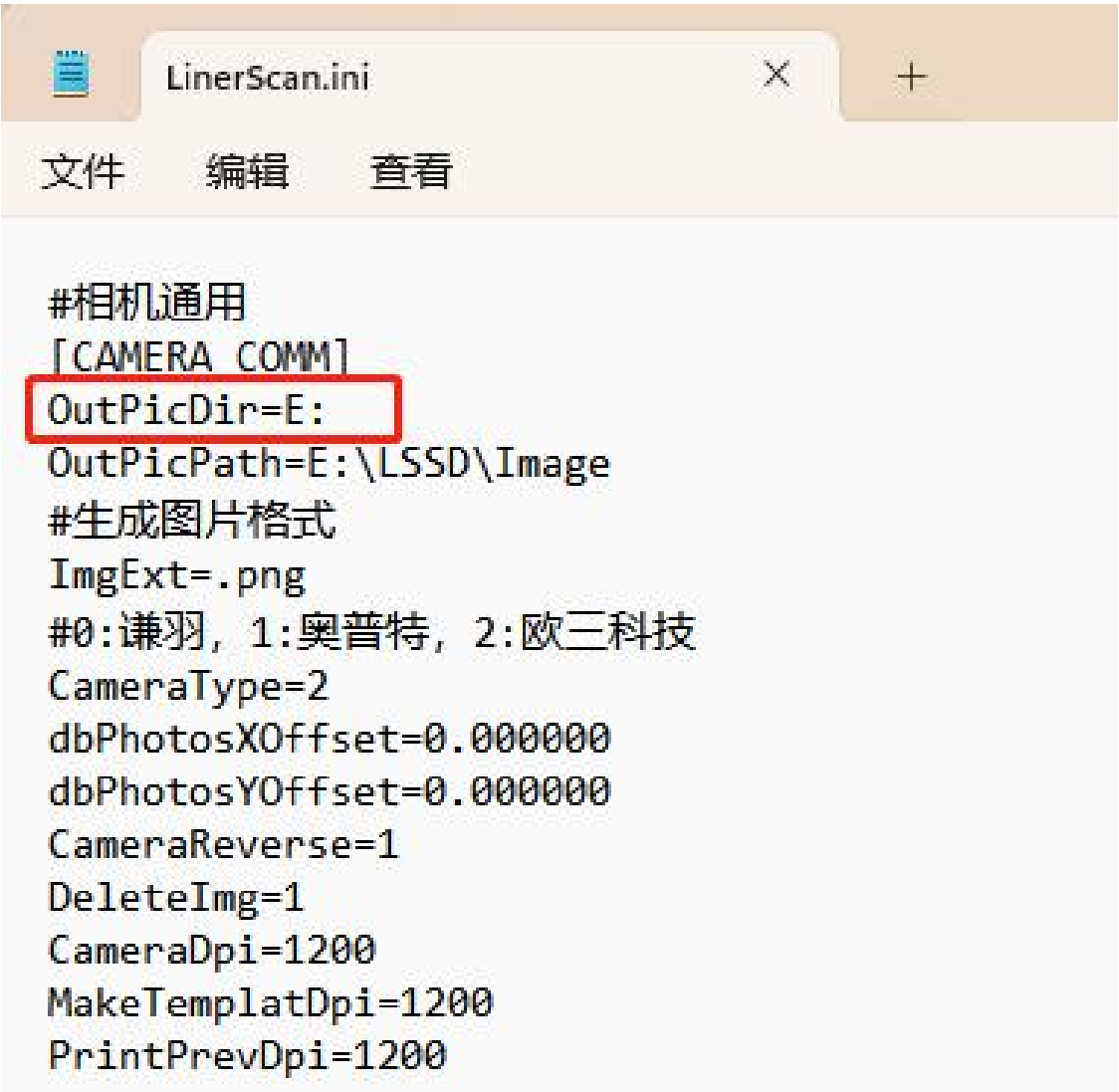


5.2.2 Import the template

Click 【Import】 to pop up the template of tif graphic， choose tif to load the template



Note： Displays the most recently opened directory, and if it is the first time, the default directory is selected as Drive Letter:\LSSD\Template The tif graphic of the catalog. The Drive Letter is set according to Data\LinerScan.ini：



It is selected by default when you import it for the first time E:\LSSD\Template tif graphic of the catalog

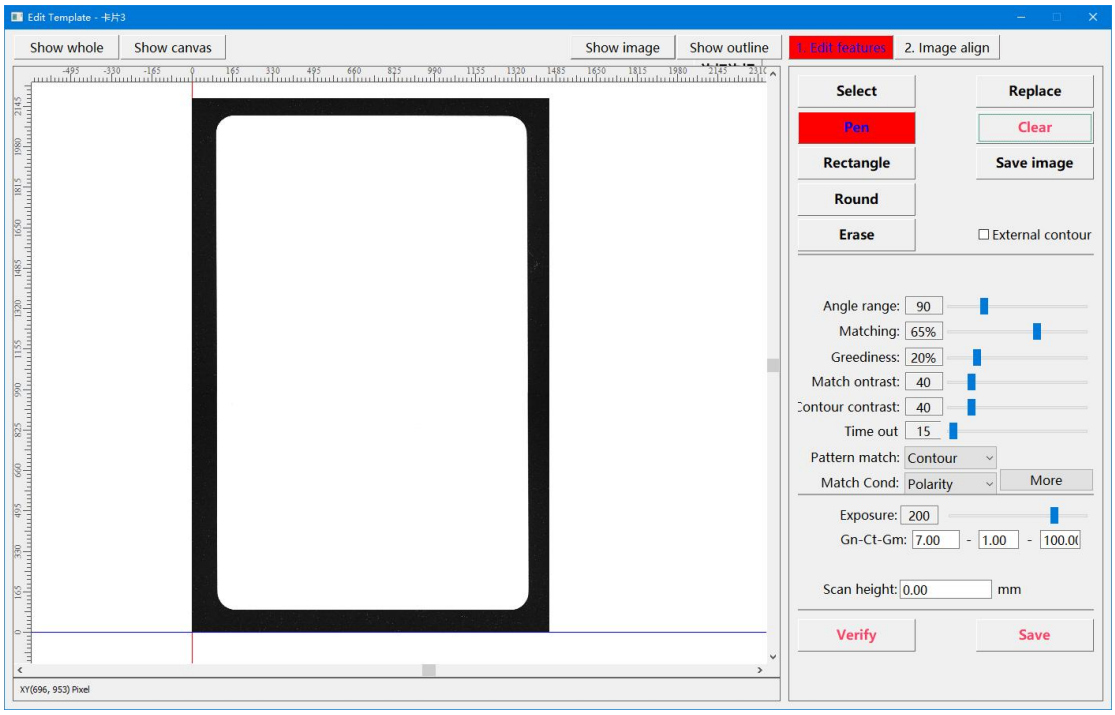
If there is no template directory in the E:\LSSD\Version\ directory that matches the name of the tif diagram (if it has been deleted), a message will indicate that the template directory cannot be found

5.3 Edit the template

Any of the following actions can open and edit the template:

- The new template is complete
- Double-click one of the template
- Choose one of the template and click [Edit]

