TVN-SGX200-800C Camera

(Machine Vision system)

Operation Manual

Table of Contents

1. Product description：

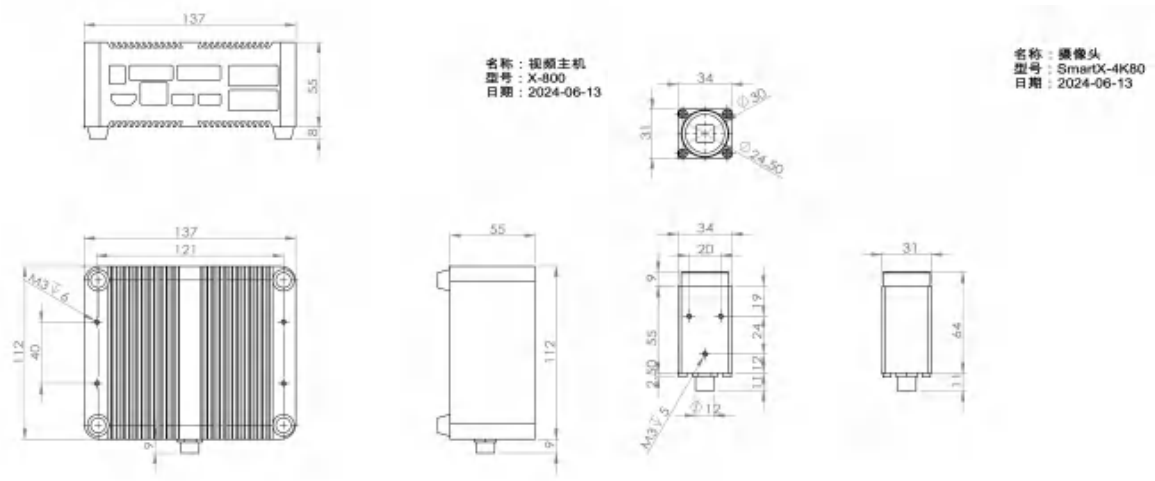
SMART-GO intelligent visual inspection camera is mainly used in the field of industrial inspection for image analysis and recognition, visual inspection and judgment. The camera has color discrimination, color area calculation, contour search and positioning, object feature grayscale matching, color or grayscale density detection, object counting, size measurement, barcode two-dimensional code recognition and reading, size measurement, mechanical guidance positioning, Character recognition and other functions.

The camera has an HDMI high-definition video output interface, which can be controlled by a mouse. The camera provides a digital IO interface with multiple sets of input and output interfaces, including switch control interface, PLC signal input and output interface, RS232 interface, and Ethernet interface. There are many ways to communicate with peripheral devices and achieve collaborative work.

This product has a PLC control input and output interface, which can be integrated with automation equipment, and has a network transmission interface, which can communicate and control through the network.

Application areas: mobile phone internal inspection, LOGO inspection, line sequence inspection, object size measurement, product defect detection, robot guided positioning, multiple barcode recognition and reading, product technology statistics, product surface scratch detection, microscope inspection, etc.

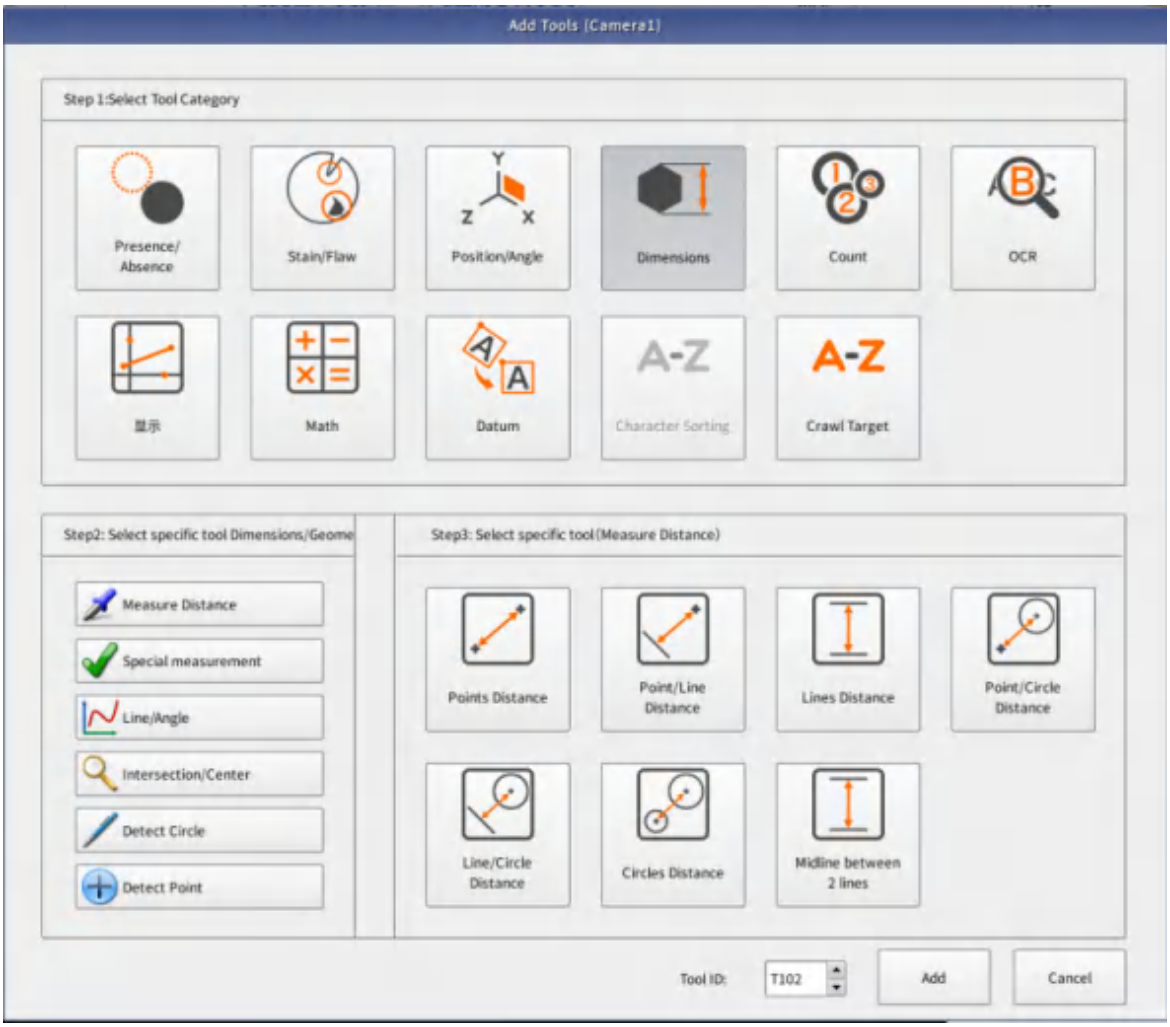
1.1 Product Structure：



1.2 Technical Parameters:

TVN-SGX200-800C			
Chip structure	Xilinx Zynq	**Optical size**	1/1.8inches
Operating system	LINUX	**Pixel size**	2.4um*2.4um
Kernel structure	ARM COTEX A12 + FPGA	**Resolution**	8 million pixel
Main frequency speed	666MHz	**Frame rate**	60/30/25 fps
Output Interface	2 USB ports. Can connect to U disk, wireless mouse or keyboard		
IO Interface	8 groups of input, 8 groups of output, 12V level output interface, can be connected to photoelectric switch, wire control switch, PLC, etc.		
Operating temperature	0-70 degrees	**Video output**	HDMI digital output
Dimensions	112*137*63mm 31*34*75mm	**Lens interface**	C mount
Weight	900g	**Voltage input**	DC 12-24V

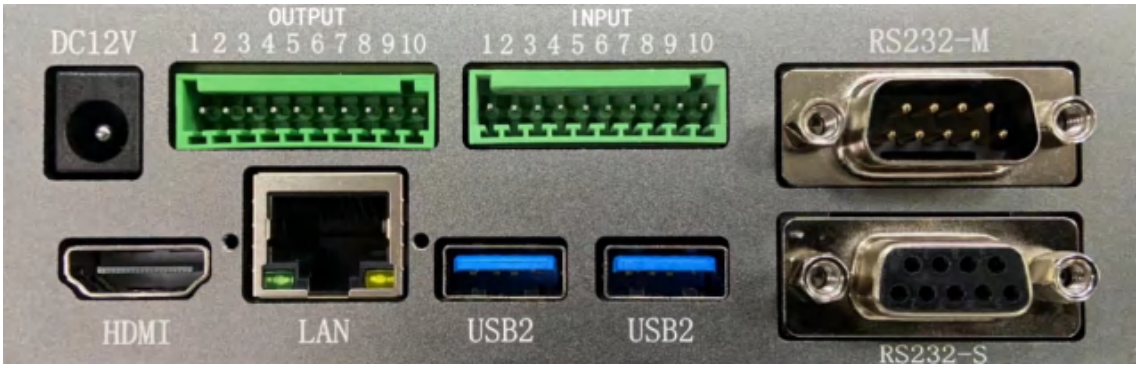
1.3 Product function diagram



Function diagram

2. Product structure.

2.1 IO Interface definition



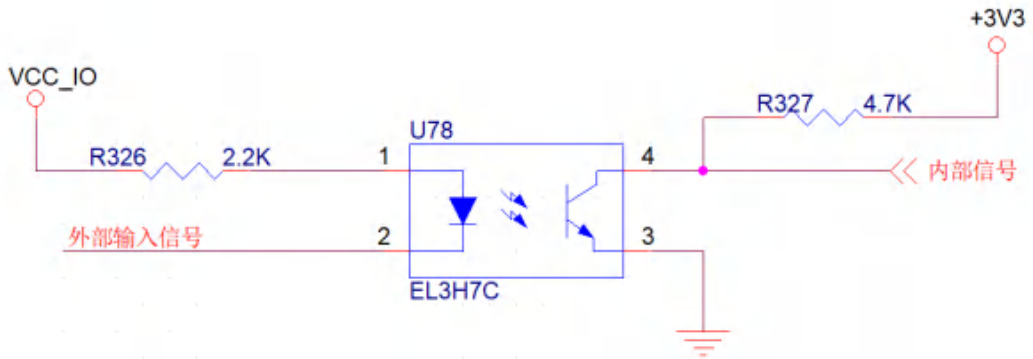
Input		
Pin	Signal	Description
1	COM+	DC power supply positive pole (output)
2	IN1	Input 1
3	IN2	Input 2
4	IN3	Input 3
5	IN4	Input 4
6	IN5	Input 5
7	IN6	Input 6
8	IN7	Input 7
9	IN8	Input 8
10	COM-	Common ground

Output		
Pin	Signal	Description
1	COM+	DC power supply positive pole (output)
2	OUT1	Output 1
3	OUT2	Output 2
4	OUT3	Output 3
5	OUT4	Output 4
6	OUT5	Output 5
7	OUT6	Output 6
8	OUT7	Output 7
9	OUT8	Output 8
10	COM-	Common ground

2.2 IO Input interface wiring diagram

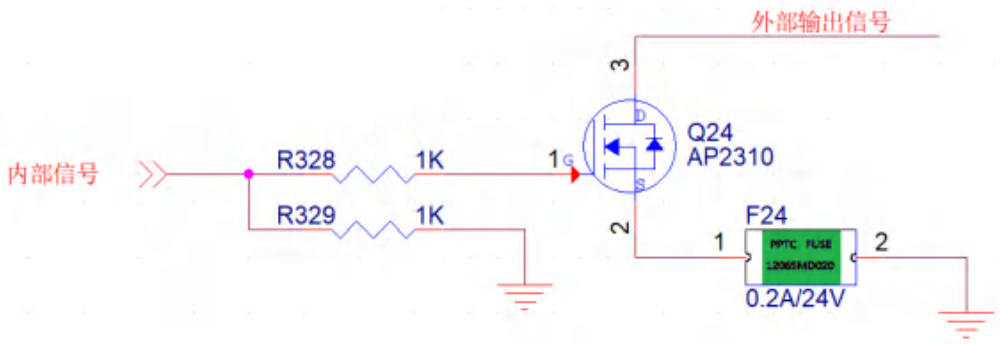
Power input range (5-24V)

Connect the input IO of the control box to NPN output device or switch button.



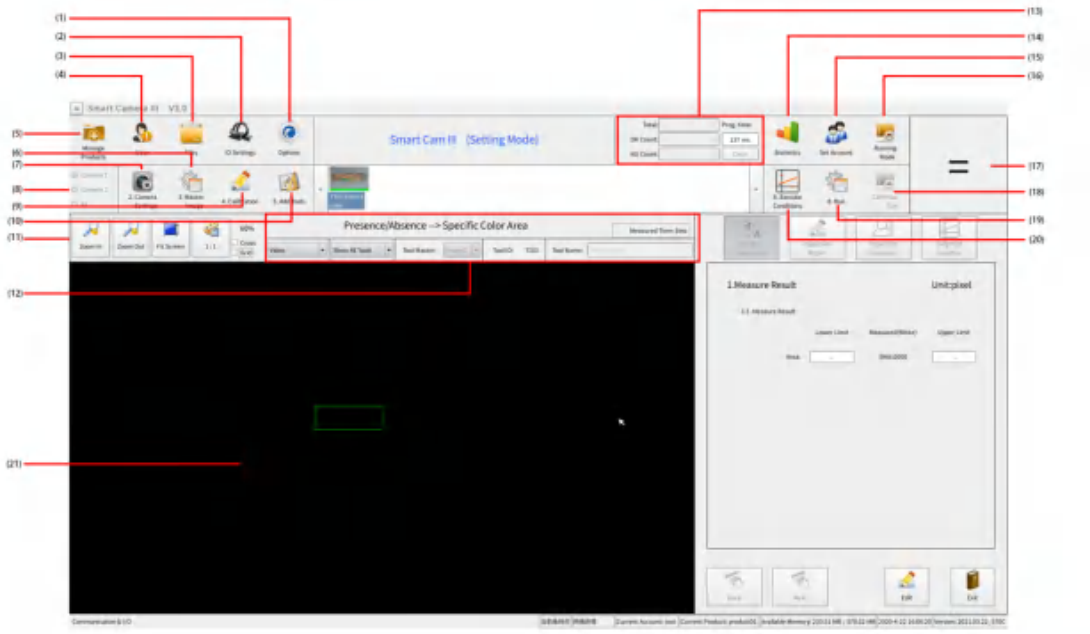
2.3 IO Output port wiring diagram

The output IO type of the control box is NPN open collector.



3. Operation Instructions

3.1 Main Menul Interface:

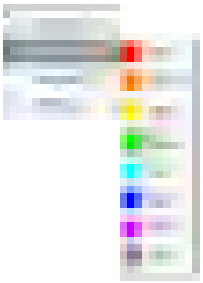


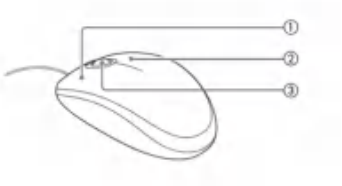
(1) Configuration options: including system upgrades, network settings, data backup, language settings, basic information settings, etc.
(2) I0 setting: Set the relevant parameters of signal output.
(3) File management: Manage system files, and can copy and delete files.
(4) User management: Manage system user related information and password settings.
(5) Product management: product settings can be created, opened, and saved.
(6) Motherboard setting: Register standard products.
(7) Camera settings: Set various camera parameters, such as exposure time, white balance, brightness, color, wide dynamic and other parameters.

(8) Camera selection: The system supports multiple cameras, select the currently operated camera.
(9) Calibrated size: set the ratio of current lens magnification.
(10) Image zoom: zoom in or zoom out the image.
(11) Add tools: add new detection tools.
(12) Display mode: display current inspection information.
(13) Statistics: Count the number of good and bad products since the last time the data was cleared.
(14) User management: user authority management can be performed.
(15) Statistical report: View the statistical results and export them to EXCEL files.
(16) Operation mode switching: divided into operation mode and setting mode.
(17) Test result display: test result OK/NG display
(18) Continuous detection button: automatic continuous detection of products.
(19) Execute test button: test once every time you press it.
(20) Execution conditions: Set the test conditions for each test tool.
(21) Image display area: the current product image display area.

3.2 Basic operation method

The main operation of this machine is to use the mouse to select the function module displayed on the screen, or input the required parameter value to set.





