Shenzhen Wisdomshow Technology Co.，Ltd

S-7200 Instruction Manual

ISO9001

Preface

Shenzhen Wisdomshow Technology Co.,Ltd. is a collection of research and development, production, sales and service in one of the professional BGA rework equipment and X-RAY inspection equipment manufacturers. Founded in early 2011, by a number of BGA rework equipment engaged in more than ten years of technical backbone and sales elite jointly founded, with professional level and mature technology, in the field of BGA rework equipment quickly rise. In 2015, the company invested in the research and development of X-RAY, and has listed a variety of X-RAY inspection machine and X-RAY dispenser. Company meritocracy, the continuous introduction of high-end technical personnel, technological innovation, the full introduction and absorption of foreign advanced technology on the basis of the design and production, maintenance and commissioning and engineering transformation capacity to rapidly improve the research and development of a variety of professional and targeted rework and inspection equipment, rework and inspection in the field of large-scale server motherboards, small-pitch led lamp beads, high-end smart phones and other rework and inspection of the field has accumulated a wealth of experience, and the product The products have been mass-produced to the market, and recognized by the majority of domestic and foreign customers. In the process of development, the scale of the company is constantly expanding, in order to meet the majority of customers, the company in Suzhou, Chengdu, Wuhan and other major cities to establish offices, the establishment of a professional pre-sales service and perfect after-sales service network. The company has set up sales and service outlets in more than 30 countries, such as the United States, Italy, Poland, Brazil, India, Algeria, Thailand, Vietnam, etc. After years of continuous efforts, the products have accumulated a good reputation.

The company has passed a series of international certifications such as ISO9001, CE, national high-tech enterprises, with a number of independent intellectual property rights and invention patents. The product line continues to expand, covering high, medium and low grade, can be customized according to the user's special requirements, and has successfully customized a number of models for a number of foreign-funded enterprises, with a good cost-effective and high-quality service, to win the recognition and trust of many customers.

Since the establishment of the company, has been adhering to the 'professional, integrity, excellence, customer first' business philosophy to meet the majority of customers unanimously recognized. We sincerely look forward to cooperating with you!

Thank you very much for using our S-7200 series X-RAY inspection machine. In order to ensure the safety of your use of the equipment and give full play to the excellent performance of the equipment, please read this manual in detail before using the equipment. If you have any questions or special requirements about the use of the equipment, please feel free to contact our relevant personnel.

Due to the continuous upgrading of technology, Shenzhen Windomshow Technology Co., Ltd. reserves the right to change the product specifications and technology without prior notice.

Shenzhen Windomshow Technology Co., Ltd. reserves the right of final interpretation of the contents of this manual.

catalogs

About Safety Signs

 Danger	Indicates an immediate danger that,if not avoided could result in injury.
 Warning	Indicates that injuries may occur.
 Watch Out	Indicates that people injury or material damage may occur .

- **Example Graphic logo**

	Indicates what needs attention (including danger 、 warning).The graphic sign describes the specific precautions,please follow the instructions.
	The sign indicates prohibited behavior.The graphic sign describes the specific prohibited items， please follow the instruction.
	The sign indicates mandatory behavior and instructions. The graphic sign describes the specific content, please follow the instructions.

- **The following graphic marks are used in both this instruction manual and this machine. Please understand the meaning of the symbol inadvance.**

	Produces X-rays when energized
	Generate high voltage, please be careful of electric shock.
	Beryllium, lead is toxic
	Ground terminal. Be sure to ground.

Safety Precautions

- The X-RAY inspection machine is an X-ray generator and must be used under the supervision of qualified personnel such as the person in charge of X-ray operations.
- The following are precautions for the proper and safe use of the machine, so be sure to read them carefully and follow the instructions.

⚠ Warnings	
	X-rays are harmful to humans. X-rays from this machine are harmful to humans. Take sufficient care during operation to avoid direct or accidental exposure. To prevent exposure to X-rays when using an X-ray source, place the X-ray source in X-ray protective equipment and install an interlocking mechanism. During warm-up, X-ray irradiation is performed at maximum tube voltage and maximum tube current. Make sure that the amount of radiation leaking from the X-ray protection equipment during X-ray generation at the maximum tube voltage/maximum tube current does not exceed the values specified by law.
	Beryllium is harmful to humans .Do not touch the X-ray window of the X-ray source .The X-ray window of the X-ray source is made of extremely thin beryllium foil, which can be damaged by touching it. Beryllium dust may be acutely or chronically toxic and may cause respiratory damage if inhaled. In case of breakage, immediately turn off the power switch and take care not to inhale the dust. In addition, wipe off any loose dust with a damp cloth and wash your hands with soap if they come into contact with the dust.
	In addition, beryllium must be disposed of in the prescribed manner. When the X-ray tube inside the X-ray source reaches the end of its useful life and must be replaced or disposed of, please contact us.
	Do not disassemble or modify any part of the unit as this may damage the internal circuit. Malfunctioning of the circuit may result in malfunctioning or failure to produce X-rays. A high voltage (maximum 80kV) is used internally. To avoid electric shock or malfunction, do not remove the operation panel or protective cover of the unit.
	Take care not to subject the unit to shock or vibration .The unit is precision equipment, so take sufficient care to operate it so that it is not subjected to shock or vibration. Shock from dropping or excessive vibration during use, transportation or installation may cause malfunction or malfunction.
	Do not install in places where there is a lot of fumes, moisture, steam, dust Fumes, moisture, steam, dust, and corrosive gases may adversely affect the performance of the unit. In addition, they may cause electric shock or fire, so avoid using the unit in such environments.

	Do not use the unit in an environment filled with organic solvents or flammable gases that may cause an explosion due to spark discharges resulting from malfunctioning of the unit or the like.
	Do not use in an environment that generates chlorine gas Chlorine gas may corrode the beryllium window of the X-ray tube and damage the X-ray tube. Do not use the X-ray tube in an environment that generates chlorine gas. When irradiating samples such as vinyl chloride, which may generate chlorine gas, be careful when handling.
	Be sure to use the specified power supply If the specified power supply is not used, electric shock or fire may result.
	Be sure to ground: To prevent electric shock, be sure to ground the GND terminal.
	Be careful not to allow foreign objects to enter the unit In the unlikely event that foreign objects or liquids, etc., enter the housing of the unit, immediately stop X-ray irradiation and disconnect the external power supply DC +24V. Continued use without removing them may result in electric shock or fire. Contact us for instructions on how to remove foreign objects.
	If there is any abnormal condition, stop using the unit. If smoke is emitted, or if you feel a strange odor or abnormal noise, stop X-ray irradiation immediately and disconnect the external power supply DC +24V. Contact us for more information on how to deal with the abnormality.
	Do not apply excessive force to the power plug or other connecting plug.Do not pull or bend the power cord excessively when pulling out the power plug or other connecting plug. Damage to the power cord may result in electric shock or fire.
	Do not block the exhaust port of the cooling fan If the exhaust port of the cooling fan installed on the unit is blocked by a wall or other object, the internal temperature may rise abnormally, which may cause a fire. Install the unit in a well-ventilated environment and keep the exhaust port clear. Keep the distance between the exhaust port and the wall or other object not less than 5cm.
	Do not use in a high-temperature and humid environment. Observe the surrounding temperature and humidity when using the product. Use in a hot and humid environment may cause malfunction or failure.
	Install the unit correctly and reliably. Install the unit correctly according to the instructions in the operation manual. If the unit is not installed correctly, it may be damaged if it falls over during operation. For mounting other equipment, use the special mounting screw holes and securely fasten it with the specified screws.
	Do not remove the warning label affixed to the main unit The warning label is a safety sign necessary for the safe use of this product. Do not remove or deface it.
	When disposing of this product, please observe the relevant laws and regulations Beryllium is used as the material for the irradiation window of this product.There is no problem with the use of this substance in this product, so please observe the relevant laws and regulations when disposing of it.

	To prevent X-ray exposure in the event of a malfunction of the interlocking mechanism,making it a habit to stop X-ray exposure when opening the door of the X-ray protection equipment.
	Install safety circuit switches for interlock 1 and interlock 2 on the door of the X-ray protection equipment. In case the interlock circuit malfunctions, install two safety switches on the door, one connected to the interlock 1 circuit and the other to the interlock 2 circuit. You can even set up additional circuits to improve safety according to your own situation.

1. Unpacking Precautions

（1）Immediately after the arrival of the product, please check the appearance of the device. If you find any damage that may have been caused during transportation, please contact us immediately.

（2）After unpacking, please read this operation manual carefully before installing the product.

（3）If there are any defects in the product, please contact us immediately.

（4）If the product is shipped from your company to the customer, or in case of quality problems with the product, the original box must be used, so please contact us when there is damage to the box.

2.Installation Precautions

 **WARNING**	Please do not install or debug the equipment without the guidance of our company's personnel.
 **WARNING**	Strictly in accordance with the equipment power specifications 220V for commissioning
 **ATTENTION**	To prevent the risk of electric shock, be sure to ground the GND terminal

3. Equipment Parameter

3.1 Composition of the Equipment

X-ray source	Optical tube type	Enclosed micro-focus X-ray source
	Voltage	90kV
	Tube current	200uA
	Focusing size of optical tube	5μm-15μm
	Maximum input power	8W
	X-ray beam angle (cone)	80 degree
Flat detector	Detector type	Amorphous silicon flat panel detector
	Sensor unit size	85μm
	Pixel matrix	1536×1536
	Resolution	5.8Lp/mm
	Detector tilt angle	0-45°viewing angle
	Image frame rate (1×1)	20fps
Software	Function	Bubble measurement, size measurement, batch inspection, etc., or other customized functions
	Intellectual propery	Self-developed, with independent intellectual property rights of software
Shielding box	Shielding box	Steel+lead+steel plate Sandwich structure shielding box, effective isolation of radiation.
	Safety	Radiation dose equivalent rate ≤0.5μSV/H Higher than international standards.
	Size	1400mm(L) * 1300mm(W) * 1700mm(H)
	Weight	Approx1500Kg

3.2 Equipment Safety Design

Safety Design	Radiation safety standard \Requirements of protective box	Adopt steel-lead-steel protective structure, and the front door window adopts leaded glass for radiation protection. At any position 20mm away from the box, the radiation dose equivalent rate ≤0.5μSV/H is higher than the international standard.
	Safety interlock function	Two high sensitivity limit switches are installed at the opening position for equipment maintenance, once the door is opened, the X-ray tube will be automatically disconnected immediately.

	Electromagnetic switch protection function	The observation window is equipped with electromagnetic switch, when the X-ray tube is in working condition, the observation window can not be opened.
	Visible window	A transparent window is provided to facilitate the observation of samples directly from the window during the operation of the equipment.
	Emergency stop switch	Emergency stop switch is installed at the prominent position of the operation desk and the equipment body, in case of emergency, the power supply system can be cut off quickly by pressing the emergency stop switch.
	Light tube automatic protection function	After 5 minutes without any operation, the light tube will be automatically disconnected from the power supply and enter into the protection state.
	Equipment automatic protection function	Once any door or window of the equipment is opened, the equipment immediately closes the light pipe to enter the shutdown protection state; any door is not closed, the light pipe can not be opened.