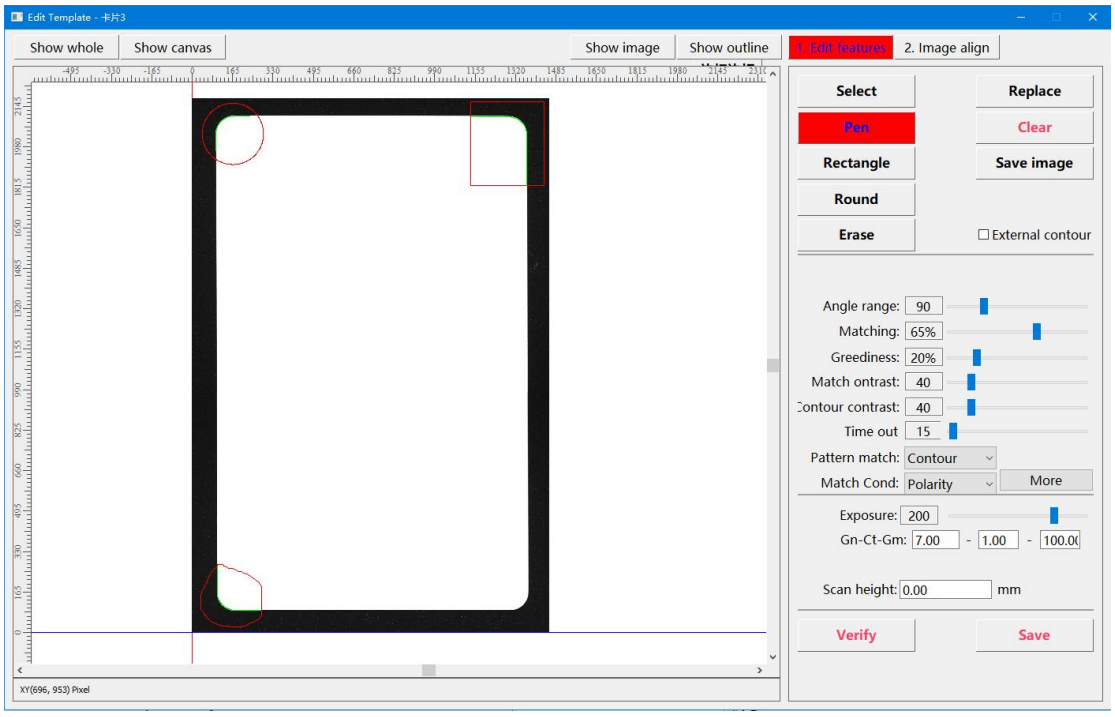
After you open the template, edit the template as shown in the following figure:



Choose【1. Edit feature】， and enter the interface

- **Parameter setting**
- **Edit feature**

You can choose【Pen】、【Rectangle】or【Round】. On the template diagram, you can select areas and generate features, as shown in the following figure

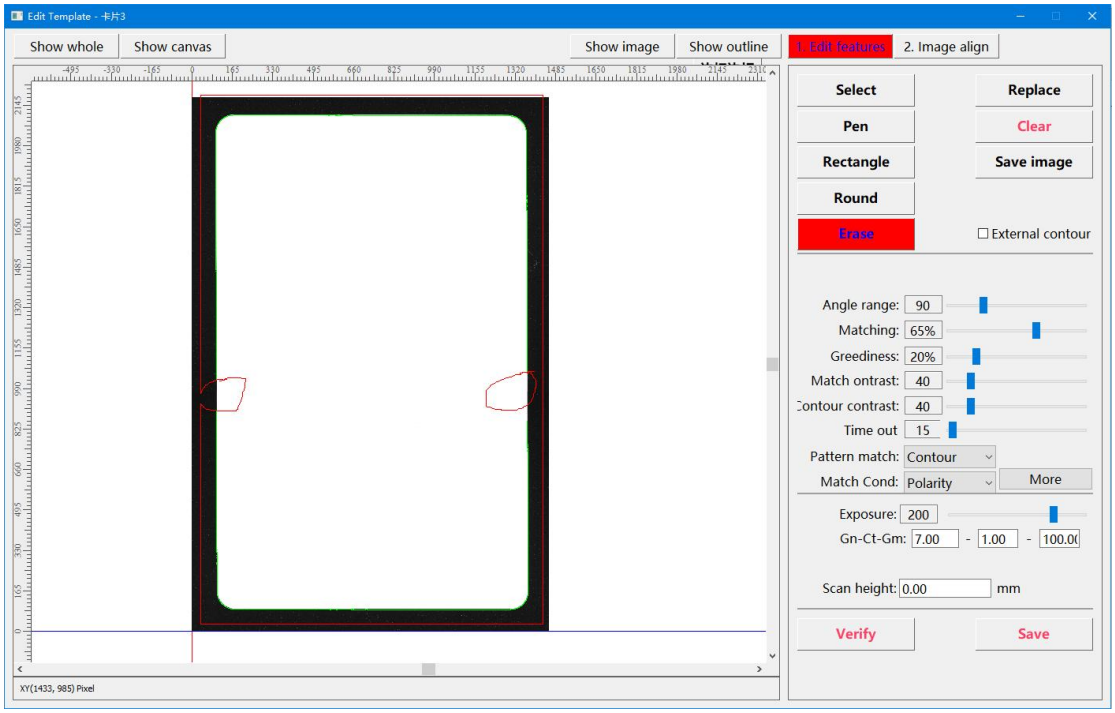


Brush operation: click right and double-click to end the brush drawing.

- **Erase the feature**

After clicking【Erase】， select the area to be erased in the template diagram to remove

the stain as shown in the following figure:



- **Replace the template**

When the clarity of the template diagram does not meet the requirements, you can re-select the product from the scan diagram, click the [Replace Template] button, replace the template diagram with the selected product, and clear the features. Note: After replacing the template, you need to re-box the features and test the features.

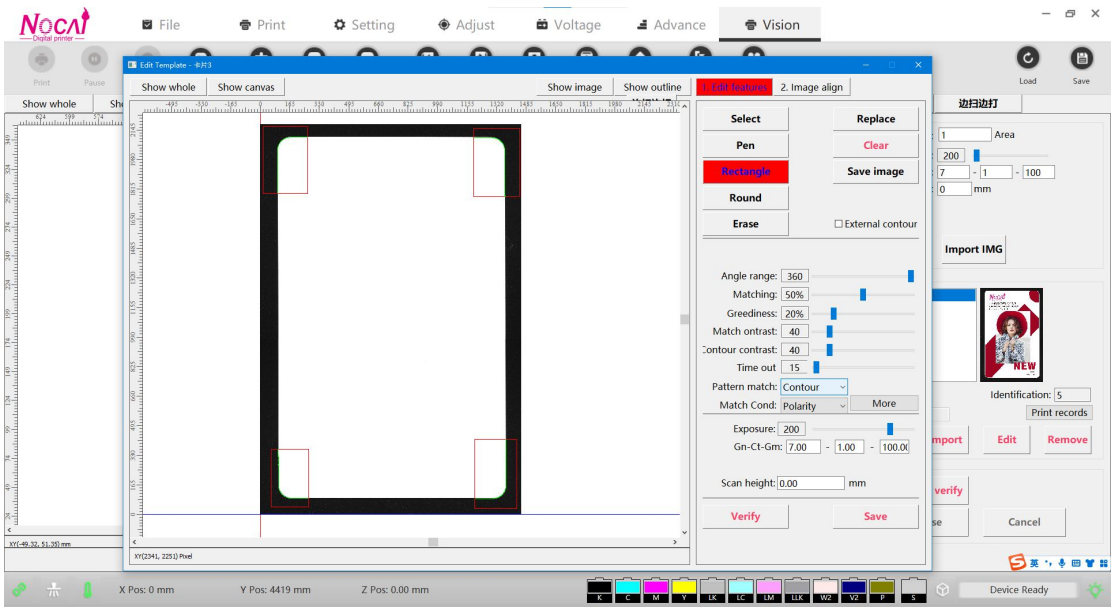
- **Delete the features**

There are two ways to delete the features:

- Click【Choose】, select a feature area and right-click or Delete button to delete the selected feature area
- Click【Delete the feature】

- **Test the feature**

Select the product that needs to be verified in the scan image, click [Feature Verification], and the selected product will display the features selected by the template after testing successful. Note: Feature verification supports multiple template validation, so be sure to remove templates that are not related to the product being scanned to ensure that verification speed is not affected



- **Save the feature**

Please save the features after editing parameters, and the function here only saves the parameters related to the feature.