Description of the main operation mode of this machine:

(1) Use the mouse

①Left button---Used when selecting items

② Right click---Use when selecting attribute function

③Mouse wheel---you can change the direction of the slider or make the image zoom in and out

(2) Enter numbers or characters

Small keyboard can input numbers, full keyboard can input numbers or letters, characters, Chinese characters

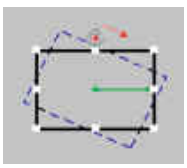
(3) Use zoom in/out/move image

You can select the zoom in/out button above the image or move the mouse to the part of the image to be zoomed in, and scroll the mouse wheel to zoom in or out.

After the image is enlarged, you can press the left mouse button on the image and drag left and right to move the image screen.

(4) Determination of detection range

When editing the detection tool, you need to set the detection range (including search range and search object), and you need to change the size and movement of the



detection range.

① Use the mouse to drag the white drag point on the wire frame to change the size of the detection range.

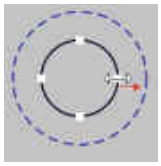
②When the mouse turns into a cross arrow in the frame, you can drag the moving range.

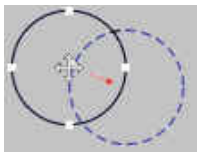
③ Use a rotated rectangle. The angle of the rectangle can be changed to suit the graphic direction

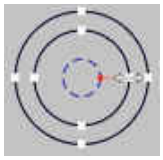
④ Draw circles and rings.

1) Specify the first point on the range of the circle to be generated, specify the second and third points in the same way, and a circle passing through these 3 points will be automatically generated.

2) The method is the same as above. After drawing the first circle, you can select 3 points outside or inside the circle to generate the second circle.







3.3 General processing tools

3.3.1 Image preprocessing

The use of preprocessing can greatly improve the condition changes caused by the condition of the workpiece or the external environment and ensure the stability of the image. Preprocessing is to perform related operations on the acquired image first, such as filtering out clutter, performing expansion operations to remove peripheral noise, and using corrosion to remove unstable pixels. It can be used according to specific needs.

The types of pretreatment are:

(1) Gray binarization

(2) Expansion

(3) Corrosion

(4) Median

(5) Mean

(6) Edge filtering 1

(7) Edge filtering 2

(8) Edge filtering 3

3.3.2 Image position offset correction (positioning tool)

When inspecting product objects, each time the operator places the inspected product, the position may be deviated. This problem can be solved if a very accurate carrier is used. But most of the time the position shift will cause false detection. Therefore, when adding other inspection tools, you need to add an image position offset correction tool, which can automatically search for the position of the feature point on the inspected product, and search for other inspection points based on the relative position. When there is a deviation in the position and angle of the detected product, the tool will give the deviation angle and displacement value, and other detection tools will use this deviation value to find their respective detection areas. It can effectively improve the accuracy of location search.

3.3.3 Pick point

① Select points automatically, click the point to be selected with the mouse, and the system will automatically match the most prominent point near the mouse.

② Select a point in the rectangle, drag a rectangle with the mouse, and the software will automatically search for the nearest point around it from the center point of the rectangle, and calculate the closest point that best meets the conditions according to the set edge sensitivity.

③ Select points by tangent line, and find the nearest suitable point along the set direction according to the selected rectangular area. The conditions that can be set are "edge sensitivity", "search direction-front and back" and "search direction-light and dark".

④ Edge sensitivity, adjust the sensitivity of edge recognition. The smaller the sensitivity, the easier it is to find edges with weak differences. With high sensitivity, edges with insignificant changes will be ignored and only edges with large color differences can be identified.

3.3.4 Choose a straight line

There are several types of line selection tools:

① Straight line rectangle, draw a close line along the target line position, the system will find the line with this line as the center line of the rectangle, and automatically find the target line according to the set edge sensitivity.

② Rotate the rectangle, use the mouse to draw a rectangular frame with direction, and then find a straight line according to the set direction and light and dark direction.

When looking for a straight line, the system searches for a straight line according to the sensitivity of the edge and adjusts the sensitivity of edge recognition. The smaller the sensitivity, the easier it is to find edges with weak differences. The higher the sensitivity, the edges with insignificant changes are ignored. Identify edges with large changes in color difference.

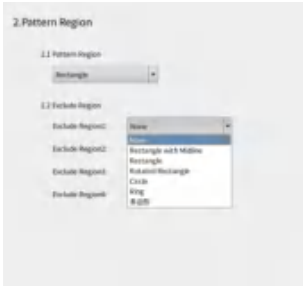
3.3.5 Select circle

The selected circles are all selected with a ring. First select the ring tool, and then point three points within the circle to be selected, as close as possible to the edge of the selected circle, the software will automatically generate the first circle, and then drag the mouse to automatically generate the second circle, as long as the target circle is in In the circle, the system will automatically search for the target circle according to the direction and the change of brightness. You can adjust the following parameters to select the best circle.

Adjust the parameters, the detection direction is "from inside to outside" or "from outside to inside", and the direction of light and darkness is from "from light to dark" or "from dark to light". As shown in the figure below, we choose to find the circle from the inside to the outside, from light to dark. If found, the system will draw a blue circle along that circle. If not found, please continue to adjust the parameters.

3.3.6 Select block area

In many selection tools, you can choose the masking tool to mask out areas that do not need to participate in the calculation, or mask out interference features, which can improve the detection speed and search accuracy.



There are several blocking tools:

- Straight rectangle
- Rectangle
- Rotate rectangle
- Circle
- Ring

Please refer to [Basic Operation Method] for the operation method of each shielding tool.

3.4 Adjust camera parameters:

（1）Video frame rate, the frame rate is 50 frames/sec and 60 frames/sec, adjust the frame rate to meet the needs of different displays.

（2）AE is automatic exposure adjustment. Click the camera to adjust to the best value according to the current brightness value. If you need to adjust manually, you can select the appropriate exposure value, and the unit is milliseconds. Under normal circumstances, setting to 2-20ms can meet the requirements

（3）AWB is the automatic white balance button. You can place a piece of white paper or other white objects under the current lens. Click this button and the system will automatically adjust to the appropriate color value. If a certain value is beating, you can change the brightness of the light source or place an object on it.

The color of the RGB channel can be adjusted as needed to change the color of the image and obtain a color balance suitable for highlighting features.

（4）Image optimization can change the quality of image effects.

Contrast: the smaller the value, the softer the image, the larger the value, the black and white image will be distinct and the visual effect will be clear.

HDR (Wide Dynamic): Suppress strong light and increase the brightness of darker parts.

SE (Sharpen): Enhance the brightness of the edge to make the image characteristics more obvious. But if it is too large, it will introduce larger noise.

Gain adjustment: used to adjust the overall color range of the image and enhance the brightness of the image. It can be saved after setting. If you don't want to adjust these parameter values at will, you can

press the lock button.

3.5 Motherboard login

Before the system is executed, a sample needs to be entered, which we call the mother board. In this way, the system can compare the defects of other products of the same model and find the inspection location based on this motherboard.

3 motherboards can be registered for each product. When you need to operate a certain motherboard after multiple motherboards are logged in, select its motherboard.

To delete unnecessary motherboards, you can select the name of the motherboard to be deleted and press the right mouse button, and the delete option will pop up.

【Display Master】: Switch to the master picture in the master setting window

【Display Video】: Switch to the real-time video screen in the master setting window

3.6 Calibration size

Calibrating the size is a way to calibrate the current lens magnification in advance when the measuring tool needs to be operated.

The specific operations are as follows:

(1) Place the calibration board under the lens, adjust the focus and magnification until you are satisfied.

(2) Click the "Re-Capture Screen" button, and the system will capture and freeze the currently adjusted image in the image display area.

(3) The user can select the "automatic circle finding" tool to select the circular target in the calibration plate. First select 3 points inside the circle (black part) to draw a green circle, and then drag the mouse outside the circle to draw a second green circle. The system will automatically find the outer edge of the black standard circle based on these two green circles ；

Note:

If you don't find the outer edge of the black standard garden correctly, you can choose the 4 options: 1. From inside to outside 2. From outside to inside 3. From light to dark 4. From dark to light 4 options to determine the current selection method. For example, if the standard circle is a black circle, if you choose from outside to inside first, then the corresponding one should also choose from light to dark. Because the direction is from outside to inside, we can see that the outside of the standard garden is a bright area and the inside is a darker area.

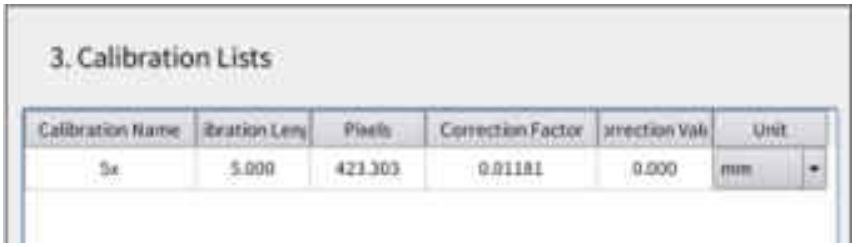
(4) After the outer edge of the standard circle can be found correctly, if the match is correct, then

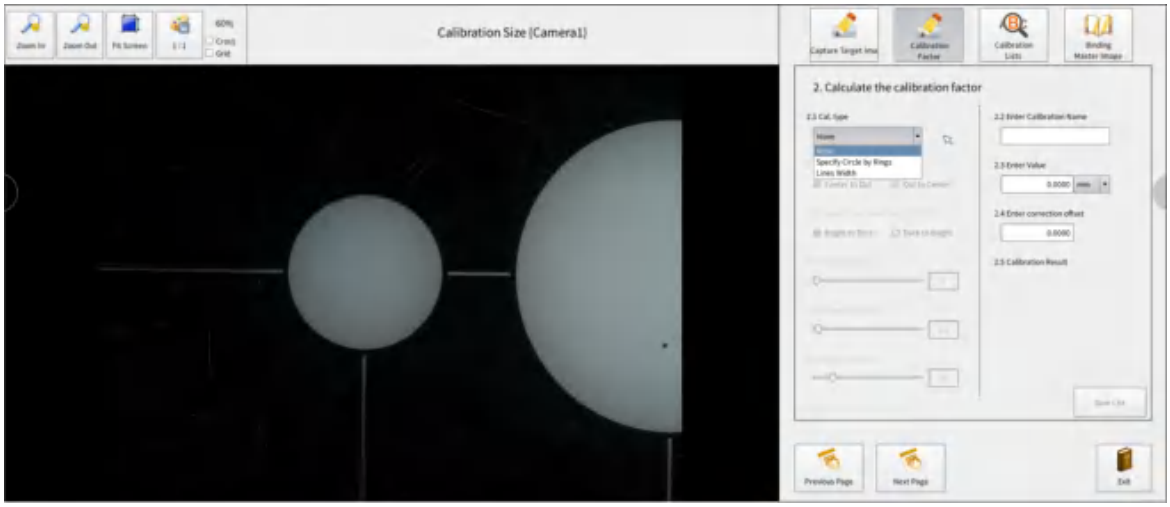
we can drill down the current lens magnification into the calibration name. Then enter the standard size of the circle (input diameter), and the calculated value will appear in the calibration result. Press "Save to List" to save the lens calibration value.

(5) "Bind Motherboard" can save the calibration lens and the detection motherboard correspondingly.

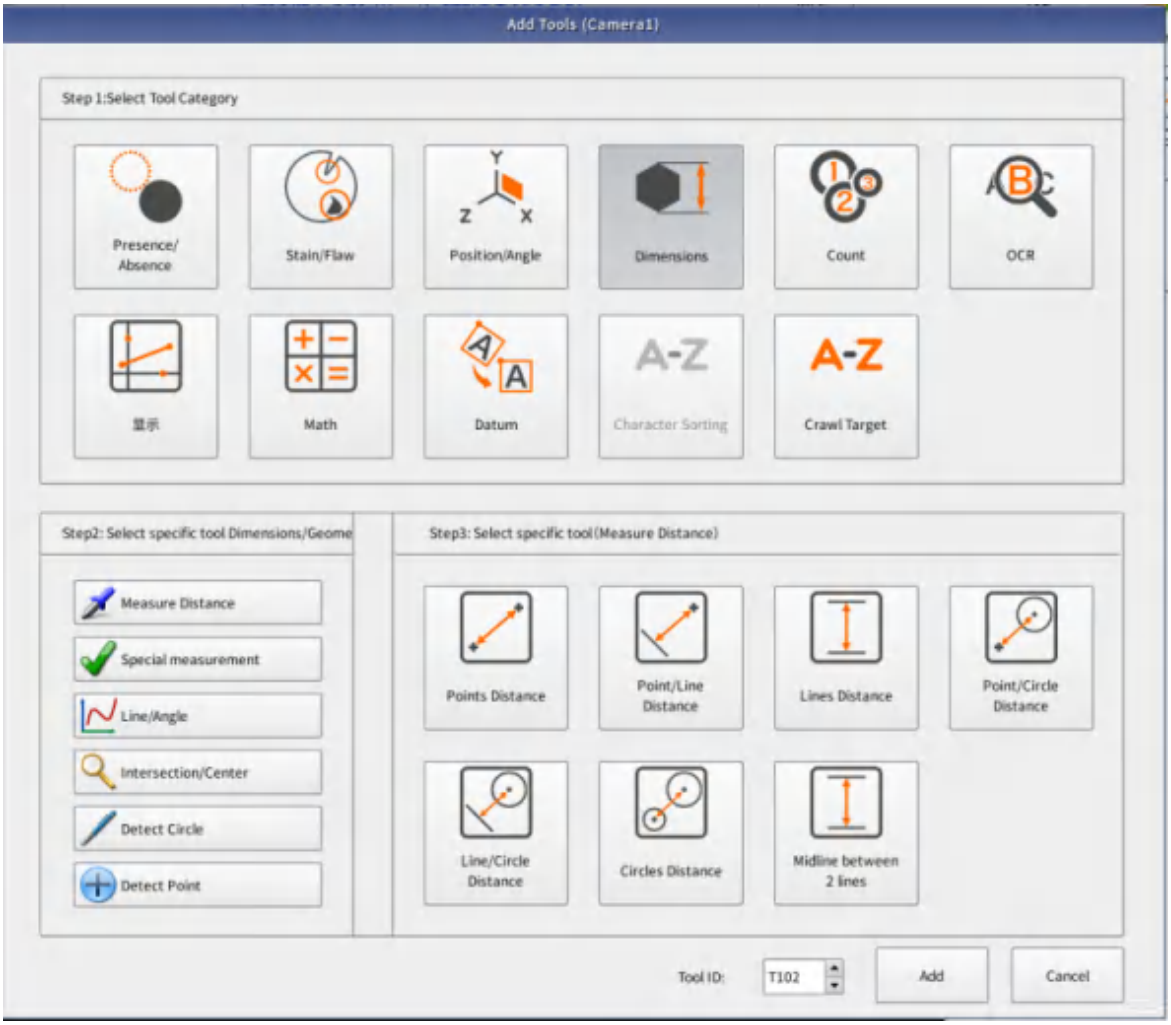
Note:

Be sure to save the motherboard correspondingly, otherwise the test result will be wrong. If the test result is wrong, you can repeat this step. After binding the motherboard, during detection, the current motherboard and calibration coefficients will appear in the "Settings column".





