SHINING 3D®

EinScan H

User Manual

May 2021

SHINING 3D®

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INTRODUCTION

Thank you for purchasing the EinScan H series 3D Scanner.

EinScan H is new developed handheld 3d scanner by Shining 3D. Based on combined structure light technology of LED and invisible infrared light, EinScan H is more popular to scan face and plays better performance of scanning black color objects, obtaining hair data much easier. With a built-in color camera and large field of view, EinScan H provides high quality 3d data at a fast 3d scanning experience with color and texture. It provides a robust tool for various scanning of human body, arts and furniture, product design.

If you need any support for your 3d scanner, please contact your local reseller or the EinScan support team einscan_support@shining3d.com.

Information in this document is subject to change without notice.

1. Specification and System Requirements

1.1. System Requirements

Preparing a suitable computer will improve your scanning experience.

One important notice for PC configuration is the **graphic card**. It has to be **Nvidia card** since certain function from Nvidia is needed for scanning. **GTX series card** is the best for scanning while Quadro series CAD card also works but you need a more expensive model comparing to the GTX series to get a good scan experience.

Handheld model	**EinScan H**	
	Required	**Recommended**
Graphics card	Nvidia GeForce GTX 660 / Nvidia Quadro P1000	NVIDIA GTX serial cards higher than GTX1080
USB port	1 of 3.0 port	
OS	win10 64bits	
Video memory	> 4G	> 8G
RAM	8 GB	32 GB
CPU	i5 3th Gen	i7-8700 or higher
Screen resolution	1920*1080 DPI: 100%; 125% 3840*2106 DPI: 100%; 200%	

➢ RECOMMENDED PC MODEL

Dell G3 laptops, Core i7-9750H, NVIDIA GeForce RTX 2060 6GB GDDR6, 2x8GB, DDR4, 2666MHz
Asus ZenBook Flip, Core i7, Nvidia MX250 with 2Gb memory, solid state hard drive, 16gb ram
Lenovo Y520 15IKBM i7-7700hq, 16GB, gtx1060
Acer Predator PH317 i7, GTX1060, 16G RAM
MSI – GS63VR 7RF stealth pro RAM 32G
Alien ALW15M-R2726R
ASUS ROG STRIX

1.2. Scanner Set Up

Unpack and set up your scanner and software before getting started with scanning.

1.2.1. Unpack the Package

Standard Package

Optional package
（please contact your supplier if you want to buy this hard case)