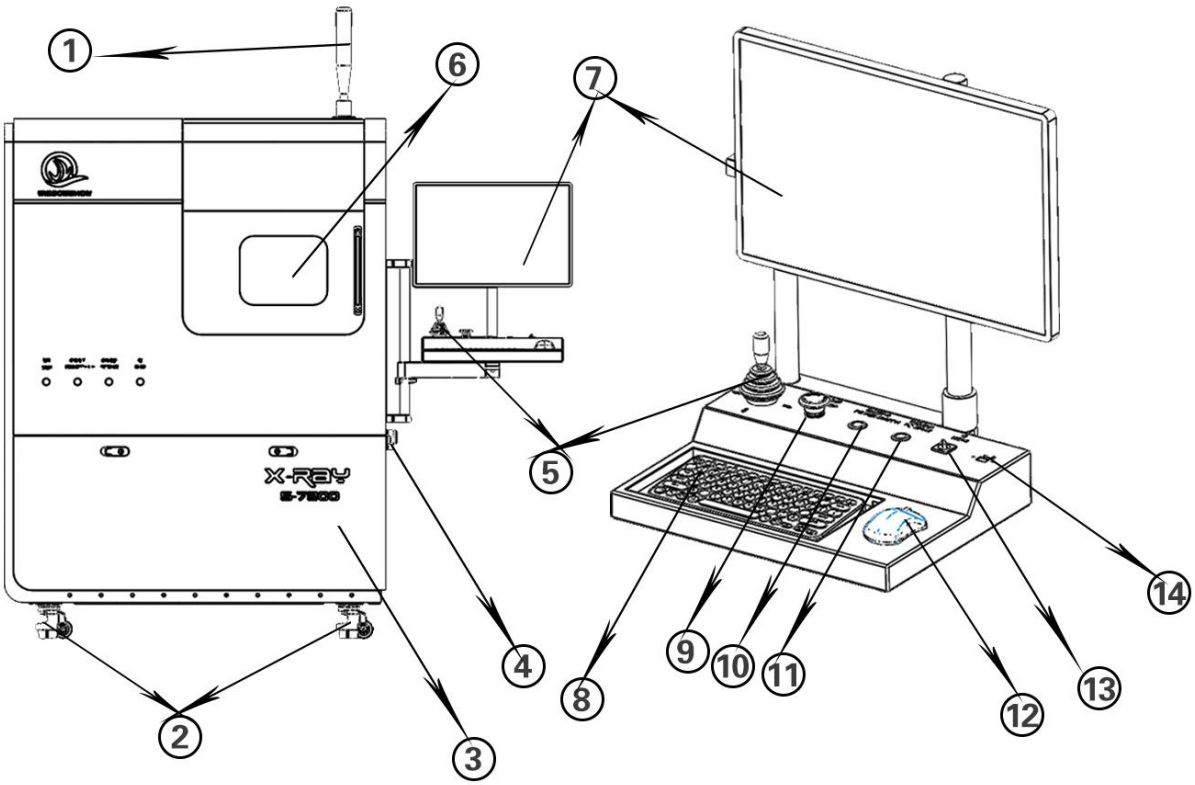
3.3 Software Function

Function Module	Operation mode	Keyboard + mouse to complete all operations.
	X-ray tube control	Mouse click on the button to turn on or off the X-ray, next to the display of real-time tube voltage and tube current values, the user can click on the up and down buttons, or drag the slider, or manually enter the adjustments.
	Status Bar	Flashing red and green to indicate interlock status, warm-up status and X-ray on/off status.
	Image Effect Adjustment	Brightness, contrast and gain of the image can be freely adjusted to achieve satisfactory results.
	Product List	Users can store the current or recall the previously stored parameters such as Z-axis position, brightness, contrast and gain, etc., which can be directly recalled for the next inspection of the same product to improve the inspection efficiency.
	Navigation Window	The picture of the item under test is displayed on the navigation window in real time, and by clicking on any position of the picture of the item under test, it can realize auto-following and auto-positioning, which improves the inspection efficiency.
	Motion Axis Status	Real-time display of coordinate position.

	Measurement results	Sequential display of each measurement result (bubble ratio, distance, area and other user-set measurement items)
	Speed control	Each axis travel speed can be adjusted to slow, normal and fast speeds.
Bubble Rate Measurement	Automatic calculation	Manual/automatic measurement, single ball/multi ball measurement modes are available. Automatic calculation of bubble ratio for each BGA in the selected area. Boundary value can be set to automatically determine the bubble rate and the maximum bubble rate.
	Adjustment parameters	Users can adjust the gray scale threshold, pixel, contrast, size filter and other parameters to get the accurate result of automatic calculation
	Manually add or delete bubbles	Users can draw polygons or free-form shapes as bubbles to be calculated into the bubble rate. Right-click on an image that is not a bubble to cancel the bubble.
	Storing Parameters	Users can store the gray scale threshold value, pixel, contrast, size filter and other parameters of the current measurement of bubbles, which can be directly recalled next time when the same product is inspected to improve the inspection efficiency.
Size Calculation	Percentage measurement of tinned holes	Mostly used to measure the circuit board through-hole tin rate, more than the measurement distance to set a D point, the vertical distance from the D point to the baseline, divided by the vertical distance of the C point, resulting in D accounted for the percentage rate of the vertical distance of C.
	Distance	Click on points A and B as needed to set the baseline, and then click on point C to measure the vertical distance from point C to the baseline.
	Angle	Click on points A and B to set the datum line, then click on point C to measure the angle between BA and BC rays.
	Round	Mostly used for measuring tin balls and other round components, click on three points to determine a circle, measure the perimeter, area and radius.
	Square	Used to measure square components, click two points to determine a square, measure the length, width and area.
	Arc	Used to measure the radian or curvature of the LED binding line.
Batch Inspection	CNC Inspection	For inspection points with regular arrangement, users only need to set two of the inspection points and the number of rows and columns, the software will automatically shoot each inspection point and save the picture.

	Automatic Recognition	For inspection points with obvious features, the software can automatically identify the specific location, measure and save the picture.
	Laser Positioning	Red dot laser positioning device, double assisted, easy to navigate.
Report Generation	According to the analysis results, you can mark the judgment results on the picture, or directly into CSV file format or report document.	

4.Introduction to the Function And Name of Each Part



NO.	Name	Purpose	Number	Name	Purpose
1	Three-color light	Indicates the operating status of the equipment	8	Keyboard	Computer command input
2	Foot cups	Fuselage support	9	Emergency stop	To stop the machine in case of emergency
3	Electrical box area	Electrical assembly area for equipment	10	Start-up keyhole	Power on/off motion control
4	Power switch	Mains power on/off	11	Start button	Starting the computer

5	Rocker	XY movement control of the carrier	12	Mouse	Computer command operation
6	Glass Window	Leaded glass viewing window to observe the carrier	13	Lighting	Illuminated light switch in the enclosure
7	Displays	Computer information display	14	USB port	Information copying

5.Equipment Installation

5.1 Installation Place Requirements

In order to ensure safety and avoid possible damage to the equipment, X-RAY should be installed in an environmental place that meets the following conditions.

◆ Keep away from flammable and explosive materials, and keep away from environments with corrosive gases or liquids;

◆ Avoid humid places where the air humidity is less than 90%;

◆ Ambient temperature -10 ~ 40 degrees Celsius, avoid direct sunlight exposure;

◆ No dust floating fibers and metal particles of the operating environment;

◆ Installation in a horizontal, stable, not easily subjected to vibration;

◆ Reserve more than 20CM space at the back of the equipment away from the wall for heat dissipation;

◆ Power supply voltage requirements are as follows: AC220V ± 10%, 50/60Hz ± 0.3%;

◆ The equipment must be well grounded; shut down is to turn off the power switch, long term out of service, please unplug the power plug;

5.2 Equipment Installation Steps

1. Place the equipment in the installation site to meet the requirements of use	See the requirements described in 5.1
2. Connect the external power connection cable.	
3. Assemble the monitor and plug in the power cord and HDMI signal cable; connect the mouse and keyboard;	
4. Rotate the main power switch to the “ON” position, connect the 220V power supply; (at this time the computer monitor lights up)	

5. Turn on the power key switch, turn on the motion control power supply.	
6. Press the “computer start” button to start the industrial computer, equipment installation is complete.	

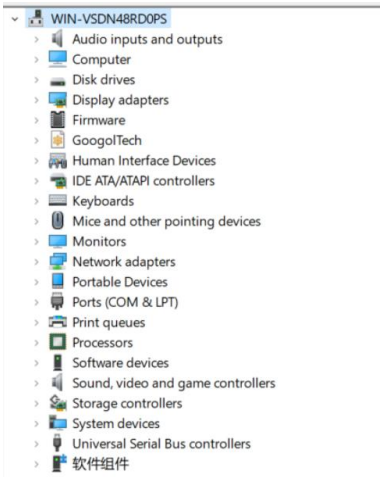
6.Software Installation

Software installation and instructions Note: Before installing the software, first install the software operating environment plug-ins and related drivers, software installation and operation instructions!

6.1 running environment plug-in installation

In the windows platform to run x-ray operating software need to install VCredist_x86.exe and Dotnetfox.Exe plug-in; C:\\...Driver Installation

1) Motion Control Card Driver Installation

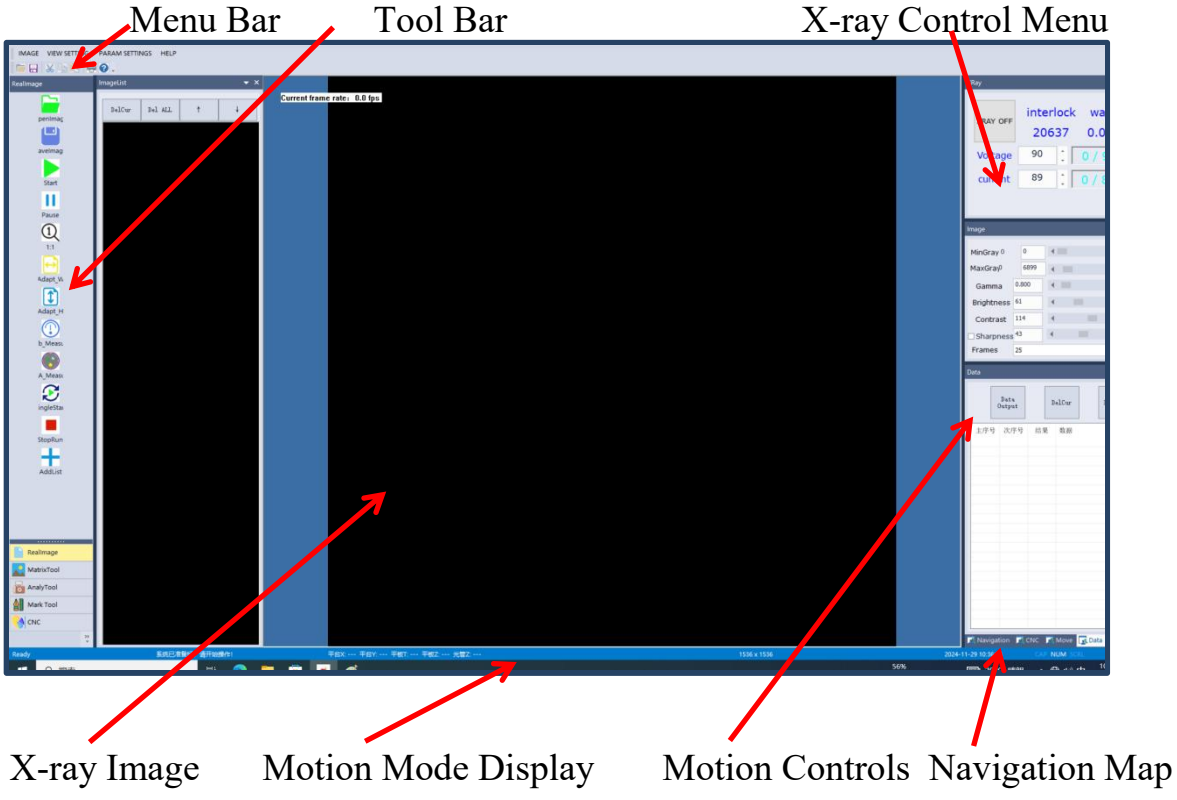


C:\\DMC2610\inf_win7\windrvr6

Click “Open (0)” and click Next to finish,
GTS-800 Motion Control Card: Double click to run C:\\\GTS800\ REG_Win_VISTA32.bat to finish.
GTS-400 Motion Control Card: Double click to run C:\\\GTS400\ REG_Win_VISTA32.bat to finish.
x-ray application software installation:
（1）first of all, to ensure that the software running environment configuration program installed correctly;
（2） secondly, install the relevant runtime libraries and related hardware drivers;
（3）finally click on the software application to enter the installation interface, according to the prompts to install the s-7200 pieces as an example; other models of software to the actual use of the software shall prevail.

6.2 System Backup
Before the machine leaves the factory, our company will make a backup of the computer system, stored in the E disk, the directory is used to store the system image.If there is a system problem that cannot be solved, use ghost software to restore the system. Generally, we will store the original application programs, related files, etc. in the D disk of the host computer.

6.3 Software Function Introduction



JPG.1-2

※Title bar: shows the specific model number of the device.
X-axis: the image moves left and right;
the shortcut keys are: A key moves the image to the left; F key moves the image to the right.

Y-axis: the image moves forward and backward;
Z-the shortcut keys are: W to move the image upward; X to move the image downward.

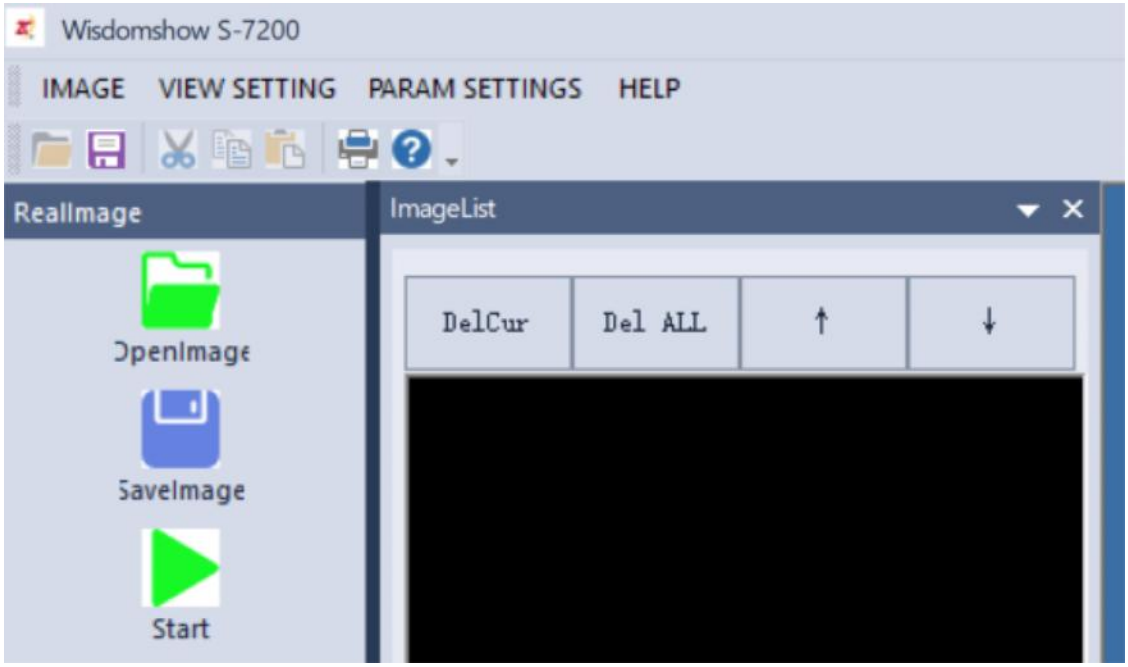
FPD Axis: The FPD axis moves up and down;
the shortcut keys are: Q to decrease the magnification downward; E to increase the magnification upward.