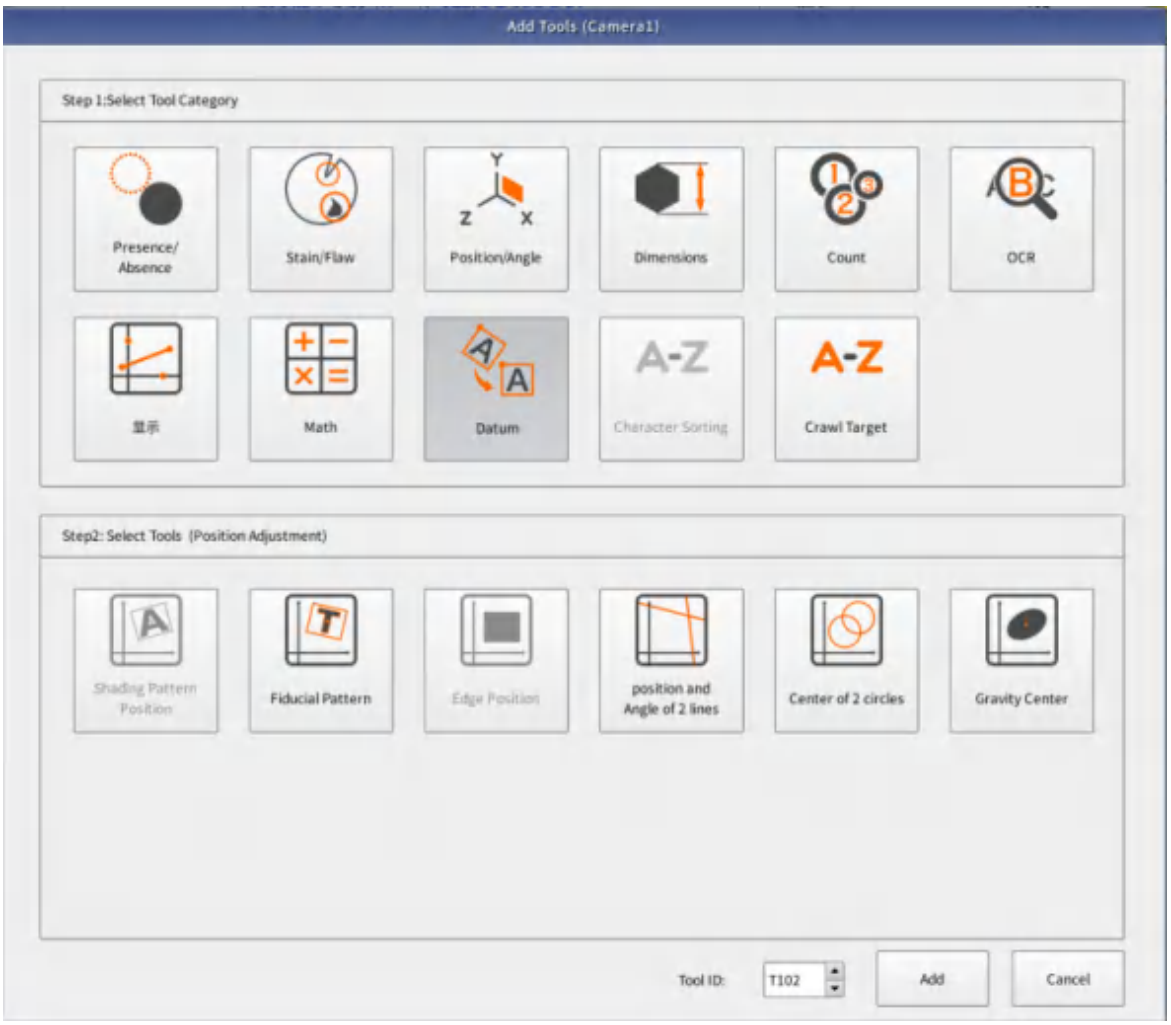
4. Detection Tool:



4.1 Position offset correction

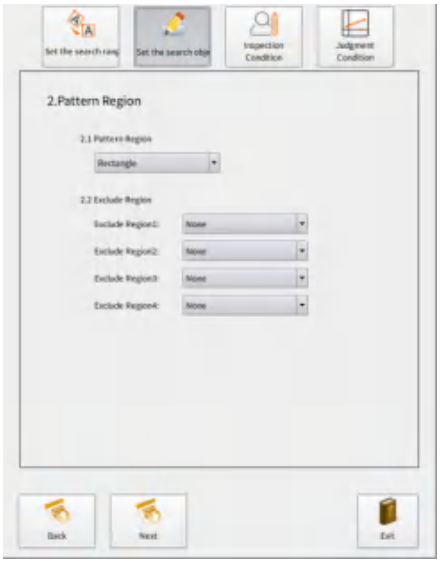
When inspecting product objects, when the inspection target workpiece is misaligned, the "position offset correction" tool can be used to correct the position of the workpiece. Through this correction processing, the movement of the workpiece can be tracked. This function is to automatically find and locate the product. Note: There are several elements needed to find a feature area that can be located in the product: 1). Uniqueness, 2). Directional, 3). The outline is clear and identifiable without too many irrelevant features.

This category can be set in three ways:



A. 

Contour positioning：



Positioning through the recognition of product appearance contours.
After selection, two boxes will appear in the image area. The white dashed box inside is the feature selection box. You can drag this box with the mouse or adjust the size of the box to select the desired target. The box should not be too large or it will reduce the efficiency of the system
The second blue box is the search range box, that is, you need to set a certain range for the searched target (of course you can also find it in full screen). The purpose is also to improve the efficiency of system operation. The smaller the range, the faster the system execution. It will be faster.
Set the search object shielding type-----You can shield unwanted search objects as needed to improve the accuracy and anti-interference of the search objects. There are 4 types to choose from.
Set detection conditions:

(1) Select "Perform preprocessing"

(2) Tilt angle ---- set the ± angle range when the search object is tilted. The smaller the angle range, the shorter the processing time. Limiting the angle at which products are placed is also to improve operating efficiency.

(3) Edge sensitivity ---- remove some edges that are not needed (we try to find the edge contour of the product as much as possible instead of reflecting certain features that are not needed or specific to the motherboard, which will cause the product Inaccurate positioning or unable to find the positioning target).

(4) Search accuracy

(5) The minimum similarity value is the degree of similarity between the set target and other products. If the similarity is too high, matching will be difficult, and if the similarity is too low, the matching accuracy will be inaccurate. It can be finally set through a certain number of product tests. Appropriate similarity value.B.

The position and angle of the straight line:
This tool locates the product by specifying the angle between two straight lines
(1) After selecting this tool, first set the first straight line. There are options such as straight rectangle, rectangle, and rotated rectangle.

(2) After selecting the line search tool, use the mouse to drag a rectangular box on the target area. Note that a green arrow will appear in the center of the box. The direction of this arrow is the direction of the line segment detected by the system. The direction of the line segment and the brightness can be corresponding to the detection direction. The system will automatically draw a blue line on the line segment. If it can't find it out correctly, it can be achieved by adjusting the "edge sensitivity".

(3) The second line segment proceeds as described above. After setting both lines, you can exit the setting.

C. Use circle center: This tool determines the positioning direction by calculating the distance between two circle centers.

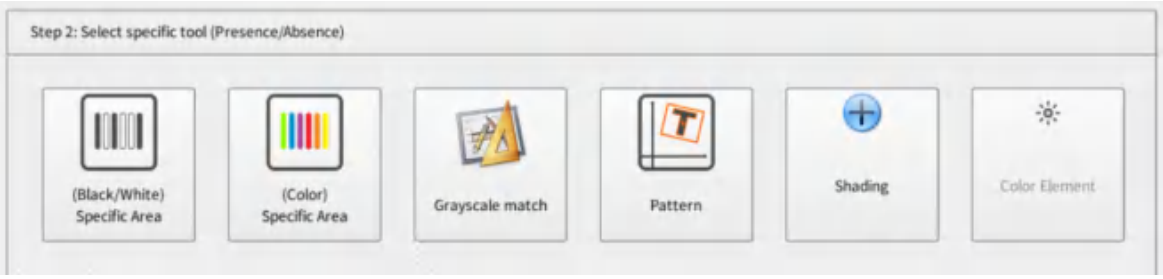
(1) Find the edge of the first circle through the ring

(2) After setting the second circle, the system will automatically connect the centers of the two circles.

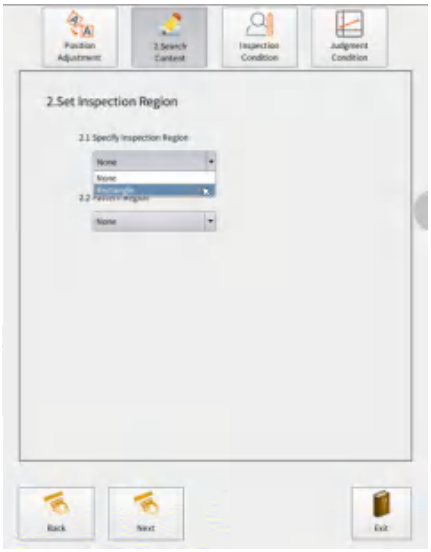
Note: The use of two circles to determine the direction is strict for the position of the product, and cannot exceed the range of the circle drawn.

4.2 Presence/discrimination

This function can be judged by gray matching, color area, black and white color area, etc.



4.2.1 Specifies the area of black and white



You can judge the presence or absence of the product by binarizing the color of the product to obtain a black or white area.

(1) Tool: If you have set the position offset tool before, you can select and associate here.

(2) Set the detection range---choose to use "rectangle" to drag the mouse to select the target area. Choose white or black to specify the judgment area, and then adjust the "binarization" slider to make the target area reach the ideal state.

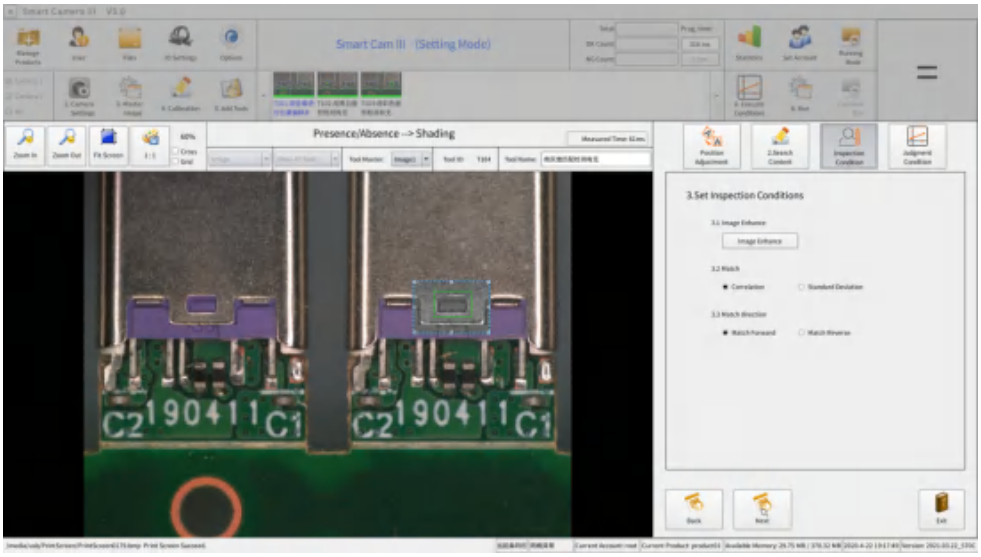
The original image Adjusting themap Ideal map

（3）"Set judgment conditions": The system will automatically give the standard value of the color area of the previously operated product, and the user can set the upper and lower limits of the area to distinguish whether the color product exists. Note: The upper limit and lower limit can generally be set at one and half of the standard degree. For example, if the standard value is 2000, then the lower limit can be set to 1000 and the upper limit can be set to 4000.

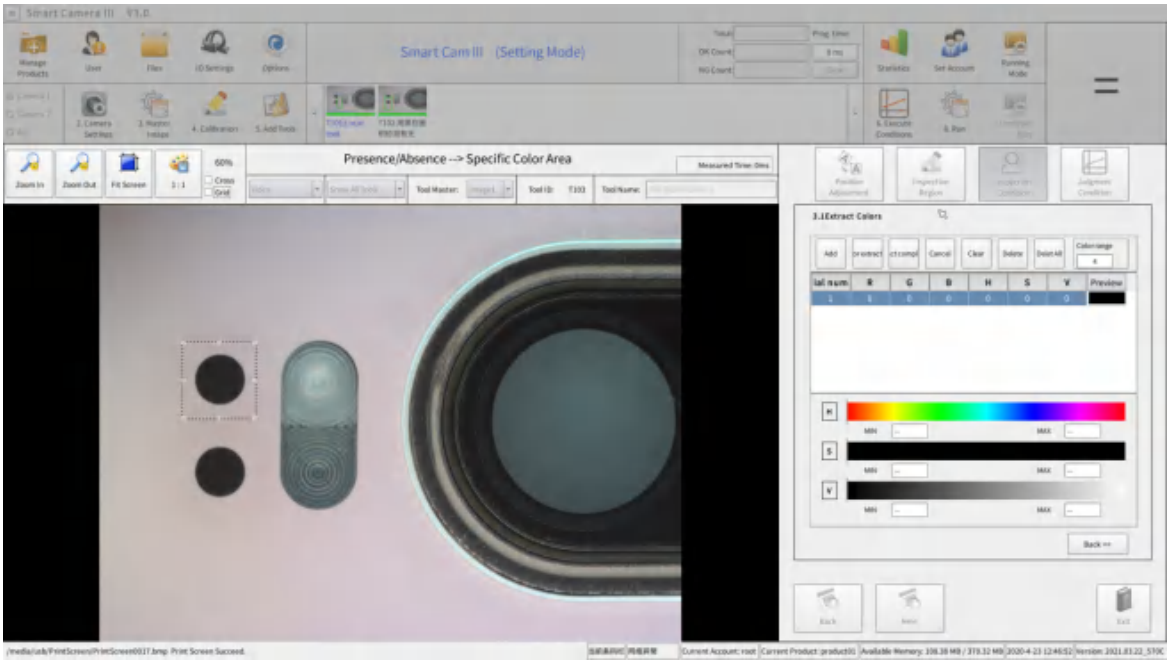
4.2.2 Area of the specified color (color)

It distinguishes whether the product exists by judging the color.

（1）First select the position offset tool: If the position offset tool has been set before, then here You can select and associate.



（2）To set the search range, you can use the rectangular box to select a target that is the product outline that needs to be judged, and use the mouse to drag the size and position of the inner box. The green box is the target box, and the blue box is the search scope box.

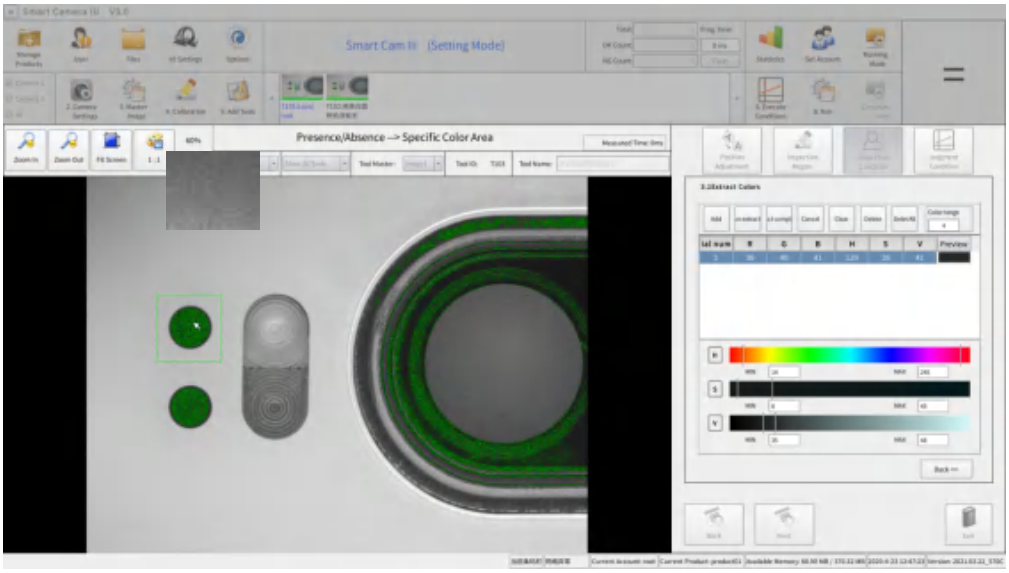


（3）Extract color---click "Add" and then click "Color Extraction", and then click on the target product with the mouse, the target will turn green, but there are many other color spots, and then use the mouse to pick the noise one by one The spots will turn green, and the target will gradually become pure green as the number of clicks increases.