1	Scanner
2	Calibration board
3	Power adaptor
4	Markers
5	Connection cable (USB, DC IN)
6	USB drive

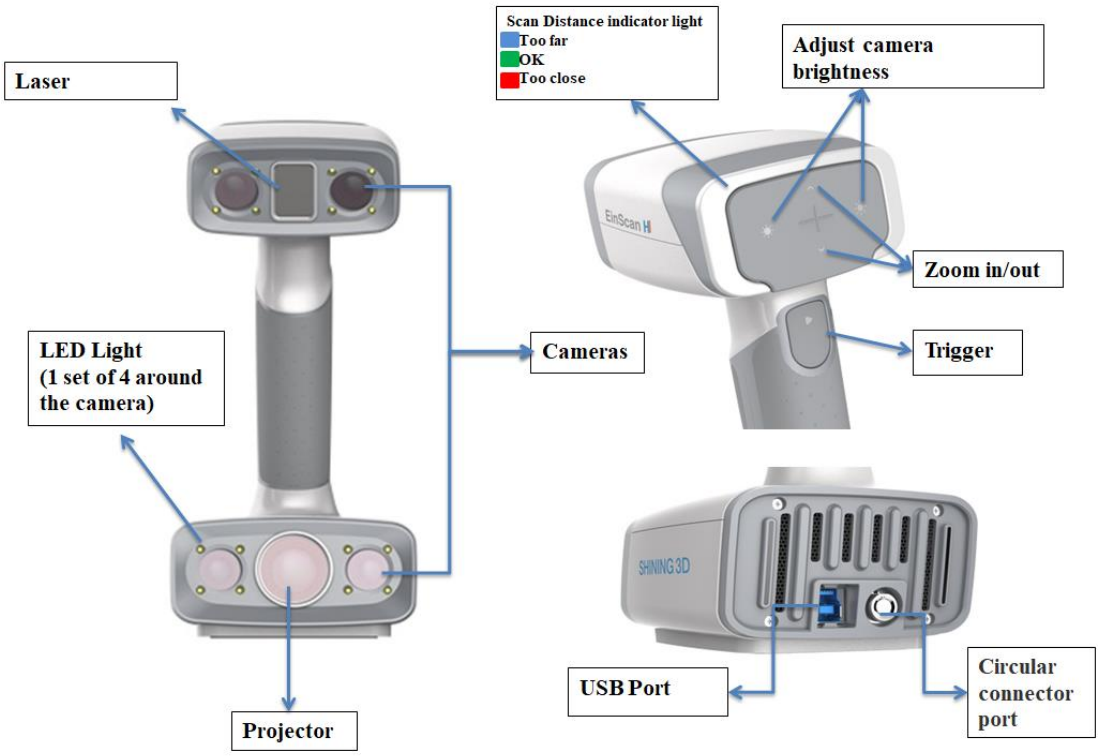
Packing list

The items listed in the packing list refer to the components and material that should be included in the package. The components may be different as listed when you purchase other accessories or change any item with your supplier. Please check carefully when opening the package.

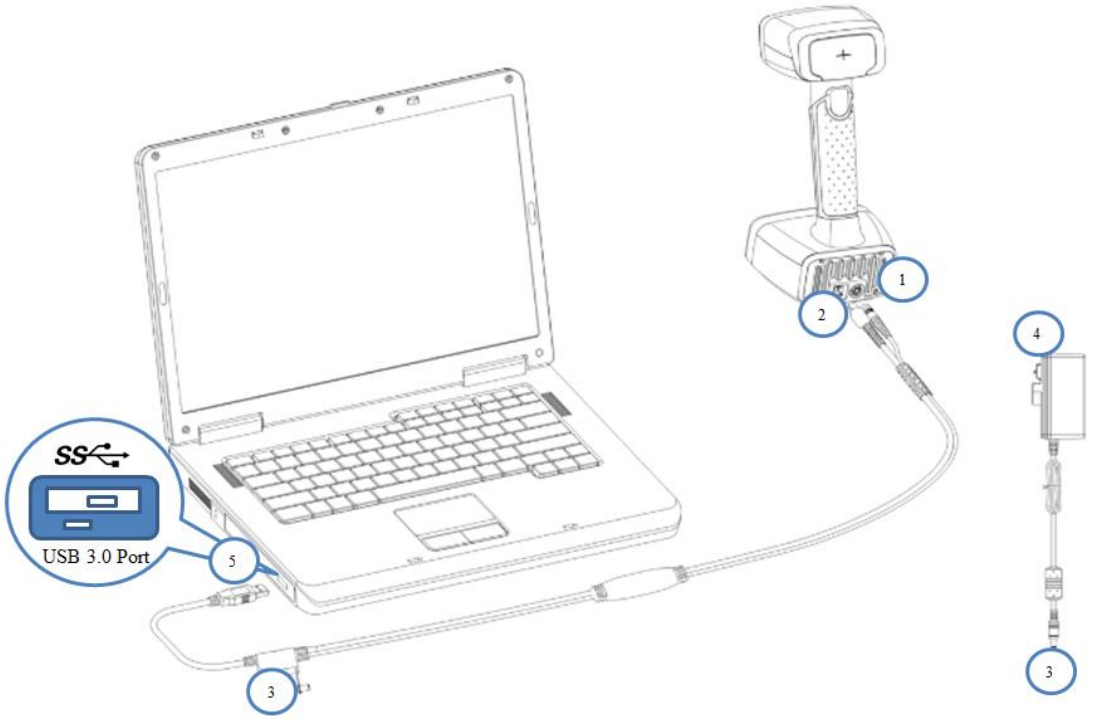
Note： Each scanner has its own serial number, label is placed at the bottom of the scanner. It will be required for maintenance. Do not remove it.