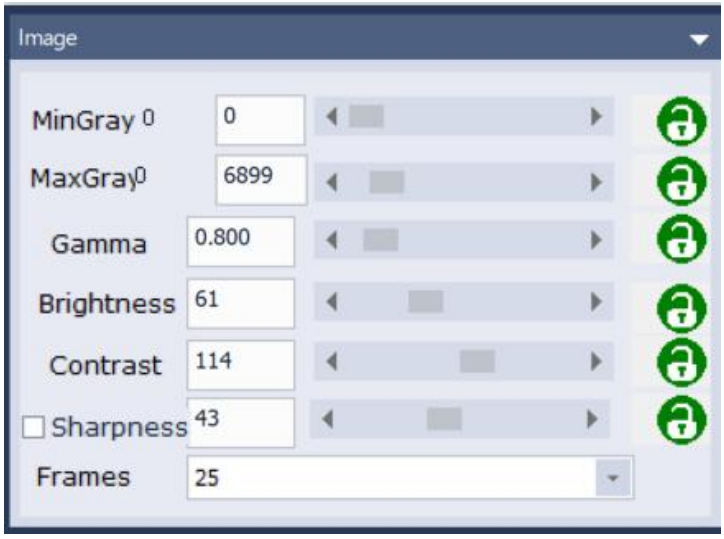
X-RAY TUBE Axis: The X-RAY TUBE axis moves up and down;
the shortcut keys are: C to decrease the magnification downward; Z to increase the magnification upward.

T-axis: T rotary axis moves;
U-shortcut keys are: tilt to the left; T image tilt to the right; space bar can realize three kinds of moving speed switching: high, low and medium.

6.3.1 Description of The Menu Bar

The menu bar includes File, View, Image, Settings and Help.
1）File：File drop-down menu includes four options: Open saved image; Save image; History of opened image and Exit. The following figure:

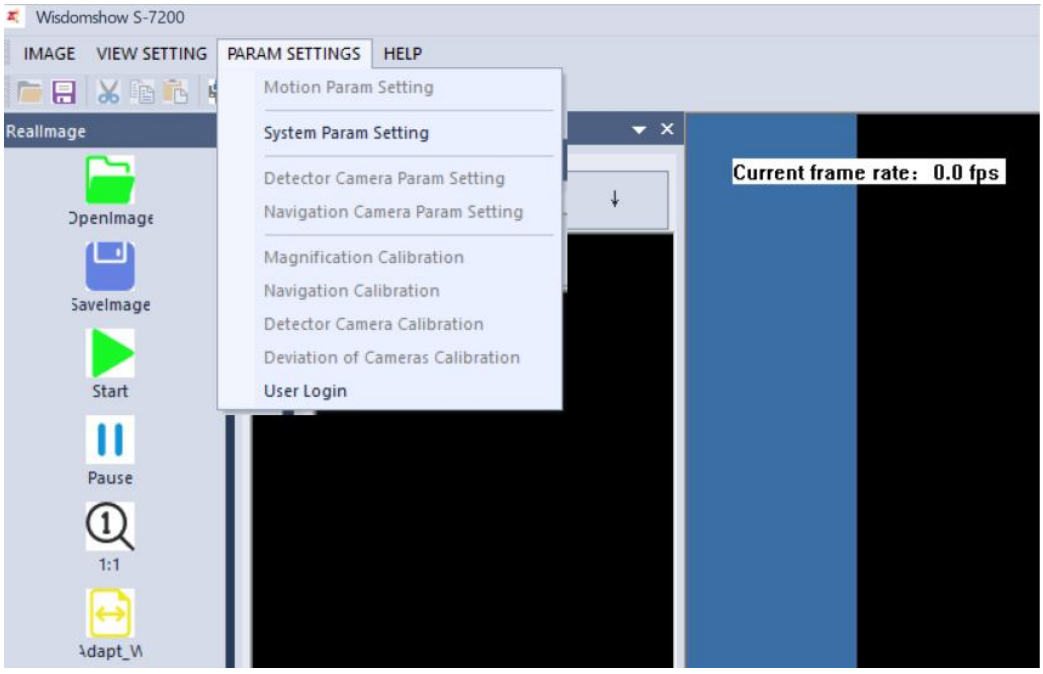




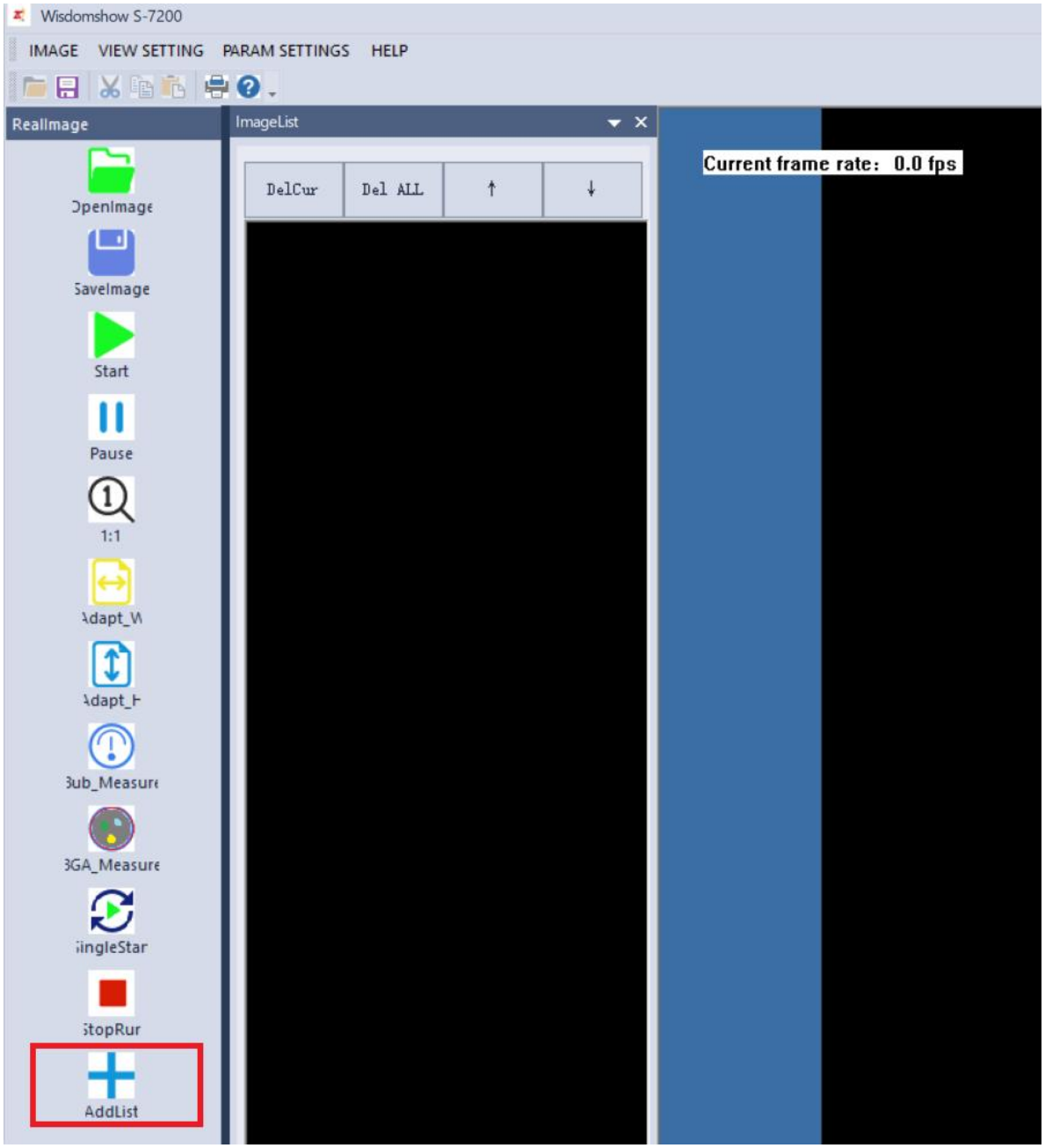
2 ） View items: View items include Toolbar (Toolbar includes: Application Toolbar, Image Toolbar, Camera Control Bar, Measurement Toolbar, Report Save), Status Bar, Control Layout, Lock Layout, Zoom In, Zoom Out, Original Size)

3 ）Image items: View items include Image Brightness Increase, Brightness Decrease, Smoothness, Median Filter Overlay Frames are selected via drop down options, the larger the value the more computer resources are consumed, but the more stable the image will be the recommended value is 1.

4 ） Setting items: Setting items include Main Camera Setting, AOI Camera Setting, Navigation Camera Setting, Magnification Correction, System Setting, Power On Auto Startup Program Setting, and Password Items (including Password Required, Operator Logon, Administrator Logon and Logout).

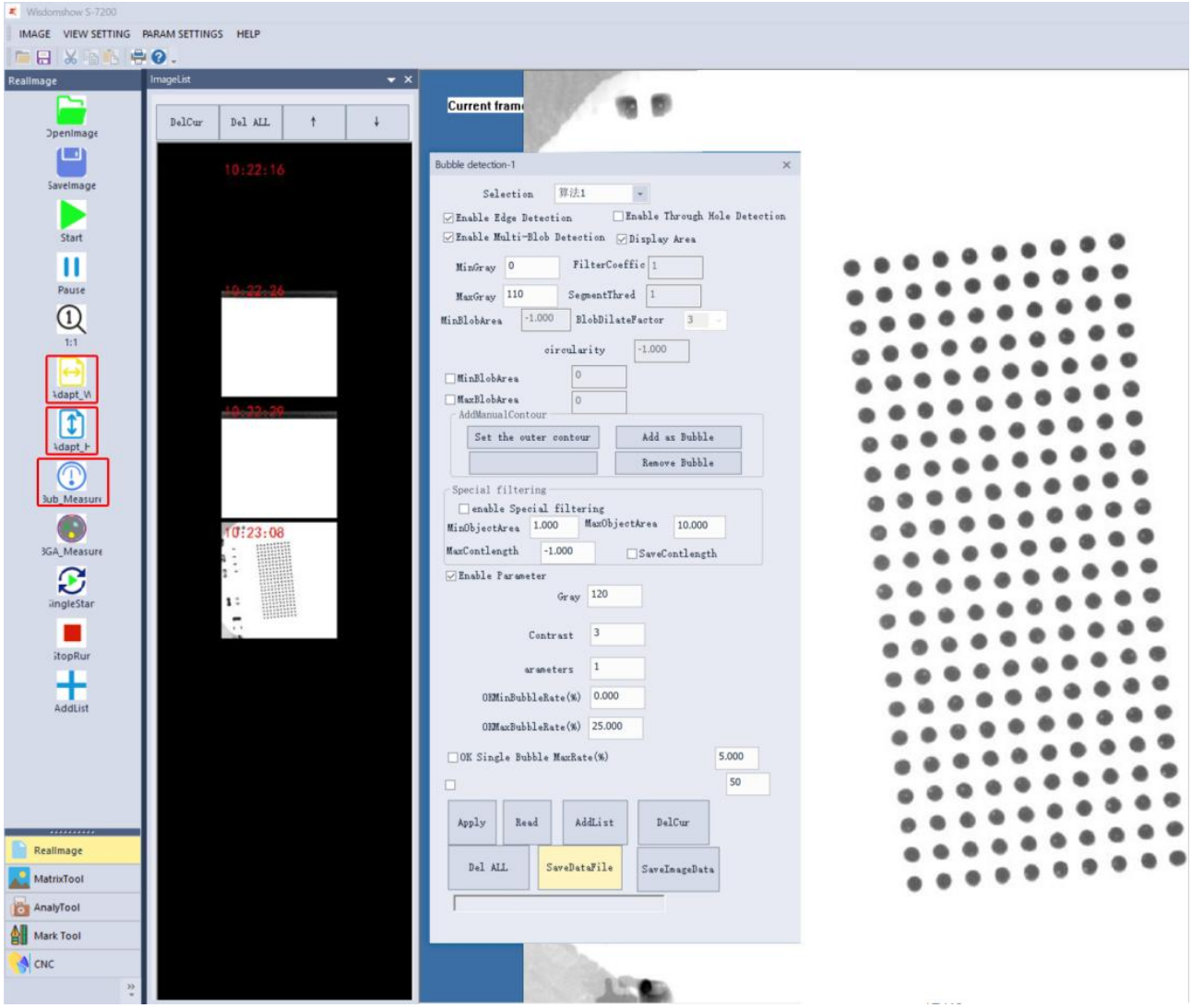


6.3.2 Toolbar (shortcut menu) Description



Application Tool Bar

	Open saved images and programs		Extended view
	Saves images in the image area		Manual Drag
	select an area		Display the measurement toolbar
	Zoom in		Display the report page
	Zoom out		Live Image
	Original image size		Non-real-time mode (pause)



6.3.3 CNC Control Bar

CNC test start, open the software to download the test program, click on the automatic test.

