

## **User Manual Of Einscan-Pro**

### **Brief Introduction**

1. PC Configuration
2. Software interface
3. Calibration
4. Fix Scan
5. Handheld HD Scan
6. Handheld Rapid Scan
- 7.FAQ

## PC Configuration

System Requirement: Before you use the scanner, please make sure the PC Configuration shall be not lower than the following specifications:

CPU: I7 or Higher

Display card: NVIDIA GTX660 or higher

Display memory: >2G

Memory Storage: 16G or more

Operation System: Testing model only runs under Win10, 64bit. (The formal released version could run under Win7, Win8 64bit)

Model	Einscan-Pro			
Scan Mode	Handheld HD Scan	Handheld Rapid Scan	Auto Scan	Free Scan
Accuracy	0.1mm	0.3mm	Single Scan Accuracy: 0.05mm	Single Scan Accuracy: 0.05mm
Scan speed	15 frames/sec	10 frames/sec	Single Scan: <2sec	Single Scan: <2sec
Point distance	0.2mm~2mm	0.5mm~2mm	0.16mm	
Single Scan Range	210*150mm			
Light source	White light LED			
Part Size Range (Recommend)	0.03m~4m	0.15m~4m	0.03m~0.15m	0.03m~4m
Align Mode	Mark Point Align	Feature Align	Turntable Align	Compatible: Mark Point Align Feature Align Turntable Align
Texture Scan	No	Yes (texture scan camera and software module shall be bought)		
Outdoor Operation	No (affected by strong light)			
Special Scan Object	--	Rich Surface Feature needed	--	--
	For transparent, reflective and dark object, please spray powder first before scanning			
Printable Data Output	Yes			
Data Format	OBJ, STL, ASC,PLY			
Scan Head	0.8KG			

Weight	
System Support	Win7/Win8/Win10 64bit

Using the scanner under good ambient light indoors similar as other structure light scanner. While scanning transparent, reflective, or black object, we advise to coat them with powder or a special anti-glare spray for a better scanning quality.

## Device Installment

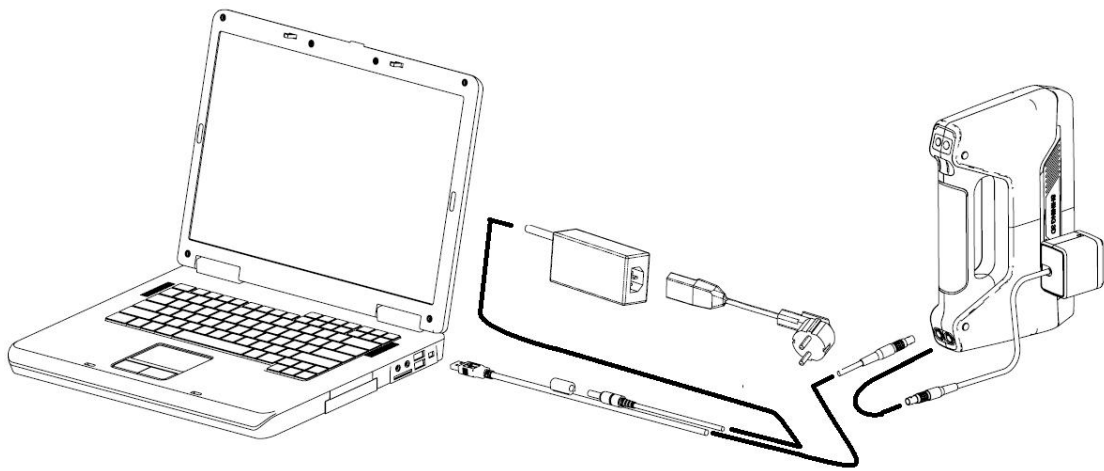
### 1. Device list

Item		Quantity	Unit
Basic Version	Scan head	1	set
	Adapter	1	pc
	Power line	1	pc
	Aviation plug	1	pc
	Calibration board	1	pc
	Mark points	1	set
	Installation Guide	1	pc
Industrial Pack (add-on module)	Turntable	1	pc
	Tripod	1	pc
	Scan head tray	1	pc
	USB line	1	pc
	Power adapter	1	set
	Power line	1	pc
Color pack	Texture camera	1	pc

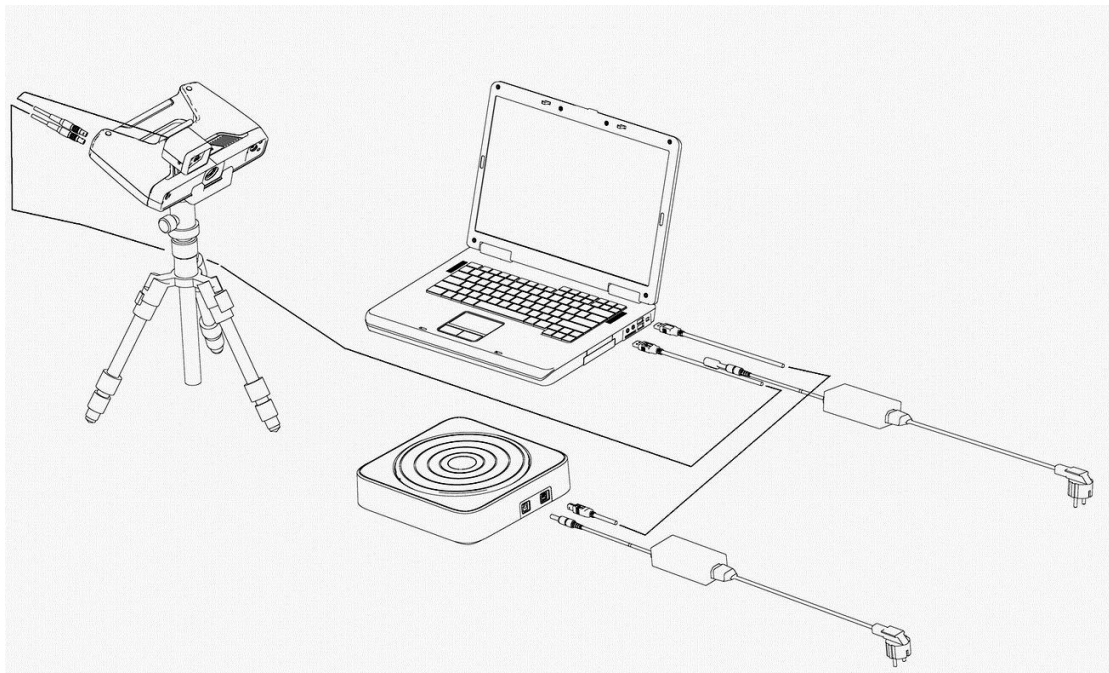
(add-on module)			
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## 2. Hardware Installation

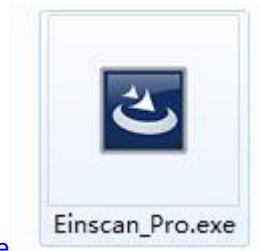
(1) Basic Module: Connect one end of the line to the scanner, the other end to power line and USB on the computer as shown in the picture. Connect to USB2.0 or USB3.0. (This installation mode is suitable for Handheld Scan.)



(2) Industrial module installation: Put the basic module on the tripod when the installation finishes. Connect the long-opening end of USB line to the computer, the square-opening end to the turntable. Then connect the power adapter to the turntable and adjust the position of scan head and turntable. (This installation mode is suitable for Fixed Scan.)

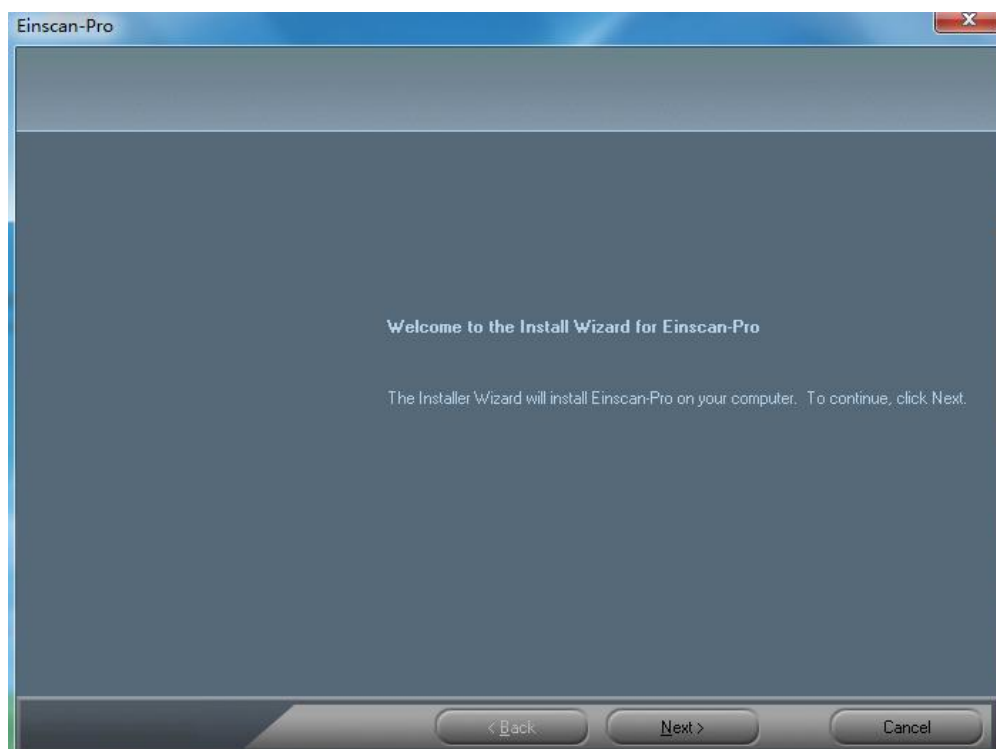


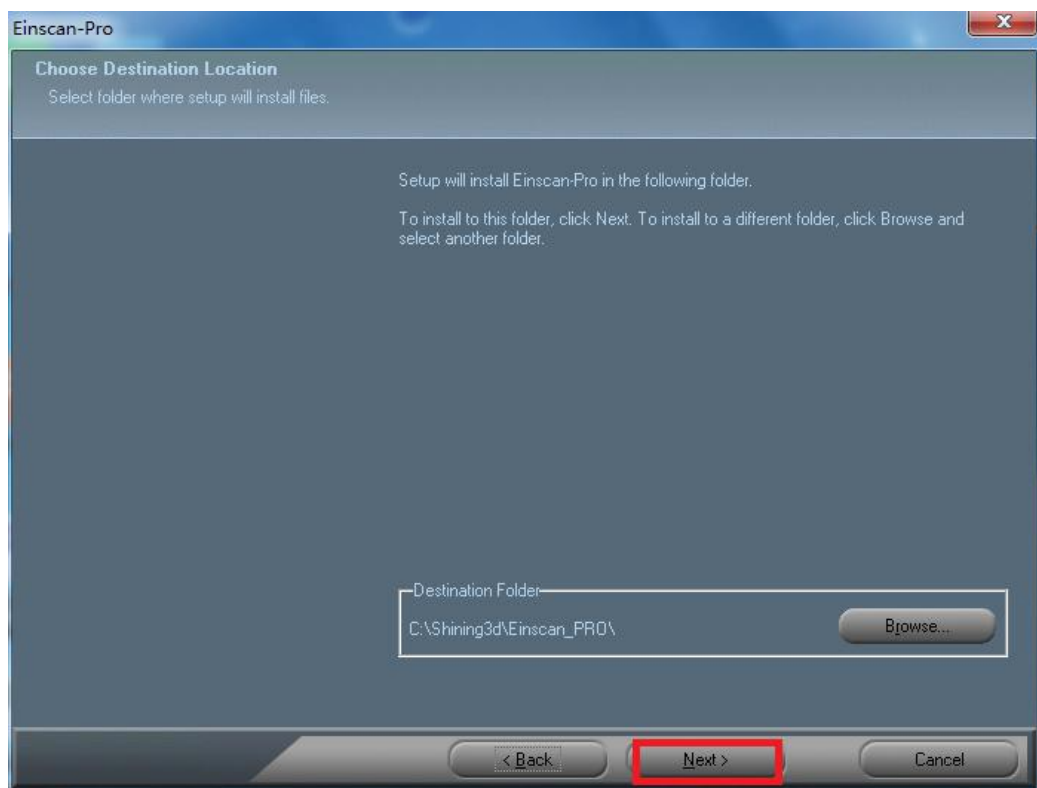
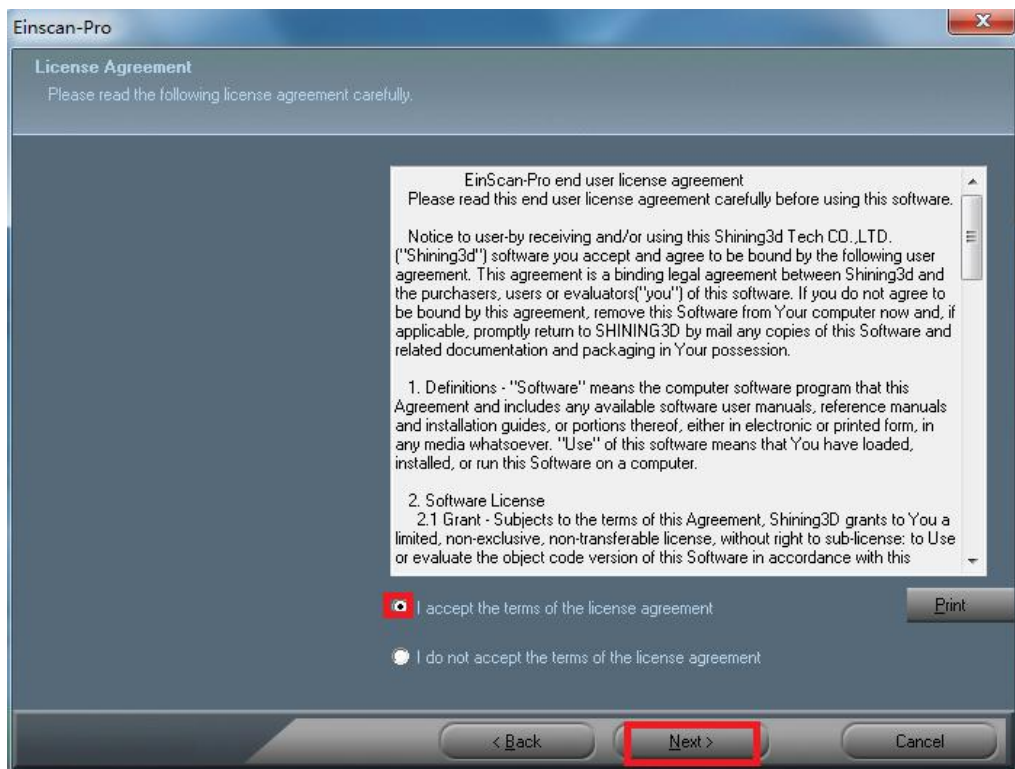
### 3. Software installation



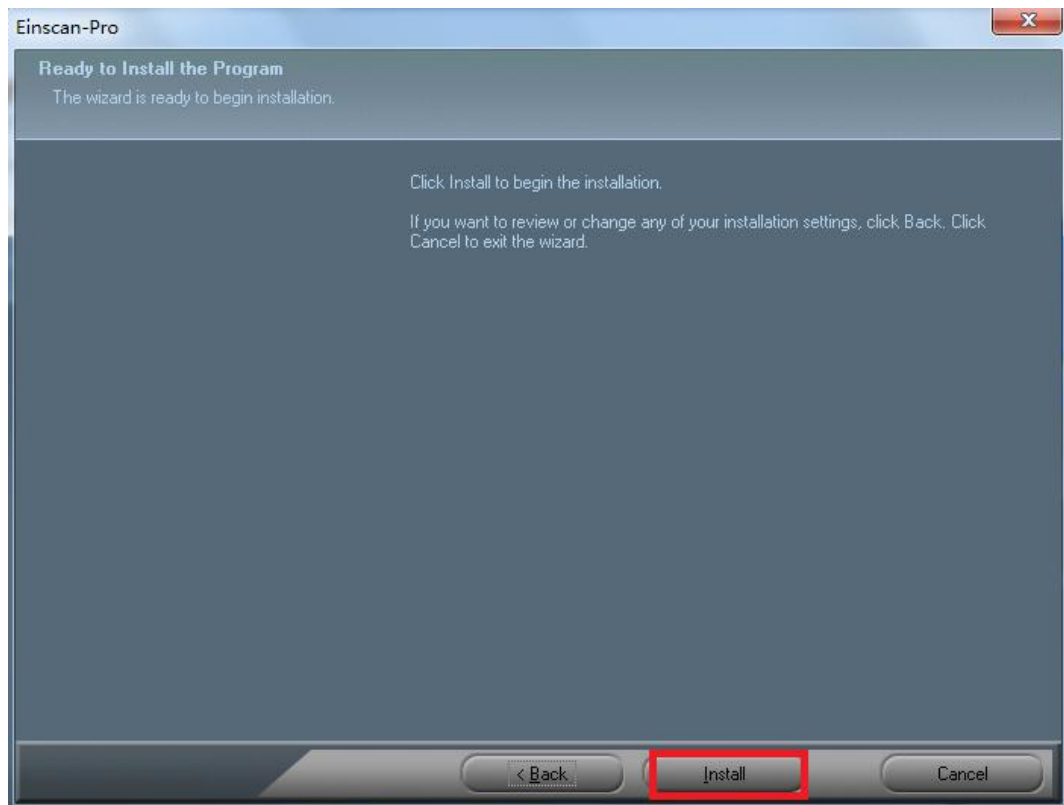
First, double click [Einscan Pro.exe](#)

Follow the instructions as the window pops up like the below pictures shown:

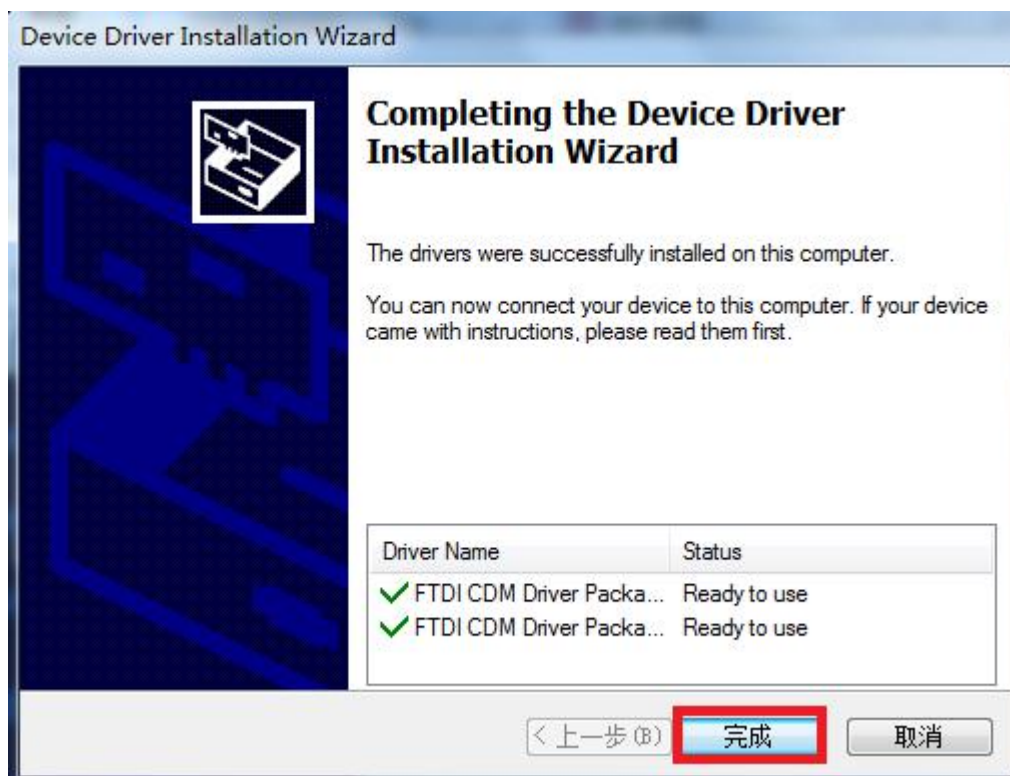
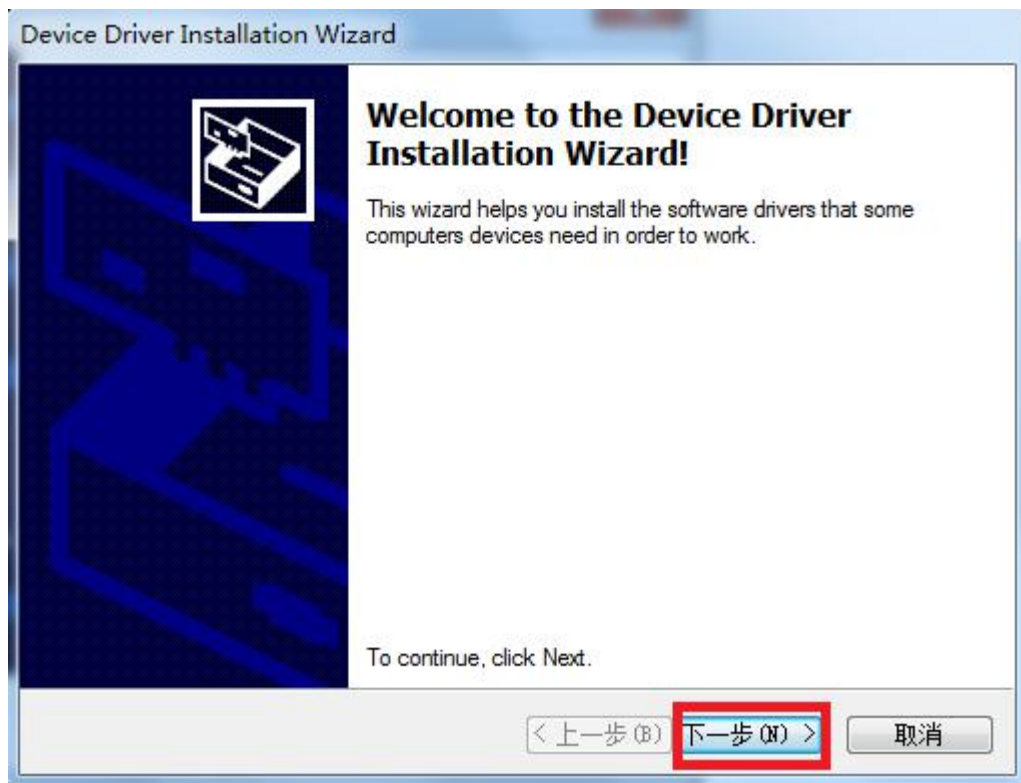




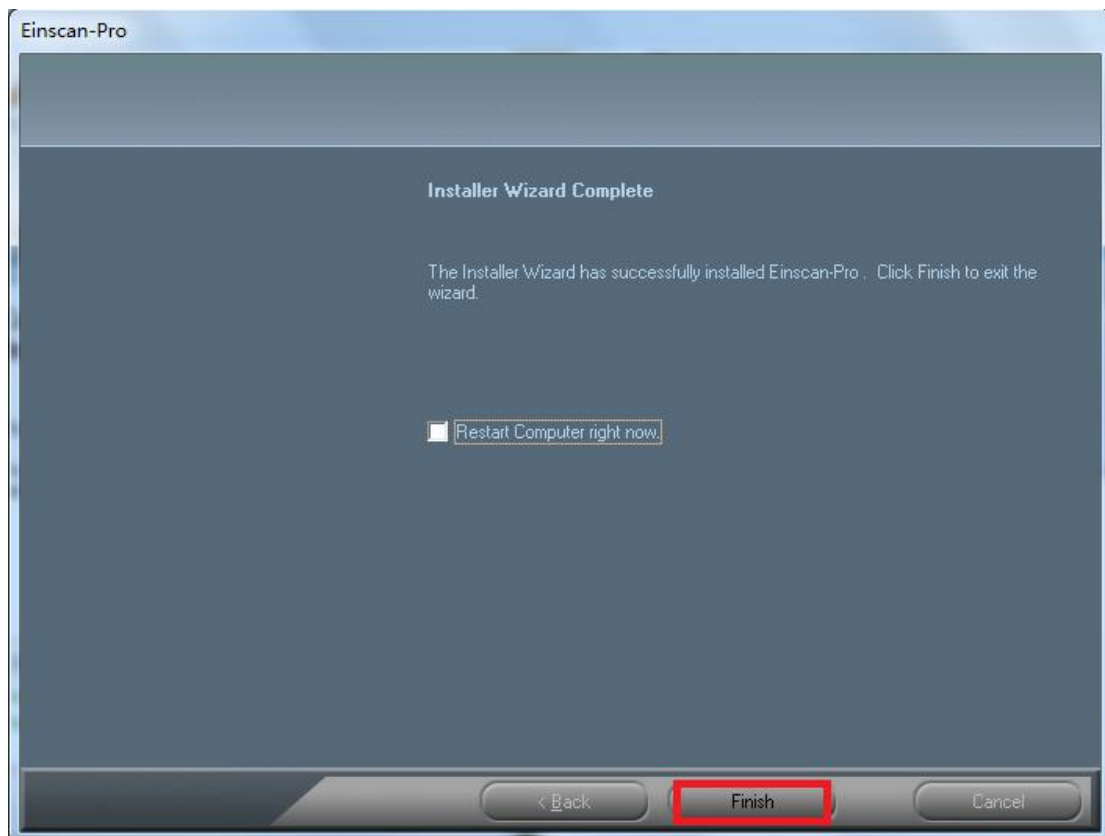
Users can either choose the default installation path or click the Browse button to select the installation path. Default installation is suggested. Click Next to install.







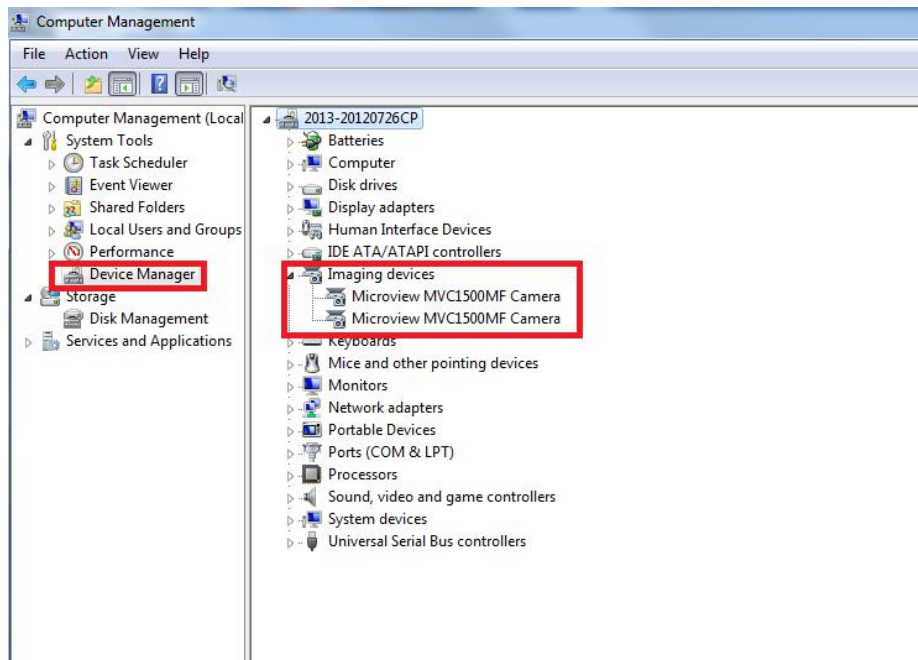




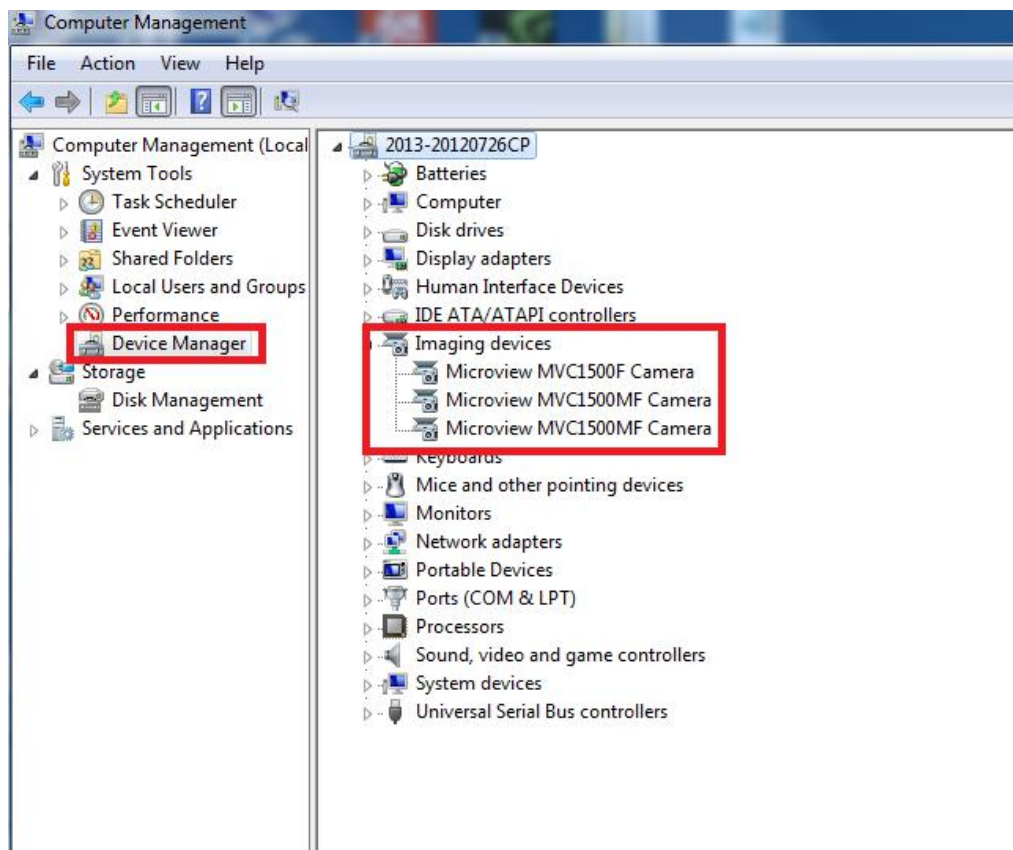
When installation is finished, there will be a shortcut of the software on the desktop, as shown below.



In the next step, we need to check whether the camera driver installation is successful, right click "Computer", choose "Computer Management"- "Device Management"- "Imaging devices" to check if the two cameras display normally (two cameras will be found when there is no color module).



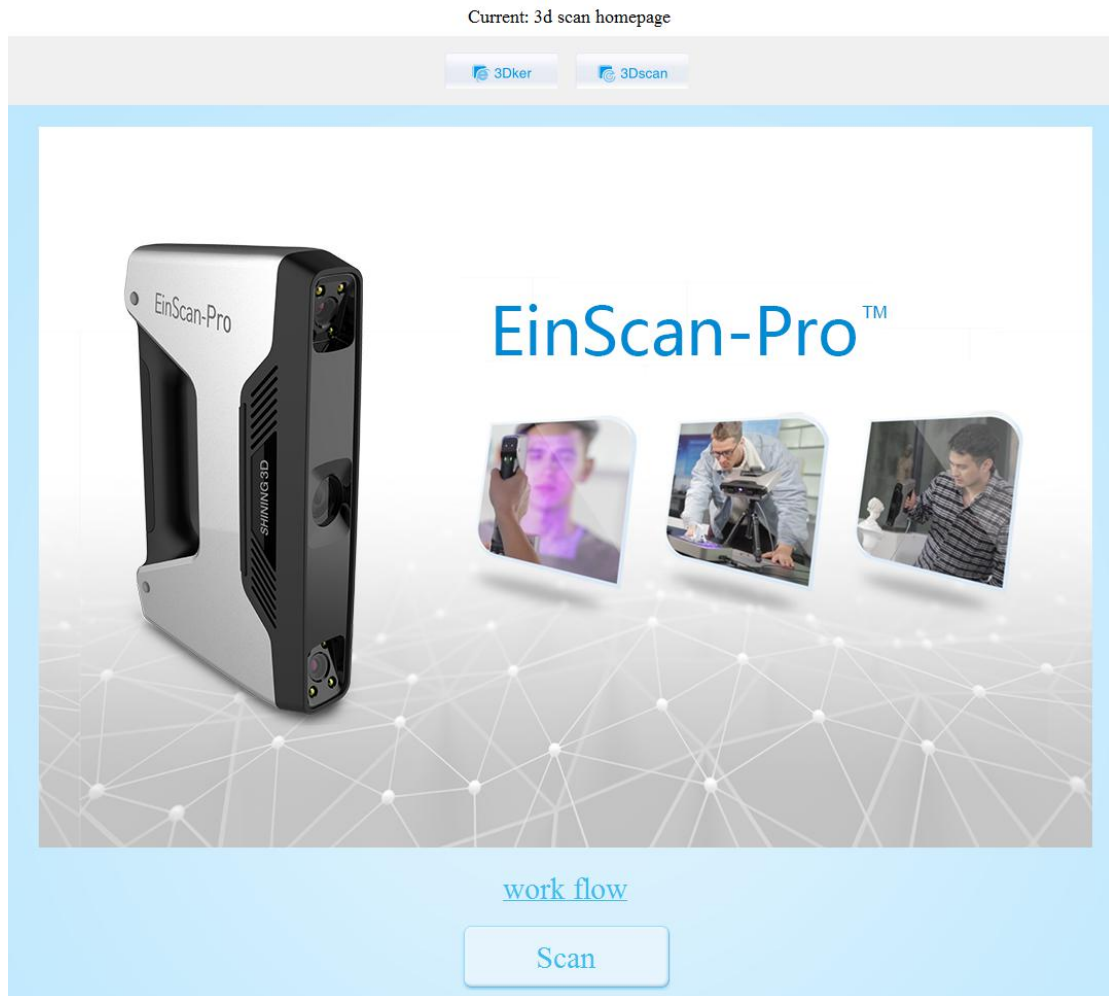
When there is color module, check if there are three cameras, as shown below.