Serial number

1.2.2. Scanner Body



1.2.3. Connection



Take out the connection cable.

1. Insert the pin plug into the scanner's circular connector port.
2. Plug the other one to scanner's USB port.
3. Plug the power adaptor into the connection cable DC in port.
4. Plug the power cable another end into a power outlet.
5. Connect the other end of the connection cable to a USB 3.0 port on your computer.

2. Software Set Up

2.1. Download the Software

Step 1: Go to https://www.einscan.com/support/download/.

Step 2: Select your scanner model.

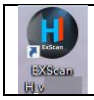
Step 3: Download the software to your operating computer.

Note: You are required to register before downloading.

2.2. Install the Software

Note before installation: Administrator rights are required for the installation of the software.

1. Double click installation package, accept the modification on your computer.
2. Follow the instructions to complete the software installation.

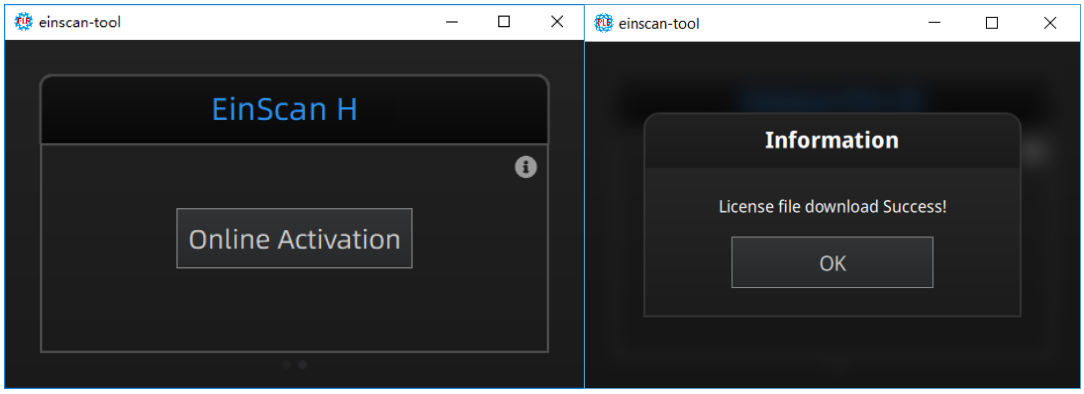
	After the software is installed, a shortcut will be created on your desktop. Double click to open the software.

2.3. Scanner Activation

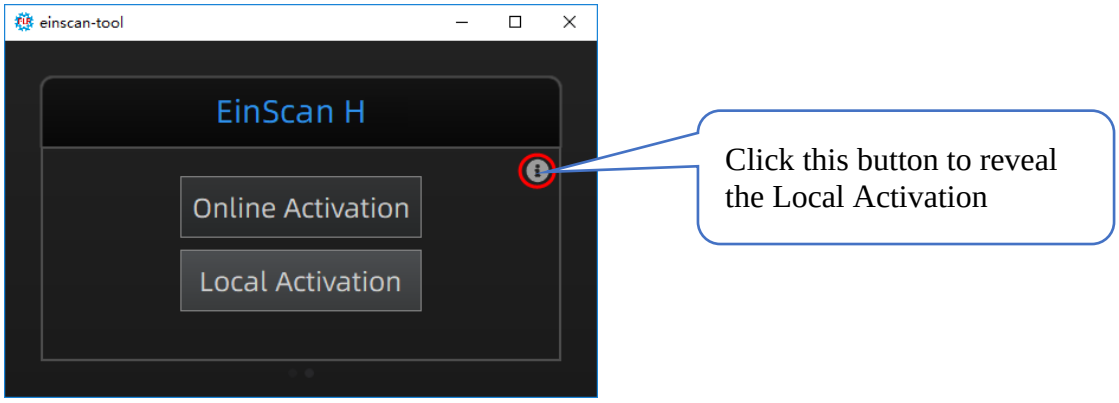
For first-time use, activate the Scanner. There are 2 ways:

1. **Online activation** is recommended if your computer is connected to the internet.
2. If there is an issue with network connection, click **Local activation** to select .ple license file on your computer. (.ple file can be found in the USB drive.)