Note：Feature verification is saved automatically and then verified.

- **Angle range**

It refers to the angle range that supports verification and recognition during feature verification and product verification, it is usually 360 degrees

- **Compatibility**

It refers to the matching error during feature verification and product verification, the smaller the matching degree, the greater the matching error, but if the matching is too large it will lead to unsuccessful matching, and the judgment is adjusted according to the results.
Greedy degree

It refers to the feature recognition degree when the feature verification and product verification are matched, and the higher the value, the greater the identification error, generally 20%

- **Match the contrast**

When matching, the contrast reference is generally set to 0

- **Contour contrast**

When generating an outline, the contrast reference is generally set to 0.

- **Match pattern**

There are two options: contour matching and circumscribed rectangle matching. External rectangular matching is suitable for products with strong rules (such as rectangles, circles, etc.)

- **Match conditions**

There are three options, which are polarity (the matching degree is generally set to 50%), global polarity, and local polarity (the matching degree is generally set to 70%)

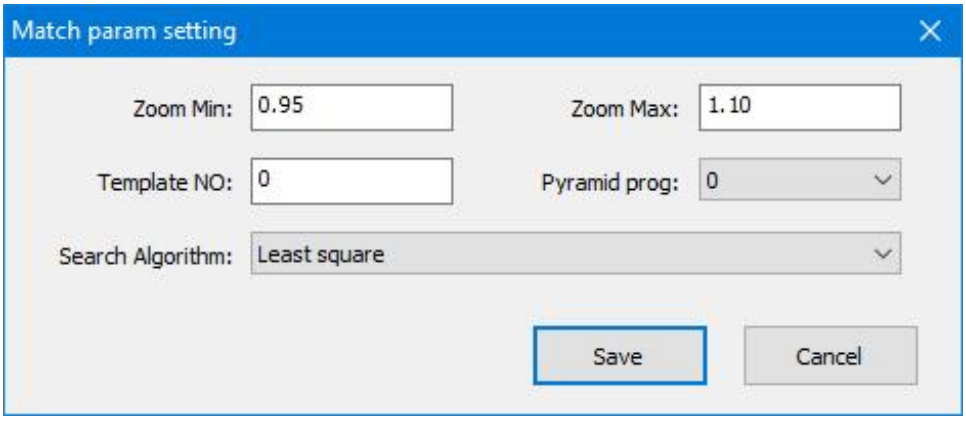
The polarity is fast, but it can affect the recognition rate.

Local polarity is slower, but the recognition rate is higher.

- **Template parameter**

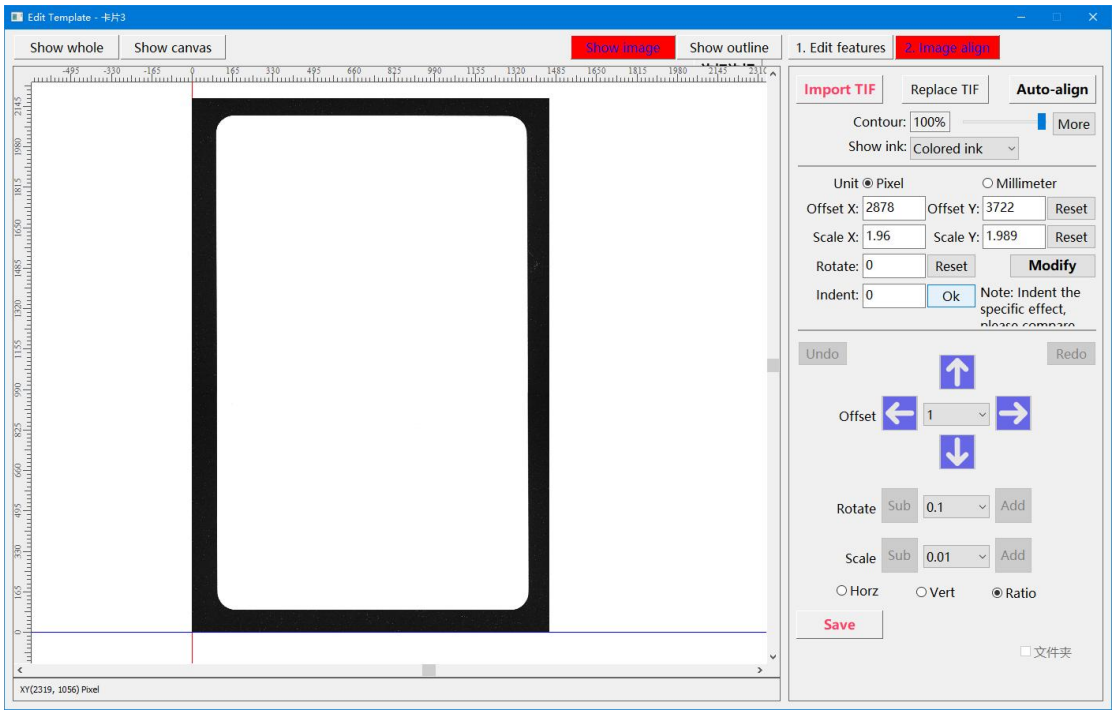
The exposure value, camera gain, and scan height of the template can be modified here, and generally there is no need to modify, and it has been determined when creating a new template.

More settings: the interface is as the following



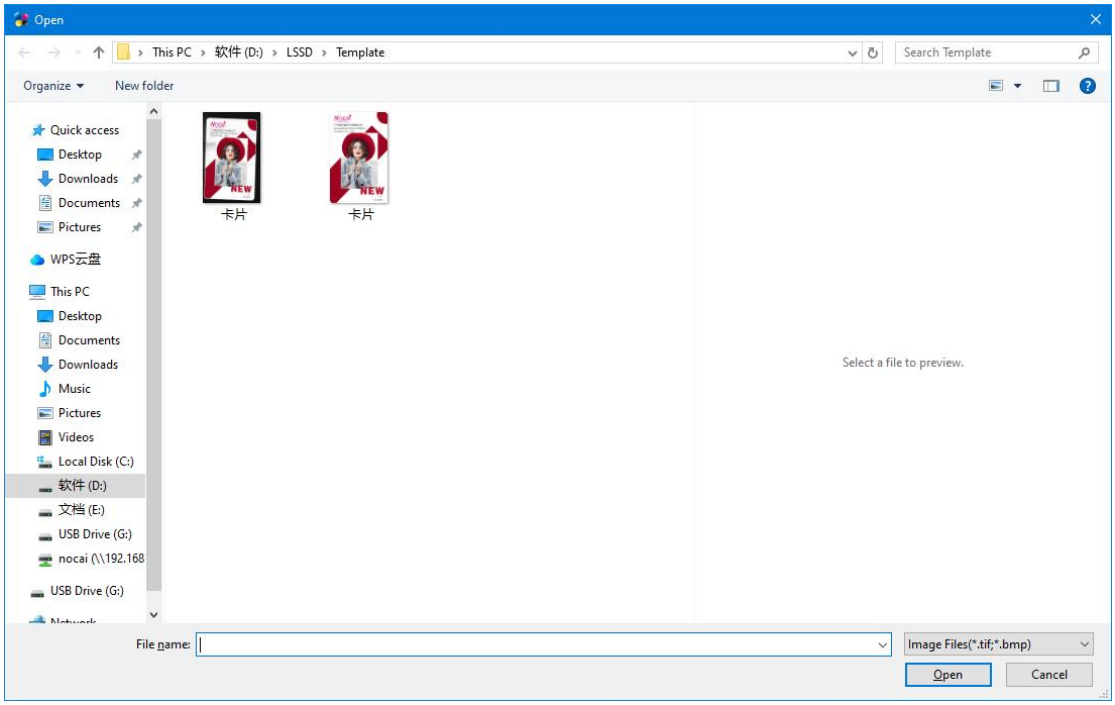
5.4 Image alignment

Click【2. Image alignment】, and enter the feature editing interface, as the following:



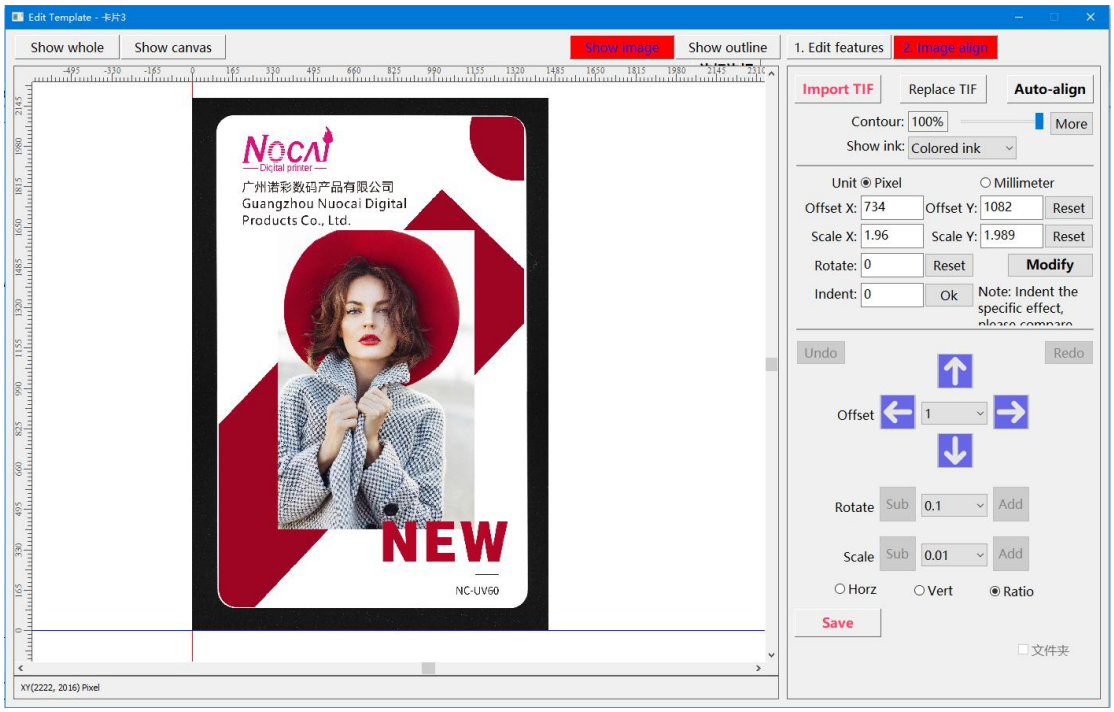
- **Import the image**

Click on the Import graphic page and select the TIF image that matches the product template



After clicking【Open】, E:\LSSD\Template catalog will generate a tif graphic file that matches with the template.

Load the selected TIF graphic into the template to display and generate a TIF graphic outline as shown in the following figure:



Note: The size and proportion of the TIF must be consistent with the product, otherwise the alignment will be inaccurate, or the boundary of the TIF graphic should be expanded

greatly.

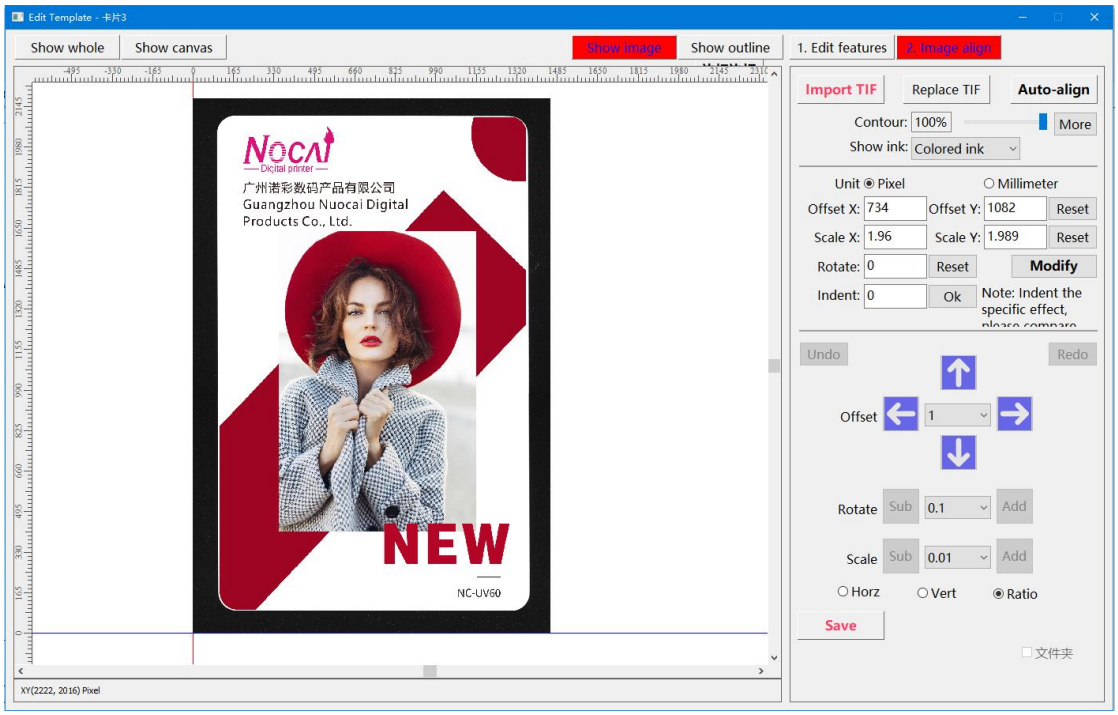
At this time, the position of the graphic does not overlap with the template image, you can click [Auto Alignment] and tune the alignment fine to overlap with the template image.

- **Replace the graphic**

If the imported TIF graphic is incorrect, you can click [Replace the graphic] to reselect it, replace the existing graphic and regenerate the outline of the new TIF graphic.

- **Auto-alignment**

The position of the newly imported texture does not overlap with the position of the template image product, and you can click [Auto Alignment] to make the TIF image and template image product overlap, which reducing the user's movement, rotation, and zoom operations. The effect of automatic alignment is shown in the figure below:



Note： If the automatic alignment fails, you can switch to [1. Edit the Feature] page, reduce the matching degree and save it, and then switch to [2. Alignment graphic interface], you can re-align automatically.