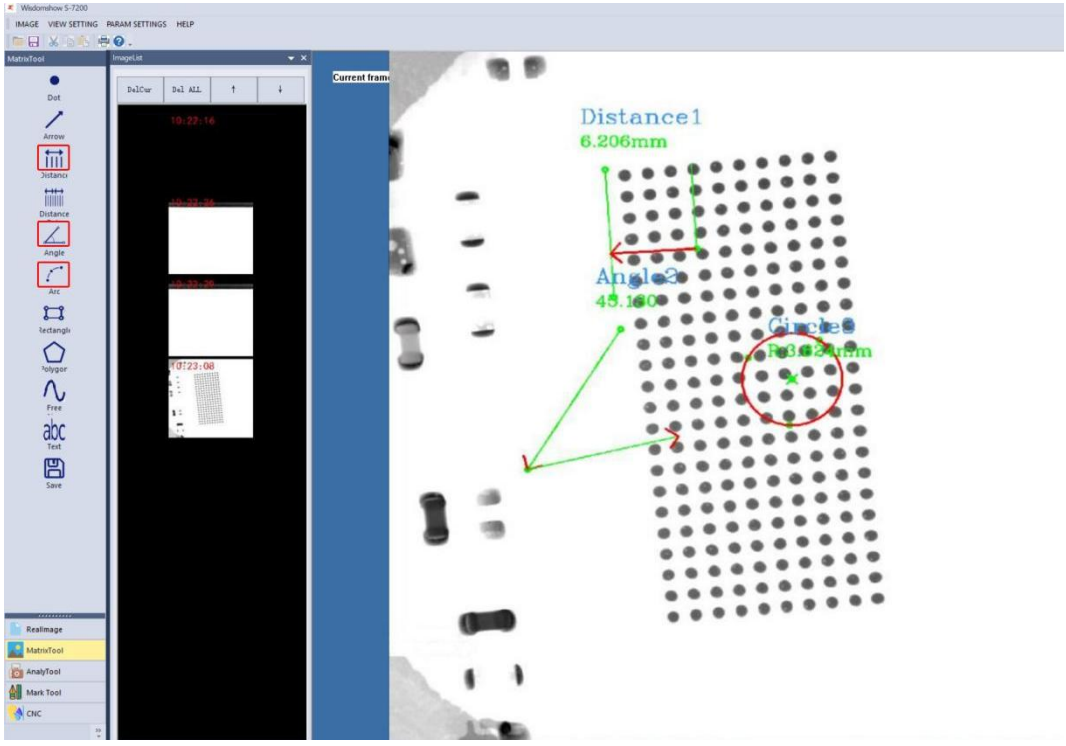
CNC test terminates

6.3.4 Measurement Toolbar

Measurement toolbar only pops up in non-real-time mode.Image Measurement: Distance straight line and distance between two points, Angle Angle of the two lines.Save Save the image data.

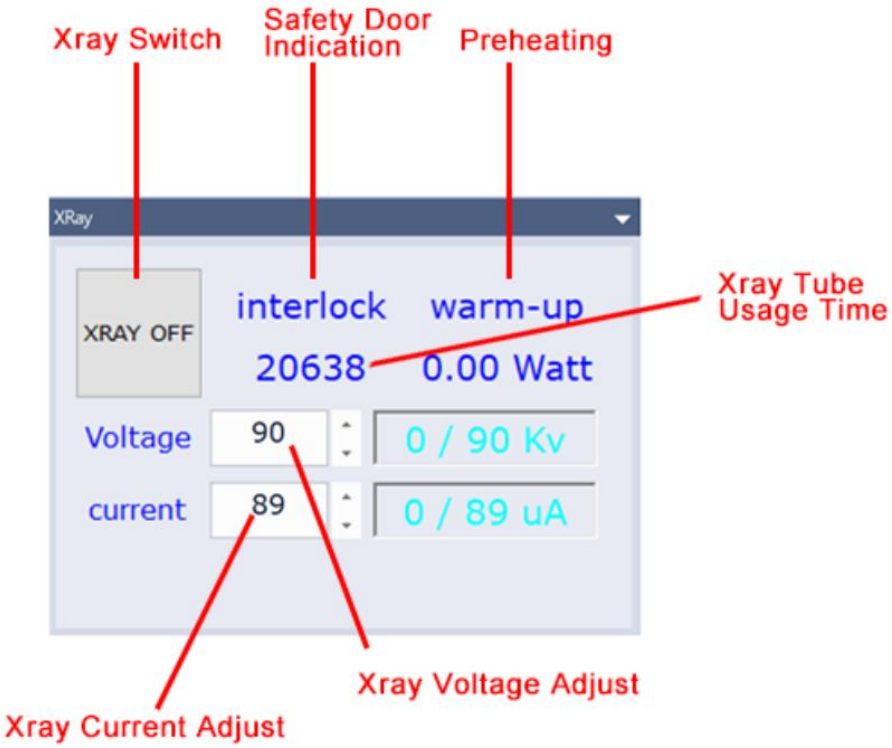
Add text annotations、

Add arrow pointing.



6.3.4 Control Bar & Navigation Area

1）X-Ray control (integrated light pipe)



Platform X: A key moves the image to the left; F key moves the image to the right
Platform Y: W key moves the image up; X key moves the image down
Tablet Z: Q key decreases downward magnification; E key increases upward magnification
Light Pipe Z: C key decreases the magnification downward; Z key increases the magnification upward.
Plate T: pup tilts the image to the left; pdn tilts the image to the right

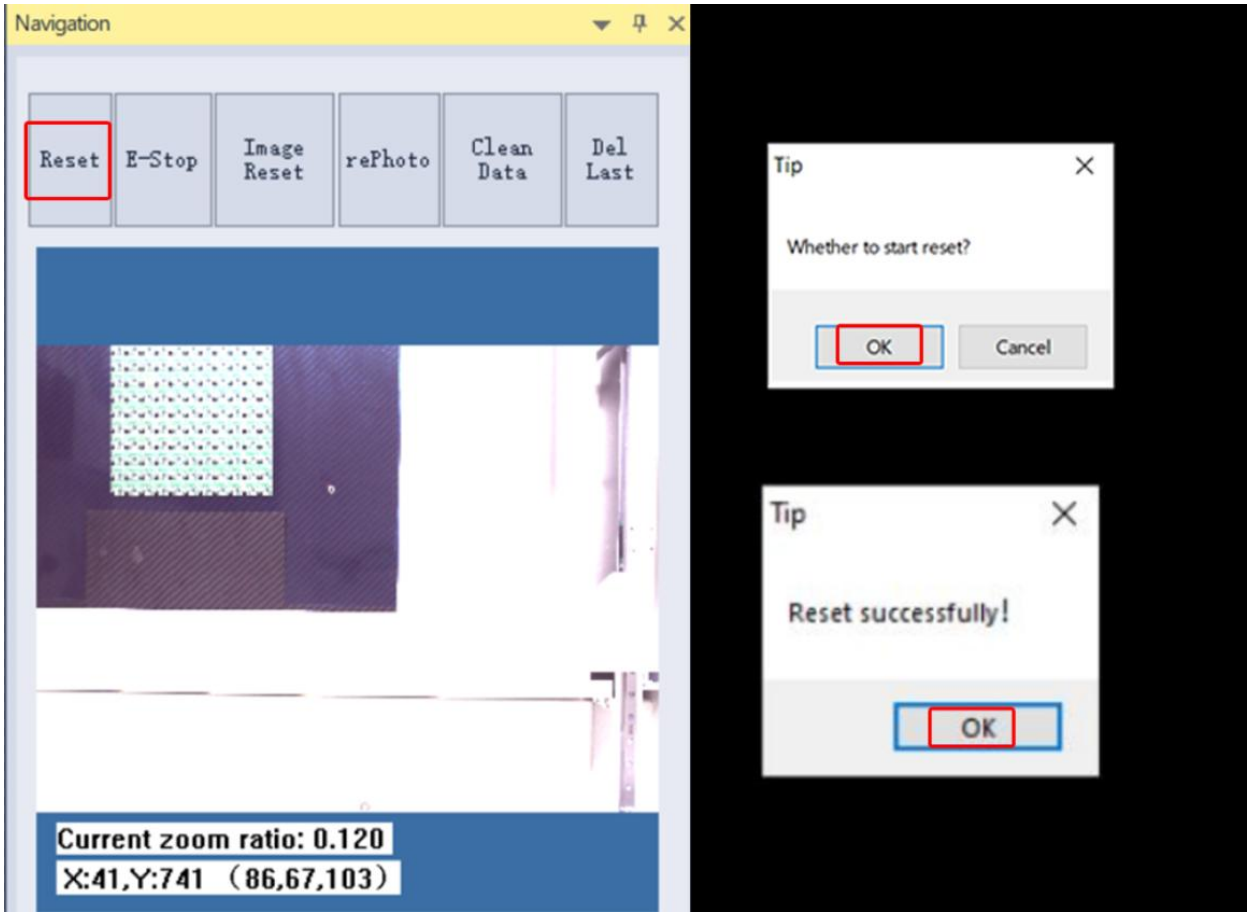
Motion control status plug-in

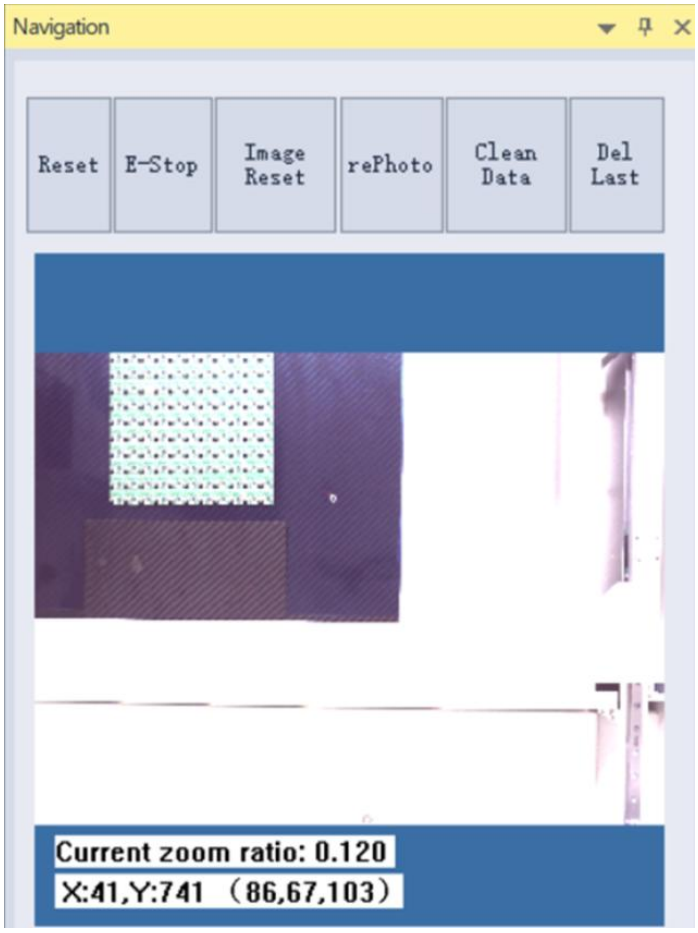
X-RAY detection 5-mode operation, Z-axis, Y-axis, T-axis, Z1-axis

6.3.5 Navigation Window

Emergency Stop Button: Emergency stop motion; during motion or CNC automatic testing, if you encounter the need to stop immediately, you can click this button to stop the motion and testing of the device.