Note: If the activation fails, send a request for activation file to einscan_support@shining3d.com with your serial number.



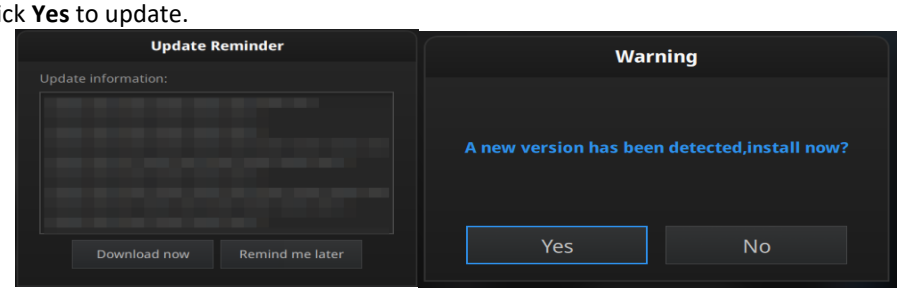
Online Activation



Local activation

2.4. Software Update

When a new version is available, a pop-up will show when you start the software to remind you update your software to the latest version.
Step 1 Click **Download now** to download software installation package automatically. During auto download, do not close the Client.
Step 2 Click **Yes** to update.

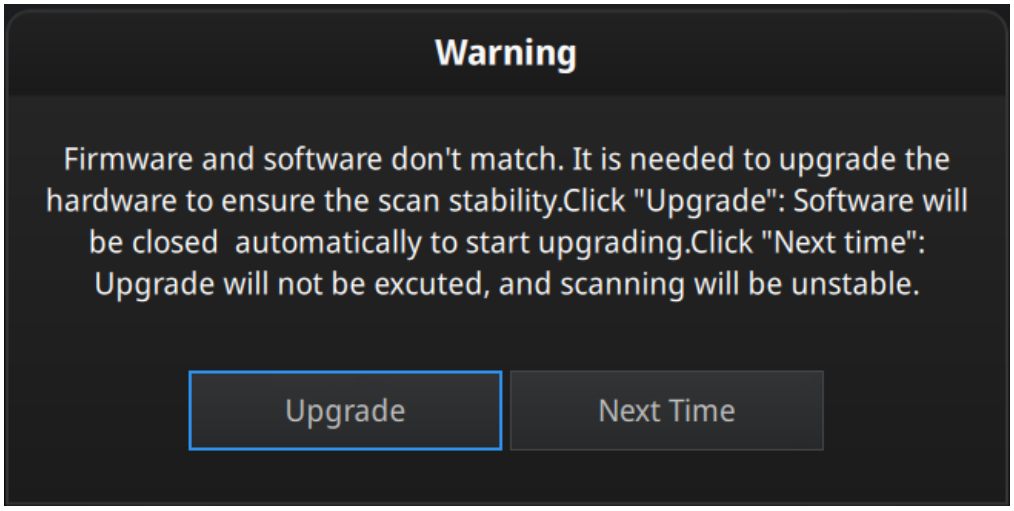


Update Reminder

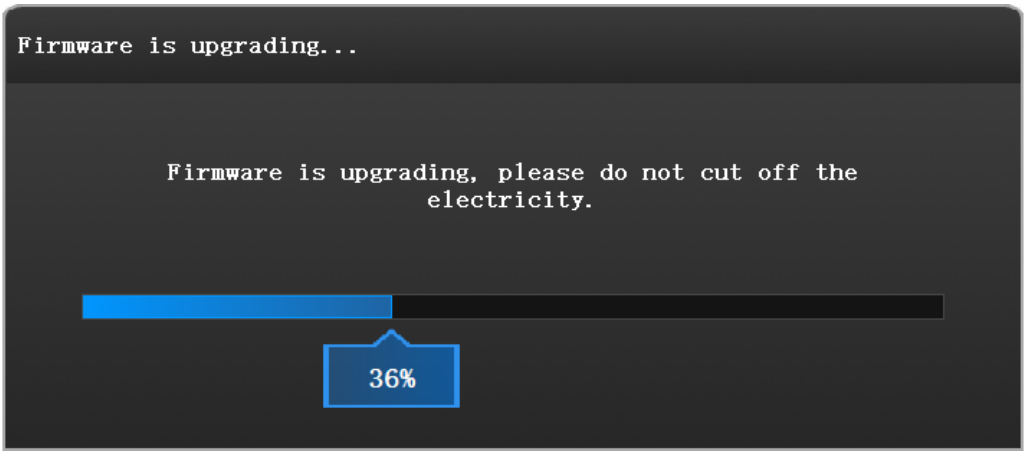
2.5. Firmware Update

When the scanner firmware is incompatible, a message will appear when software is open.