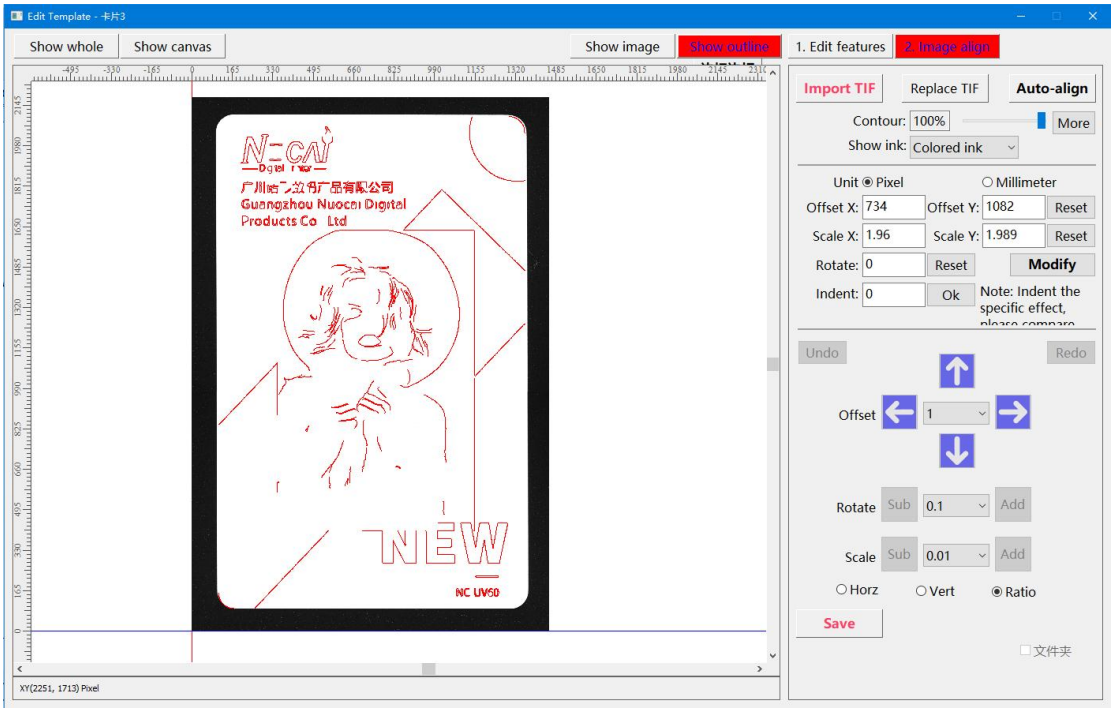
Note： The alignment is accurate if the contour of the product is consistent with the TIF, otherwise the alignment needs to be adjusted manually, or even the alignment will fail automatically.

- **Show image**

Click【Show image】.

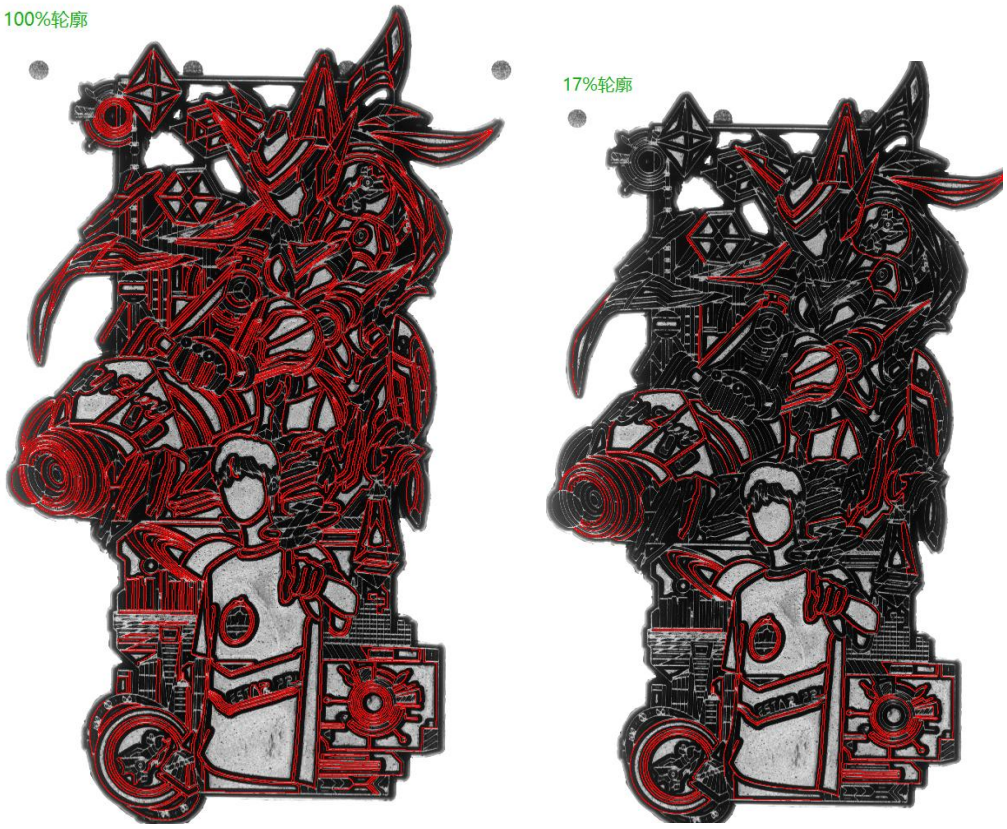
- **Show outline**

Click【Show outline】. As the follows:

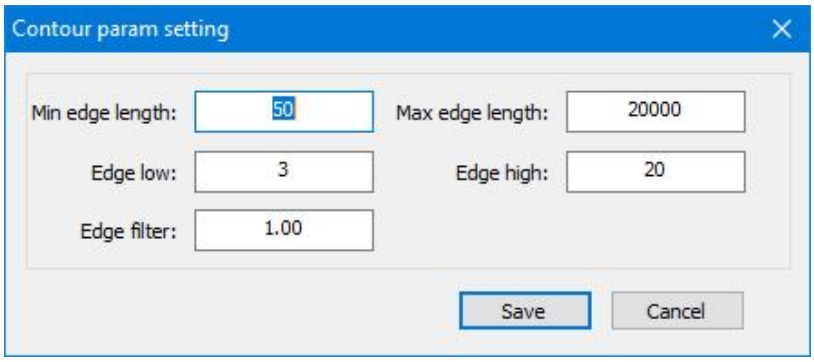


- **Outline parameter**

Adjust the slider below the effective profile and click [More Settings] to configure the scale of the displayed outline, as shown in the following area:



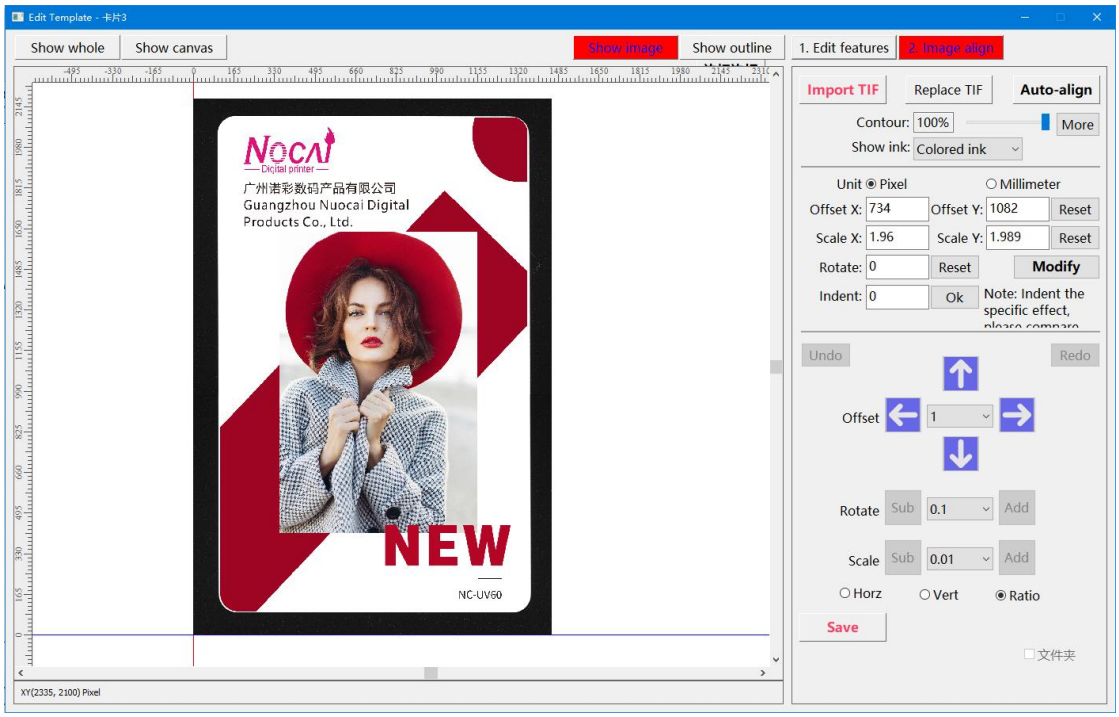
Other outline parameter



- **Graphic channel switching**

Select [Show Image] and select the channel (the number of spot color channels is determined according to the actual number of spot colors in the TIF diagram), and you can switch the channel display.

The color graphic is as the following:

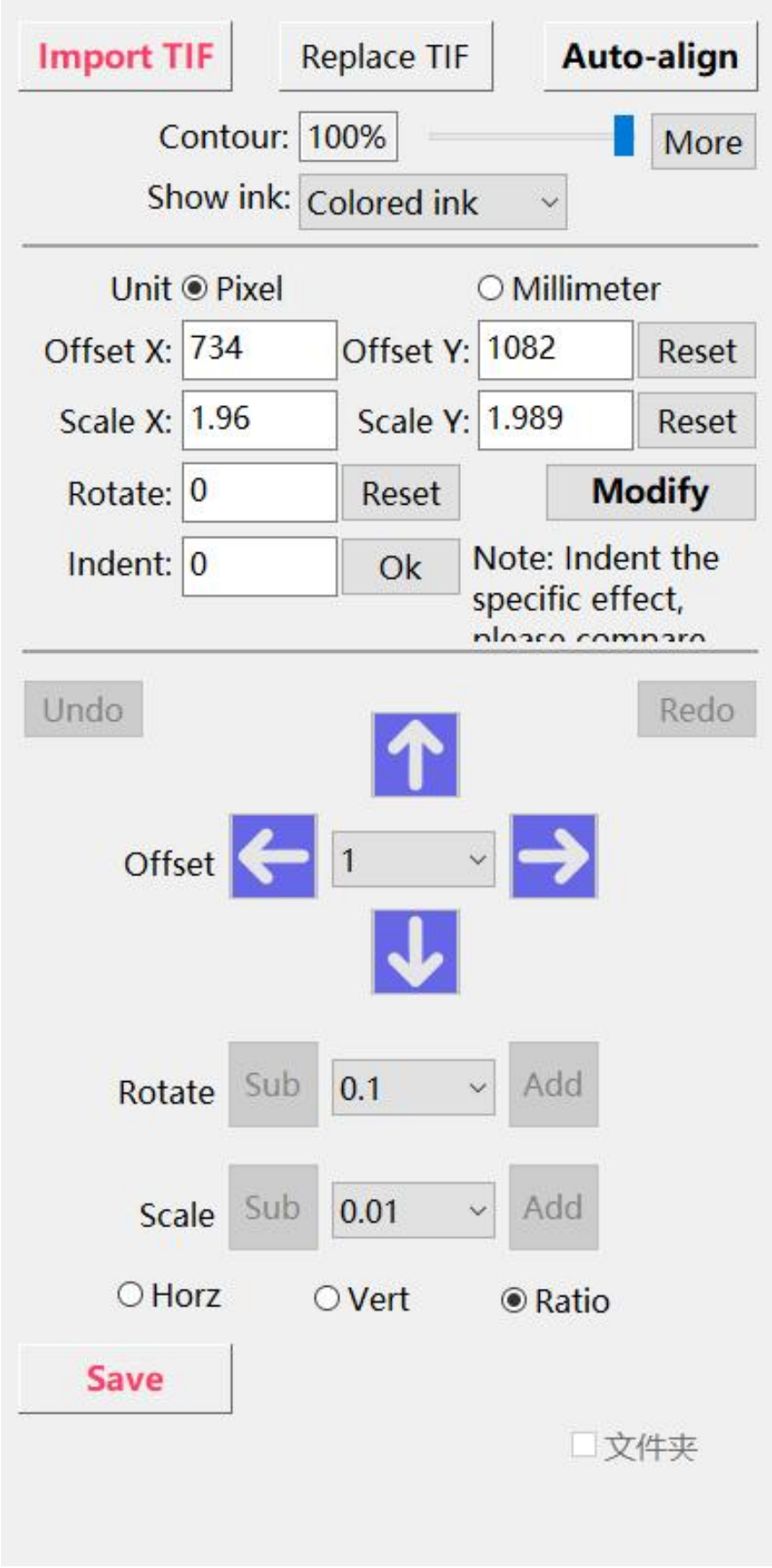


- **Image align**

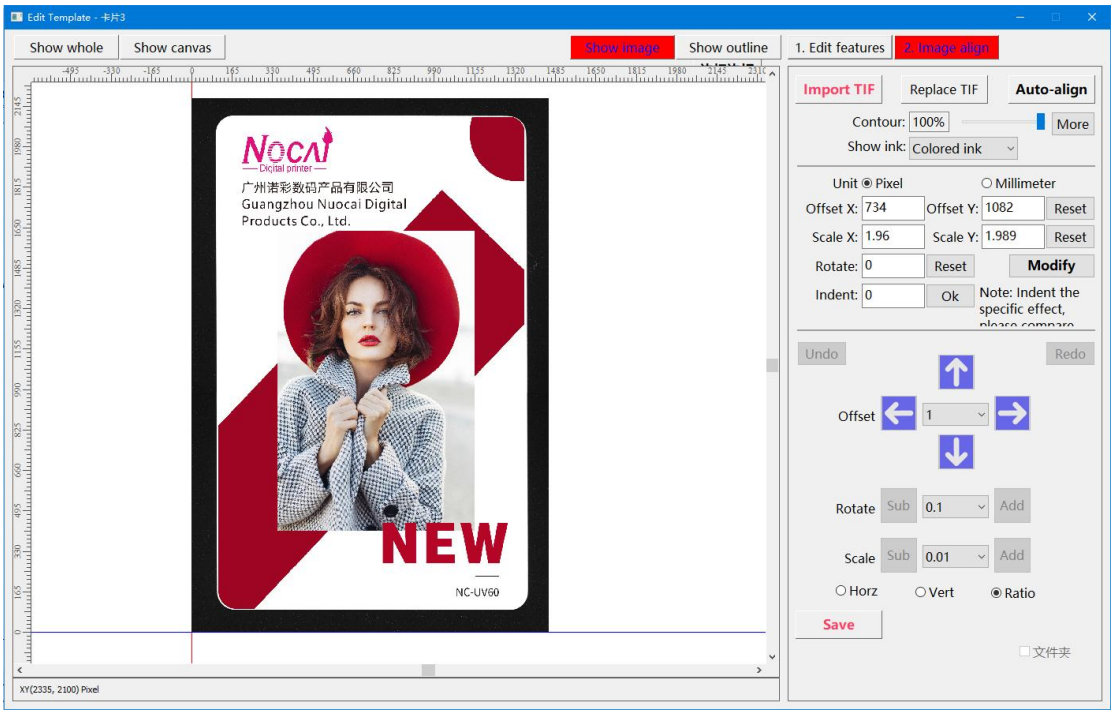
【Show image】and【Show outline】can align. It is recommended toclick【Show outline】to align， this may be more correct.