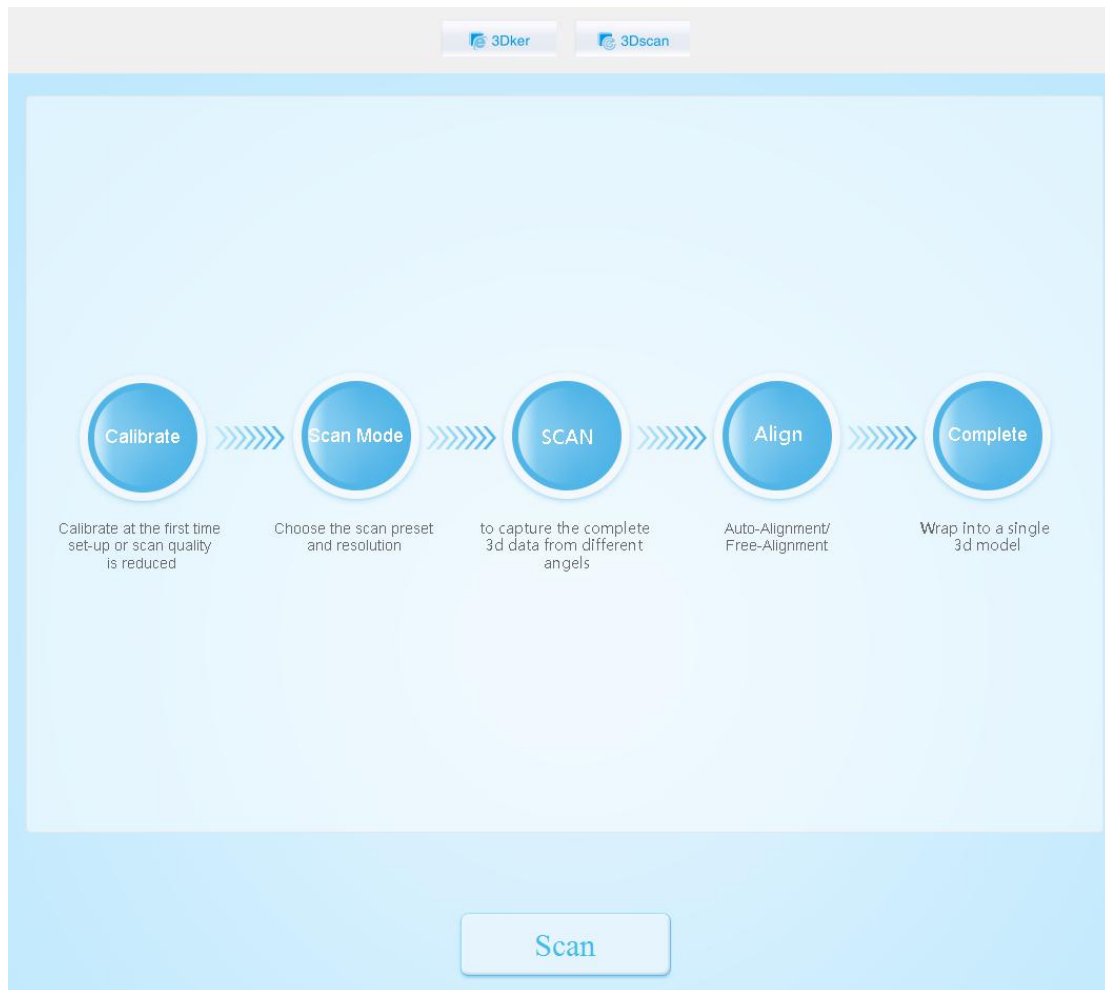
## Software Introduction

### 1. Software Interface

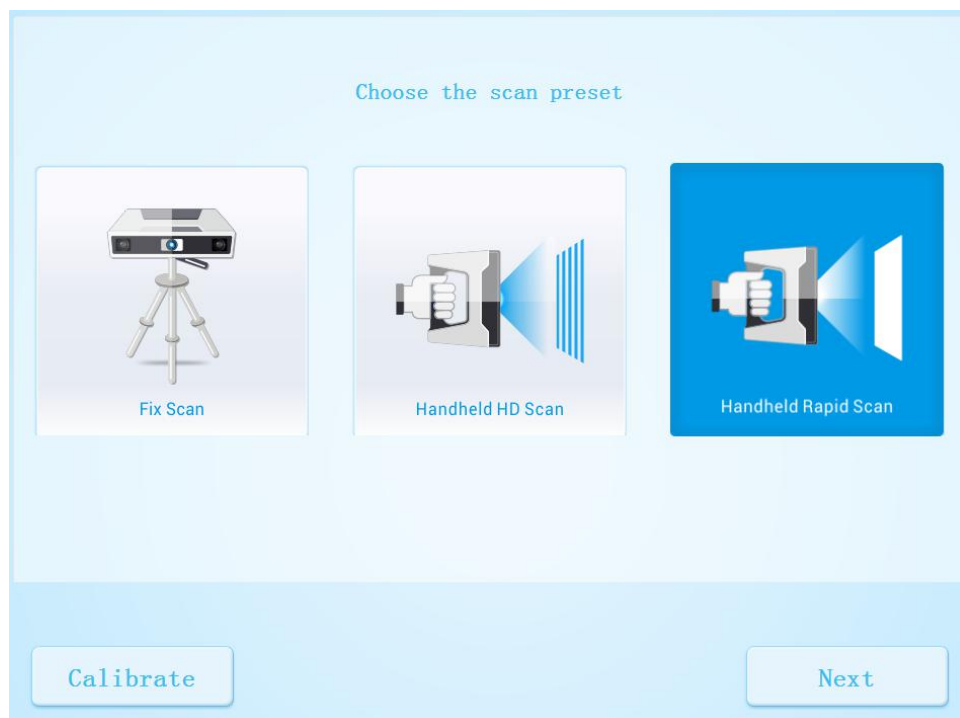
Firstly, open the software to enter the home page, as shown below:



Click 'work flow' to open the page of workflow introduction, as shown below:



Click 'Scan' to enter the page of scan preset selection. There are three scan modes: Fix Scan, Handheld HD Scan and Handheld Rapid Scan.



You have to calibrate before first scanning, then you can choose the scan preset.

## 2. Mode selection recommendations

### (1) Industrial Mode:

Auto Scan: This mode is recommended for objects within the size of 200\*200\*200mm.

Free Scan: This mode is recommended for objects over the size of 200\*200\*200mm, while high details and resolution, as well as a comparative stable environment (without obvious vibration) are required. For example, industrial parts which require high details and resolution.

### (2) Handheld Mode:

Handheld HD Mode: When the size of the object is over 30\*30\*30mm, environment is not stable or with vibration, sticking mark points on the object is allowed, high resolution and details are required, this mode is recommended. For example: Industrial part, sculpture, or art works with rich details.

Handheld Rapid Scan: When the size of the object is over 150\*150\*150mm, environment is not stable or with vibration, surface is not with much detail pattern, this mode is recommended. For example: Human body (the whole body, face, chest, hand, foot and other parts), sculpture that doesn't require high detail.

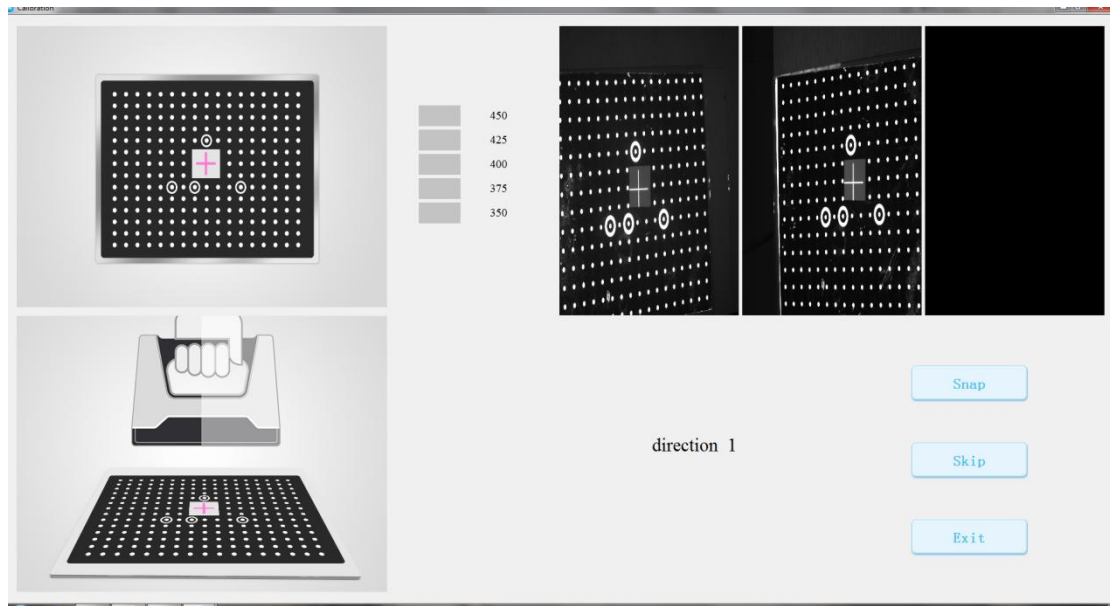
## Calibration

Firstly, Enter the interface of scan preset selection, as shown below:

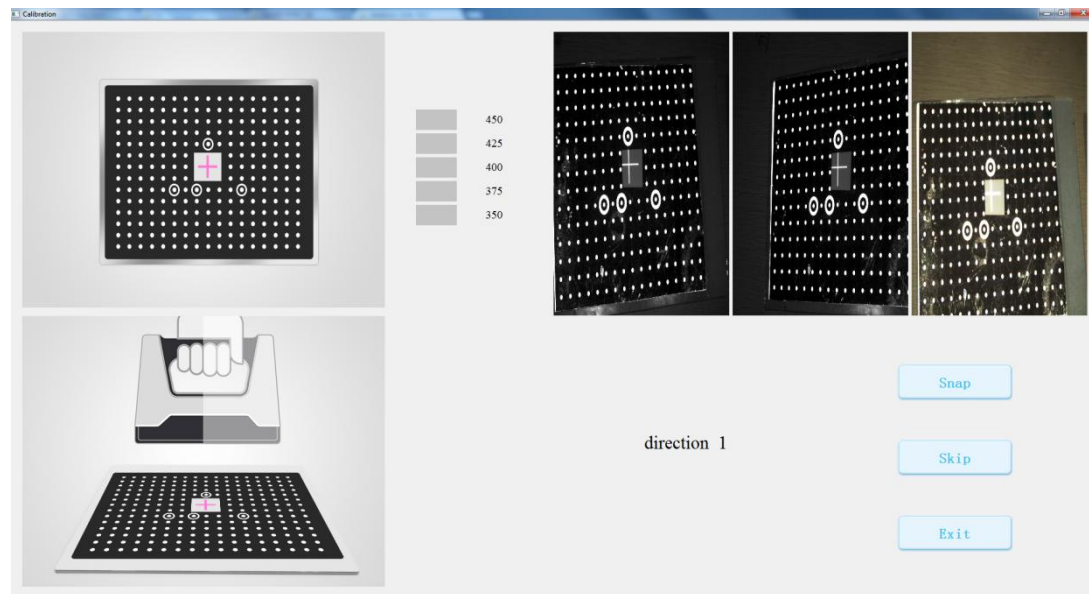


Note: Scanning can not be entered if calibration is not done. Please do the calibration first when there is a WARNING: No calibration data, please calibrate first.

Click 'Calibrate' to enter the interface of calibrate. It will show the below picture if the device only has two cameras. (texture camera is not attached)



It will show the below picture if the device has three cameras. (With texture camera)



There are two calibration steps if the device without texture camera: ①camera calibrate ②High detail scan calibrate

There are three calibration steps if the device with texture camera: ①camera calibrate ②High detail scan calibrate ③Texture camera white balance

**Note: High detail scan calibrate is not needed when Handheld HD scan mode is not required to be used. Both camera calibrate and texture camera white balance are needed when texture module is added for application.**

**No matter which preset is chosen, you have to do the first step (camera calibrate) in the first calibration.**

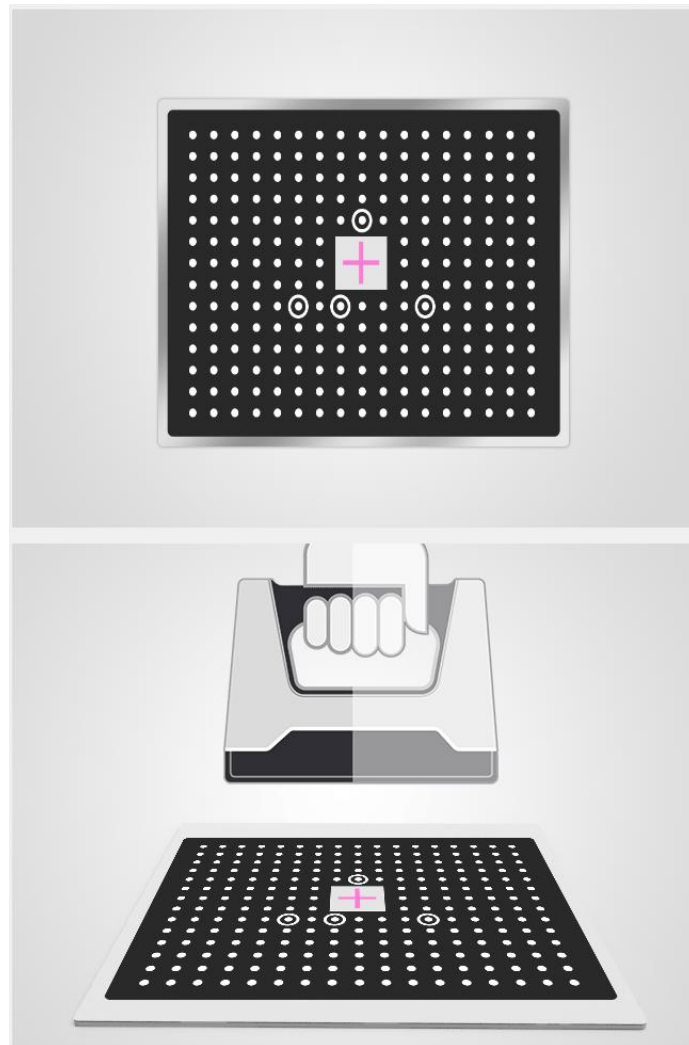



Take the scanner with texture camera as an example (without texture camera, it only takes the first two steps)

The first step: Camera Calibration. The calibration board should be placed in 5 different positions as the software operation guide shown, and each position will be taken 5 photos.

Firstly, adjust the distance between the projector and calibration board (450mm-350mm).

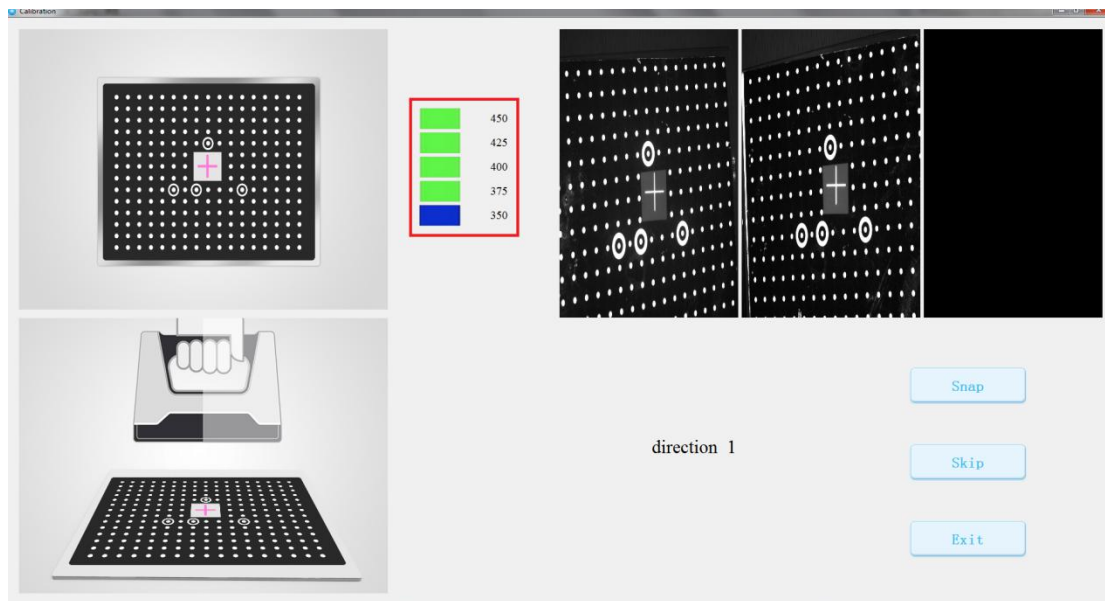
The first calibration board direction should be same as software operation guide shown below, and the cross from scanner should target at the blank position clearly.



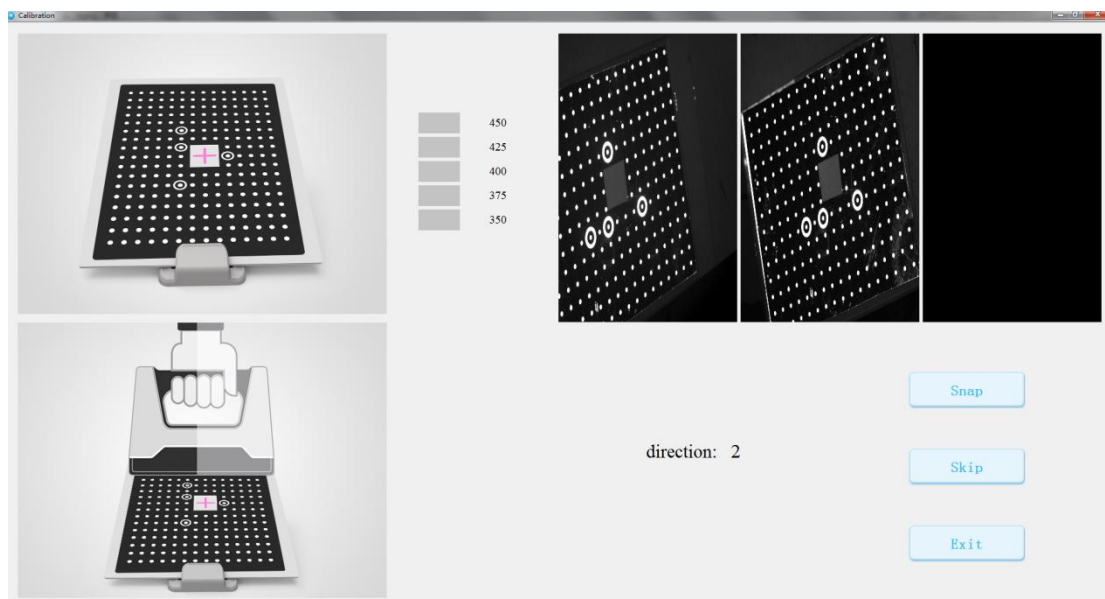
Click "Snap" or , the photo will be captured. Move the scanner from top to bottom or from bottom to top, until the distance bar appears all green, so the photos are all captured in this position.

Note: 1. When the distance bar appears green, it means pictures of this position are collected. Blue means the current position.

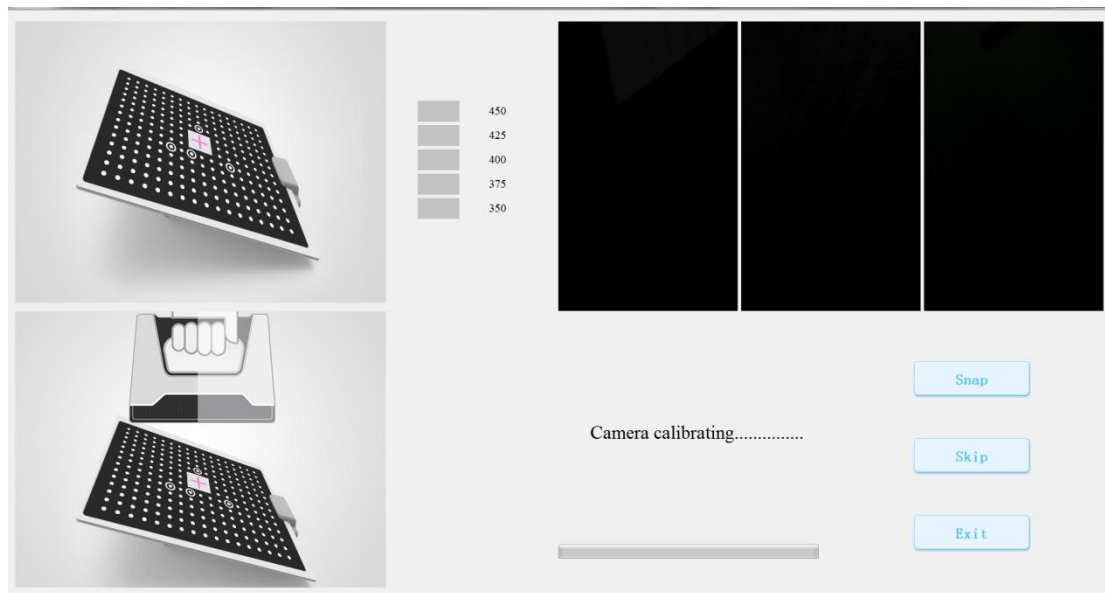
2. Keep the cross in the white square area when moving the calibration



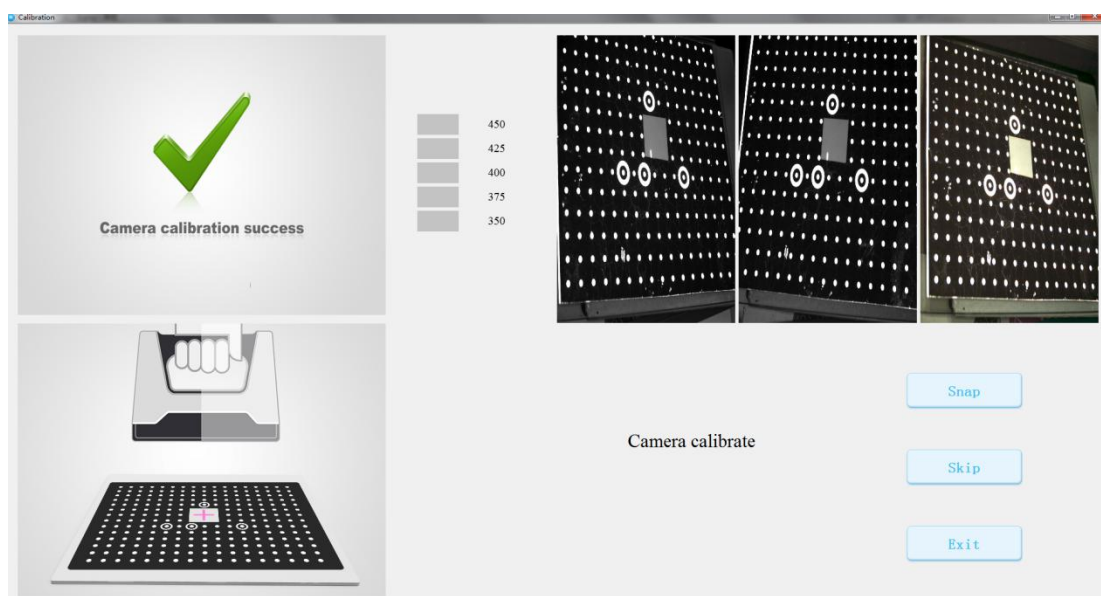
When pictures of one position are well collected, the software will turn to the next position as below:



Put the calibration board on the support according to the instruction. The collection is same as above. When all five positions' photos are captured, the software will calibrate the camera automatically. You will see the progress bar as below.