- Click Upgrade and follow the instruction to update the device firmware.
- Firmware updating will take around 6 mins.
- Power off the device after upgrading successfully.
- Reconnect the device, and open the software again, the device is running under the latest firmware.



When firmware doesn't match



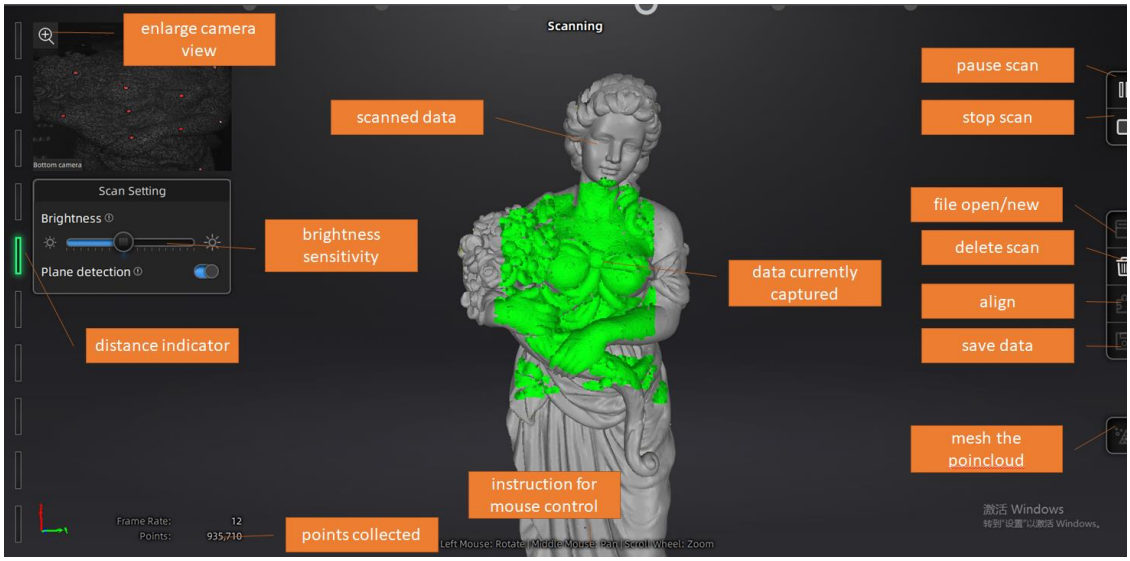
Firmware Upgrading

Note:

1. Do not disconnect the scanner, or unplug the power during the upgrade.
2. Recovery will start from a failed upgrade. You can restart the firmware update after successful recovery.
3. If recovery fails, turn off the power of the scanner and reconnect the scanner to restart the software for upgrading.