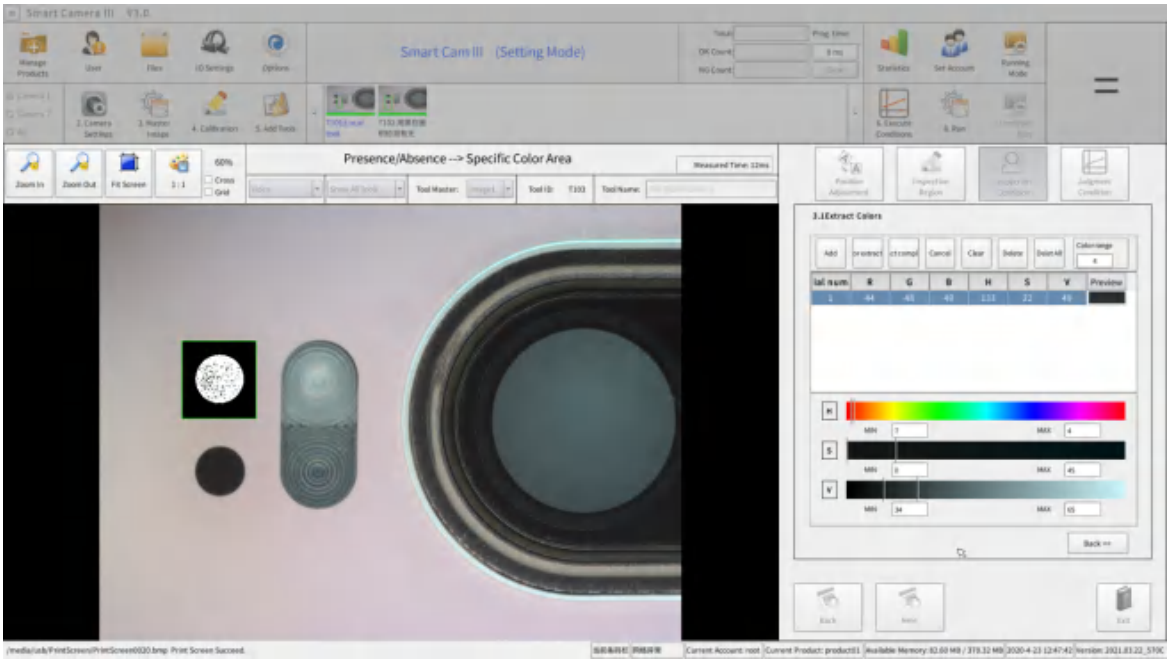

The original image


Drawing


Ideal map

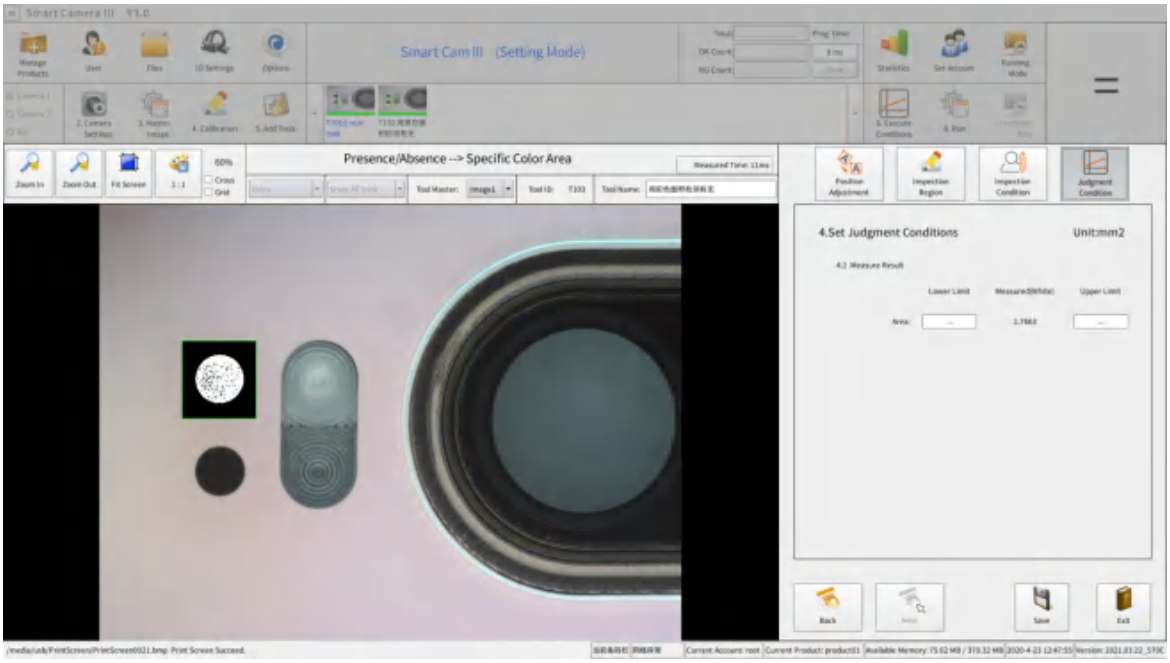


Click "Extract End" after completion to complete this operation.



(4) If you are not satisfied with the above operation, you can click the "Delete" button and restart the above operation until you are satisfied.

(5) "Set judgment conditions": The system will automatically give the standard value of the color area of the previously operated product, and the user can set the upper and lower limits of the area to distinguish whether the color product exists. Note: The upper limit and lower limit can generally be set at one and half of the standard degree. For example, if the standard value is 2000, then the lower limit can be set to 1000 and the upper limit can be set to 4000.

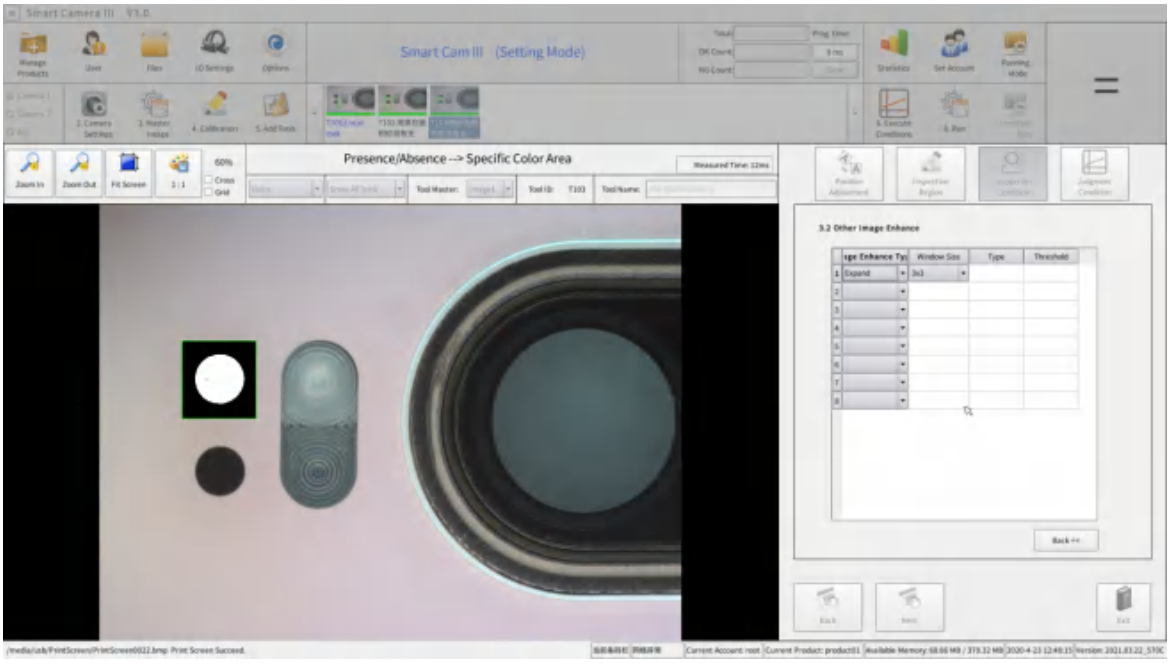


4.2.3 Grayscale matching

Grayscale matching is to judge whether the target exists according to the comparison of the contour of the target.

(1) First select the position offset tool: If the position offset tool has been set before, you can select and associate here.

(2) Set the search range, you can use the rectangular box to select a target, that is, the product outline that needs to be judged, and use the mouse to drag the size and position of the inner box. The green box is the target box and the blue box is the search range box. Use skill: Need to operate that frame, you can click with the mouse near the corresponding frame line, and then the system will automatically select the frame as the target frame, you can easily operate the frame with the mouse.



（3）Setting conditions: After setting the product target, you can set relevant parameters for this target.

"Matching option"-Whether the correlation and standardization affect the light source, the correlation has nothing to do with the brightness of the light source, and the standardization is closely related to the brightness.

"Matching direction"-forward matching and the existence of the target is ok, anyway, it is NG. For reverse matching, the existence of the target is NG, and the absence of the target is OK.

"Judgment Condition"—You can set the similarity of target matching. The similarity needs to be obtained after testing multiple products. At the beginning, you can set a temporary similarity value. After multiple product comparison tests, the minimum similarity value shall prevail .

4.2.4 Contour

Positioning through the recognition of product appearance contours.

(1) First select the position offset tool: if the position offset tool has been set before, you can select and associate here.

(2) Set the search range, you can use the rectangular box to select a target that is the product outline that needs to be judged, and use the mouse to drag the size and position of the inner box. The green box is the target box, and the blue box is the search scope box.

Set detection conditions:

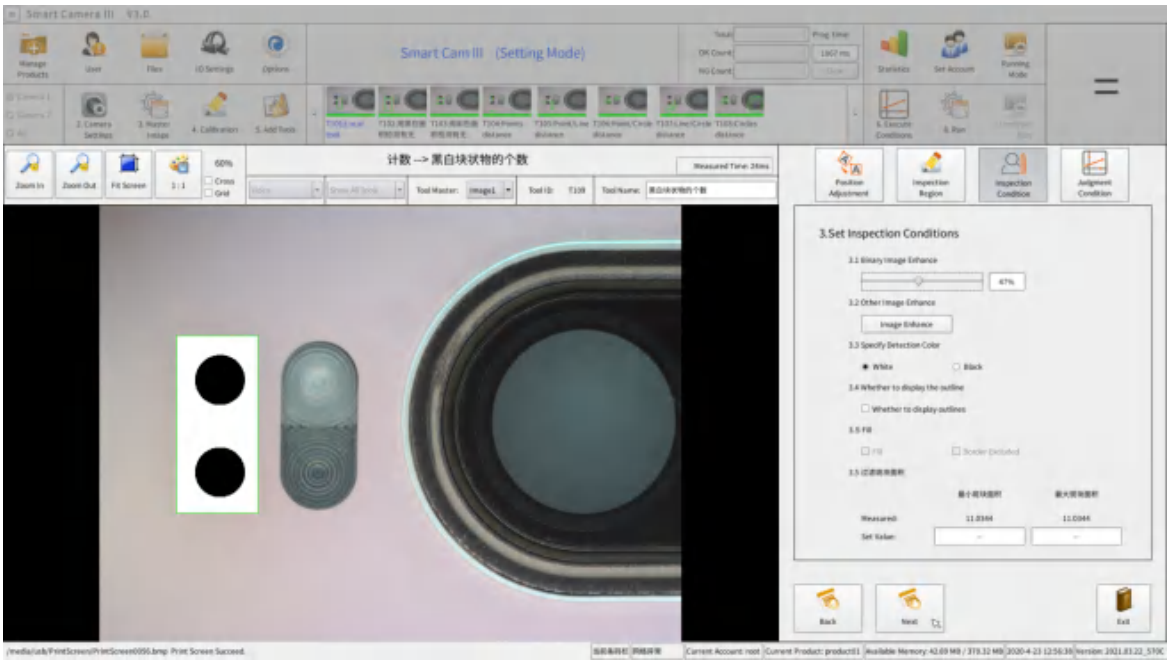
①Select "Perform pretreatment"

②Tilt angle ---- set the ± angle range when the search object is tilted. The smaller the angle range, the shorter the processing time. Limiting the angle at which products are placed is also to improve operating efficiency.

③Edge sensitivity----remove some unneeded edges (we try to find the edge contour of the product as much as possible instead of reflecting some unneeded or motherboard-specific features, which will cause product positioning Accurate or unable to find the positioning target).

④Search accuracy

⑤The minimum similarity value is the similarity between the target and other products. If the similarity is too high, matching will be difficult, and if the similarity is too low, the matching accuracy will be inaccurate. A certain number of product tests can finally set a suitable Similarity value.

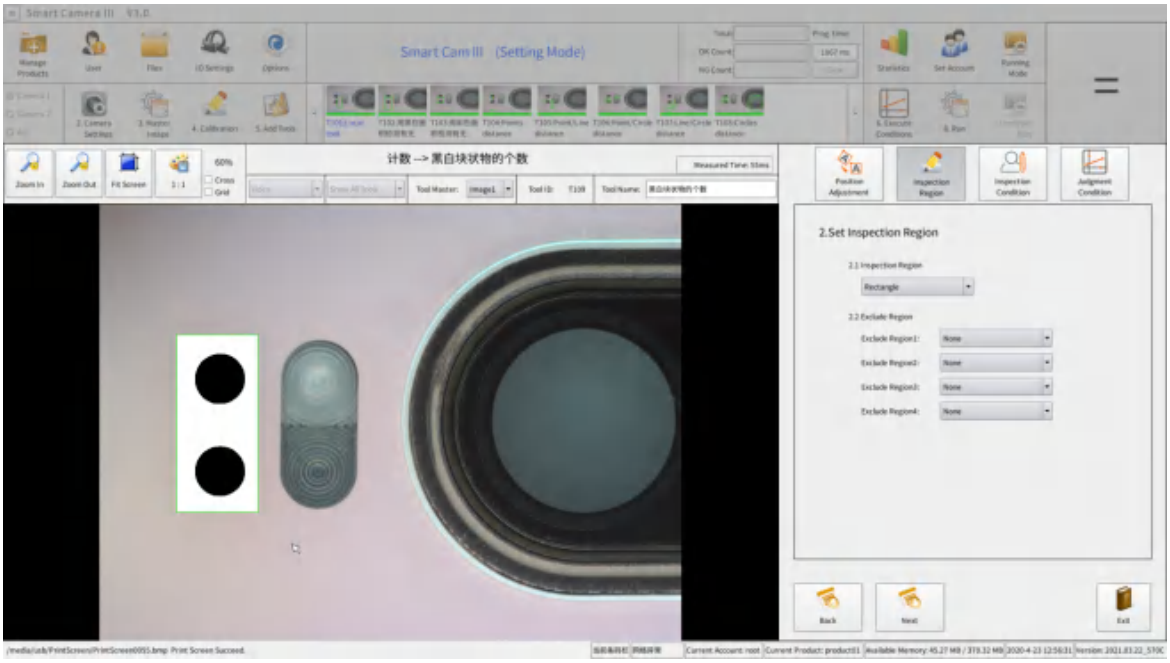


4.2.5 Shade

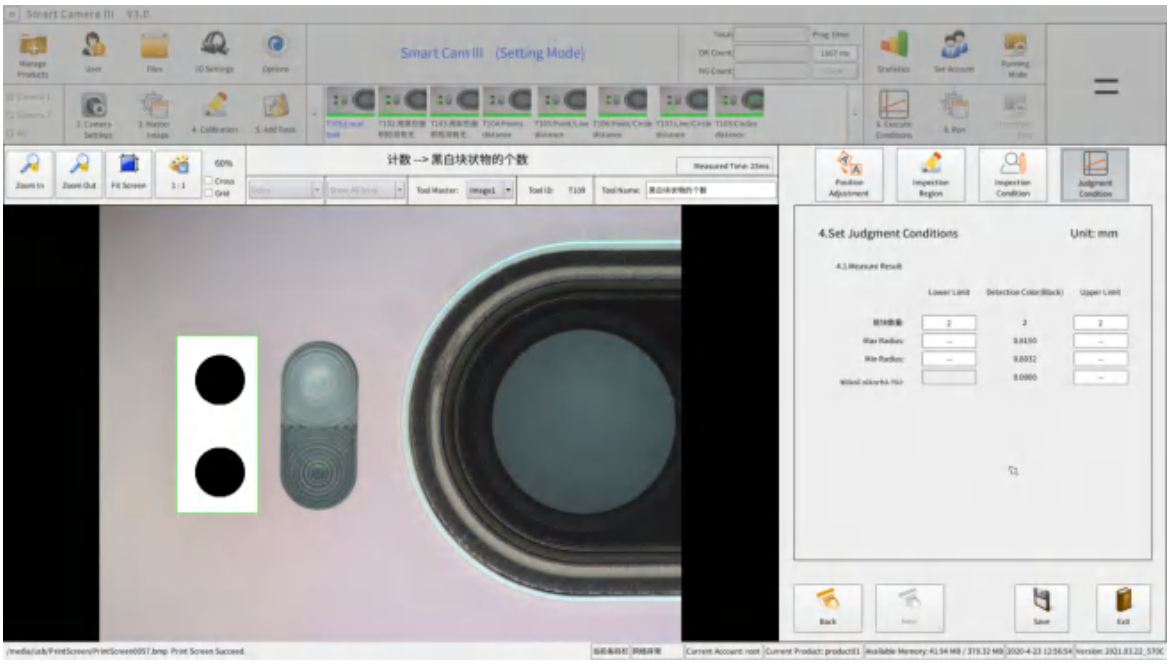
Determine whether it meets the requirements based on the color intensity of the test trademark.