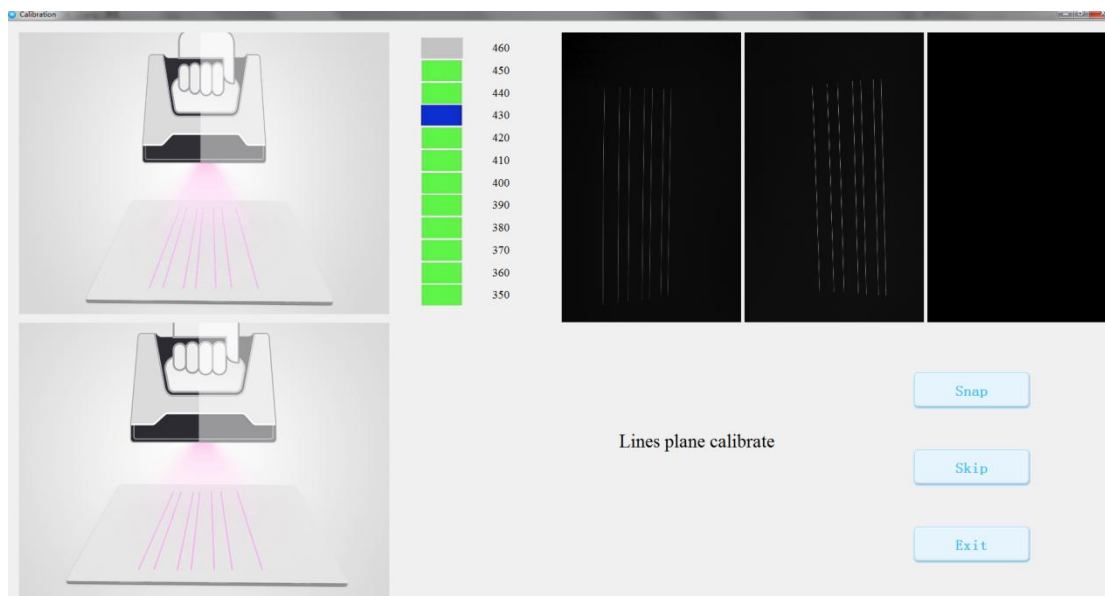
When the camera calibration is finished, you'll see "Camera calibration success". The software will enter HD calibration mode automatically.



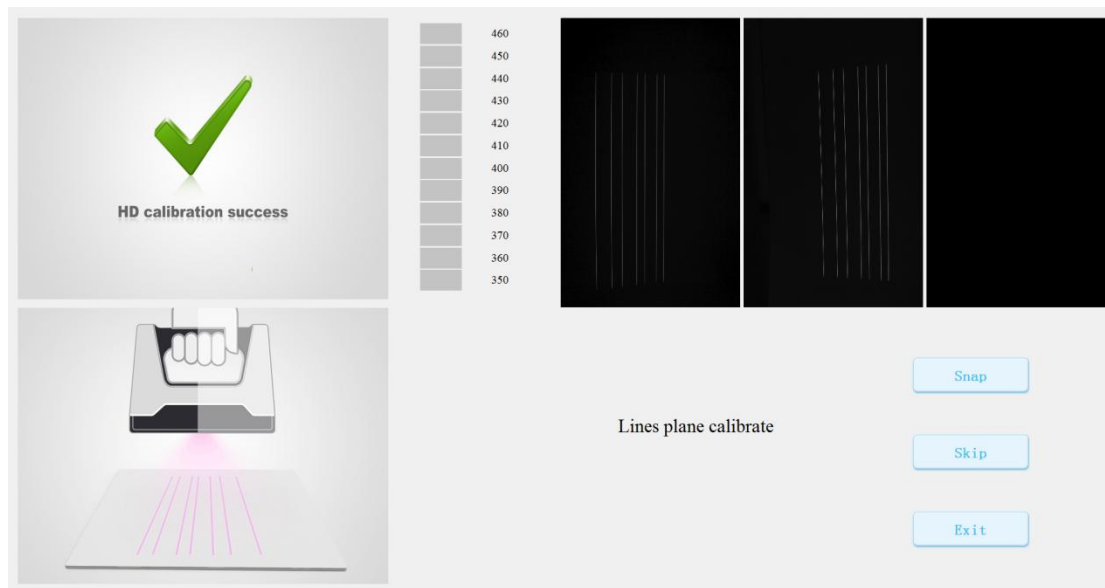
2. HD Scan Calibration. The software will enter HD calibration mode automatically after camera calibration. (Click "Skip" to enter next step if HD scan is not needed)



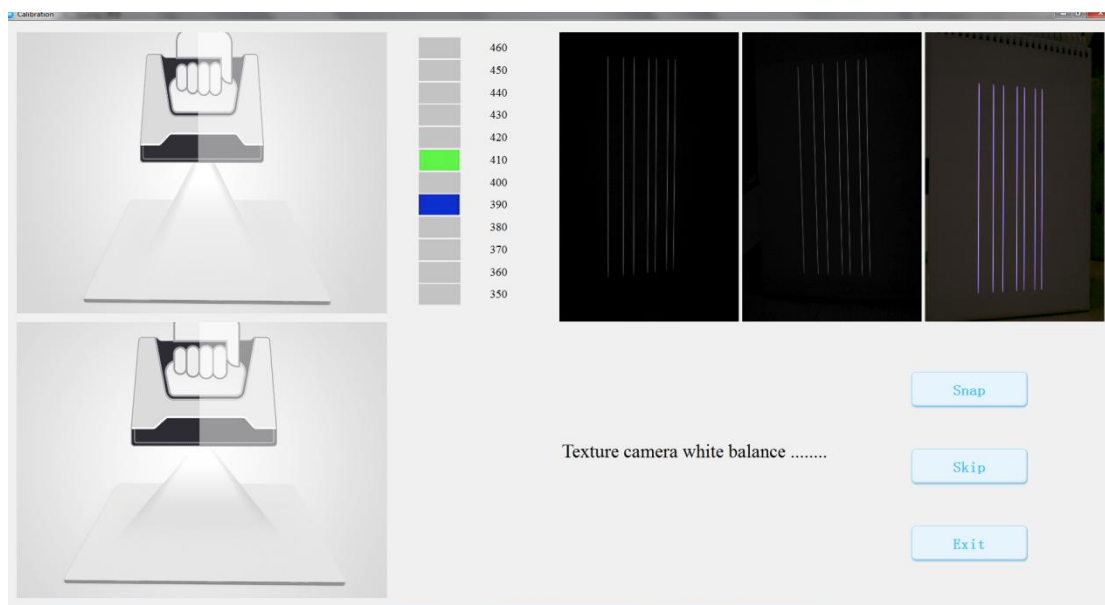
Put the calibration board according to the indicating diagram, with the line plane facing the white smooth area at the back of the calibration board. Click “Snap” or , move the scanner up and down, the software will collect the pictures until the distance bar appears all green.




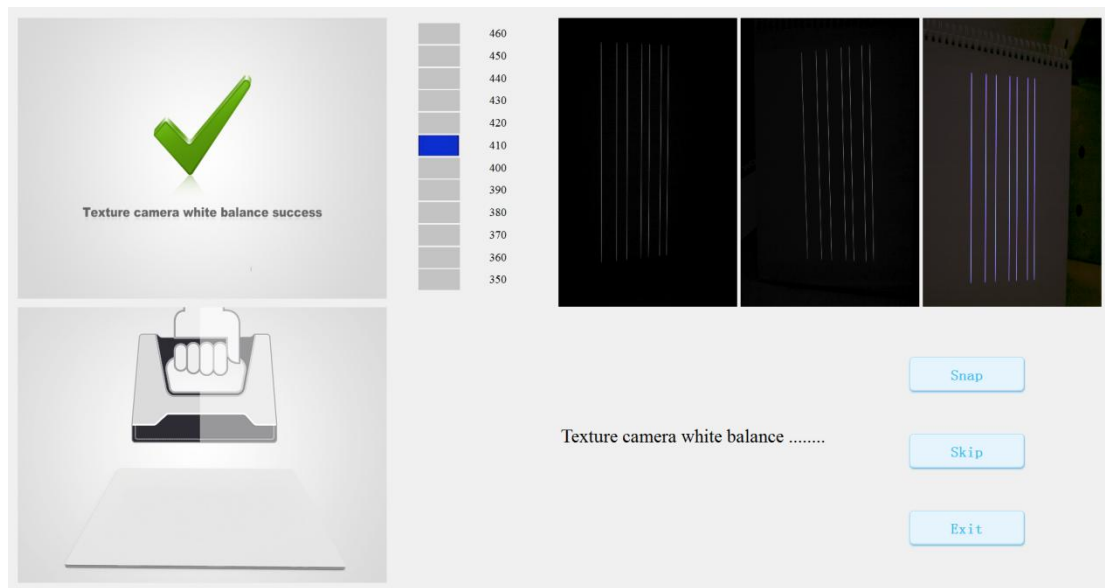
When the distance bar appears all green, the software starts to calibrate automatically. It will show “HD calibration success” when calibration is finished. If there is no color camera, click “Exit” to exit the calibration page, enter the scan mode selection page.



### The third step: **Texture camera white balance**



During the texture calibration, just place texture camera towards white area of the reverse side of calibration board, click “Snap” or the button  on the hardware, and move the scanner up and down, until the green area turns blue, and the white balance test is completed. The picture below will show up when the calibration is successful.



Note: You could try times to do the white balance calibration until it is successful.

When calibration is finished, click “Exit” to exit calibration and enter the scan mode selection page.

You must finish all the calibration steps according to the instruction when you calibrate at the first time. If resolution is lost under HD Mode, or environment light changes and influences the scanning, you can do line calibration or white balance calibration solely.

The camera view port displayed on the software is opposite to the actual position of the calibration board at present.

Situations as below need calibration:

- (1) When the scanner is used for the first time or after long time without using.
- (2) When there is strong vibration during the transportation.
- (3) When alignment mistake or failure frequent appear during the scanning.
- (4) When environment light changes under Color Scan, white balance calibration is needed.
- (5) When scanning data is incomplete and quality is much worse during the scanning.

Note: Make sure to keep the calibration board still and then click “Next” to collect during calibration.

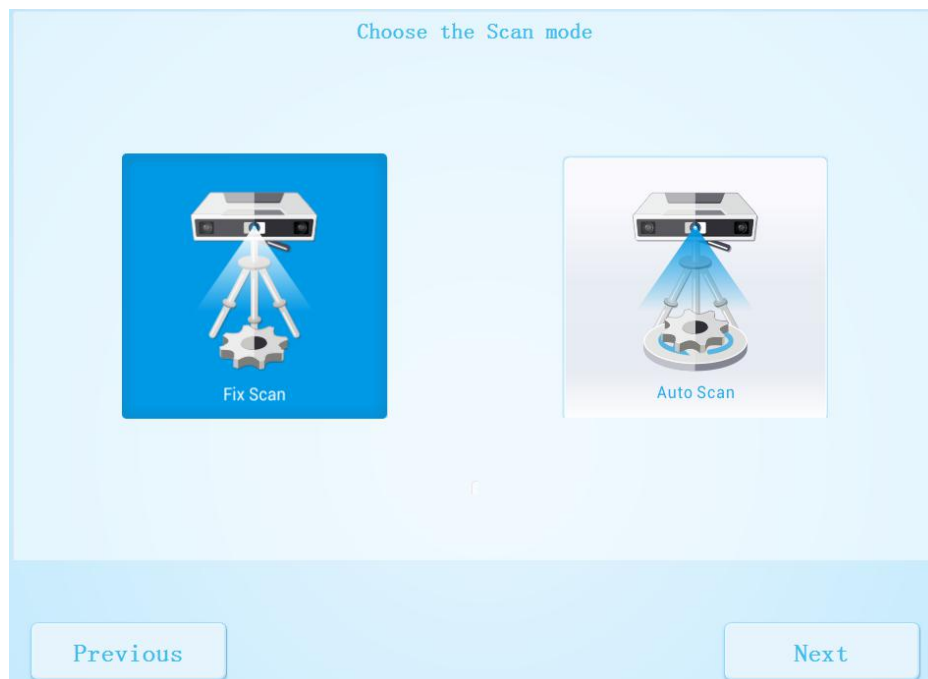
## Fix Scan

Fix scan has two scan modes : Free Scan and Auto Scan.

Choose Fix Scan, as shown below:



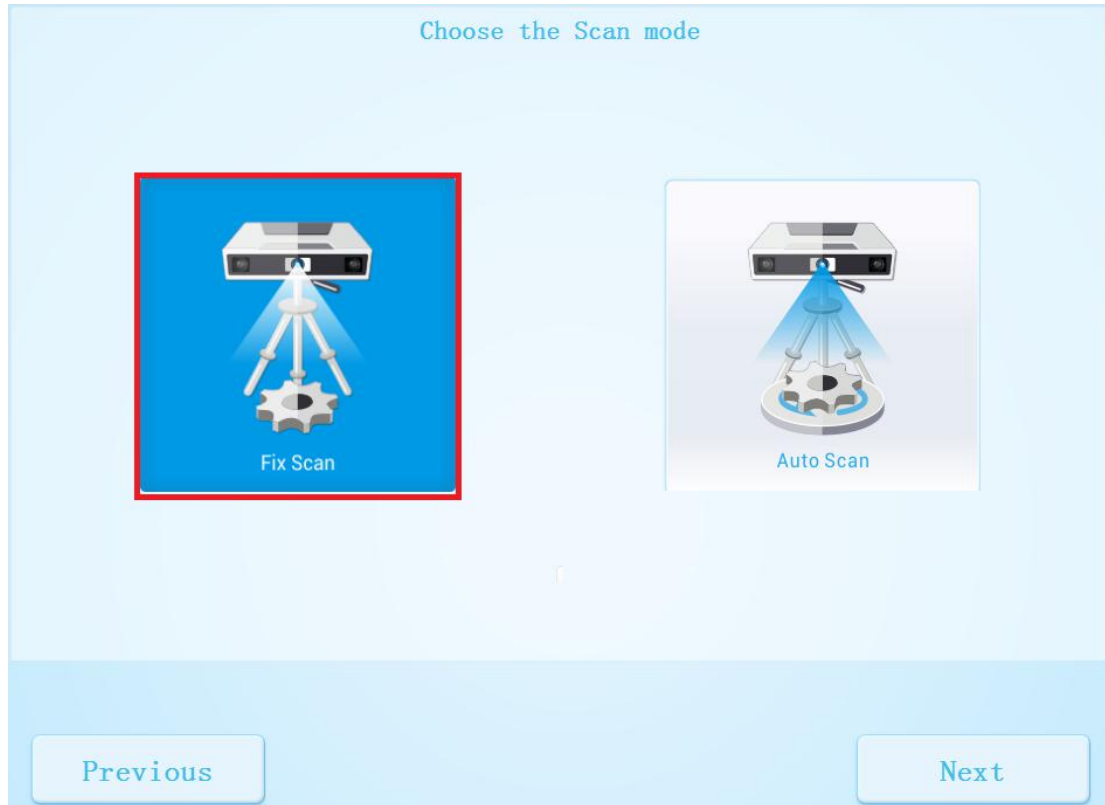
Click 'Next' to enter the interface of two scan modes selection.