Purpose： The contour is aligned with the scanned product perfectly, so that it can be printed on the actual position of the product to meet the requirements.

Select the graphic to tune the position fine, as shown in the image below:



The effect is shown below:



Alignment operation：

- **Unit switch**

The unit can be pixel units and millimeter units, which refer to the units in which values are moved when panning.

- **Translation**

Click the up, down, left, and right buttons, or tap the keyboard arrow keys to move the graphic and outline. The offset of each click is selected as a value for the drop-down box, which is 1 by default. If the value is selected as 1 (unit pixel), 1 pixel will be moved per operation.

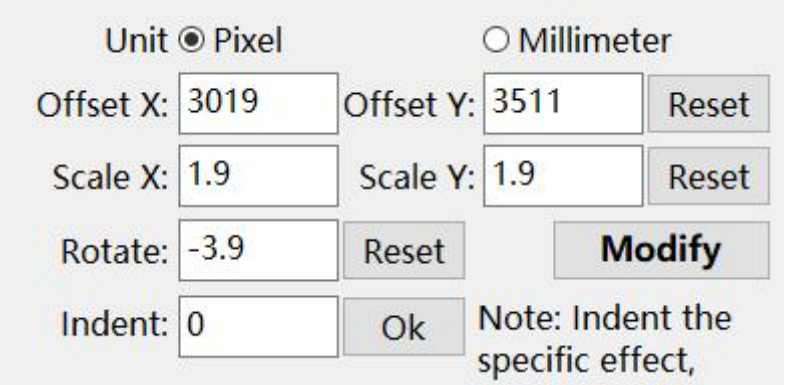
- **Rotate**

Click the reverse and forward buttons to rotate the texture and outline counterclockwise and clockwise, and the rotation angle of each click is the angle selected in the drop-down box, which is 0.1 by default.

- **Scaling**

Click the small and large buttons to zoom out and enlarge the texture and outline, and the scale of each click is the scale selected in the drop-down box, which is 0.01 by default.

Scale mode: Landscape, Portrait, Equal Proportional (default). You can enter the value and click modify or reset to align it directly

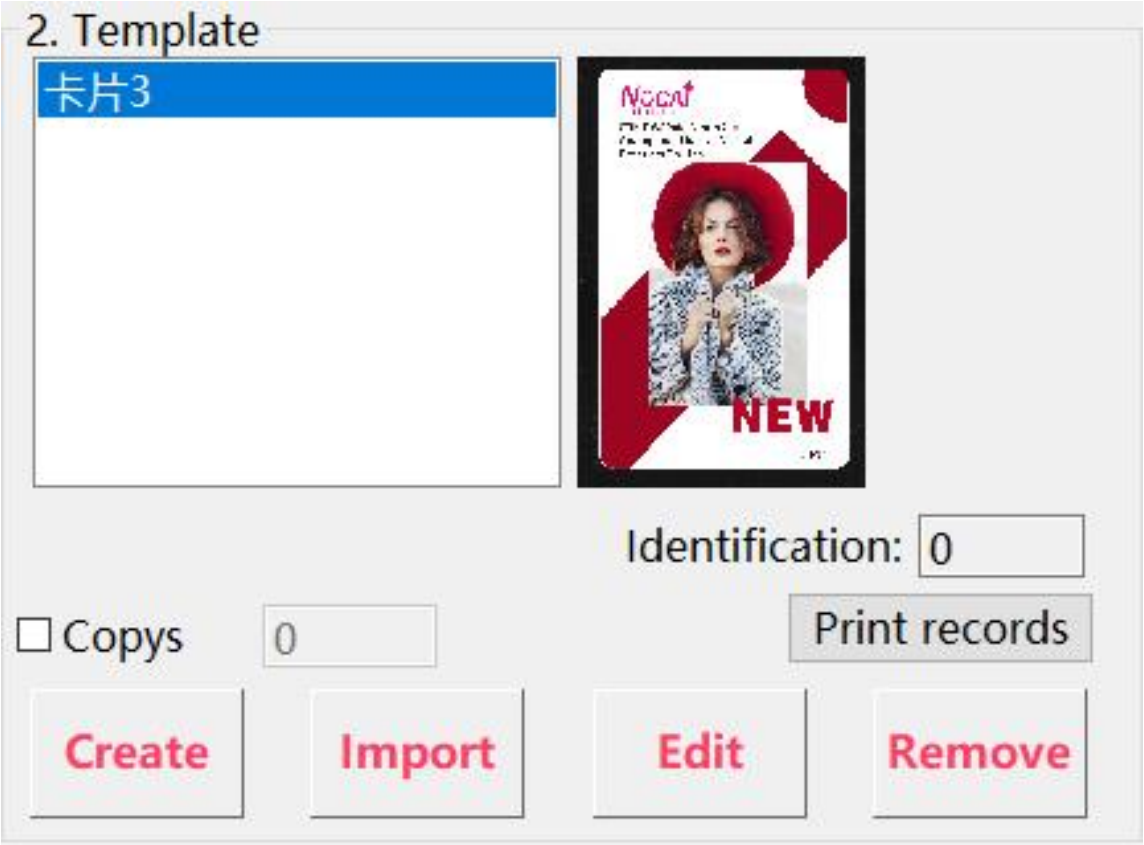


- **Reset**
  Return to the last step
- **Repeat**
  To the next step
- **Save**
  After the texture alignment, you need to click the save button manually, otherwise the modification of the texture alignment will not take effect. When not saved, the product is verified and printed as the result of the last saving.

5.5 Remove the template

Select the template from the template list, click [Remove] to remove the template from the list, and select the first template.

Note： Removing the locally saved template will not be deleted, and the removed template can be re-imported by clicking the [Import] button.



5.6 Produce

This section introduces the functions of the generated sub-areas of Zone 3.