Reset button: return to the original state button: return to the original X,Y,X_ray, camera coordinates back to the initial position, emergency clear data delete last button: all clear the measured data on the picture;

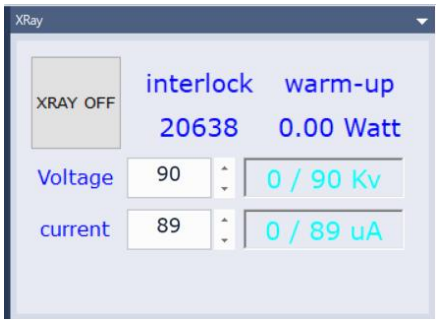


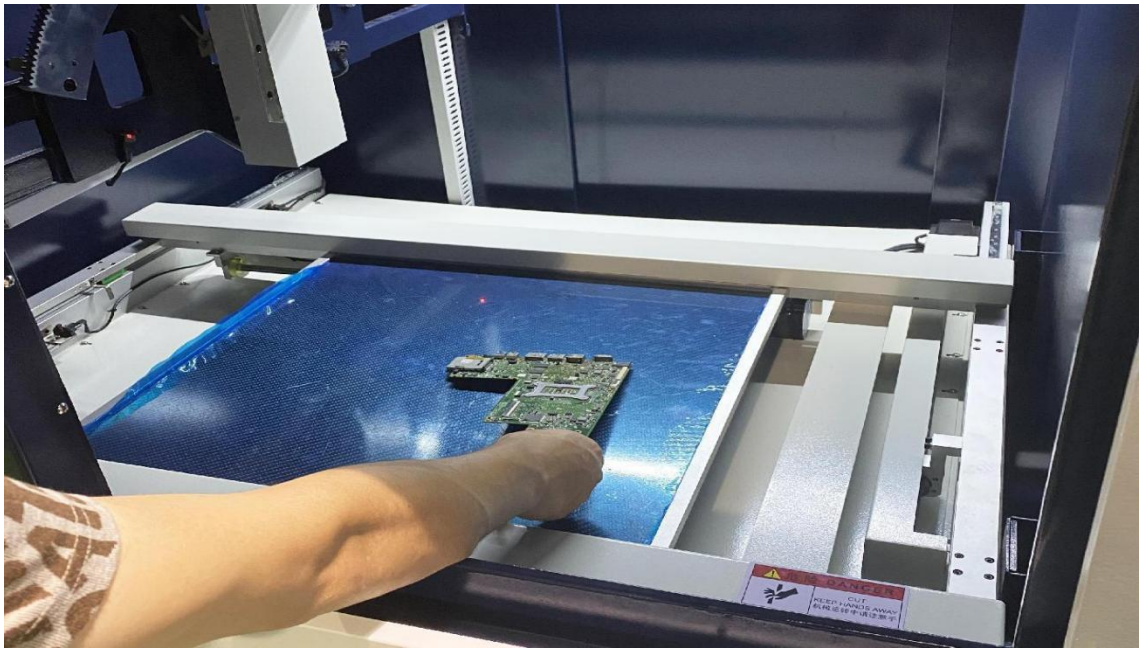


7.Step-by-step Instructions

7.1 Find the desktop X-RAY software icon (see below), double-click the icon shortcut to enter the X-RAY detection system;

7.2 Enter the main interface, click the “X-RAY” button, open the light tube preheating, preheating about 15 minutes, when the three-color light turns green, preheating is complete



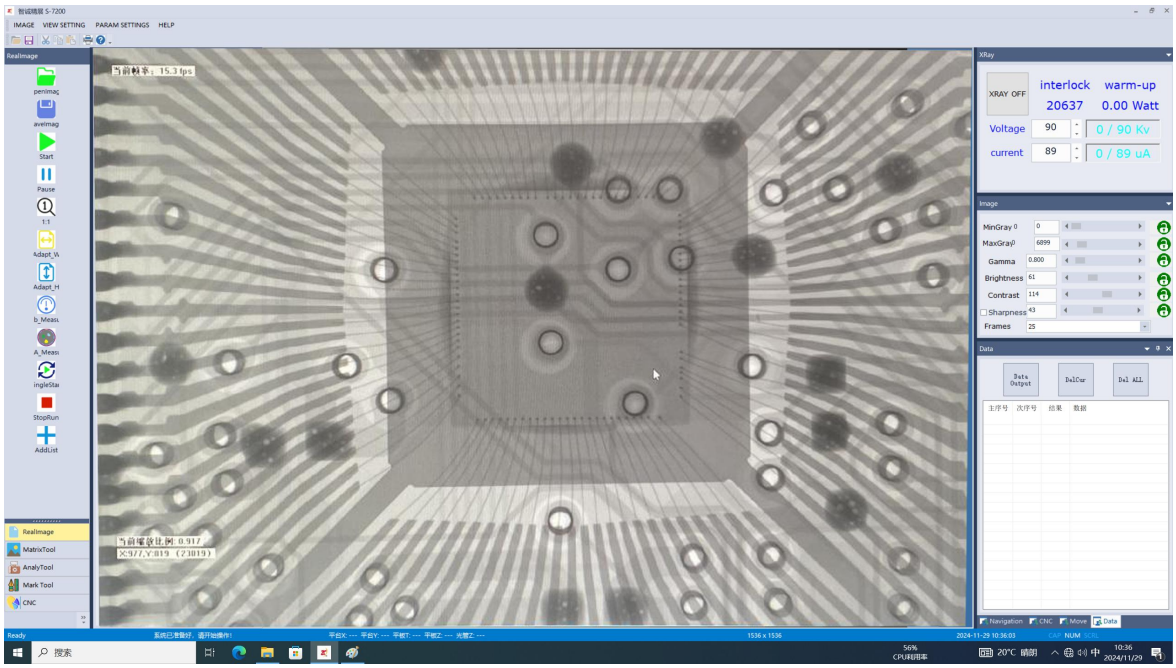


Note: The machine working prompt light, red for working, green for standby, yellow for the safety door is not closed.

7.3 After the preheating is completed, you can open the safety door, put the product to be tested on the carrier table, and then close the safety door.

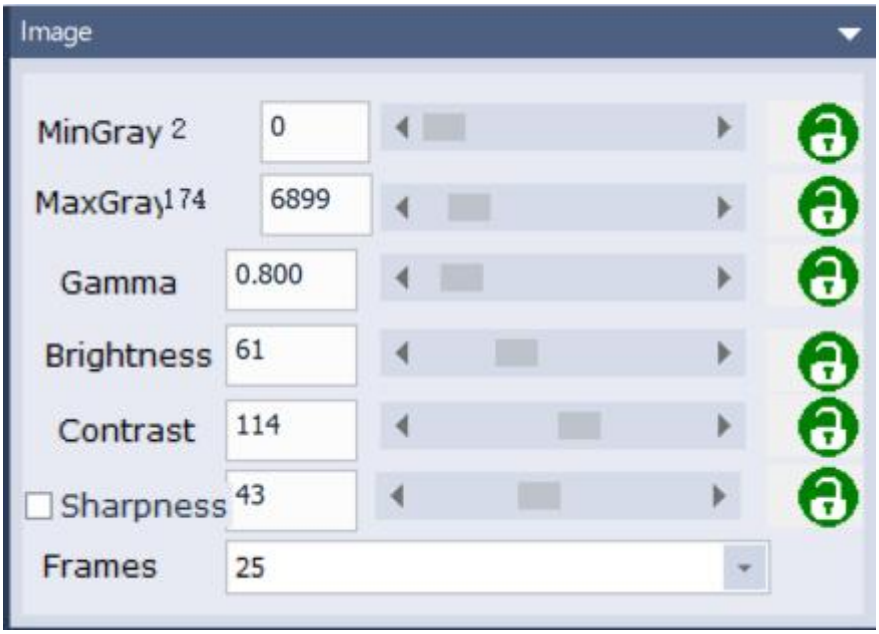
Click the “X_RAY” switch to turn on the light tube;

7.4 Adjust the voltage and current to the appropriate values, and after penetrating the object to be tested, the image of the object to be tested can be seen in the display area.



7.5 Adjust the image size, “Q” “E” controls the flat panel detector to zoom in and out; “Z” 'C' controls the X-ray tube to zoom in and out; adjust the image to the right to size;

7.6 Adjust the contrast and brightness to make the image the clearest; then save the image;



8.Description of the Software Interface

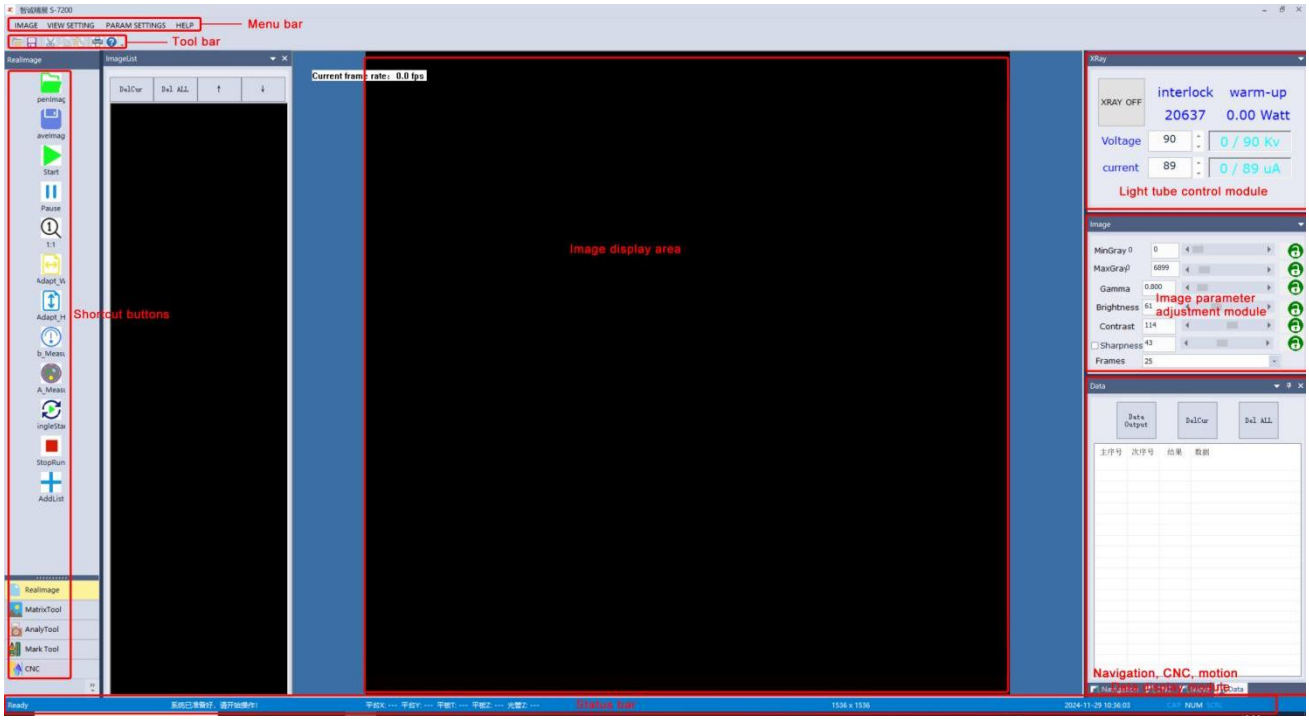


Figure1-1

※Title bar: shows the specific model of the equipment.

Subject to the shipping equipment X-axis: the image moves left and right;

The shortcut keys are: A key moves the image to the left; F key moves the image to the right.

Y-axis: the image moves forward and backward; the shortcut key is: W to move the image upward; X to move the image downward.

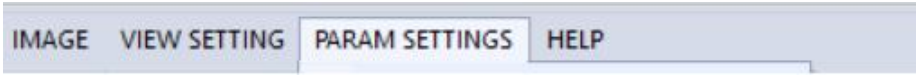
FPD Axis: The FPD axis moves up and down; the shortcut keys are: Q key to decrease the magnification downward; E key to increase the magnification upward.

X-RAY TUBE Axis: The X-RAY TUBE axis moves up and down; the shortcut keys are: C to decrease the magnification downward; Z to increase the magnification upward.

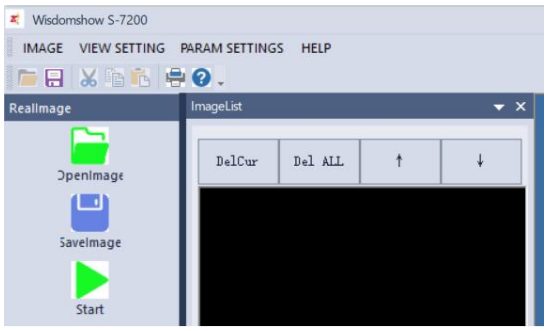
T-axis: T rotary axis movement; shortcut keys are: tilt left; T image tilt right; space bar can realize high, low and medium three kinds of speed switching.

8.1 Menu Bar Description

The menu bar includes Image File, View Settings, Parameter Settings, and Help.



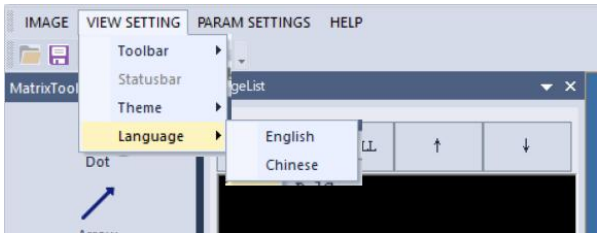
8.1.1 Images Films



Save: Used to save the image

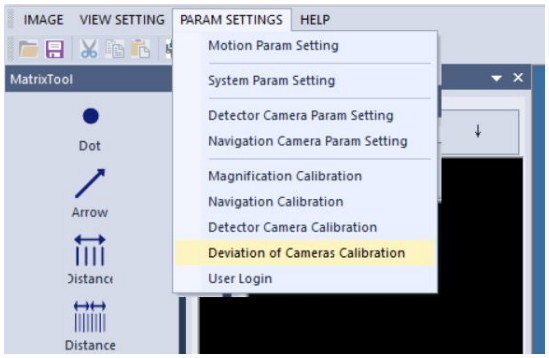
Exit: Click to exit the application directly

8.1.2 View Settings



Language: Used to switch between English and Chinese. If you select English, the application switches to English.