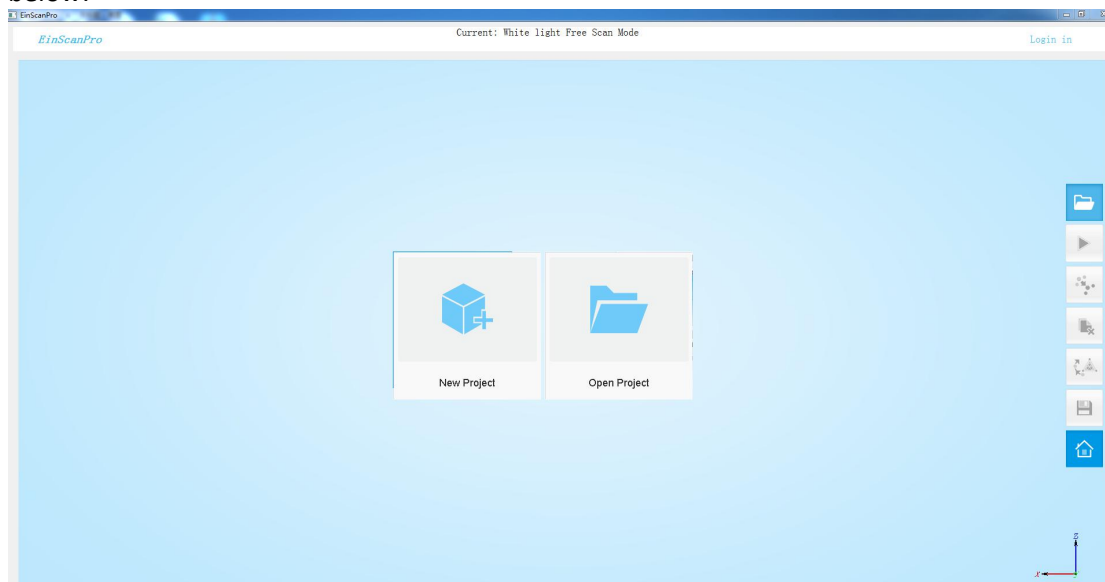


### (1). Free Scan

Choose 'White Light Free Scan', as shown below, Then click 'next',

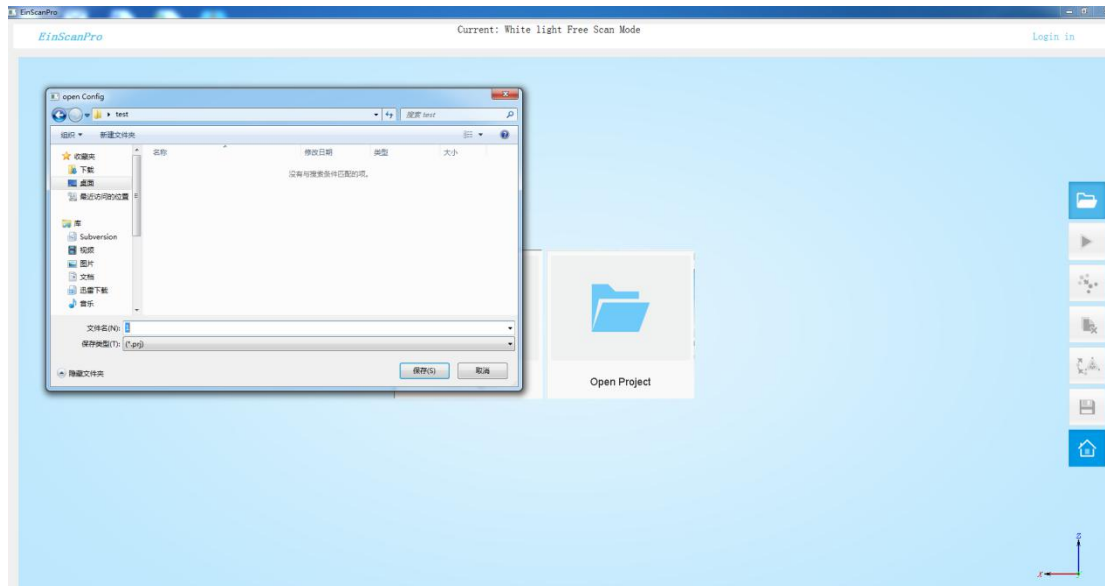


Enter the interface of New Project and Open Project, as shown below:

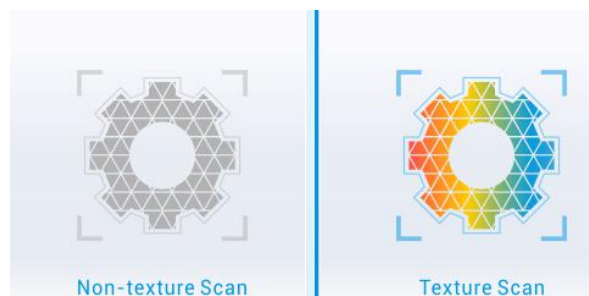


Click 'New Project' to build a new project. If you want to import project, the opened project should be scanned under the same calibrated condition and scan mode.

Note: The scanning projects created by different scan modes (Industry fixed scan, handheld HD scan and handheld rapid scan) cannot be reciprocally imported. The projects created by auto scan and free scan can be reciprocally imported.

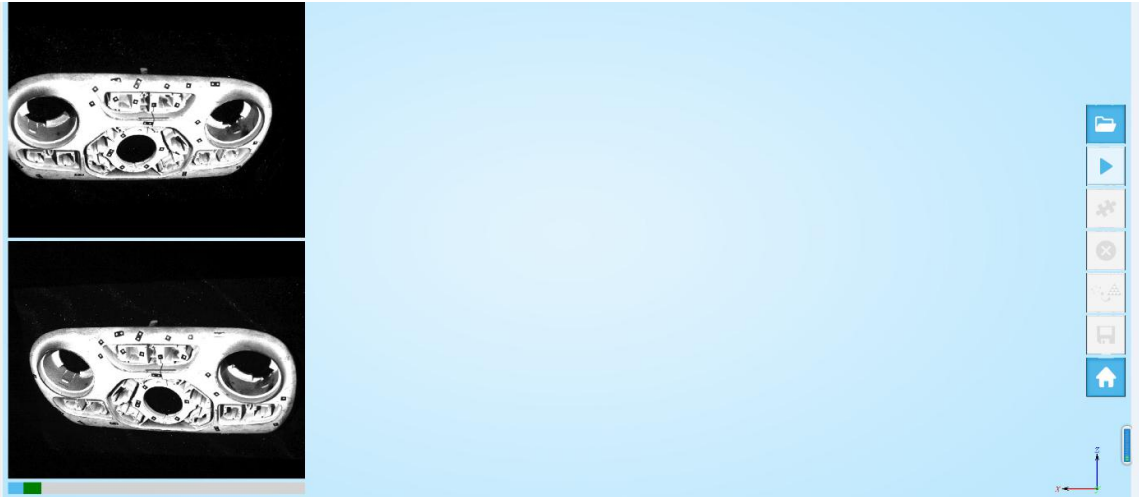


Click 'Save' to enter the interface of Non-texture Scan and Texture Scan selection. Texture scan is only active when the scanner is with texture camera. The process of Non-texture Scan and Texture Scan are same, take Non-texture scan as an example.



Note: After importing the project, direct access to scan, choose the scan mode based on whether the imported project is texture. The texture project cannot be continued to scan if the scanner is without color texture camera.

Enter the interface of scan

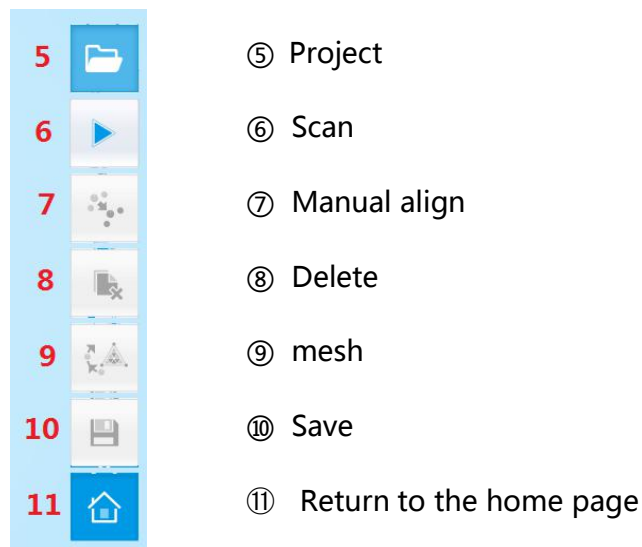


Adjust the distance between the object and device, until the cross is clearly to be seen on the object.

### Buttons Introduction



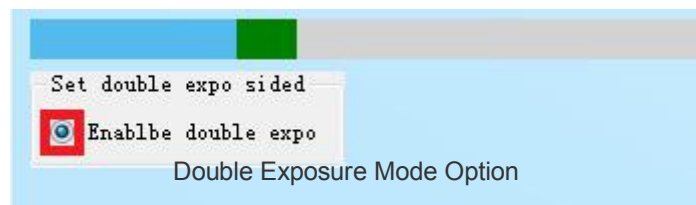
Edit Button : 0 Deselect 1 Invert 2 Delete 3 Relocate 4 Show/Hide Texture



Brightness Adjustment: The cameras view point on the left, you can drag the button to adjust the brightness, as shown below :



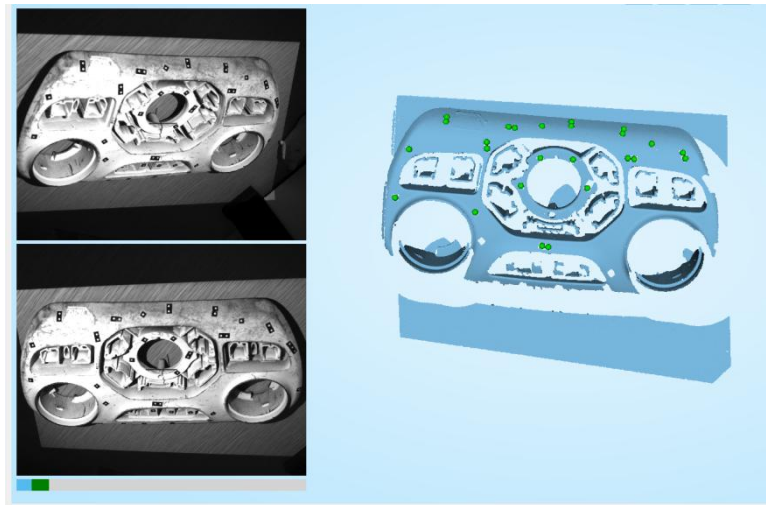
Move it to adjust the brightness.



You can use mark point align, feature align and manual align. Mark point will be recognized to align automatically when there are mark point on the object.



Click to scan, the scan result as shown below:



If the current slice data is incomplete, make sure that the scan distance is appropriate (suitable working distance is 350 ~ 450mm), the projected cross can clearly appear on the object if the scan distance is appropriate; to make sure the brightness is appropriate at the right scan distance: equipment against objects, the cross is clearly in the brightness viewing window

**Edition:** After some parts are scanned, you can do the below edition if the data has excess parts, as shown below:





SHIFT+ left mouse button to select excess parts, as shown below:



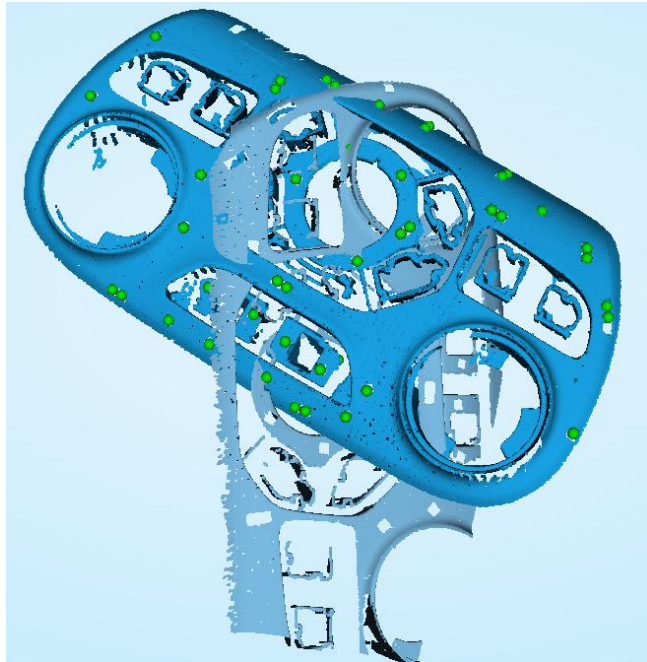
Click Or DELETE to delete selected data, as shown below:



When the edition is completed, change the position of object or scanner for next scan. If use feature align, make sure the overlap area of currently scan area and the last scanned data is

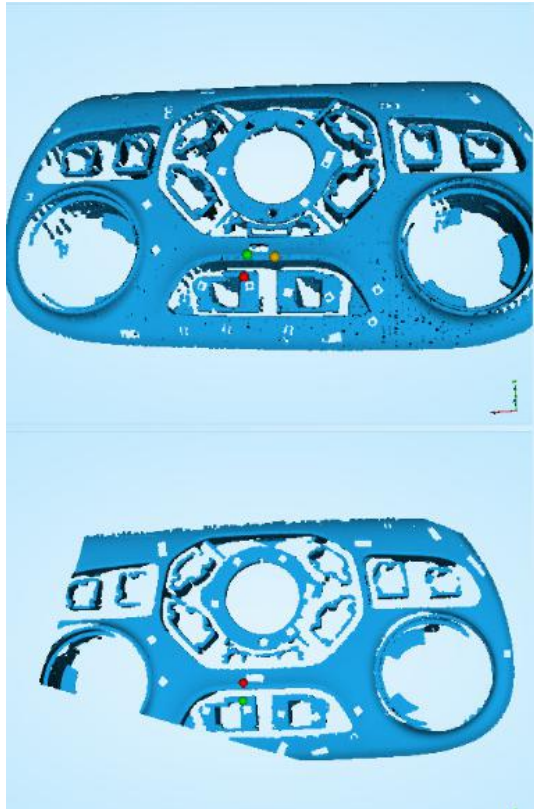
more than 1/3. If use mark point aligns, the common points should more than 3. Then click scan button, the data will automatically align, until the whole scanning completed.

**MANUAL ALIGN:** Use Manual Align if automatic alignment failed during scanning as shown below:

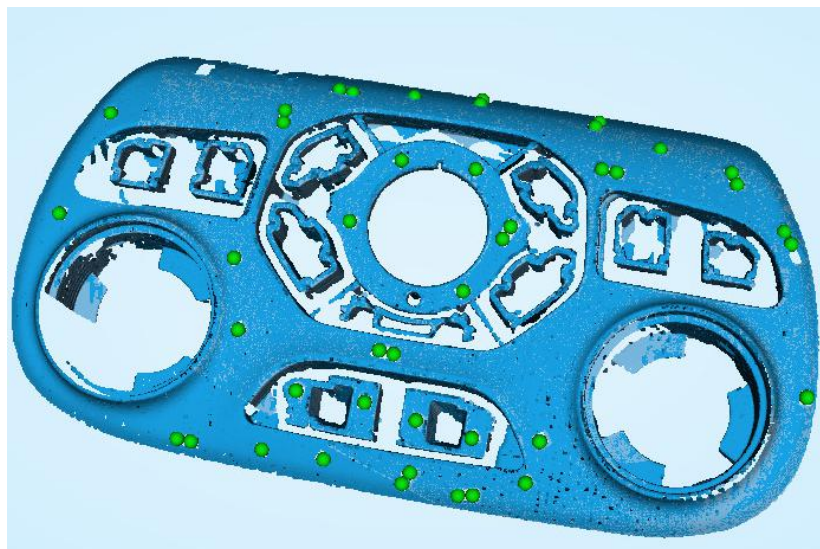



Click button to open Manual Align view port on the left side of the software. Keep SHIFT down, and click left mouse button to select at least 3 non-collinear corresponding points in the 3D preview windows for Manual align.





The data will be corrected after manual alignment as shown below:




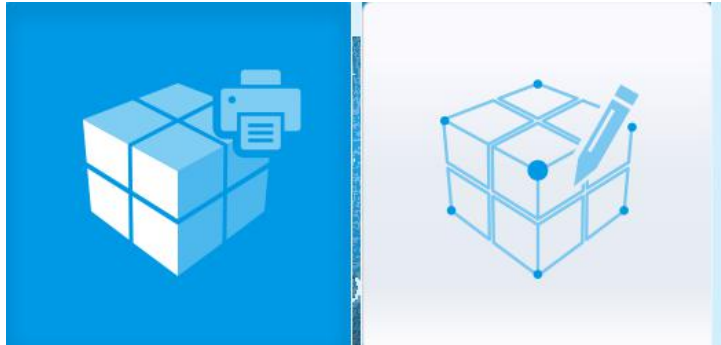
If manual alignment failed due to incorrect selection of corresponding points, click  to re-select points.

**DELETE CURRENT DATA:** If there is not enough overlapping region for registration, click

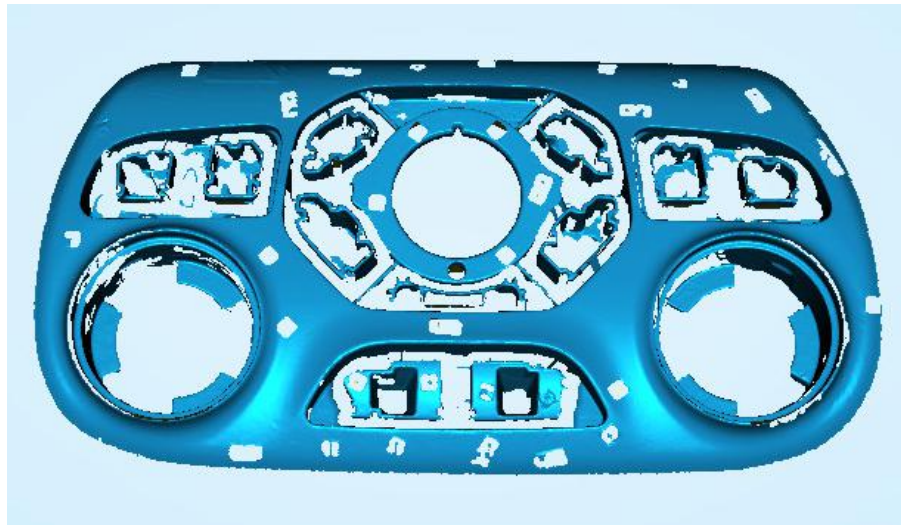


to delete current data and then change the position of the scanner or the object to scan again.

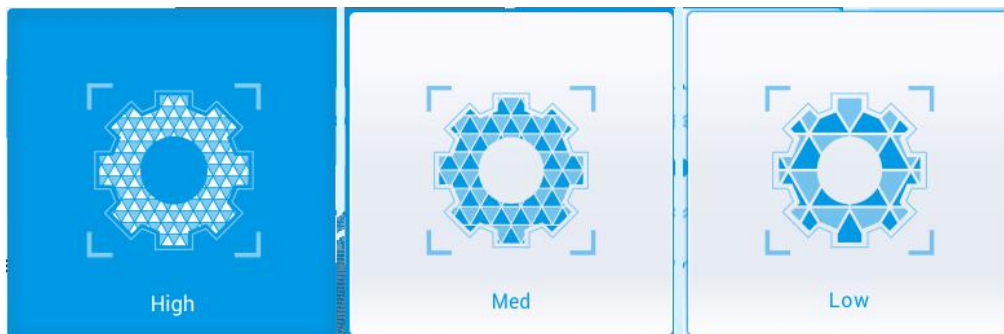
**MERGE:** Click  after scanning to enter post-processing. There are 2 modes as below.



: Un\_watertight For Design: Grid merge to produce un\_watertight model.  
The result is as shown below:



: Watertight for print : Watertight model, which can be applied to print directly. Select level of detail of scanning after merging as shown below.