The operation area is as the following：

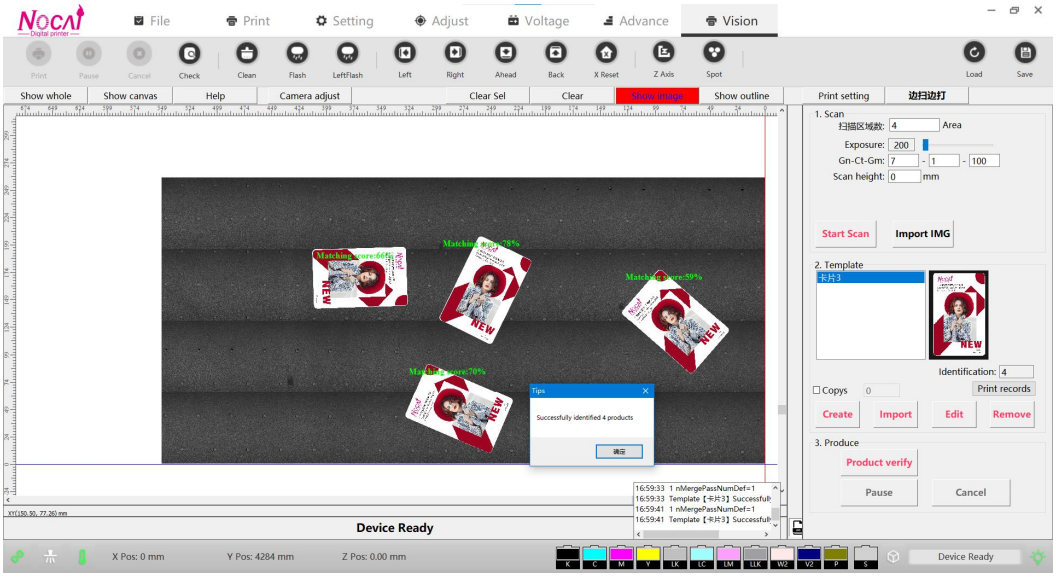
The finished template can be reused, and there is no need to redo the template. When verifying a batch of products (multiple different products can be verified together), import the finished template, and you can directly scan --> generate PRNs --> print, or click [Product Verification].

5.6.1 Product verify

The templates generated in the following two modes can be used for product verification:

- After the new template, the feature verification is OK and the texture alignment is OK.
- Import templates that have already been produced.

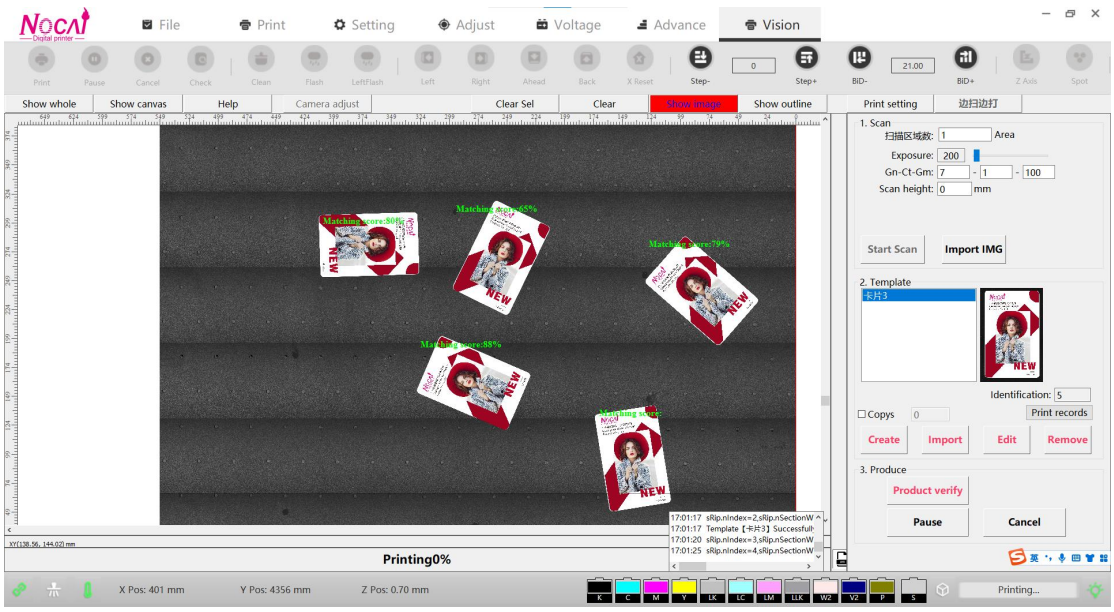
After adding the above template to the list, select the product on the scan chart, click [Product Verification] to start the product verification, after a certain period of time, if the product verification is successful, the product verification result will be displayed, and the product verification graphic will be displayed on the scan chart on the product, as shown in the following figure:



5.6.2 Scan and print at the same time

- **Scan and print at the same time**

After the product is verified, click [Scan and print at the same time]



- **Pause**

While printing, click Pause to pause printing.

- **Continue**

After printing is paused, click [Continue] to resume printing.

- **Cancel**

After printing and pause, click [Cancel] to cancel the printing.

Common problems

NO.	Problem	Reason and solution
1	The camera is not recognized	Install the new driver IKapLibrary ; Check whether the power supply of the camera is normal, whether the power trigger cable is loose, and whether the camera indicator light is green; Turn off your computer's firewall; Check whether the network cable is abnormal or loose; Check whether other network port camera drivers are installed on the computer, and it is recommended to disable them;

2	The camera is not connectted	The network cable of the camera is loose, or the network cable is not directly plugged into the network port of the computer mainboard, or the network cable is not a Gigabit network port, which affects communication; The light source network adapter is not assigned an IP address correctly, please confirm that it is 192.168.1.100;
3	Abnormal external trigger	Check whether the trigger wiring is correct, please check Trigger Wiring Method and Configuration Instructions for more details; Check that the camera software frame trigger and line trigger settings are correct, especially the direction setting of the encoder;
4	Abnormal graphic	Picture stretching, compression, unfixed position, mirroring, etc; Check whether the mechanism platform movement is stable; Check whether there is any jitter in the movement of the shooting object; Check that the camera is scanning in the correct direction; Reduce the exposure time and increase the filter value;
5	There is no image after the camera starts to acquire	Reopen the software and start the acquisition again to see if there are any images; Detects the camera trigger mode, and if it is an external trigger, adds an external trigger source;
6	The device could not be scanned	Check whether the network is connected; Scan multiple times to see if the scan is successful;
7	The frame rate is not up to expectations	Adjust camera parameters to increase the capture frame rate; Replace the host with better performance; Replace the NIC with better performance;
8	Camera captures lost frames	Adjust the frame rate of the camera appropriately;
9	Abnormal imaging of calibration scans	Printing the calibration diagram onto adhesive tape causes blurred line acquisition; Please lay out the paper and turn on the suction to ensure that the lines are not bent;

10	Failed to load configuration file	The configuration file may be an old version, replace it with the latest version
11	The scanned image has misalignment, vertical lines, or horizontal lines	There is a vertical line to check whether the camera is installed horizontally and vertically, and there is a horizontal line to recalibrate the test
12	The outline of the scan is not obvious, and the focus is not on the product	Check whether the camera shooting height is too high from the product;
13	Automatic alignment failed	After reducing the degree of matching and saving, it is sufficient to re-align automatically, provided that the product contour is consistent with the contour of the TIF
14	There is an offset in the product verification graphic failure	Check whether the graphic alignment is biased and adjust it; There is also a deviation after the graphic, check itl is level;
15	The actual drawing is offset	The overall offset machine error can be adjusted in the print settings for X/Y offset adjustment
16	The selection of template features is not ideal	Adjust the degree of matching, clear the feature and re-select the box; Change the exposure time to rescan the material;
17	The drawing recognition rate is low	When the box is selected, it is slightly larger than the material, and the blank space will lead to a low recognition rate; If the feature is not ideal, reselect the feature;
18	The first line of scanning does not scan the full calibration point	Modify SDPI(1480/1158/1600) in the catalog: HSCameraCfg
19	Visual printing software crashes	You can delete the DMP file in the root directory of the software
20	Visual printing with stuttering	Whether the factory mode is disabled and the debug log is printed