8.1.3 Parameter Settings



1) Motion Parameter Setting: Set the speed, acceleration and deceleration of each axis.
2) System parameter setting: set some global parameters of the software, CNC dwell time, whether CNC image and data are saved and exported, whether the platform returns to the initial position after opening the door.
3) Flatbed camera parameter setting: set the parameters of flatbed camera.

4)Navigation Camera Parameter Setting: Set the parameter of navigation camera.

5)Magnification calibration: This is calibrated by the engineer before leaving the factory, and the customer doesn't need to calibrate it.

6)Navigation camera calibration: used to calibrate the relationship between image and motion position, factory calibrated, customers do not need to calibrate.

7)Flatbed camera calibration: used to calibrate the relationship between flatbed image and motion position, calibrated before leaving factory, customers do not need to calibrate.

8)Calibrate the deviation between cameras: factory calibrated, customers do not need to calibrate.

9)User login: control user authority.

8.1.4 Help

Display the software version, get the serial number and get the number of days the application can still run.

8.1.5 Shortcut Button Description

：Opens an existing image.

：Saves the currently displayed image.

：Clicking this button while the image is paused will display the live image.

：Clicking this button pauses the live image.

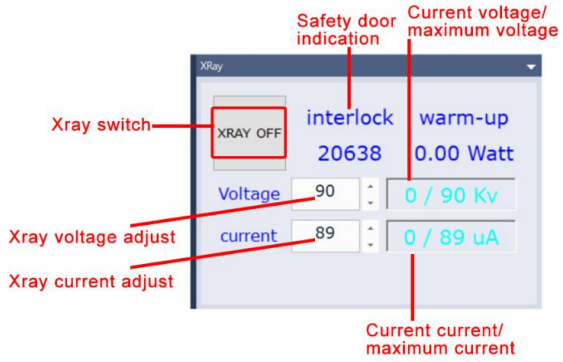

：Click this button when you need to measure bubbles.


：Click this button when you need to measure the air bubbles of a tin ball.

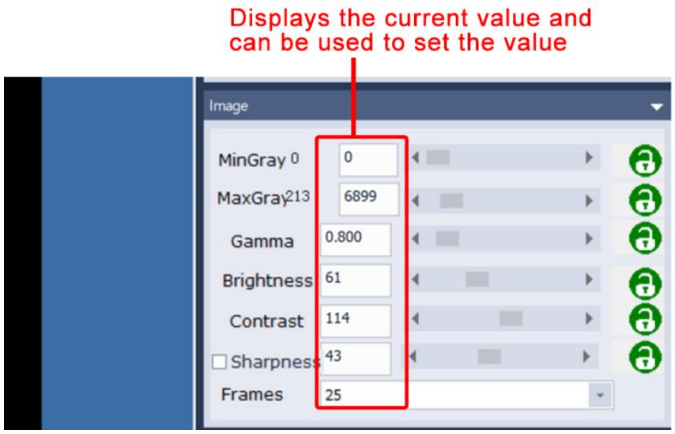

：Click this button to run the CNC process.


：Click this button to exit the CNC process.

8.1.6 Xray Module



8.1.7 Image Parameter Module



Minimum gray scale: normally 0, can be set as required.

Maximum gray scale: normally between 3000-5000 can meet the requirements, can be set as needed.

Gamma: generally about 0.5, can be set as needed.

Brightness and contrast, generally the value of contrast is greater than the value of brightness. Set as needed.

Sharpness: optional, moving process, it is best not to check, check the box, the image shows a drop in frame rate, still look at the effect and then check. Enhance the image sharpness, make the image clearer.

: The variable cannot be changed if the button is locked. To change it, you must unlock it.

8.2 Measurement Functions

8.2.1 Bubble Measurement

Click the button in the shortcut button to pop up the measurement parameter setting dialog box. As in Figure 2-1:

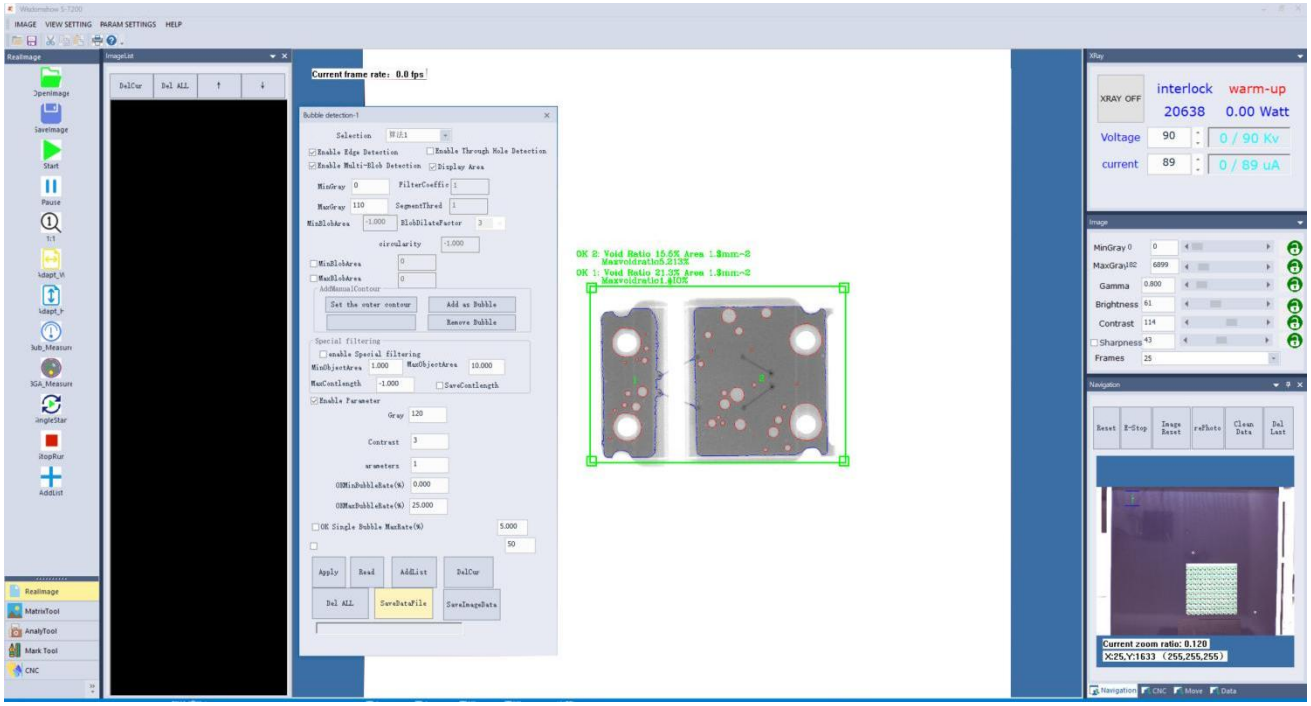


Figure2-1

Parameter setting instructions:

1. Algorithm selection: default algorithm 1. mainly use algorithm 1.

2. Enable edge detection to be checked.

3. Check Enable Multi-Blob Detection to measure multiple target bubbles, unchecked, only test the largest one selected.

4. Minimum gray scale: generally 0.

5. Maximum gray scale: set according to the solder gray value. Generally between 100-180.

6. Set to Outline: Used to measure the bubble of irregular solder. Draw the measurement area first, then click Set as Outline.

7. Add as bubble: When the measurement process, by adjusting the parameters, there can not be detected bubbles, and the bubble must be calculated, the first manual animation out of the bubble

area, and then click on Add as bubble can be.

8. Eliminate bubbles: In the measurement process, by adjusting the parameters, there are still bubbles that are not part of the bubble, which are recognized as bubbles, then manually animate the part of the bubble to be eliminated, and then click on Eliminate Bubbles.

9. Check the startup parameter setting.

10. Gray scale: this value, generally the pixel width of the largest bubble in the measurement area. When setting this value, first set the contrast and filter value both to 1, change the grayscale value until most of the target bubbles are found, then adjust the contrast and filter value.

11. Contrast: adjusted according to the results of the grayscale parameter adjustment, not easy to be too large, within 10, the value from small to large slowly debugging.

12. Filtering: adjusted according to the results of the grayscale parameters, mainly filter the smallest bubbles. The value is slowly adjusted from small to large.

13.OK minimum bubble ratio: generally 0.

14.OK maximum bubble ratio: according to demand, generally 20% -30%.

15.Ok individual bubble ratio: limit the target, the largest bubble can not exceed the value, more than the judgment is NG.

16. Apply: perform bubble measurement.

17. Read: Import parameter file.

18. Delete Current: Delete the current measurement result.

19. Delete All: Delete all measurement results.

20. Save Data File: Save parameters for CNC.

21. Save Image: Save the result image.

8.2.1 BGA Measurement

Click the button in the shortcut button to bring up the measurement parameter setting dialog box. As in Figure 2-2:

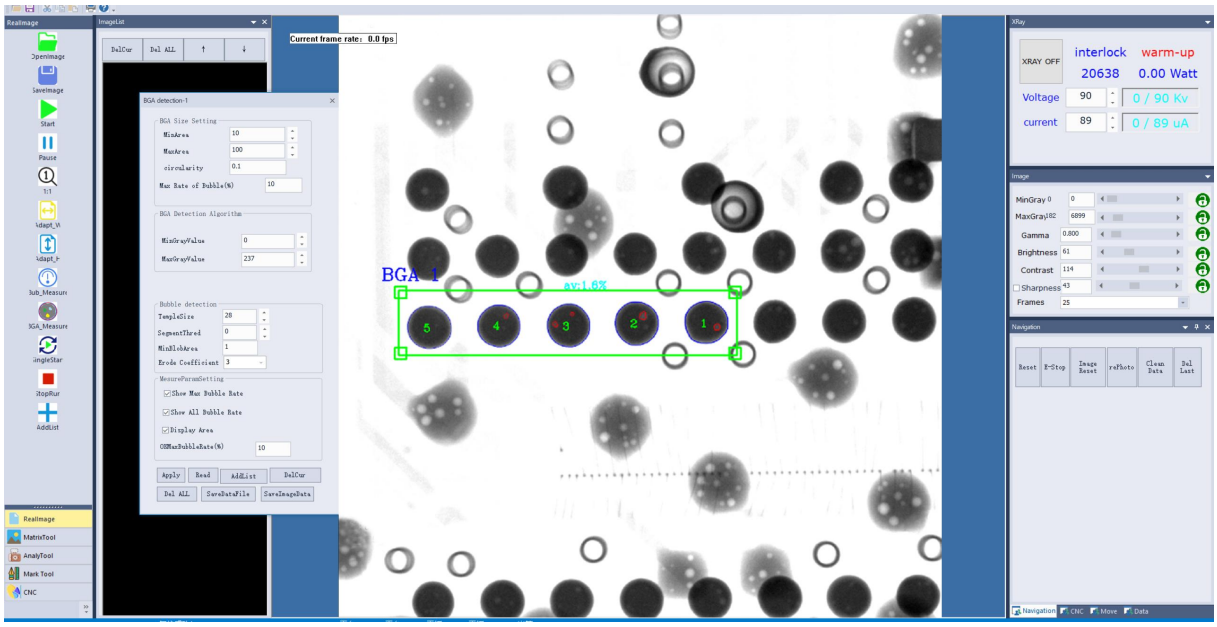
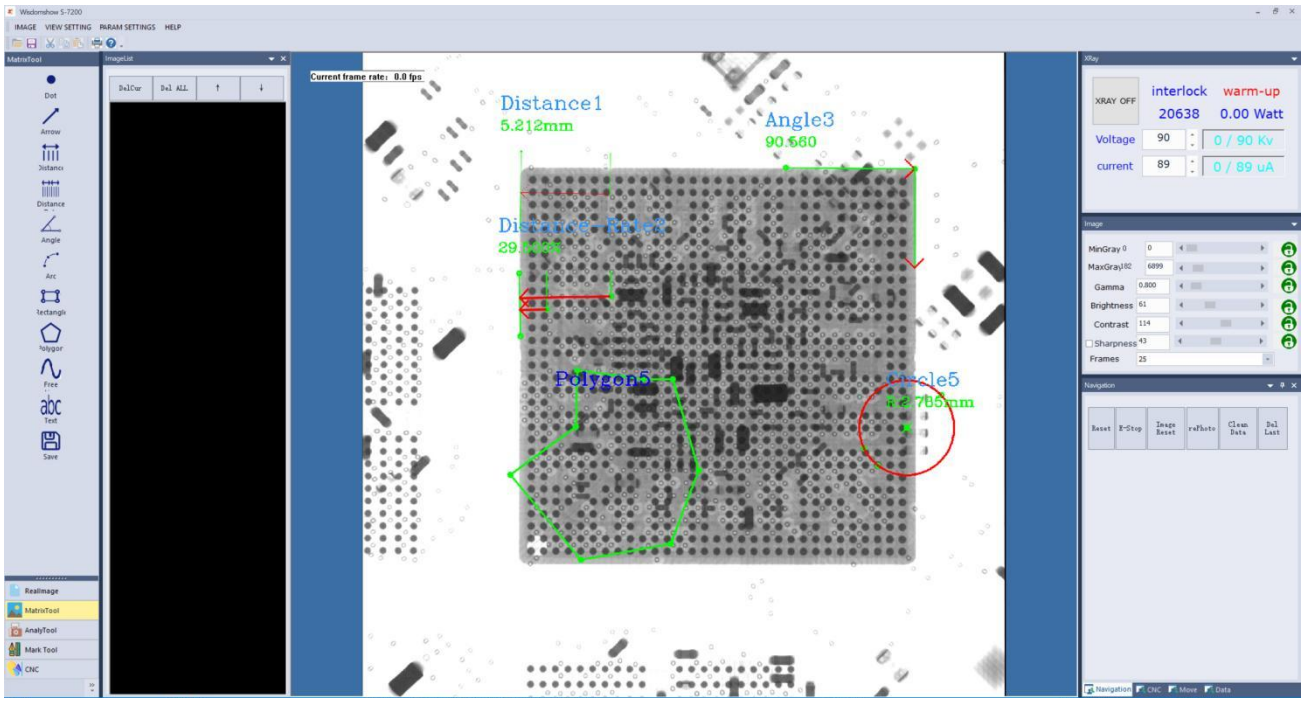