**NOTE:**


Choose high for objects with fine textures; Choose Med or Low for objects with smooth surface and few textures. The time of data processing depends on the detail you select. The higher level of detail is, the more time it will take.

The merging result is as below:



The texture scan result is as below:



**SAVE DATA:** Click  after merging to save data. It can be saved as stl, asc and obj. Obj is with color texture.

Note : Texture scan mode will take more time compared to Non-Texture scan mode.

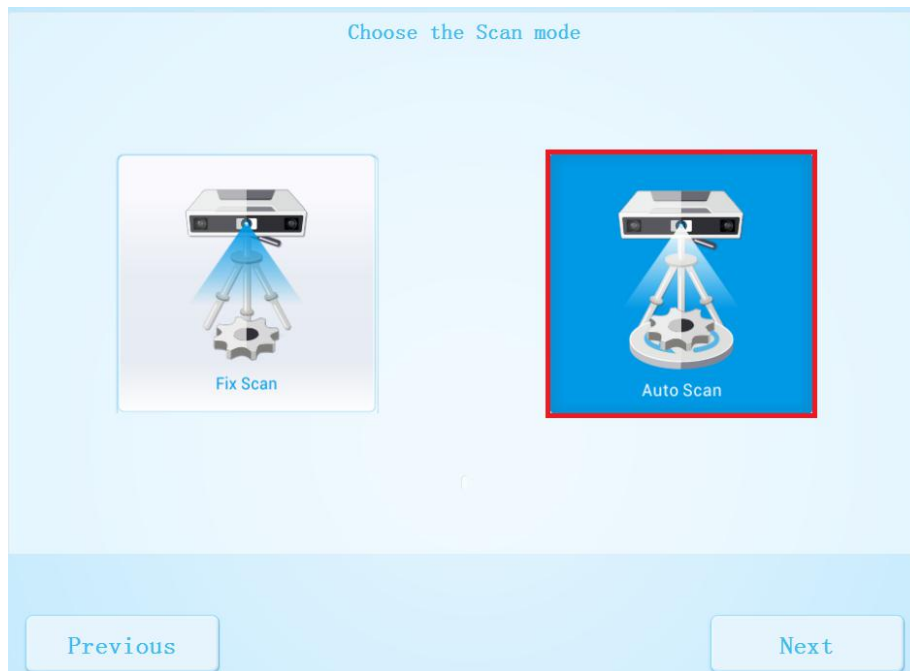


Click  after scanning. Choose New Project or Open Project to start next scan.

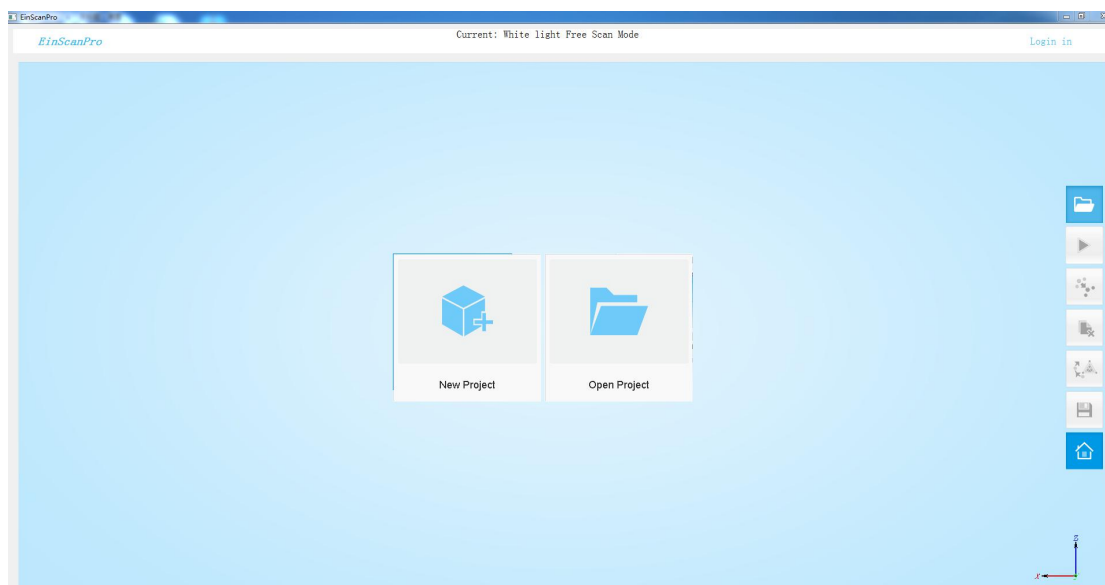


If you want to change the scan modes, click  to go back to the homepage to select the scan mode.

## 2. TURNTABLE AUTO SCAN



Choose Auto-scan, click next, and enter the page below.



Choose New Project or Open Object (the operating steps are the same as Free Scan, please refer to Free Scan part for details) to enter the page as below.



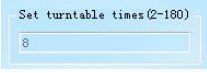
Adjust the distance between the scan head and turntable. When the cross appears on the subject clearly, the distance is the best. The mark points on the turntable should be in the

view port of the camera. Then click  to enter turntable scan.



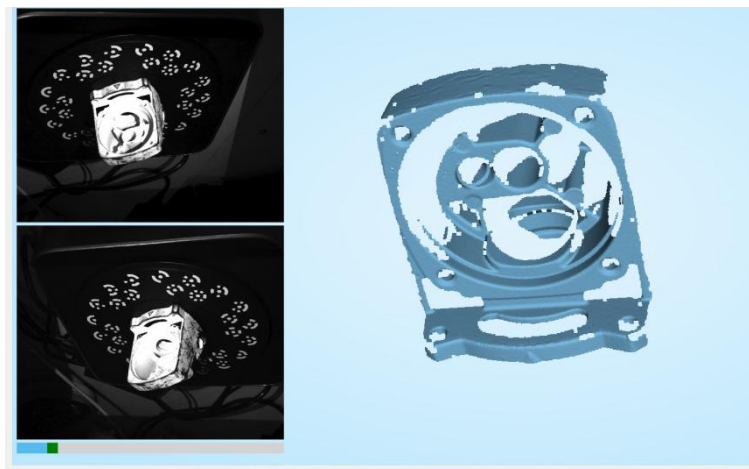
**Note:**


1. Please make sure that the object won't block the mark points on the turntable. Or, there will be no fringe pattern, while turntable will be still rotating.


2. Before scanning, you can set the scan times per round under turntable scan by . The default setting is 8 times.

3. If the scanned object is too high and will block the mark points on turntable, you can stick mark points on it (if allowed) to continue auto scan. At this time, it doesn't matter if the mark points on turntable are blocked. Make sure there is no less than 1/3 overlapping region between the current scanning data and existed scanning data, to realize automatic alignment.


Click , scanning will pause.




Click  to resume scanning.

If you are not satisfied with current scanning data, please click  to stop the current scan. The current data will be deleted directly.

After scanning, it is available if you want to edit the 3D model. Please refer to Free Scan part for details.

If the model is completely scanned, you can merge it directly after edition. Otherwise you have to put the object onto the turntable at another angle and click  to finish the scanning.

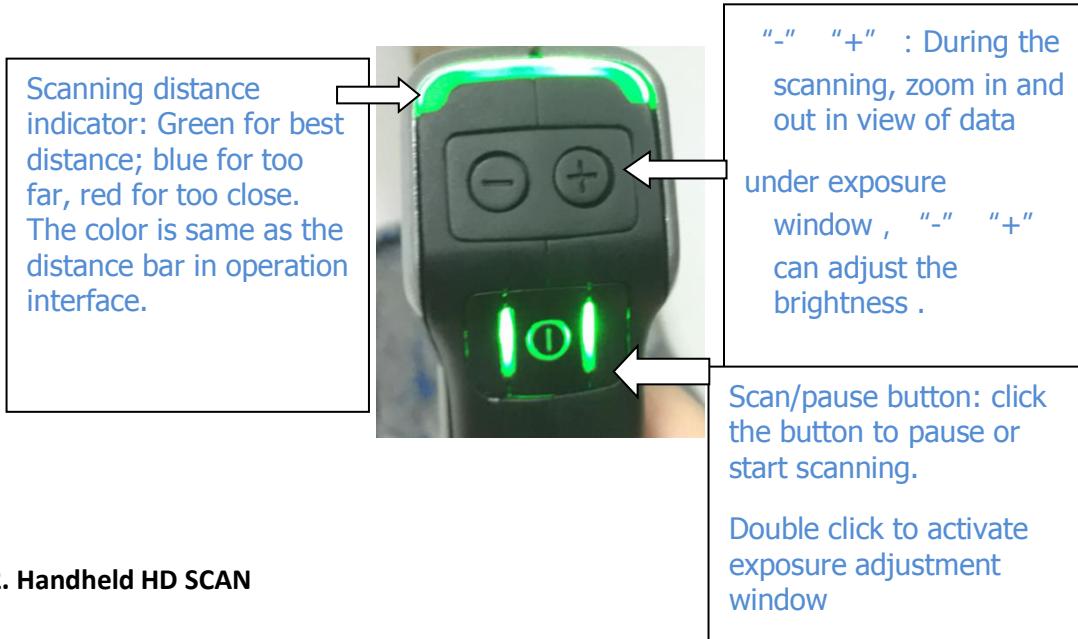


If automatic alignment failed, click  to start Manual Align, which you can refer to Free Scan for details.

Merge and Save Model is also the same as Free Scan.

## Handheld SCAN

### 1. Buttons.

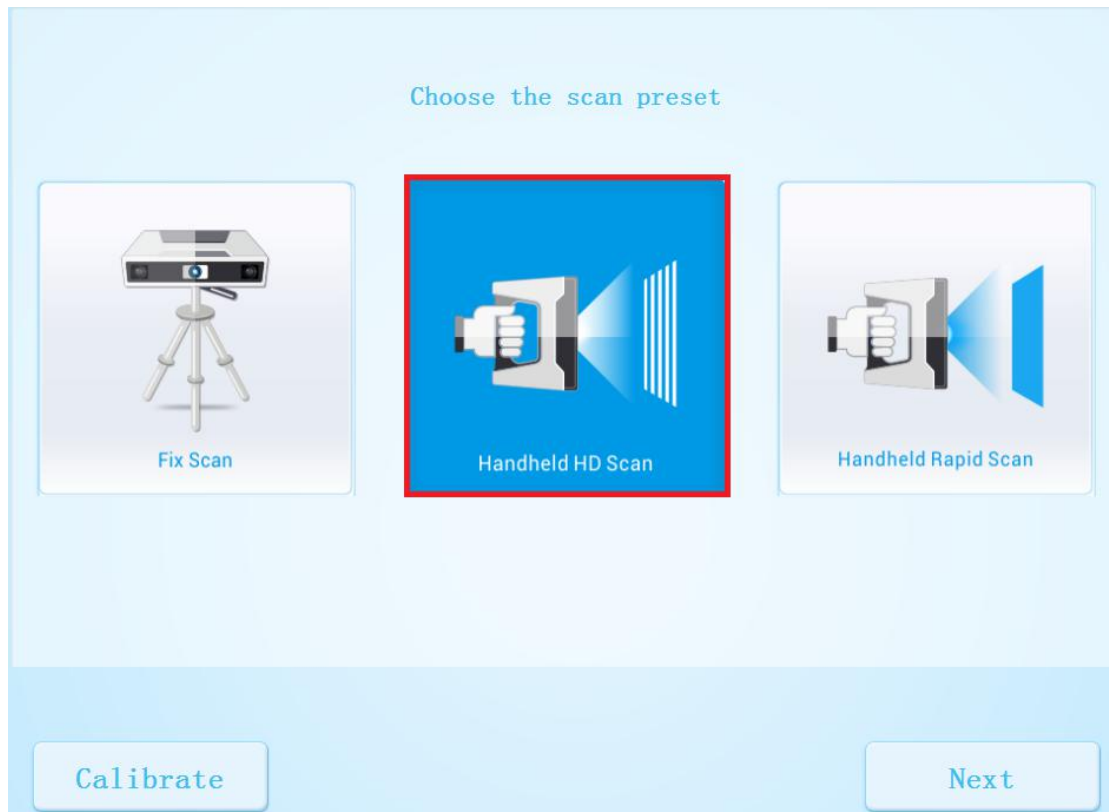


### 2. Handheld HD SCAN

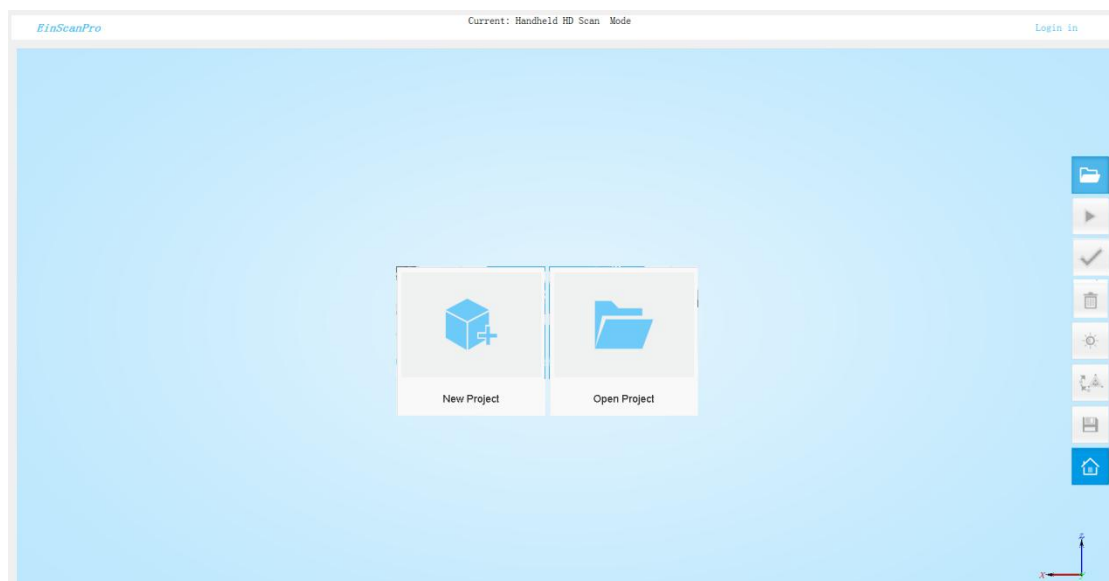
HD scan relies on reflective mark points to align. Stick mark points on the object in random, avoiding sticking in one line.

Note: The single scan range is 210mm X 150mm, public areas alignment require at least four mark points. While placing the points, uniformly stick the mark points on the object, and make sure that in each single scan area has at least 4 points.

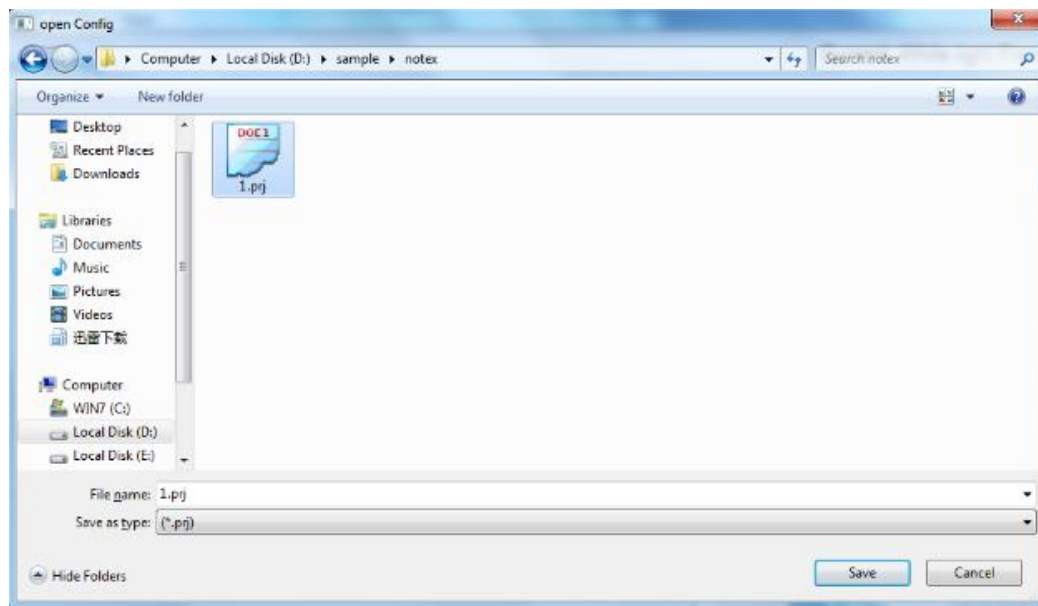
Choose Handheld HD Scan as shown below:



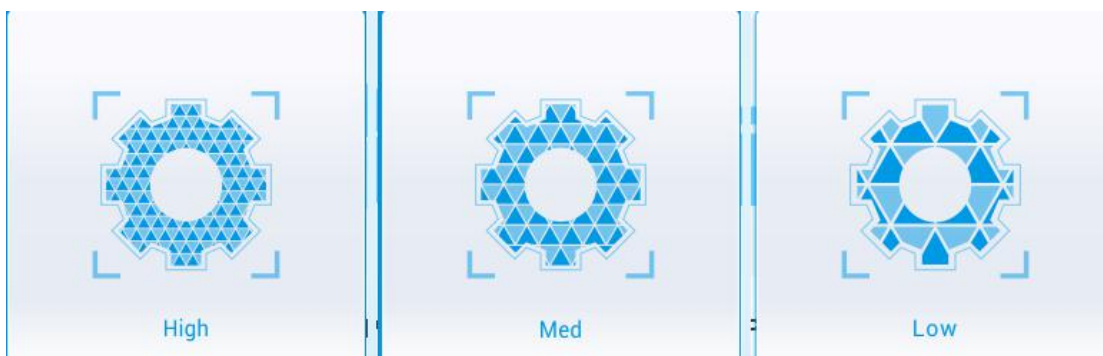
Click Next to enter the page as below:



Click New Project as below



Click Save to choose resolution, the higher, the better quality will be. (High 0.2mm, Med 0.5mm, Low 1.0mm)

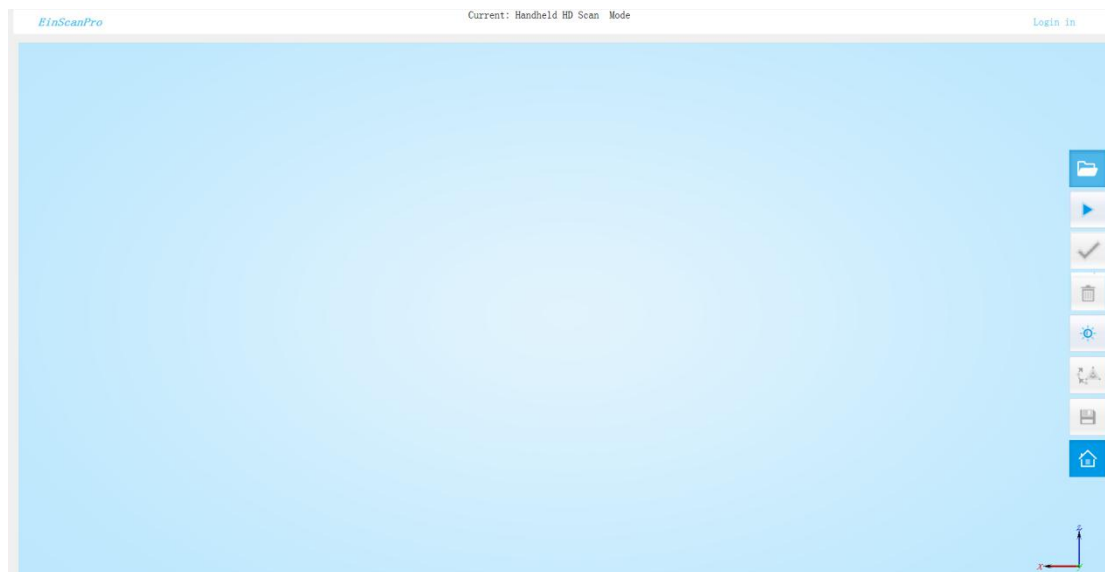


Note : 1.Higher resolution takes more time to scan and consumes more memory of graphic card , and size of the object to be scanned scanned will be limited. Theoretically, the maximum size of scan = point distance\*8192/mm. In actual process, the size of the object can be scanned depending on computer graphic card.