(1) First select the position offset tool: If the position offset tool has been set before, you can select and associate here.

(2) Set the search range, you can use the rectangular box to select a target, that is, the product outline that needs to be judged, and use the mouse to drag the size and position of the inner box to select the object to be detected. Set the gray scale binarization.



（3）Setting conditions: After setting the product target, you can set relevant parameters for this target.



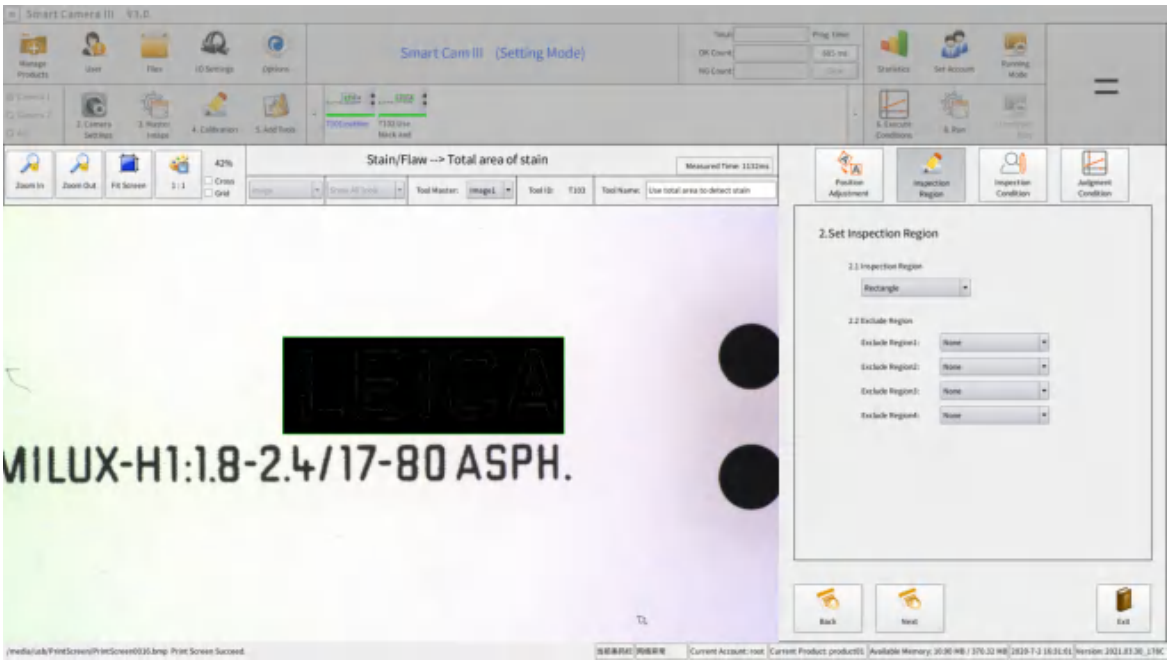
4.3 Blemishes:

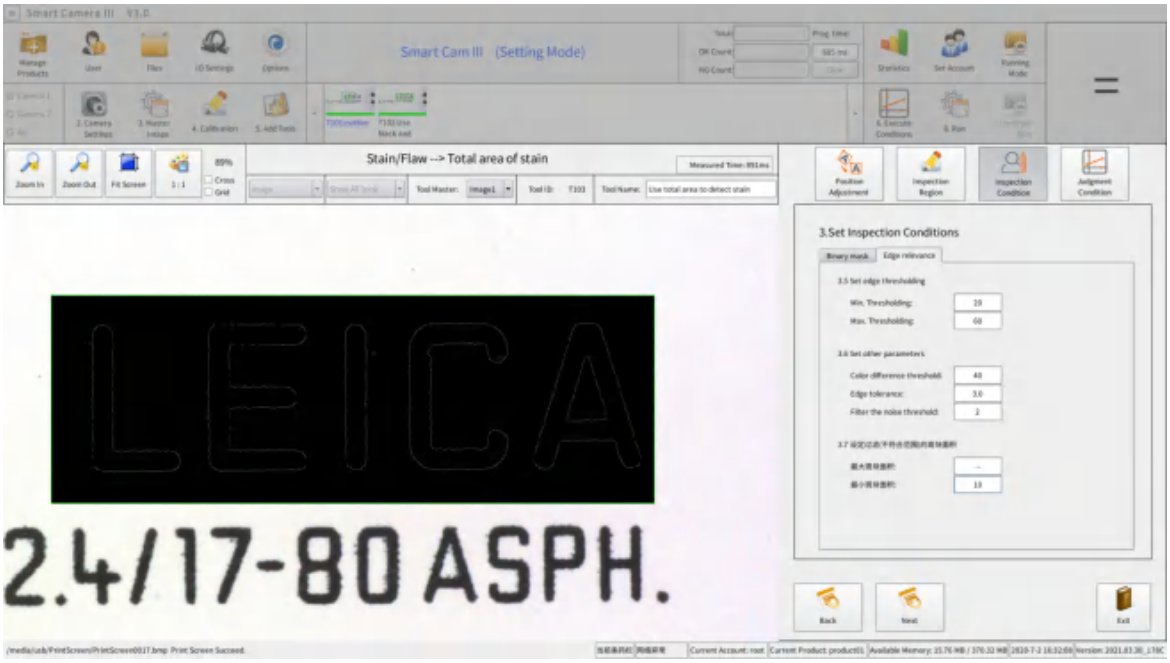
Check whether the product is defective or damaged

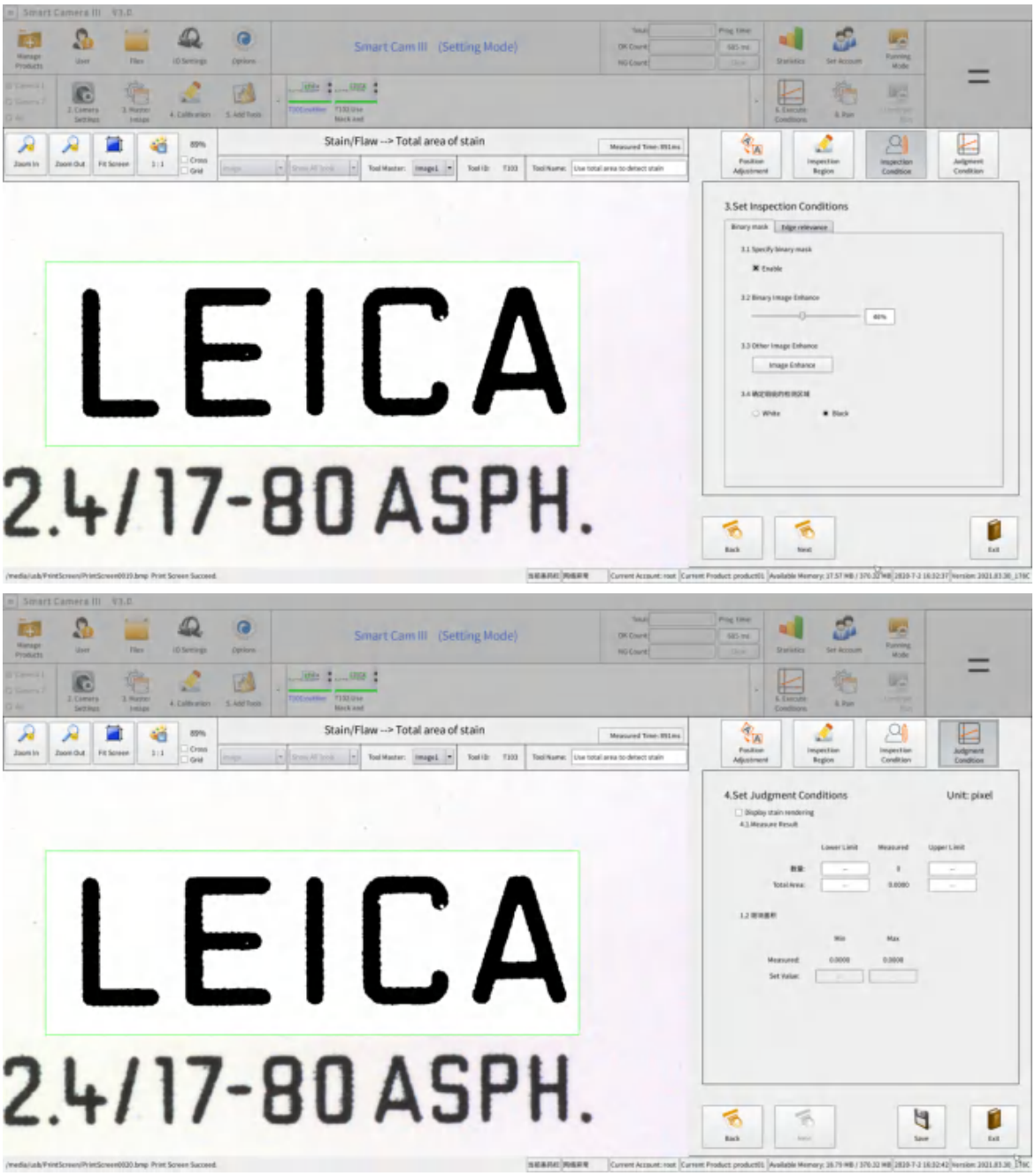
(1) First select the position offset tool: If the position offset tool has been set before, you can select and associate here.

(2) Set the search range: you can use the rectangular box to select a target that is the product outline that needs to be judged, and use the mouse to drag the size and position of the inner box. The green box is the wipe target box, and the blue box is the search range box.

(3) Set detection conditions: edge-related values, set parameters, filter area, and binarization mask.


Smart Cam III (Setting Mode)
Stain/Flaw --> Total area of stain
2.Set Inspection Region
MILUX-H1:1.8-2.4/17-80 ASPH.


Smart Cam III (Setting Mode)
Stain/Flaw --> Total area of stain
3.Set Inspection Conditions
LEICA
2.4/17-80 ASPH.



（4）Set the judgment conditions: the upper and lower limits of the total area of detection, the upper and lower limits of the number of defective blocks.

4.4 Geometric measurement

4.4.1 Point spacing measurement

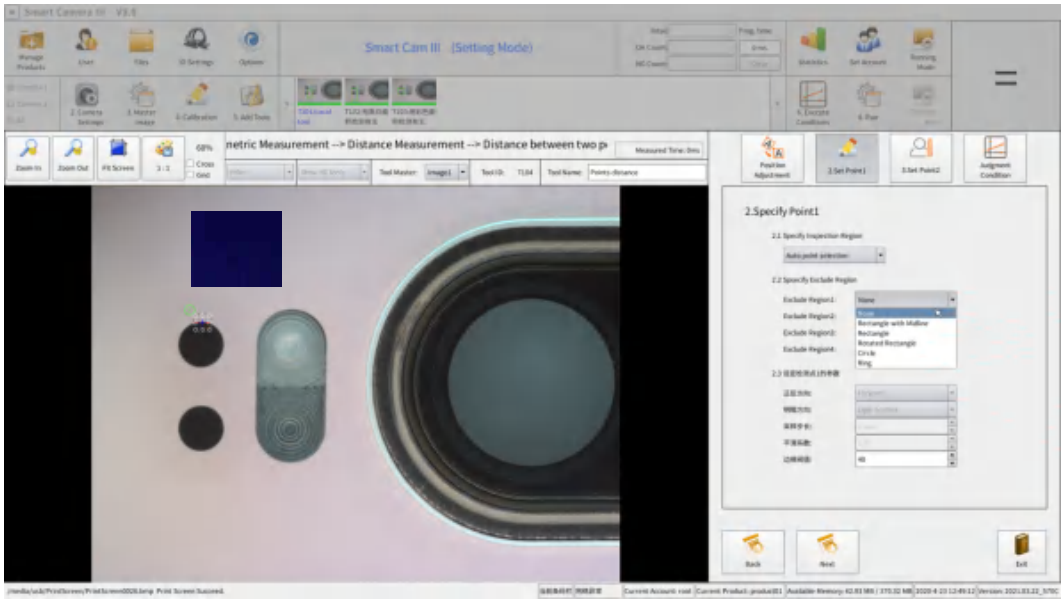
Measuring the distance between points

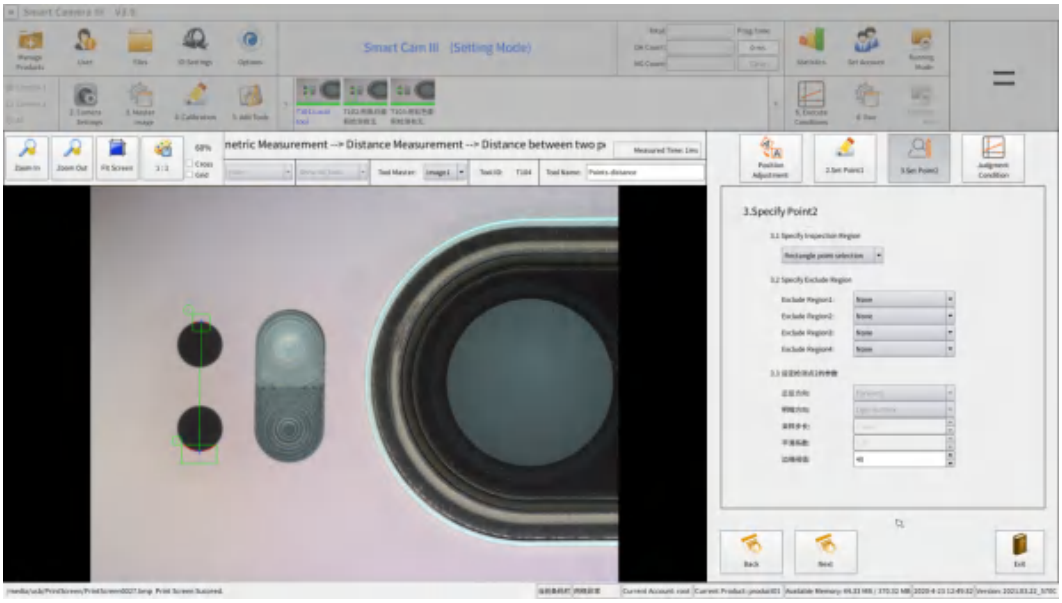
①Select the position offset tool first: If the position offset tool has been set before, you can select and associate here.

②To select points, you can select points through 4 methods (select 2 points).

Note: The fourth method is to share items, its function is to inherit the points (lines) recorded in the previous drawing. Select the shared item, the system will automatically draw the point (line) used in the previous drawing for you, and then manually select a desired point (line).

③Select the upper and lower limits and specify the range of error.





4.4.2 Distance between point and line

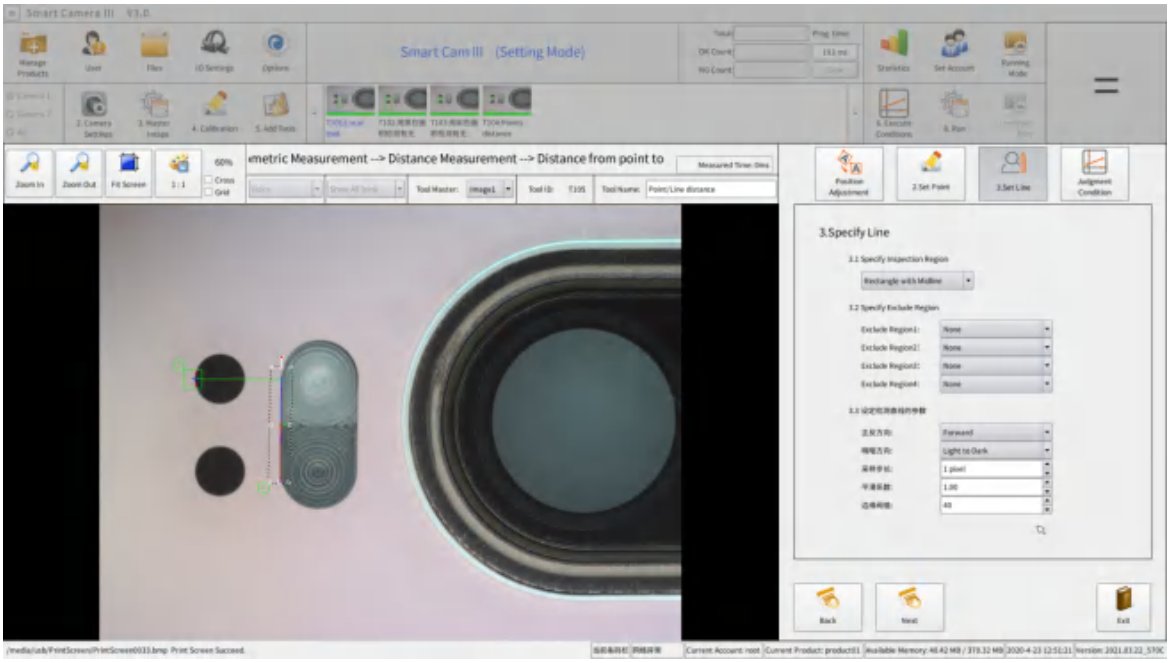
Distance between measuring point and straight line

①Select the position offset tool first: If the position offset tool has been set before, you can select and associate here.