Figure 2-2

This function is mainly used to detect the bubble ratio of tin balls. The detection of each tin ball is marked in passing and the result is displayed in the data dialog on the lower right side.
The parameters are described as follows:

1. Minimum area: screen the tin balls and limit the minimum pixel area.
2. Maximum area: Filter the solder balls and limit the maximum pixel area of the balls.
3. Roundness Factor: Filter the tin ball, limit the roundness of the tin ball, the closer the tin ball is to a circle, the larger the value is, the maximum is 1, the minimum is 0.
4. Maximum Bubble Percentage: Filter the tin ball, filter the tin ball whose bubble percentage is larger than this value.
5. Minimum gray: the minimum gray value of the tin ball, generally 0.
6. Maximum gray scale: the maximum gray scale value of the tin ball. Set according to the gray value of the tin ball. The blacker it is, the smaller the gray value.
7. Template size: generally close to the size of the radius pixel of the tin ball.
8. Segmentation Threshold: the adjustment parameter needs to start from 1, and gradually increase to see the effect.
9. Minimum bubble: filter the smaller bubbles in the tin ball.
10. Corrosion factor: generally choose 3.
11.OK maximum bubble ratio: more than the value of the tin ball, set to NG.
12. Apply: perform bubble measurement.
13. Read: Import the parameter file.
14. Delete Current: Delete the current measurement result.
15. Delete All: Delete all measurement results.
16. Save Data File: Save the parameters for CNC.
17. Save Image: Save the result image.

8.3 Dot Matrix Tool Usage



Distance measurement: Click Distance ,then drag the mouse over the image. Draw 2 lines with the mouse. As above.

Angle Measurement: Click Angle ,then drag the mouse on the image and point 3 dots with the mouse as shown above.

Circle: Click Arc ,then drag the mouse on the image and point 3 points with the mouse.

Line segment ratio: click Distance Rate ,measure the ratio of 2 line segments.

Irregular polygon: click Polygon , draw as many polygons as needed, and finally click the mouse to right click to end.

8.4 CNC Use

8.4.1 CNC Production

To make CNC, you need to click the button in the navigation dialog box to complete the reset of the system, then turn on the light pipe, move the target to the plate, adjust the height of the light pipe and the plate to the appropriate height, so that the measurement target can be clearly seen, and easy to measure. Then start to produce CNC process, CNC process production is divided into two cases:

1. CNC points are not regular; 2. There is a regular CNC points, CNC points into the shape of an array.

1. CNC points are not regular
In this case, you need to make each point individually. The production steps are as follows:
Step 1: Prepare the detection algorithm file (if you only take the map and do not need automatic detection, then ignore this step).
Open the bubble measurement or BGA measurement. Figure 2-3 below:

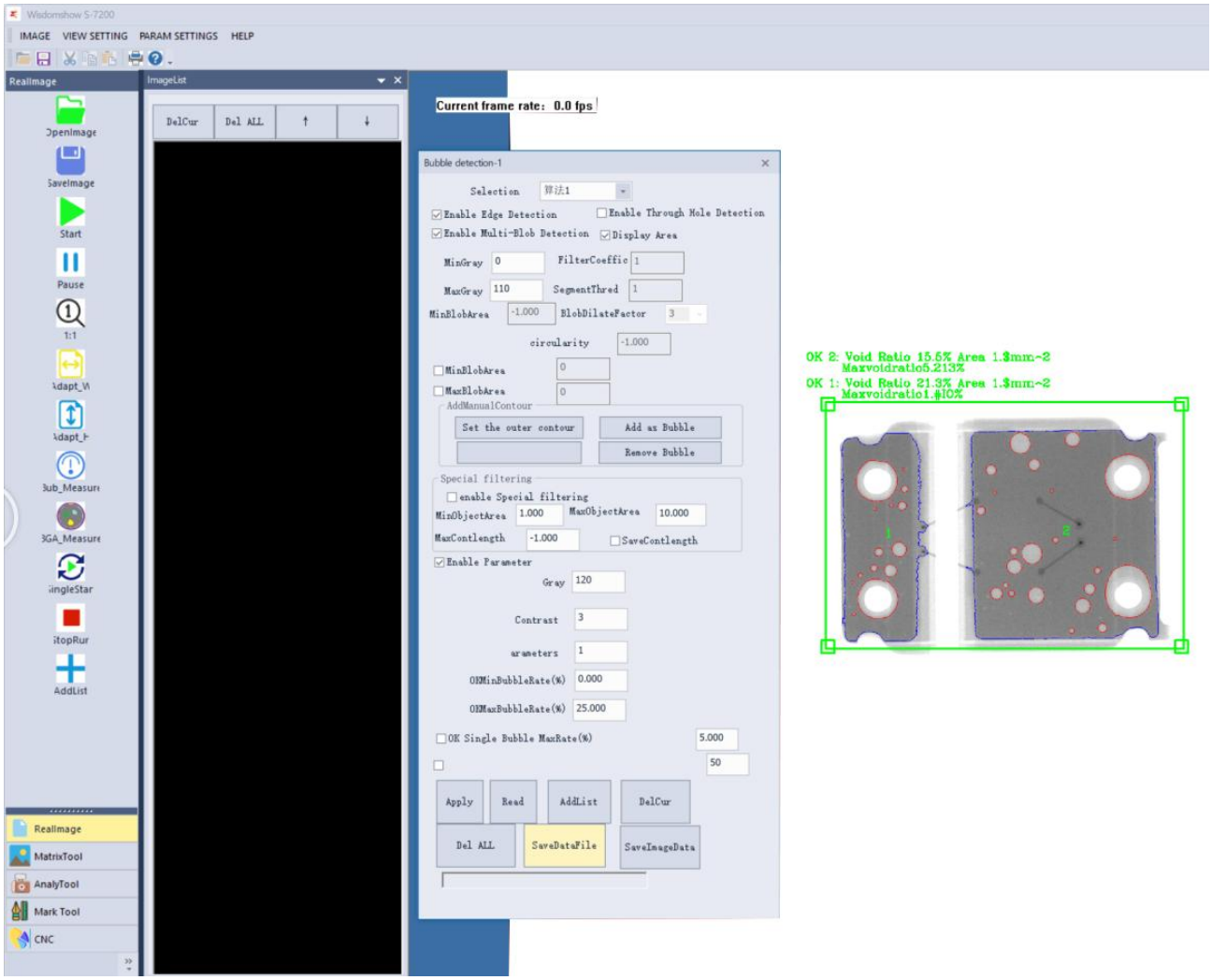


Figure2-3

Adjust the parameters so that they meet the measurement requirements. Then click to save the data file, such as 555.xml can be.
Step 2: Click CNC as below Figure 2-4

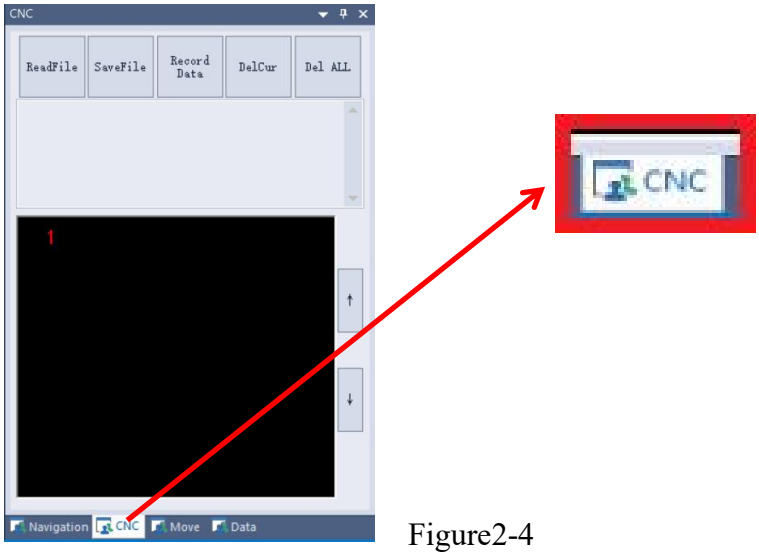


Figure2-4

First, move the object under the flatbed so that the measurement target is near the center of the image. Adjust the image parameters so that the measurement target has the best contrast, clarity.

Then, click the Record Data button 

,and the following dialog box, Figure 2-5, pops up.

If you need to detect automatically, judge NG, OK, you need to select the corresponding file in the algorithm list 

.Then click the button in the dialog box to complete a point production.

If you don't need to detect automatically, judge NG, OK, you don't need to select the corresponding file in the Algorithm list, just click the button.

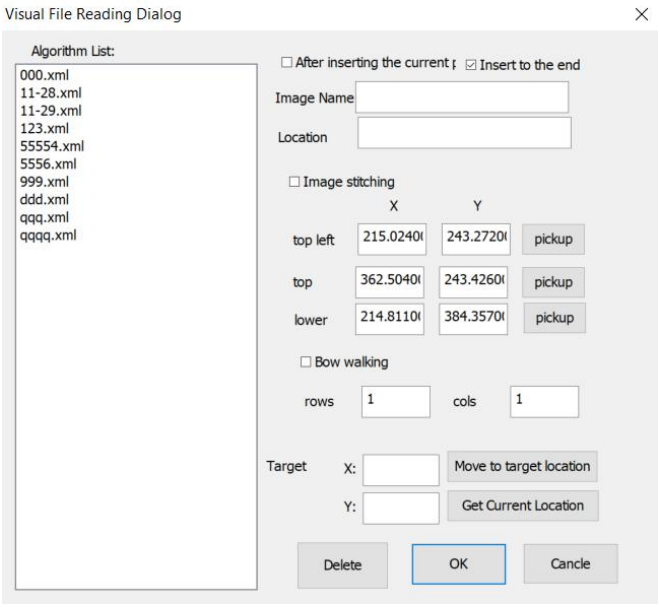
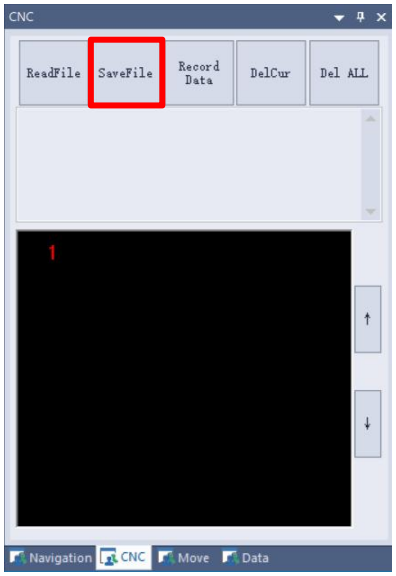


Figure2-5

Step 3: Move the platform and move the next spot under the flat surface and just repeat step 2. Until all the points are made.

Step 4: After finishing all the points, click save file, input the name of saving CNC process, and then, CNC production is finished.



2. Regular CNC points, CNC points into an array shape.

When the points to be traveled are in array shape (i.e., similar rows with the same spacing and columns with the same spacing), use this way to create the CNC process as shown in Figure 2-6 below (4 rows and 4 columns):

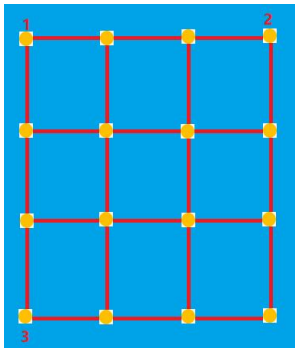


Figure2-6

Step 1: Prepare the detection algorithm file (ignore this step if you only take the diagram and do not need automatic detection).

Open bubble measurement or BGA measurement. As in Figure 2-3.

Adjust the parameters to meet the measurement requirements. Then click save data file, such as 555.xml can be.

Step 2: Click CNC, as in Figure 2-4.