2.Choose 0.2 mm resolution, the data output is slow, please be patient.

3. when import project, and continue the scan, the scanning will be in accordance with the imported project resolution.

Choose resolution and enter the page as below:




### Buttons:

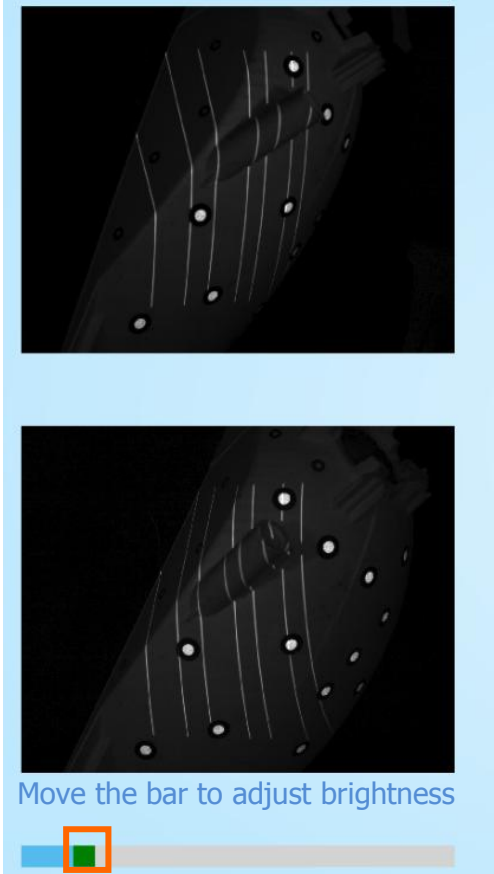


- ① Project
- ② Scan
- ③ Complete
- ④ Delete
- ⑤ Exposure
- ⑥ Mesh
- ⑦ Save
- ⑧ Homepage





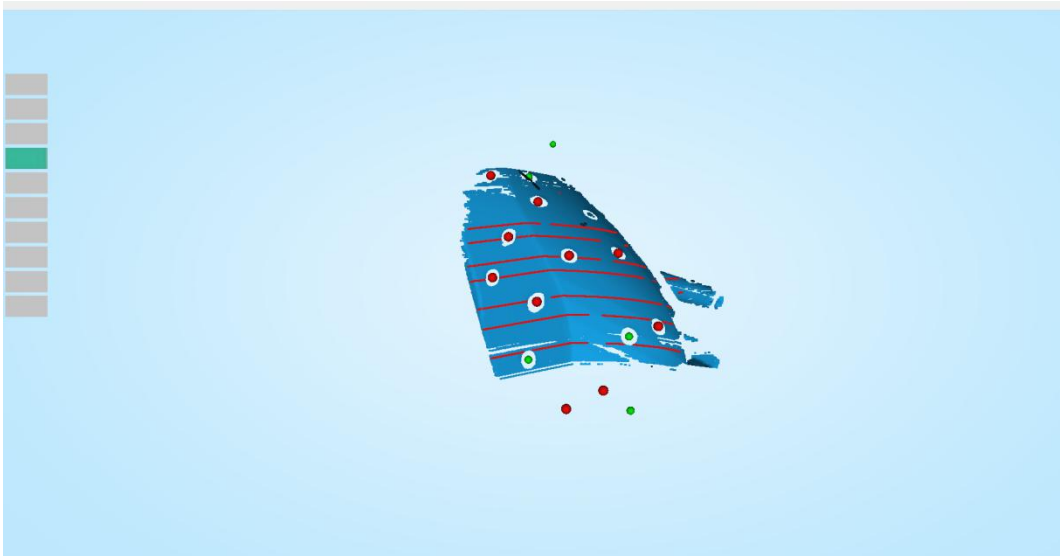
**BRIGHTNESS CONTROL:** You can adjust brightness before scanning. Click  to open view port; drag the brightness bar to adjust. Click again; the view port will be hidden. You can also adjust it during scanning if the brightness is not appropriate.

**BRIGHTNESS JUDGMENT:** When the view port presents fringes clearly and shooting on






object is lined completely.

Choose proper resolution and enter the scan interface. Click  or the  button on the hardware and start scanning.



**Note :** If the 7 lines appear on object completely and continuously, the brightness is good, otherwise you have to adjust it again.


( Click  to open the brightness viewing window, slid

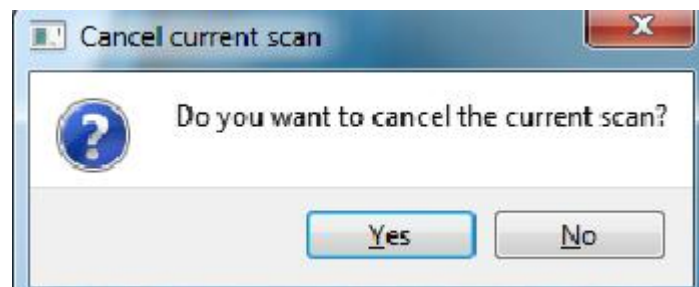
 to adjust brightness, or double click  to activate brightness adjustment model, press '+' or '-' to adjust brightness, double click  to exit the brightness adjustment model.

On the left side is the distance bar. Green means the best distance, blue means too far and red means too close. You can adjust the best distance according to the color. There's also a light on the handle with colors has the same meaning.


**SUSPEND:** Click  or press the button  on the scanner to suspend scanning and check with it.

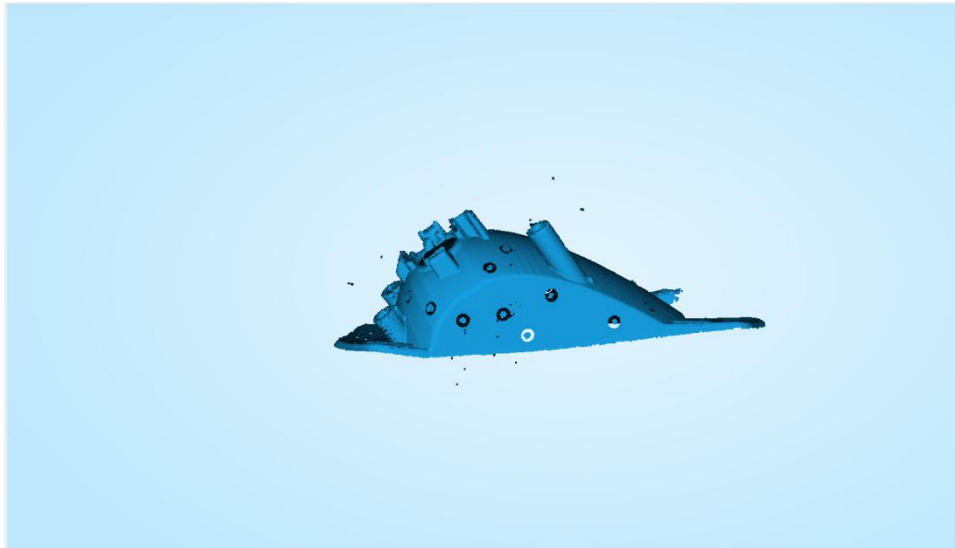
Keep the left mouse button down to rotate and check the scanning. Click Scan and continue.

**DELETE:** Click  to delete current scans. Reminder will appear as below:



If you want to delete the data, click Yes, otherwise click No.

**COMPLETE:** Click  when scanning data is complete as shown below:



Note: Currently, HD packaging speed is slow, it always keep for a long time in 95%, please be patient.

Once it is completed, you can then edit if there is noise or redundant data to remove

**Edit button introduction:**




①Deselect ②Invert ③Delete ④Relocate

Note: Under handheld HD scan mode and handheld rapid scan mode, the data can be edited only after click the complete.


Shift + left mouse button, select the redundancies, as shown below:

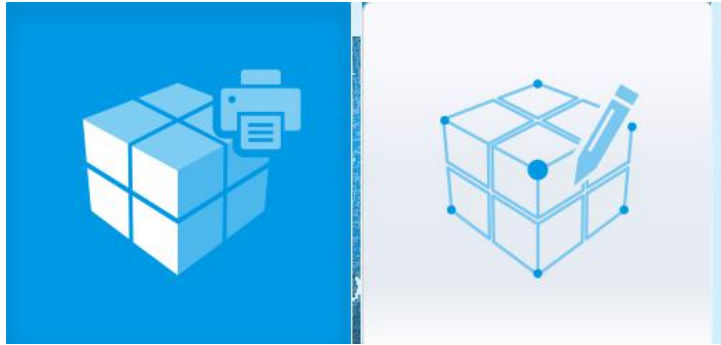




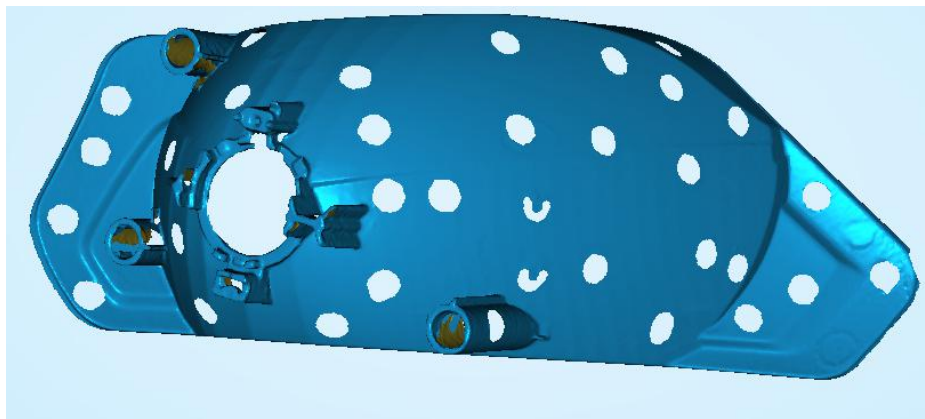
Click  or Delete to delete selected data, as shown below,



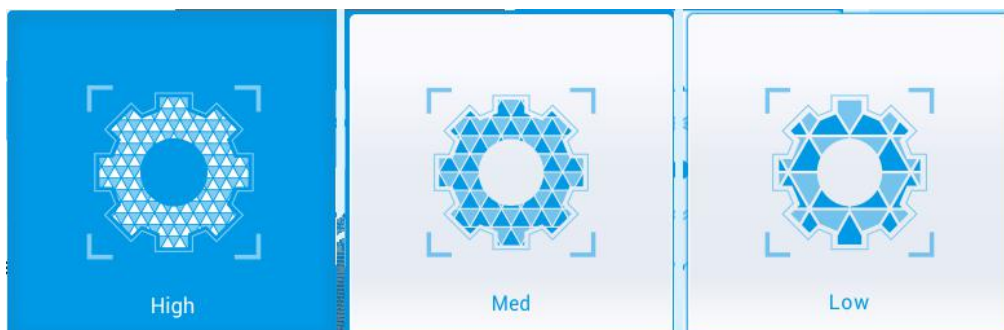
**Watertight** : When the scan is completed, click  , proceed to post-processing. You will see two modes after clicking the button, as shown in the picture:



: “Un\_watertight For Design” : grid encapsulation, unclosed mode, encapsulation results as shown in the picture



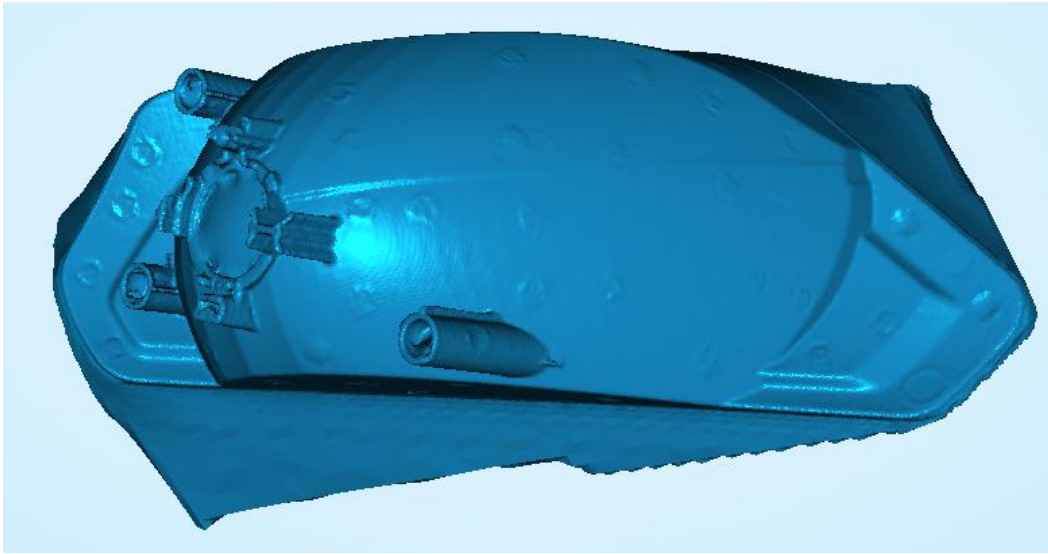
: Watertight for print: closed mode can be printed directly. You will see the pictures pop up as following after selecting this encapsulation. Select the object details.



**Note:**

Select High for objects with fine texture, select Med or Low for objects in smooth surface or with less detail. The time for data processing is in relation to the detail setting. The higher the level of details is, the longer time the processing takes.

Watertight results is shown in the following picture :



**Save data** : click after watertight, and save the model in stl, asc or obj format.

**Note** : If some details haven't been scanned after



encapsulation, you could click to continue scanning on the base of the original data.



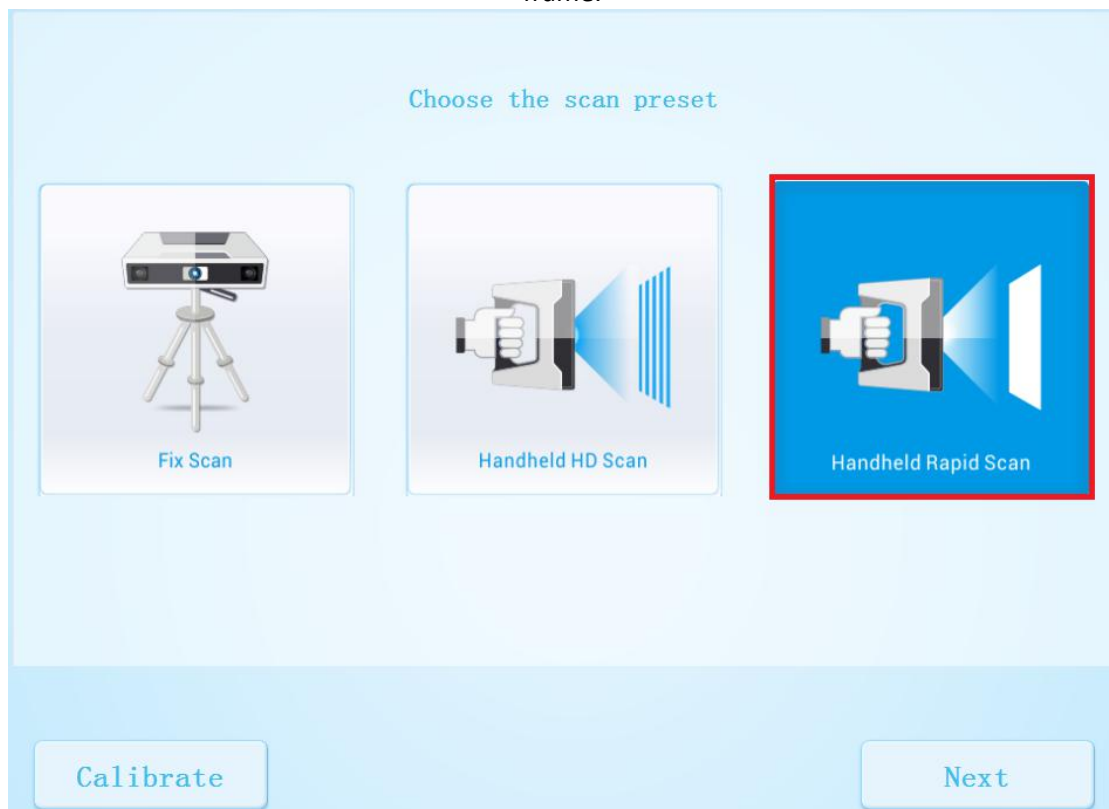
Click when the scanning is complete, establish a new project or import a project to proceed with next scanning operation.