②To select points, there are 4 methods to select points.

③Select the range of the straight line and determine the range of the straight line.

④ The upper and lower limits of the fixed distance and the allowable error range.



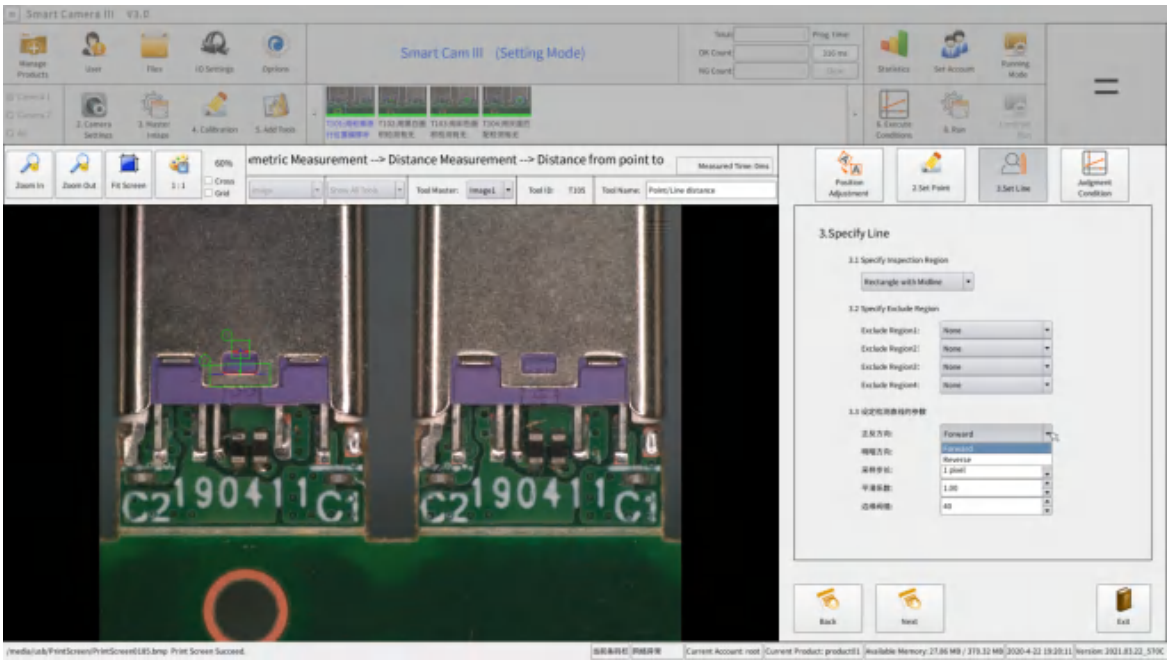
4.4.3 Distance between two straight lines

Line-to-line position detection

①Select the position offset tool first: If the position offset tool has been set before, you can select and associate here.

②Select the range of the straight line and determine the range of the two straight lines.

③The upper and lower limits of the fixed distance and the allowable error range.



4.4.4 Distance between point and circle

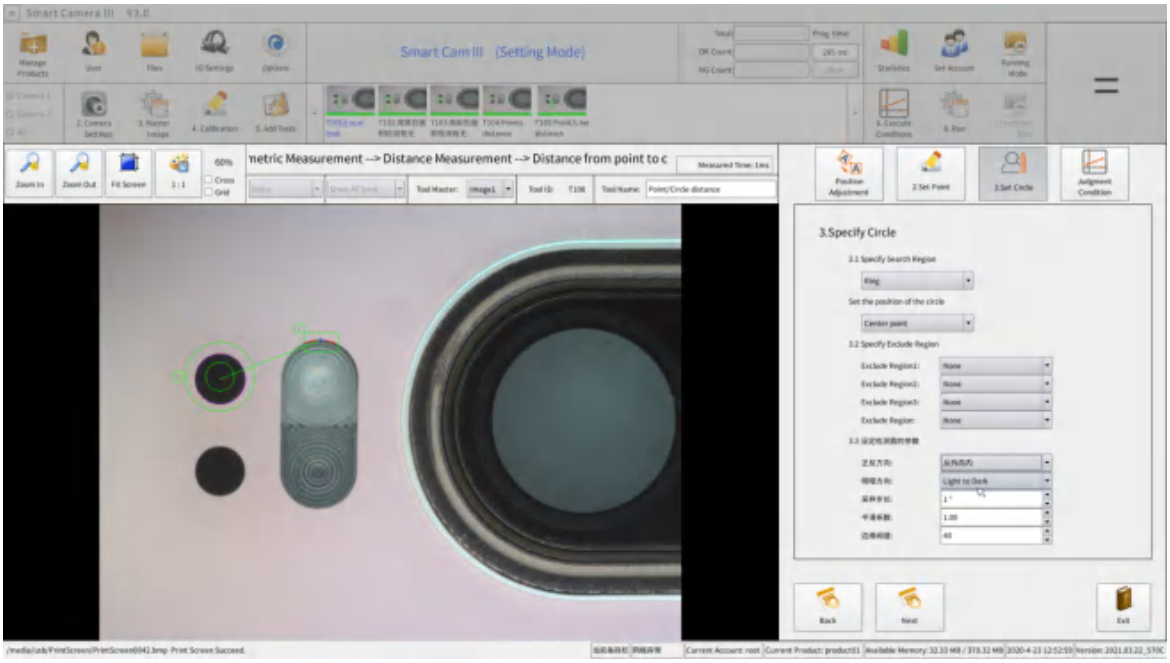
Distance from a point to the circle

①Select the position offset tool first: If the position offset tool has been set before, you can select and associate here.

②To select points, there are 4 methods to select points.

③Set the range of the circle and the position of the point.

④ The upper and lower limits and error range of the fixed distance.



4.4.5 Distance between line and circle

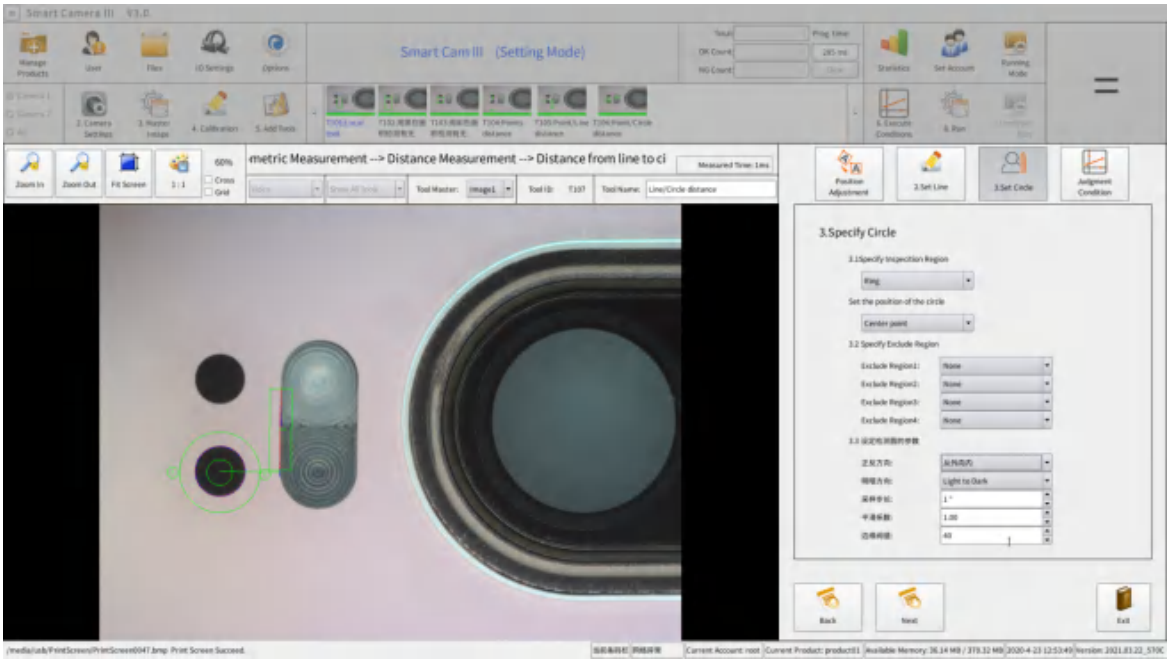
The distance from the straight line to the point on the circle

①Select the position offset tool first: If the position offset tool has been set before, you can select and associate here.

②Select the range of the straight line and determine the range of the straight line.

③Set the range of the circle and the position of the point.

④ The upper and lower limits and error range of the fixed distance.



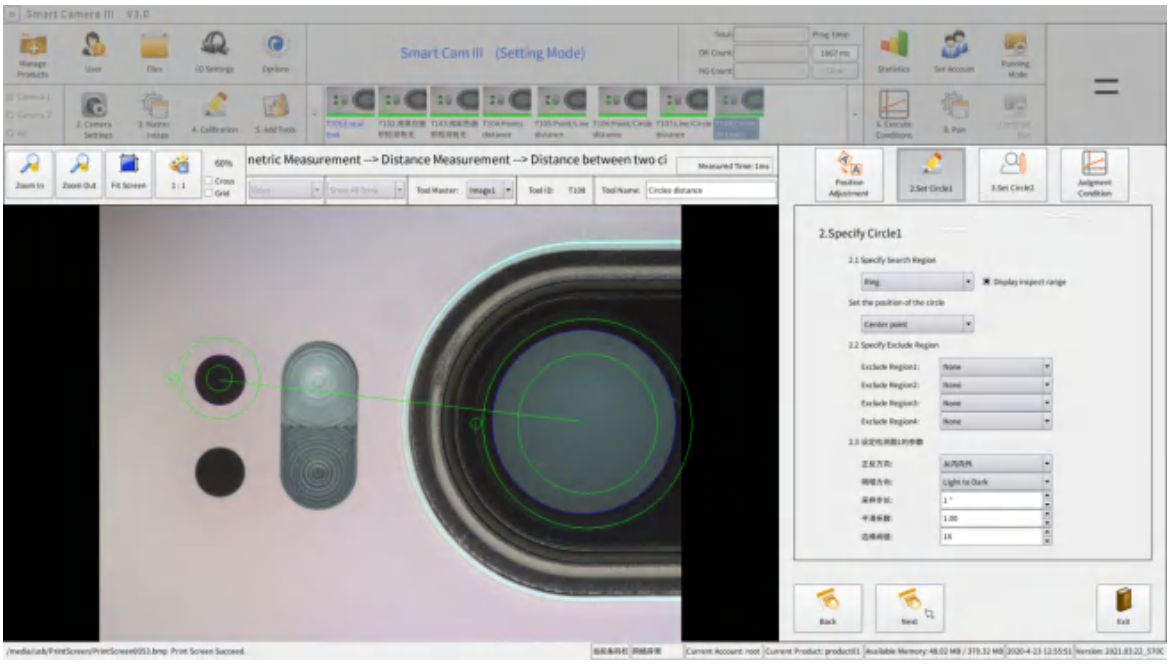
4.4.6 Distance between two circles

Measure the distance between the circle and the circle

①Select the position offset tool first: If the position offset tool has been set before, you can select and associate here.

②Set the range and position of the two circles, and determine the positions of the two circles.

③The upper and lower limits of the distance and the error range.



4.5Count

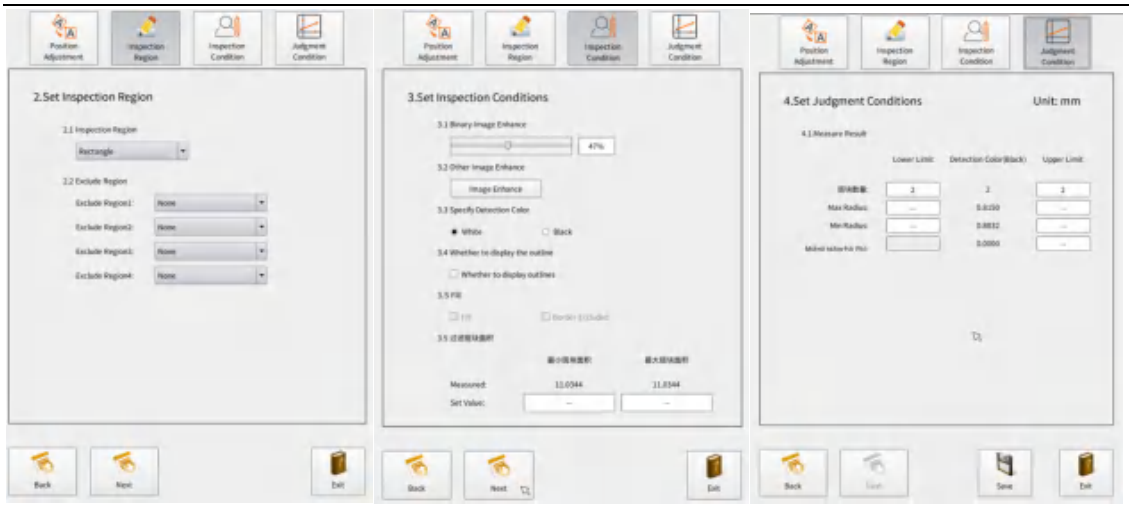
Lump counting is mainly used to automatically calculate the quantity of specific smaller products, suitable for products with similar shapes and sizes. Objects can be placed at will, but do not stick or overlap each other.

The first step is to add a block counting tool.

The second step is to set the detection range, and generally detect the entire screen. But the larger the selection range, the longer the time.

The third step is to set the detection conditions and adjust the binarization pre-processing value so that the detected object can be clearly distinguished from the background. Some other pre-processing functions can also be added to meet the processing needs.

The fourth step is to set the judgment conditions. According to the size of the detected object, set a range, and count the number of those that meet this range.



4.6 Identify

Usually used to identify QR codes and barcodes.

(1) First select the position offset tool: If the position offset tool has been set before, you can select and associate here.

(2) Set the search range, you can use the rectangular box to select a target, that is, the product outline that needs to be judged, and use the mouse to drag the size and position of the inner box. The green box is the target box and the blue box is the search range box.

(3) Selection of barcode type and number of scanning lines.

(4) Set the judgment conditions, select the barcode to be detected, and the length of the barcode to be detected.

4.7 Sort

Use color features to sort objects. This function applies online order sorting, product color identification sorting, etc. According to the pre-set order rules, if it matches, the system will display OK, if it does not match, it will be NG.

The first step is to add a color sorting tool.

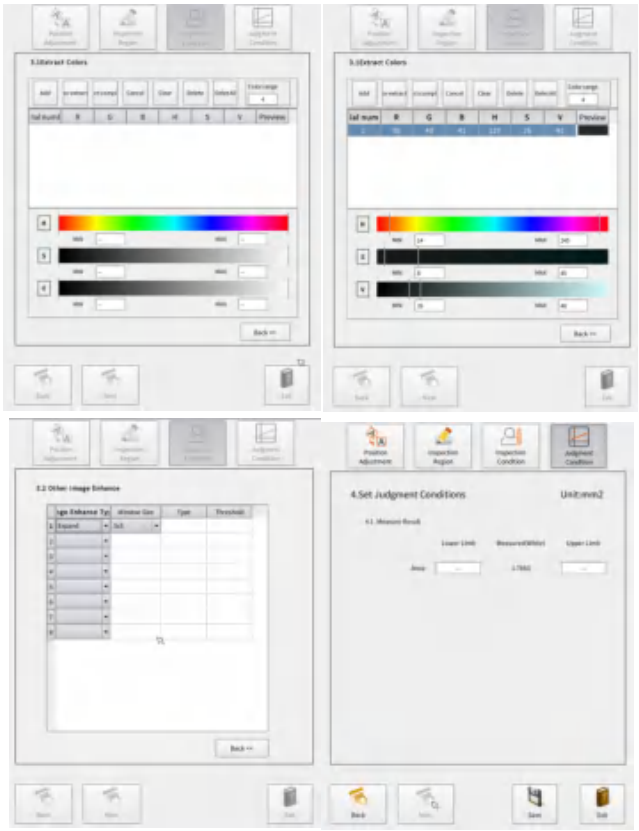
The second step is to set the search area, usually a rectangle. You can set 4 shielding areas.