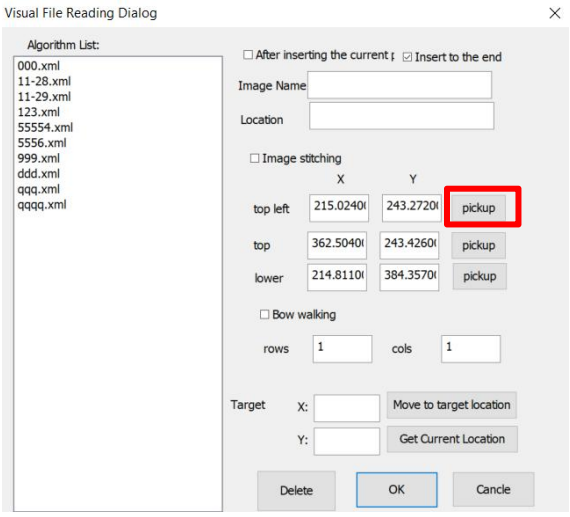
First, move the object under the plate so that the measurement target is near the center of the image. Adjust the image parameters so that the measurement target has the best contrast and clarity.

Then, click the Record Data button 

, and a pop-up will appear as shown in Figure 2-5.

If you need to auto-detect, judge NG, OK, you need to select the corresponding file in the algorithm list.If you don't need auto-detect, judge NG, OK, then you don't need to select the corresponding file in the algorithm list.

Step 2: Move to the upper left corner position of the target, such as position 1 in Figure 2-6. Find the center. Click the pickup button behind the upper left corner to get the current position. Figure 2-7 below.



Step 3: Move to the upper right corner position of the target, such as position 2 in Figure 2-6. Find the center. Click the pickup button behind the upper right corner to get the current position. Figure 2-8 below.

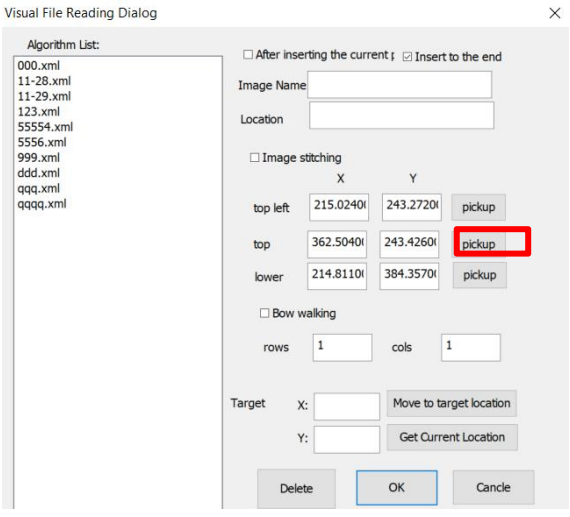


Figure 2-8

Step 4: Move to the lower right corner position of the target, such as position 3 in Figure 2-6. Find the center. Click the pickup button behind the lower right corner to get the current position. Figure 2-9 below.

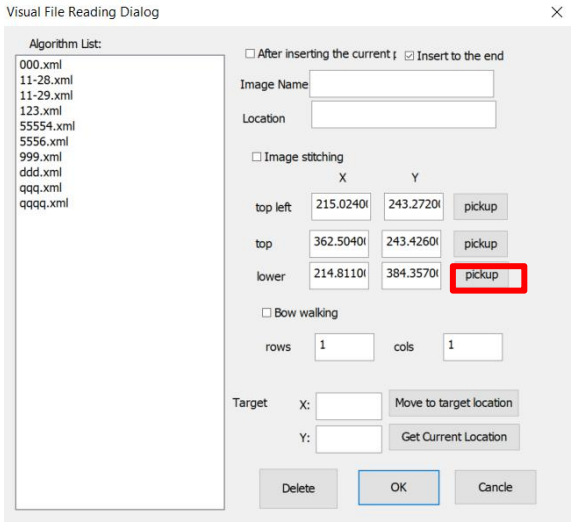


Figure 2-9

Step 5: Set the number of rows and columns of the target. As in Figure 2-10.

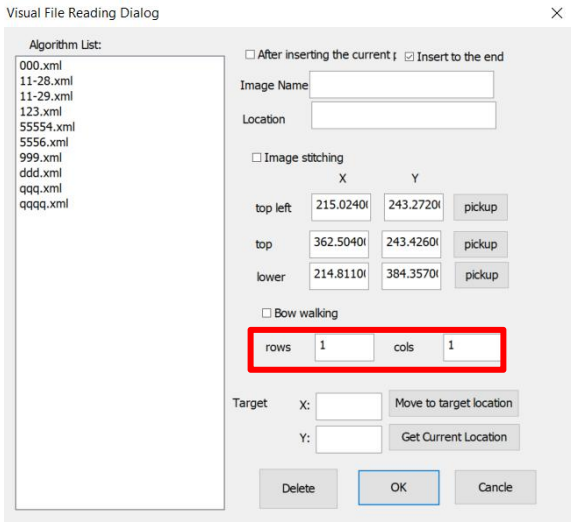


Figure 2-10

Select whether or not to bow alignment. If not selected, the CNC alignment goes as in Figure 2-11.

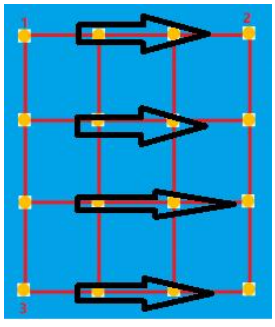


Figure 2-11

If you choose the bow alignment, the CNC alignment will be as shown in Figure 2-12.

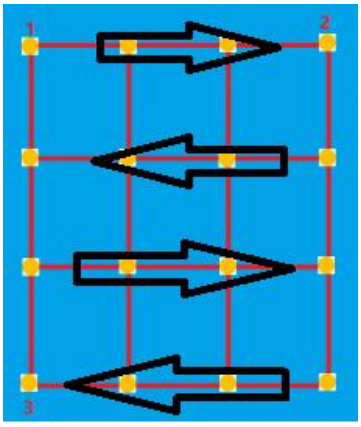


Figure 2-12

Step 6: If you need to auto-detect, judge NG, OK, you need to select the corresponding file in the algorithm list. Then click the button 

in the dialog box to complete all the points.

If you don't need to auto-detect, judge NG, OK, then you don't need to select the corresponding file in the Algorithm list, and you can click the button 

directly to finish all the points.

Step 7: After completing all the points, click Save File and input the name of the saved CNC process, then the CNC production is completed.

8.4.2 CNC Run

After making and saving the CNC process, to run the CNC process, first click the Read File button, as in Figure 2-13.

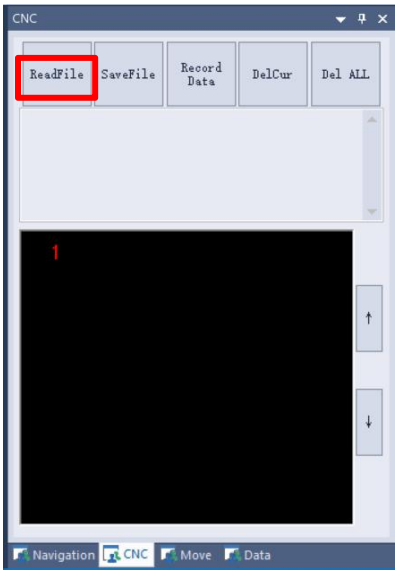


Figure2-13

After reading successfully, then click Run button. The run button is in the shortcut button CNC's single start or the single start button in the real-time image. As Figure 2-14

Figure 2-14

End CNC running, click the shortcut button CNC's stop running or the stop running button in the real-time image can be.

9.Motion Control

9.1 Motion Shortcut Keys

A key moves the image to the left;

F key moves the image to the right. **Plate X**

W key moves the image up;

X key moves the image down. **Plate Y**

Q key decreases downward magnification;

E key increases upward magnification. **Flatbed Z**

C key decreases the downward magnification;

Z key increases the upward magnification. **Light tube Z**

T tilts the image to the left;

R tilts the image to the right. **Flatbed T**

9.2 Axis Parameter Setting

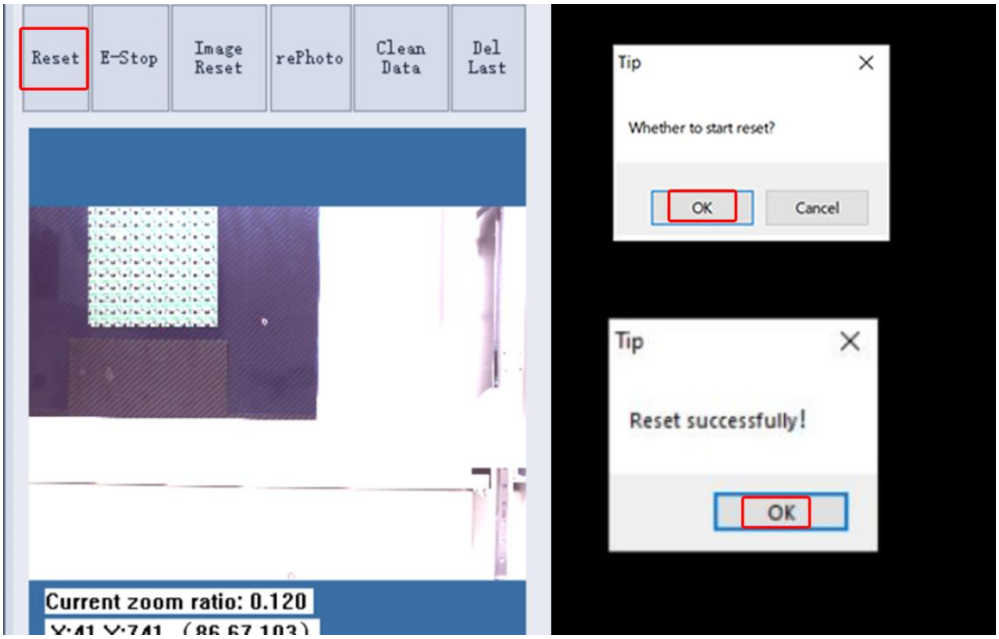
X-RAY detects 5-mode operation, Z-axis, Y-axis, T-axis, Z1-axis, Z2-axis

9.3 Navigation

Emergency Stop Button: Emergency stop motion; during motion or CNC automatic testing, if you encounter the need to stop immediately, you can click this button to let the device stop motion and testing.

Reset button: back to the original point Status button: back to the original X,Y,X_ray, camera coordinates back to the initial position, urgent clear data.

Delete last button: all clear the data measured on the picture.



10.Description of Machine Parts

1： machine work prompt light, red for work, green for standby, yellow for the security door is not closed.

2：computer monitor.

3: safety door, can be observed through the lead glass on the machine workbench.

4： Emergency stop.Key switch to control the power supply of the machine.Computer start button.Lighting button to turn on the machine lighting. usb interface is convenient to test out the data.

5：Mouse, keyboard

6：Computer host and machine circuit .

7：machine total power supply.

11.Equipment Note

Operating Precautions(I)

Precautions:

1）CCD lens focus can not be adjusted at will.

2）the working voltage is generally between 60KV and 90KV, the current in the range of 0.08mA use, the voltage is generally not more than 90KV

3）the optical tube part can not go to contact, avoid X-ray tube part from other items impact and vibration.

4）Lead glass can not be replaced by ordinary glass when it is damaged, please contact the manufacturer.
5）The machine has 90KV high voltage inside, the ground wire must be connected firmly.
6）When stopping the test, try to put X-RAY in OFF state.
7）X-ray tube open state can not open any door.
8）Can not adjust the current and voltage, please notify the manufacturer in time.

Operation Precautions (II)

X-Ray machine has 90KV high voltage inside, all the high voltage circuit current over into the earth, so there must be a good independent grounding wire. The machine must be connected to the ground wire before use after new installation or moving the machine. The machine is not grounded or grounding does not meet the requirements and damage, the machine is not suitable for warranty!

Grounding requirements: resistance not greater than 4 ohms when connected to earth. Grounding must be greater than or equal to 2.5mm2 multi-core soft copper wire.

Grounding must lead from the distribution line grounding copper row, no branch connection in the middle. The grounding wire must be yellow and green.

Thank you very much for ordering our X-ray products. Before the installation of the equipment, the use of the environment of the equipment is specially required as follows:

Placement of the ground requirements: placement of the equipment should be a solid foundation, preferably reinforced concrete structure, the ground must be able to withstand the pressure of 800-1000 kg / square meter. The ground should be smooth and easy to clean.

The temperature of the room where the equipment is installed should be kept between 0℃-35℃. The relative humidity of the room should be controlled between 40% - 60%. It must be pointed out that the greater humidity on the equipment is very harmful, it will make the equipment's optical system moisture, mechanical parts rust, circuit board short circuit.

Placement of equipment around the space should be left for heat dissipation and maintenance. Generally, the space around should not be less than 800mm. it must be emphasized that the equipment must have a good grounding, otherwise the parts are easy to damage.

The equipment requires high air cleanliness, serious dust or corrosive substances will affect the clarity of the optical system and mechanical transmission accuracy.

Official website QR code

Public QR code

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