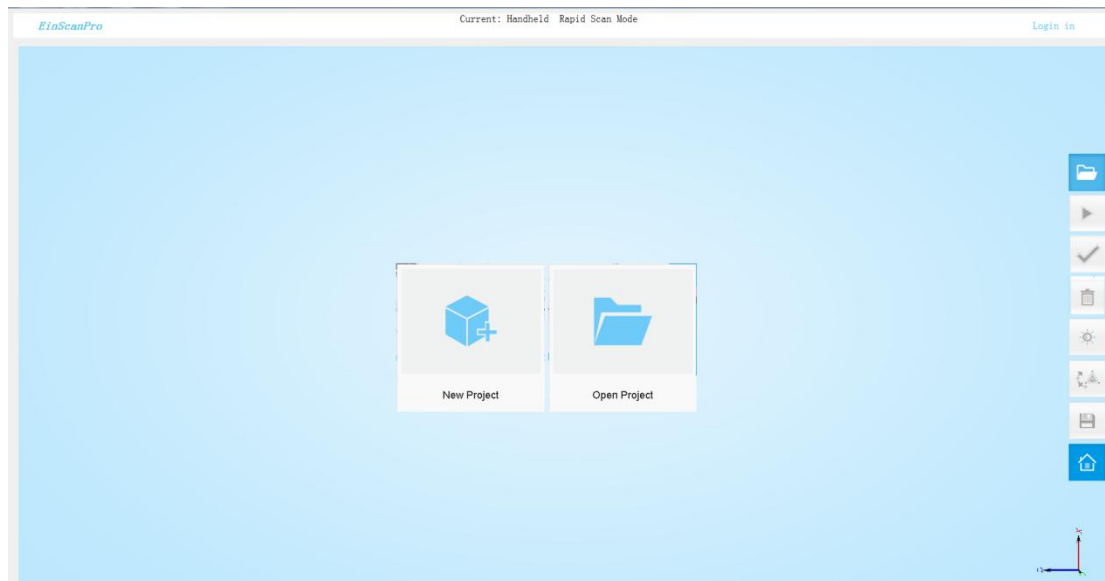
Click to back to homepage if you want to change the mode.

### 3. Handheld Rapid Scan

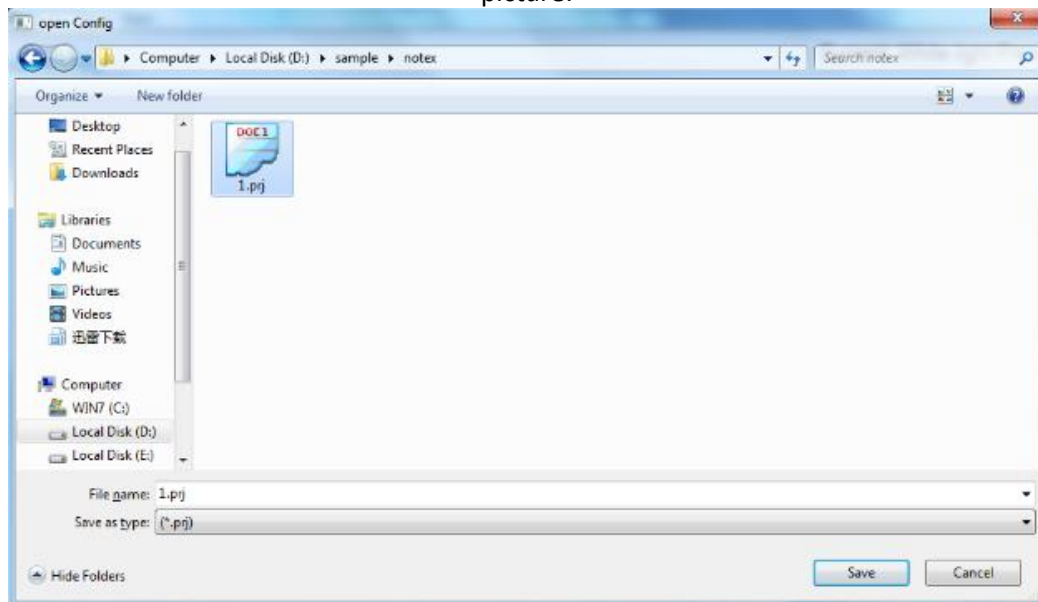
Enter modes selection; choose Handheld Rapid Scan in the red frame.



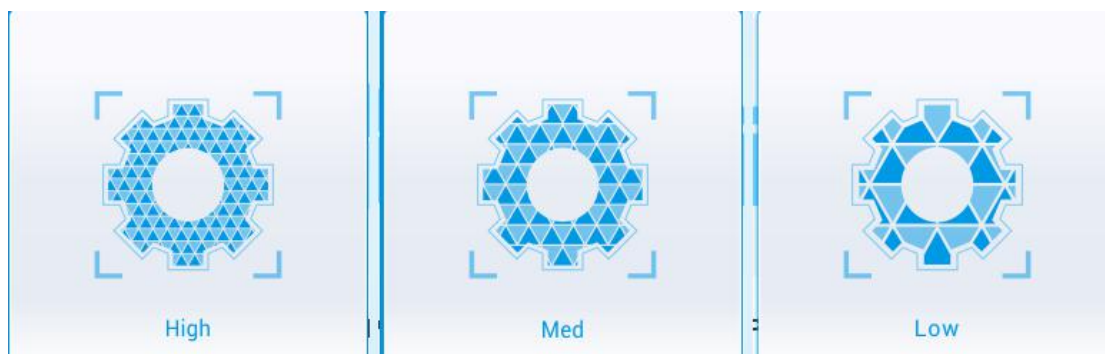
Click NEXT to establish a new project and import the engineering interface.



Click New Project as shown in the picture:

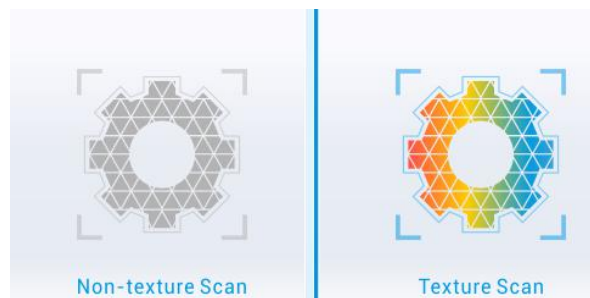


Click Save and enter the selection of resolution. The higher it is, the better the detail presents. ( High0.5mm; Med1mm; Low1.5mm )



Notes: the better the detail is, the slower the scan speed would be and the more resource it would consume, the scan size will be limited as well. The maximum scan size in theory=point distance\*8192/mm, while the scan size in reality is limited to your computer memory.

Enter the selection of texture and non-texture after choosing the resolution. It could only be chosen with texture camera. As shown in the picture:

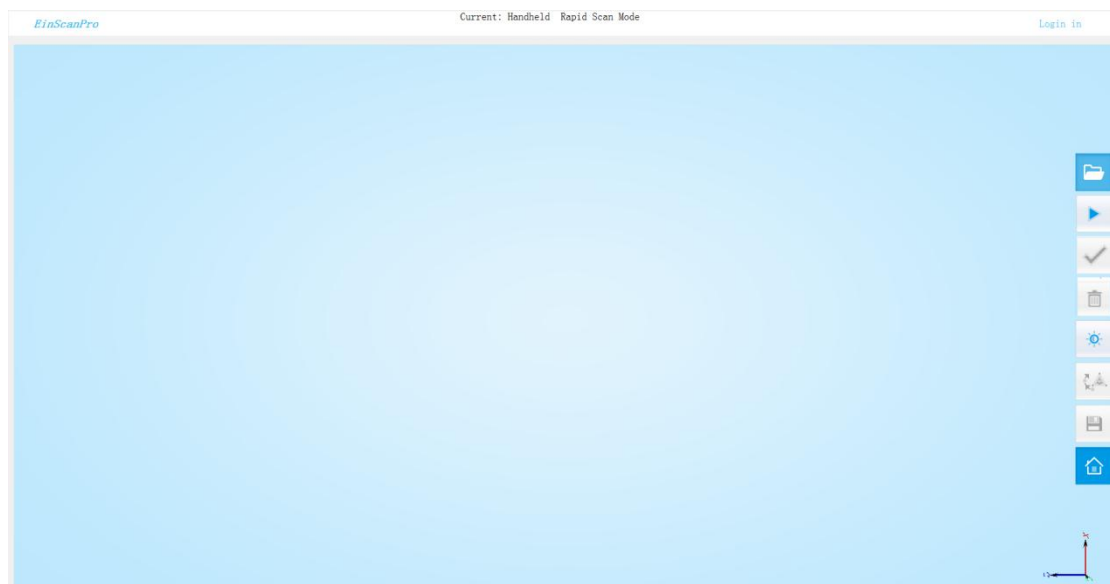


Notes: scan directly after importing a project. Scan mode will be followed whether the imported project has texture or not.

You can't do further scan when your scanner is without a texture camera, but only edit or merge a texture-scanned project

Non-texture has the same scan processing as the texture does. Set non-texture as an example.

Choose non-texture to enter scan interface, as shown in the picture:




### Buttons:





- ① Project
- ② Scan
- ③ Complete
- ④ Delete
- ⑤ Exposure
- ⑥ Mesh
- ⑦ Save
- ⑧ Homepage

**Project:** It can open a project again or establish a new one after scanning is completed.



**Exposure :** you could adjust the brightness before scanning, click  button to call up the camera viewport ( the brightness adjustment is same as that of handheld line scan, details see the handheld line scan brightness adjust ) , drag the brightness bar above to adjust. Click the button again, and the camera viewport will be hidden. Observe whether the data is integrated during scan process, if not it is able to adjust the brightness.



Click  or  on the hardware to start scanning.

**Note :** When start scanning, keep the scanner opposite to the object for 3 seconds, and start to move when scan data shows. To improve the scan efficiency, the movement should be continuous and uniform.





The bars on the left indicate the distance, green indicates the optimum distance, blue indicates the distance is too far, red indicates the distance is too close. Get the best position according to the color bars. You could also refer that to the light on the equipment handle, the indication of which is as same as above.

**Notes: when the scanned data quality is not good, please check the distance, and if the brightness is proper in good distance condition. Check brightness through exposure whether the light frame is clearly shooting on the object.**

If the scanning presents purple color as shown in the following picture, it indicates that the position tracking fails.



You need to go back to this scan data position and wait for about 3 seconds or find the previous scan data position with features and adopt merging features for about several seconds, and then try to scan normally.



If the merger fails during the scan, please go back to the scanned part for 3 seconds where there are features and details, start to scan again when it is followed again.

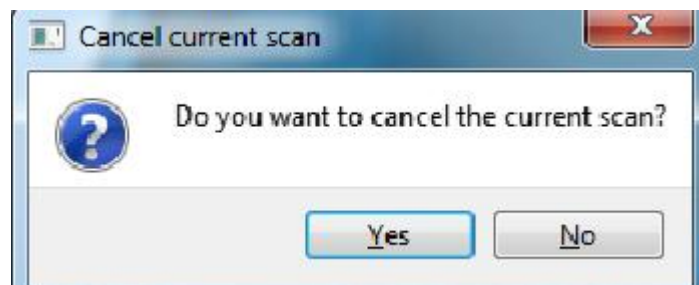


**Suspend Scan** : click during scanning process, or press the button on the hardware to suspend scan to observe the scanning situation.


You could choose to observe the scanning object in rotating by clicking the left button, and go back to scan by clicking START button.

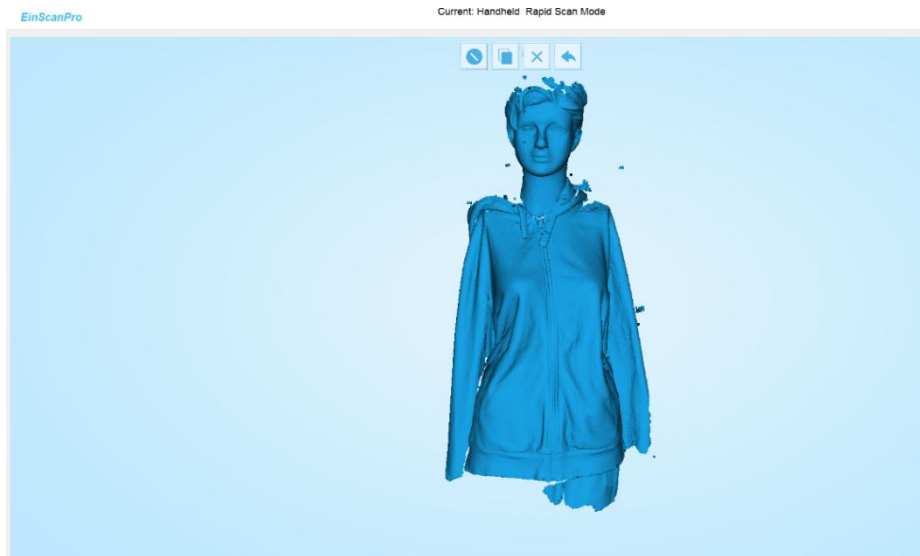


**Delete Scan** : click to delete the current scan



Click Yes to delete the current scan data, and click Scan button to start over.

**Finish Scan** : when the scan data is finished, please click  to complete. Shown as in the picture:



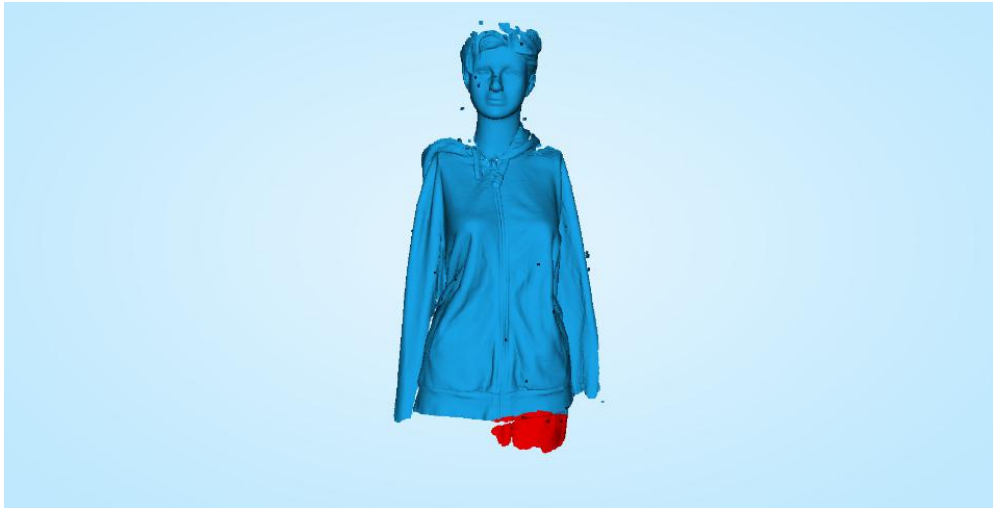
After finishing scan, you could edit it if there are redundancies or straggling points.

Buttons :

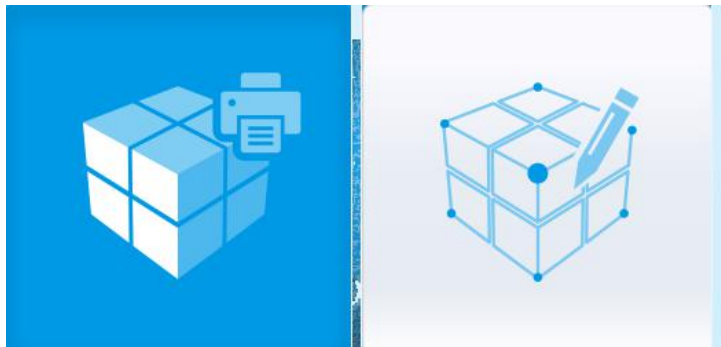


0 Deselect 1 Invert 2 Delete 3 Relocate 4 Show/Hide Texture

Shift + left button to choose the redundant parts, DELETE to delete the selected data, as shown in the picture:



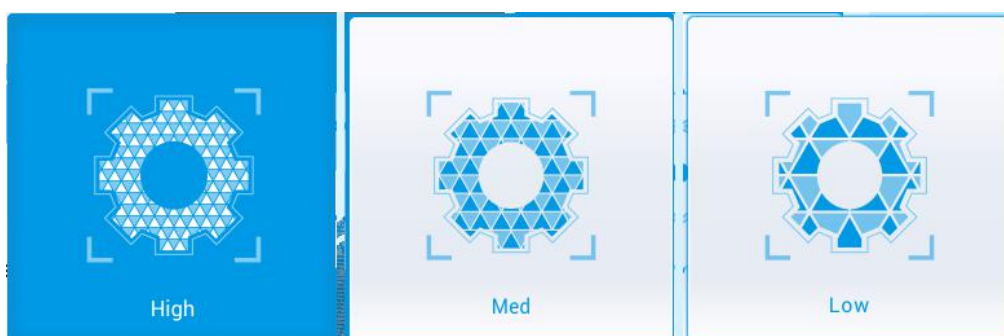
**Watertight** : When the scan is completed, click , proceed to post-processing. You will see two modes after clicking the button, as shown in the pictures:



: “Un\_watertight For Design” : meshing, unclosed model, results are shown in the picture:



: Watertight for print : Closed model can be printed directly. You will see the pictures pop up as following after selecting this encapsulation. Select the object details.



Note : Select High for objects with fine texture, select Med or Low for objects in smooth surface or with less detail. The time for data processing is in relation to the detail setting. The higher the level of details is, the longer time the processing takes.

Watertight results are shown as in the picture :



Texture watertight results are shown in the picture:



**Save data** : Click after encapsulating, and save the model in stl, asc or obj format, among which the obj format is in texture and color.



Click when the scanning is complete, establish a new project or import a project to proceed with next scanning operation.



Click to back to homepage if you want to change the mode.



## FAQ

### 1. What if the merging fails when the turntable has rotated one circle?

Solution: When scan under auto scan mode, try to adjust the distance between the scan head and turntable within 350-450mm, and the mark points on the turntable could be clearly seen by the two cameras and try to reduce the blocks.

### 2. What if the merging fails without mark points when the turntable has rotated several circles or when it is under free scan mode?

Solution: Try to make sure there are at least 1/3 overlap between the current scan area and the previous scan area and the object surface should be featured. For objects which are symmetric and without rich features, using mark points or manual merger is recommended.

### 3. How to scan objects in transparent, semi-transparent or black?

Solution: Scan before spraying on the surface.

### 4. Under handheld HD mode and handheld rapid mode, what if there are straggling points?

Solution: (1) Adjust the brightness, until the reflected graph and mark points are clear to be seen. (2) Try to make sure the background environment is single, for example, to use a black cloth or 500mm away from other objects. (3) Do not scan opposite to the computer screen.

### 5. Under Handheld HD mode, what if only the mark points could be identified while there is very less data captured?

Solution: Please do the HD scan calibration again, and during the calibration and capturing graph, please make sure the calibration board and scan head are still.

### 6. Under handheld rapid mode, how to continue scanning when the merging fails?

Solution: please move back to the scanned part (undeformed) for 3 seconds where there are features and details, start to scan again when it is followed to scan.

### 7. What should I do if the software collapses after I create a new project?

Solution: Make sure the project path is Chinese or English path.