The third step is color extraction. The system can extract multiple colors. First select the color range. The default is 4, which means that 4 different colors can be extracted. Under normal circumstances, one color can meet the needs. Click [Add] to add a color, and then click [Color Extraction] to extract the color that needs to be selected on the screen until the color you want to select becomes the green part. If the color extraction is not satisfactory, you can click [Clear] to extract again. After the extraction is complete, click [Extraction End] to proceed to the following steps.

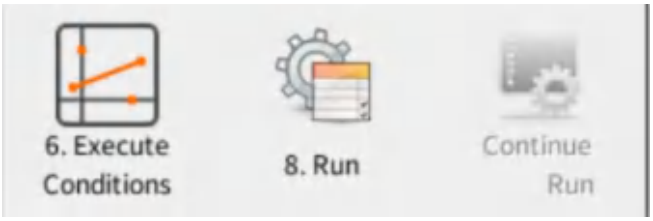
In the fourth step, after the color extraction is completed, you can choose to do some necessary preprocessing. This item is generally not required.

The fifth step, auxiliary conditions, allow customers to set the width of the line, the area to be checked, and the correlation with the color. The higher the color correlation, the higher the color matching degree, and the lower the color range, the larger the color range.

The sixth step is to set the judgment conditions.



5. Perform detection and detection condition setting



5.1 Perform testing

After setting up various detection tools, we need to let the program run the detection tools to start the detection. There are currently three ways to start operation.

① Manual inspection (execution inspection)

② Continuous detection (continuous detection)

③ External trigger detection

These three detection methods can be adapted to various needs according to the use environment and requirements.

1. Perform detection is to perform a detection every time the left mouse button (external trigger) is pressed, and an OK or NG prompt is given at the same time.

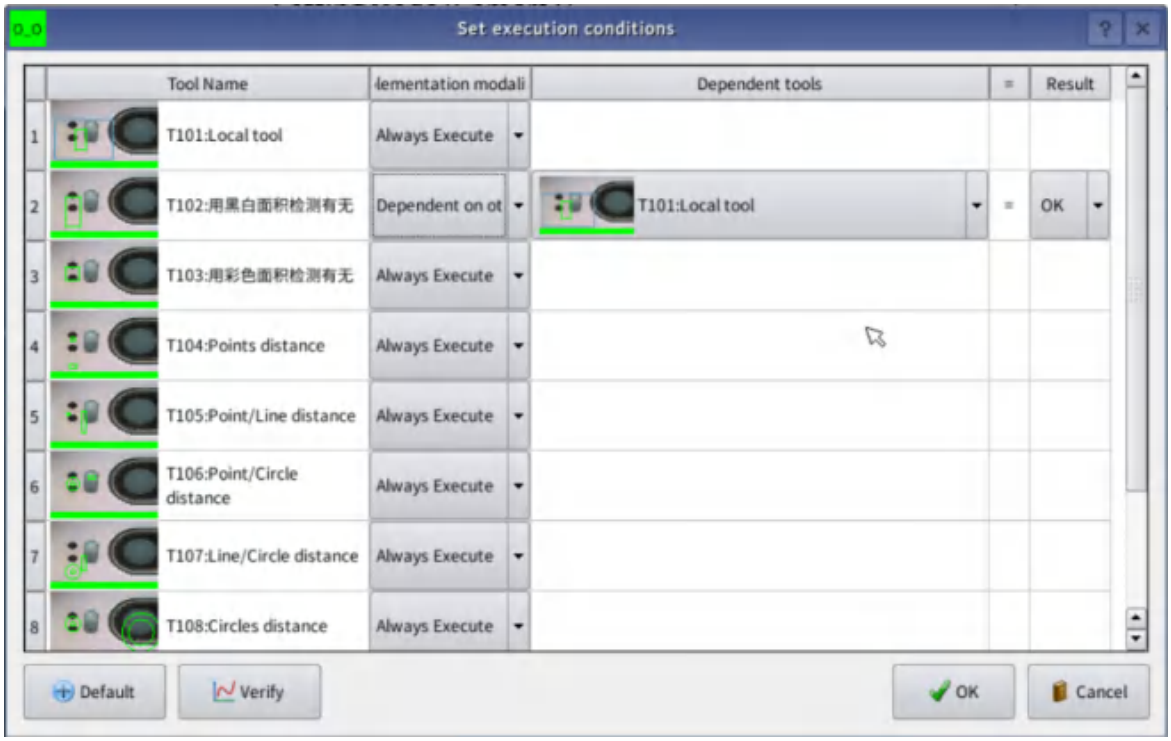
2. Continuous detection means that the next detection will be performed automatically after a delay of 500ms after each detection.

3. In the execution condition setting, the execution status of each tool can be changed separately. The purpose is to easily switch the detection content and use it in one detection setting.

Always execute: Make the tool always execute, simply check the NG/OK of a single tool

Never execute: keep the tool in a non-executed state, and do not run the tool during detection.

Depend on other tools: Make the tool depend on the previous tool, and the running status depends on the OK/NG of the previous tool. After the previous tool is NG, the tool will be checked automatically. (Mostly used for both front and back detection)

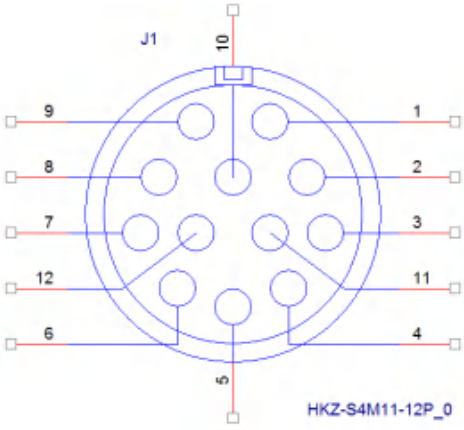


5.2 I/O Set up

IO Interface definition

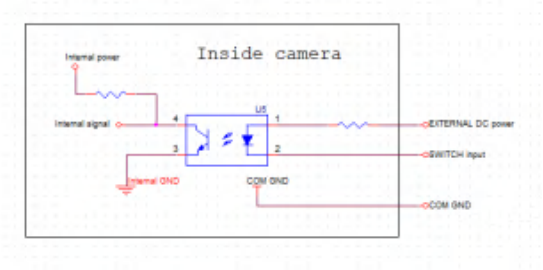
PIN	Signal	Color	I/O	Define
1	COM1+	Blue	POWER	DC+
2	COM1-	Brown	POWER	GND
3	232RX	Bright green	Input	RS232 TX
4	232TX	Red	Output	RS232 RX
5	IN3	Pink	Input	IO IN3

6	IN2	White	Input	IO IN2
7	OUT1	Orange	Output	Out1
8	OUT2	Purple	Output	Out2
9	OUT3	Yellow	Output	Out3
10	COM2+	Blackish green	POWER	DC+
11	COM2-	Black	POWER	GND
12	IN1	Gray	Input	IO IN1

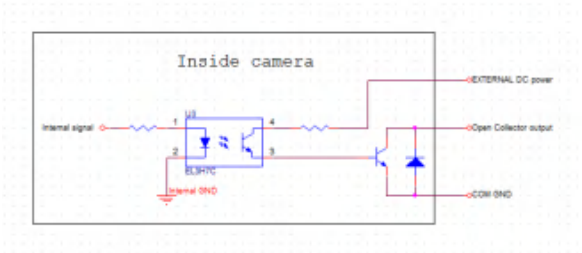


Power input range (5-24V)

Camera optocoupler input is connected to NPN output device or switch button.



The camera output type is NPN open collector.



This model has 3 inputs and 3 outputs, which can realize light, sound alarm and PLC, photoelectric switch, button, foot pedal and other input control through simple and convenient settings.

5.2.1 Output settings

① There are three PIN pins for output settings, corresponding to the 7, 8, and 9 ports of the IP interface. Port 11 is a public ground, and all ground wires are connected to port 11.

② If you need to output a signal, please select the corresponding PIN port pulse type as "Pulse Time" or "Continuous Level". The pulse signal has a time setting. Set the length of time according to your own needs. The unit is milliseconds (ms). When the level is sustained, the given signal will be kept until the next time it is detected.

③ In addition, the delay time and the number of delays can be set, and the pulse signal will be triggered after a certain delay after the detection is completed. It is set according to the requirements of the specific external equipment. The purpose is to keep the detection result synchronized with the time of trigger control.

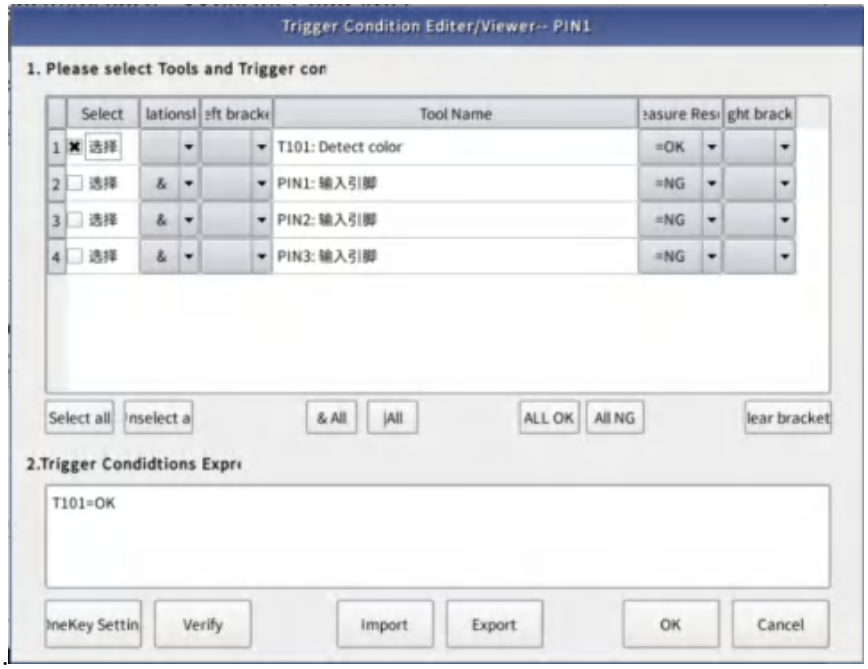
5.2.2 Output trigger conditions

The trigger condition refers to the logic judgment rule triggered after the system detects. The 3 PIN pins can individually set trigger conditions.

The trigger condition is triggered according to the judgment result of each tool item. It can be set to trigger when a certain detection tool is OK, or it can be set to trigger when it is NG, or it can be set to trigger when all NG or all OK is triggered. You can also set some tools to trigger when the test result is OK or NG.

According to the following selection types, select the detection tool to participate in the calculation, and then select the calculation operator "and &&" or "or ||", the system will automatically generate the conditional expression, and then save the result.

If you are not familiar with the setting rules, you can select [One-key setting], the system will automatically set all the detection tools PIN1 port to be all OK trigger, PIN2 port to trigger if there is an NG.



5.2.3 Input settings

Input settings can be photoelectric switch, wire controller, infrared photosensitive detector, PLC, etc. Trigger the system to perform detection by receiving external signals.

Trigger type:

□ **High level trigger**

□ **Low level trigger**

□ **Rising edge trigger**

□ **Falling edge trigger**

□ **Level trigger**

□ **Edge trigger**

□ **invalid**

The default system setting is that PIN1 and PIN2 are low level trigger, and PIN3 is invalid. The specific situation is set according to the external device interface specifications.

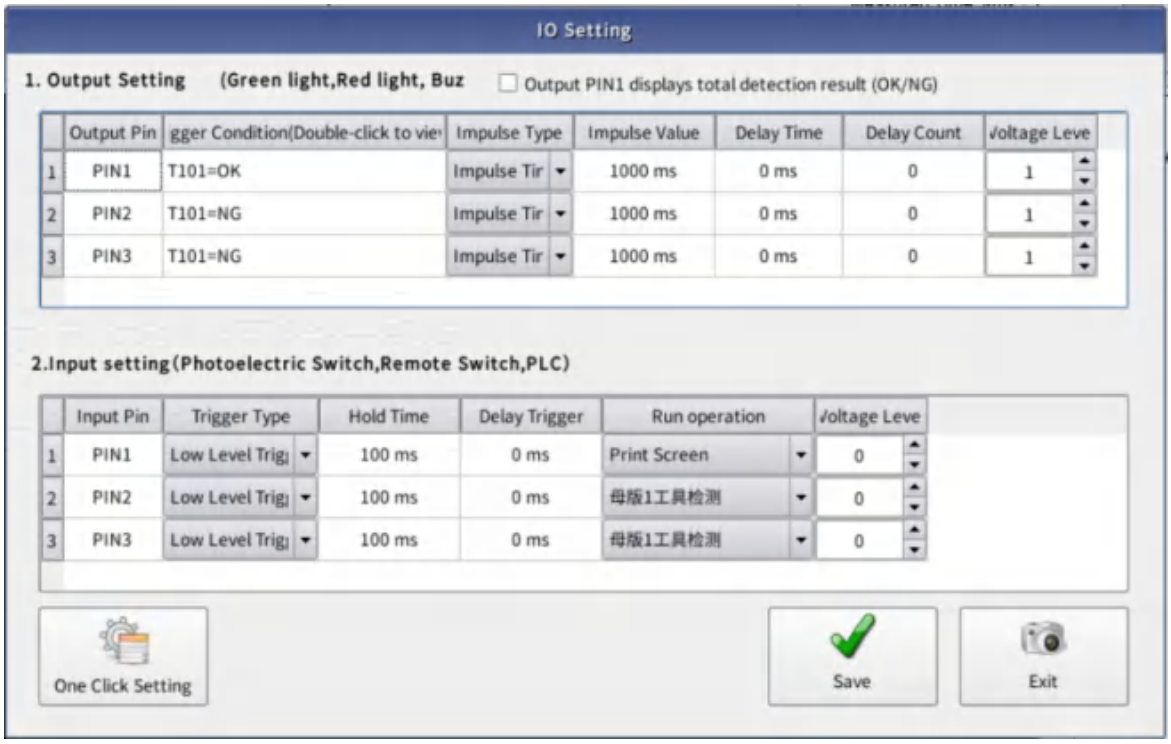
The system provides a one-key setting function, which can automatically set to commonly used modes. It can basically meet most of the needs.

This model has 3 inputs and 3 outputs, which can realize light, sound alarm and PLC, photoelectric switch, button, foot pedal and other input control through simple and convenient settings.

Trigger condition: PIN1 is usually set to green light, PIN2 is usually set to red light, and PIN3 is usually alarm sound. By setting the trigger conditions, you can set whether the traffic lights are on or off and whether the alarm is alarmed.

Output setting: Usually we set, when tools A&B&C..., and OK at the same time, we choose PIN1 light green light, the effective level is high level effective, the delay time is set according to your own needs; when the tool! A|! B|! C..., when there is an NG, we choose PIN2 red light to be on, the effective level is high, and the delay time is set according to your own needs; as a tool! A|! B|! C..., when there is an NG, the PIN3 alarm light will sound, the effective level is high level and the alarm time is set according to personal needs.

Input setting: Because of the stability and duration of the output display, we usually choose edge trigger here, but you can choose high (low) level trigger, rising (falling) edge trigger, level trigger according to personal conditions . If the execution condition is to detect an object, choose to execute the detection. If you need to save the data picture, choose to capture the full screen and save the picture.



6. Product configuration

You can create a new detection object or open the existing detection object settings; copy the detection content that has been set by other devices; rename and delete old files.