2.6. Interface and Parameters

2.6.1. Navigate

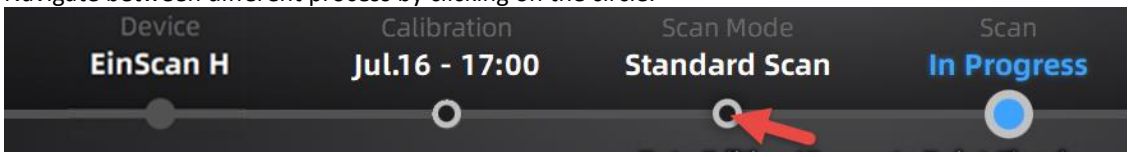


Interface navigation

Left mouse: rotate
Middle mouse: move the data
Scroll up and down: zoom in or out
Keyboard:

Spacebar to scan again or restart the scan & validate
Delete key to delete selected data
Esc key to exit current pop-up
Enter key to select when there is pop-up interface (an operation like clicking with mouse to select).

Navigate between different process by clicking on the circle.

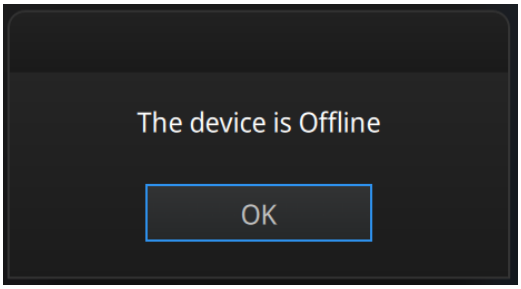


Navigation bar

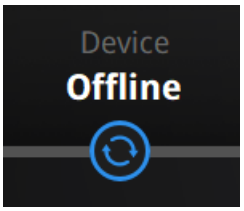
Note:
"Device offline" notification shows that you don't connect the Scanner to PC or the Scanner is offline. Confirm that the Scanner is connected properly (no loose connection, for example), and click reconnect area to reconnect.

2.6.2. Reconnect the Scanner

"Device offline" notification shows that you don't connect the Scanner to PC or the Scanner is offline. Confirm that the Scanner is connected properly (no loose connection, for example), and click on **Device Offline** aera to reconnect.



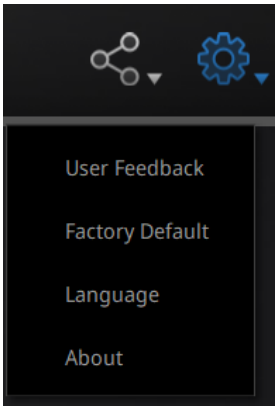
Device offline or connection loose



Refresh the connection on the status bar

2.6.3. Settings

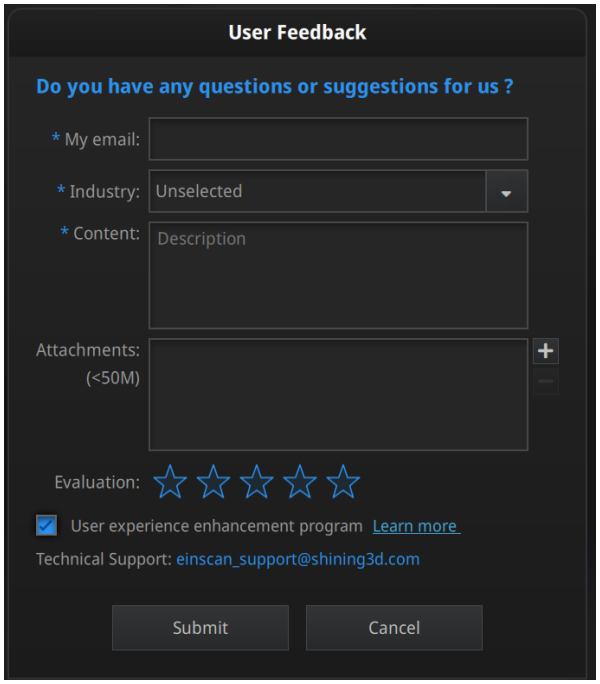
Click the settings logo from the upper right to open the drop-down menu.