6.1 Product management

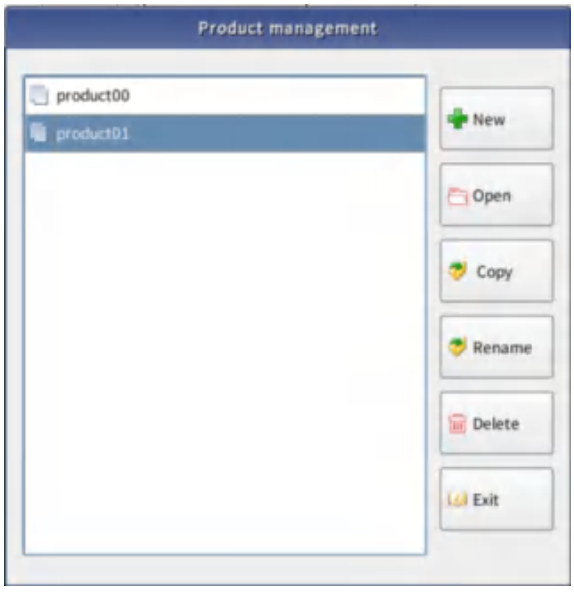
[New File], create a new product management file, and start setting related tool parameters.

[Open file], open a product management file that has been set, and prepare the data to start testing.

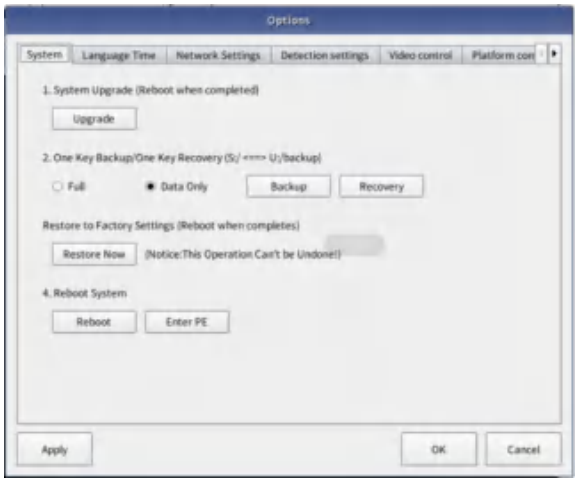
[Copy file], copy an existing product management file, change and edit the content.

[Rename File], rename the selected product management file.

[Delete file], delete a currently used product management file, and clear all data.



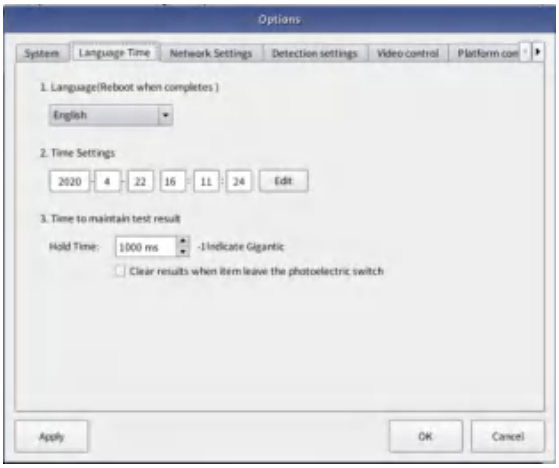
6.2 Configuration options



6.2.1 System functions

System upgrade, used to upgrade system files.
Data backup and restoration: backup product files or full disk data and programs.
Restore factory settings: restore to the factory settings file.
Restart the system

6.2.2 Language time



Set the system language environment.
The current system supports Chinese, Traditional Chinese and English). After selecting the desired language, click OK, and the system will restart and switch the language automatically.
Time setting: You need to set the correct system time when you first use it. When you need to change the time, move the mouse to the corresponding input box, scroll the mouse button, and the date or time numbers will change cyclically. Adjust to a suitable time and then save.

6.2.3 Network settings

The network port setting is used to provide network IP address parameter setting. Contains the subnet mask and gateway.
The camera provides a way to set IP. If there is a DHCP server in the network you are connected to (the router can provide this service), you can use DHCP to automatically obtain an IP address.
You are more familiar with the network, you can set your own IP address and gateway.
Generally, the first three segments of the IP address you set should be the same as the IP address of the computer you will communicate with, and the last segment address is different.

For example: service computer IP address: 192.168.2.X1

Subnet mask: 255.255.255.0

Gateway: 192.168.2.1

Then, the IP address of the camera: 192.168.2.X2

Subnet mask: 255.255.255.0

Gateway: 192.168.2.1

Note: X1 and X2 are between 1 and 255.

6.2.4 Detection settings

Detection settings are used to configure whether the detection results are saved and transmitted.

6.2.4.1 Inspection graphics save

There are several ways to save the image after detection:

Do not save images (default)

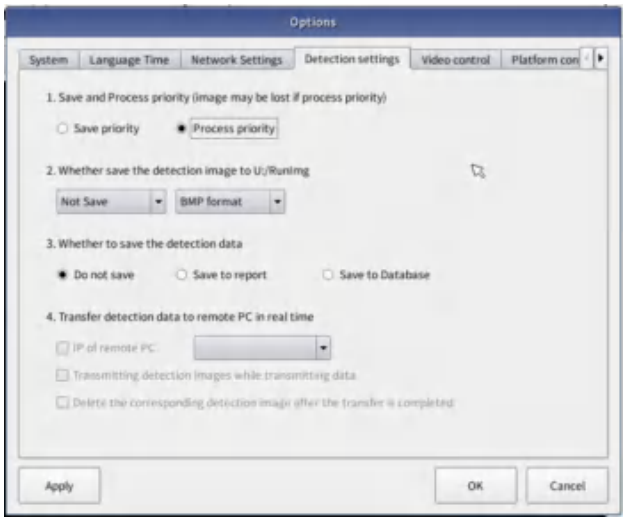
Save image when OK

Save image when NG

Save all graphics

The image save format can currently choose BMP format and JPG format. BMP format is not compressed, and the space occupied by a single unit is not very large. JPG format will compress the image to save space, but the image effect will be worse.

Note: You need to insert an external U disk to save the image. If the U disk is not inserted, this function will not save the image by default.



6.2.4.2 Test data storage

If save data is selected, the system will save each test result, and the test result is saved in the form of a report, which can be exported to EXCEL.

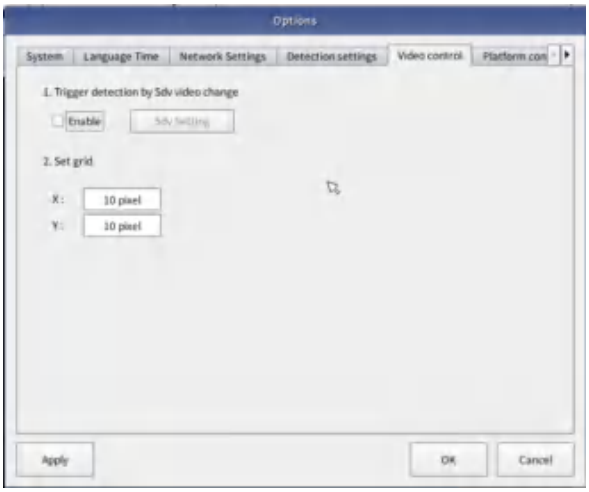
6.2.4.3 Remote storage of data and graphics

The camera provides the function of saving data remotely, select the remote server, and then choose to save the data or images.

Note: The remote server needs to install the software to receive the data to complete this function.

6.2.5 Trigger switch

This part is used to set the detection trigger mode. You can use software trigger or external signal trigger.



6.2.5.1 SDV Set up

When SDV is enabled, when the detection is triggered, if the human hand has not left the detection area, the system will not start the detection, and the detection will start after the detection of the human hand has left. It is used to prevent false alarms caused by slow evacuation. For the setting method, four rectangular areas can be set around the product picture. The system reads this area and compares it with the template. When the difference exceeds the set value, it is considered that there is a foreign body that has not been evacuated. At this time, wait for 20 seconds before testing. If the foreign body is evacuated, the inspection is performed immediately.

6.2.5.2 Camera photo trigger mode

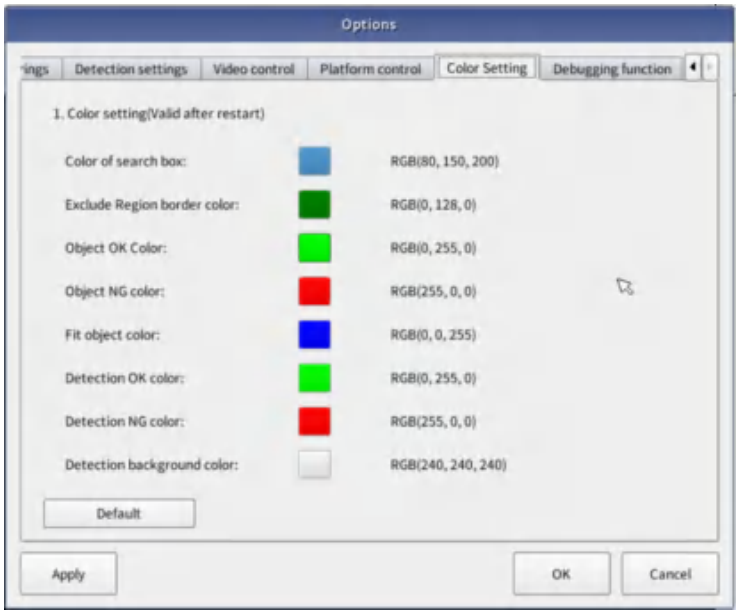
The camera can be triggered by software or external signal. By default, the software is used to trigger the camera.

6.2.5.3 Scan code gun settings

The barcode setting is used to open the externally connected barcode scanner. When the cover barcode gun is opened, the barcode gun connected to the system starts to work. Barcode gun generally cooperates with the system to complete the equipment scanning work.

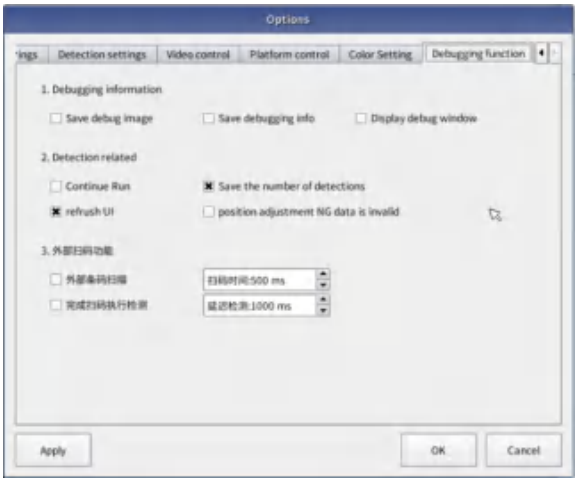
6.2.6 Color setting

The color setting is used to configure the color of each tool. For example, the default selection area tool is green, and NG will display the area as red when it is detected.



6.2.7 Debugging function

The debugging function window is used for equipment debugging, and it is not recommended for non-professionals.

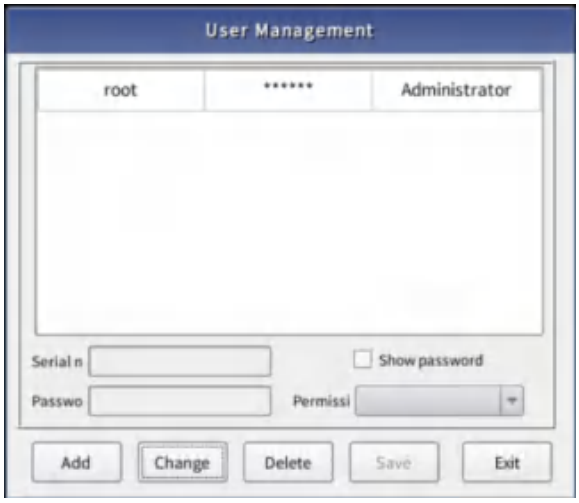


6.3 Switch user

The administrator account and operator account can be set by password to prevent the set detection conditions from being modified.

Administrator account permissions can operate and modify all operating tools

The operator account can only have operation authority and no modification authority .



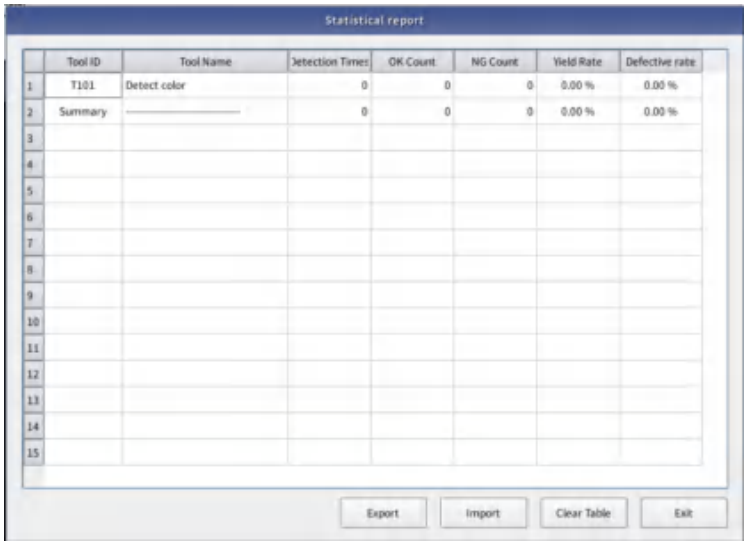
6.4 Mode switch

With execution interface and setting interface. The setting interface can display all contents and modify operations; while the execution interface has no setting interface.

6.5 Statistical report

The execution results can be summarized and statistics can be produced and reports can be produced,

and import and export operations can be carried out through U disk.



6.6 Reset times

Clear the number of execution results and re-statistics.

Seven, common problem solutions

7.1 The image is not clear

There are many factors that affect the unclear image. Generally, there are several reasons: inaccurate diagonal, inappropriate illumination angle, poor quality of the lens itself, insufficient light intensity, too large lens aperture, and unequal placement of objects.

Focal length deviation: Check whether the lens focal length adjustment ring is loose and cause out of focus, readjust the focal length and lock the lens.

Improper illumination angle: Some products have a relatively smooth surface, and the use of direct light sources will cause too strong reflections and unclear pictures. At this time, you can use side lighting to solve the problem.

Some light sources have uneven illumination range, so the detection uses a relatively large area of scattered light sources.

Insufficient light intensity: If the light intensity is not enough or the light is not concentrated enough, the brightness of the light source is not enough, you can choose a stronger light source.

The lens aperture is too large: the lens light source is too large, which will result in a large amount of light, and the lens depth of field will be reduced, and the highlight will look blurred. At this time, you can reduce the aperture and increase the brightness of the light source to solve this problem.

7.2 Inaccurate positioning

Inaccurate positioning is mainly caused by the unclear outline of the selected feature points or the selected feature points are too small. Feature points should select feature elements with obvious color contrast, clear outline, unique features, and no interference in the middle. Such as LOGO, rectangular block, etc. Do not choose a pure circle as the positioning feature element, because the circle has no angle.

Inaccurate positioning will affect other inspection tools to make mistakes, so before doing a test project, the positioning tool must be set accurately.

7.3 Cannot trigger detection

System triggering is usually done by infrared sensor switch. If it cannot be triggered, please check whether there is any foreign object in the trigger switch slot to block the switch. If there is, remove the foreign object first.

Trigger the light to block

Trigger opening failure

The IO input PIN1--PIN3 interface is set incorrectly. The input interface is PIN1 by default. Check whether the input level of the PIN1 interface is correct. Please communicate with the engineer for details.

7.4 The test result is OK or the NG light is off

The OK light and NG light are controlled by the output ports PIN1 and PIN2 in the IO setting. Generally, the output is set to 500-1000 millisecond pulse signals. If it is set to continuous signal, the test result is OK and NG light is always on.

In addition, it is necessary to set whether each test result participates in the logical operation of the final result. If the added tool is not involved in the calculation of the detection result, the final display result will also be wrong.

If you are not sure about the specific settings, you can click the "one-key setting" button to let the system complete the settings.

7.5 No sound from the test result

Please check whether the output PIN3 is set correctly in the IO setting. The default output pulse is 100-500ms, all tools involved in the calculation are selected, and the logical relationship is all-and.

7.6 The test result picture cannot be stored

The external U disk does not exist or is damaged, and the picture file cannot be stored if the U disk cannot be read.

If the U disk is full, there will be the problem of not being able to store pictures.

Check whether the image storage part switch in the configuration options is turned on.

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