Drop down menu

Feedback

If you have any questions or suggestions, please share with us by clicking “Feedback”. Please leave your email in “My E-mail”.



Feedback window

User Experience Enhancement Program

To help us improve the quality and user experience of EinScan, we hope to be allowed to collect usage experience information. This information will not contain your personal information or scanned data, and will not be accessible to any third party. This checkbox is selected by default, and we strongly recommend you keep it checked. As a reward, the User Experience Enhancement Program will continuously keep you informed with the newest software update information, to assure you get free software updates and enjoy the latest improvements based on your collective feedback. If you close the User Experience Enhancement Program, you might not be informed with software updates automatically.

Factory Default

All settings modifications will go back to the original settings.

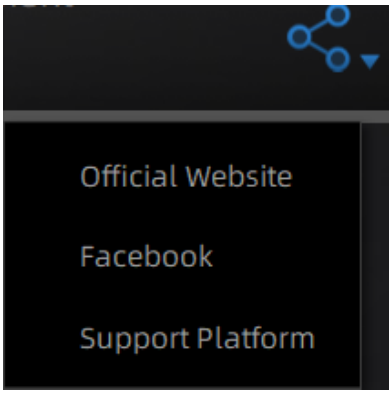
Language

Select the language for the interface, click apply to change, restarting the software is not needed

About

For version information and support, email einscan_support@shining3d.com.

2.6.4. EinScan community



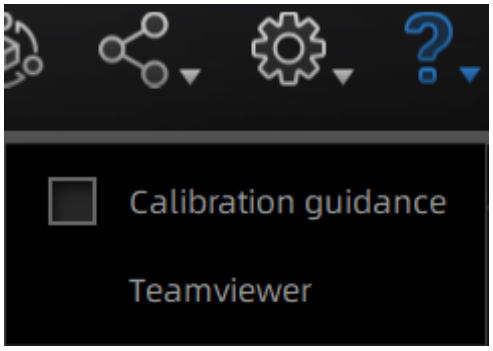
Community drop down menu

- **Official Website** (http://www.einscan.com/) refers to SHINING3D's official website for Einscan product and information.
- **Facebook** (EinScan) refers to facebook "EinScan Expert" for EinScan users to discuss and share the ideas, achievements and experience.
- **Support Platform** refers to the platform for EinScan users to validate the warranty and submit support ticket when necessary. Service live software updates, manual, video download can be accessed in support platform. Register your EinScan at support.shining3d.com

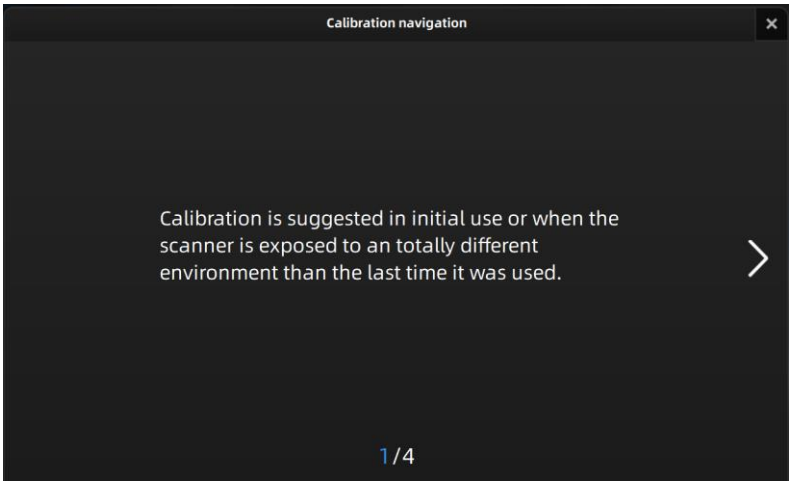
2.6.5. Help Mode

Open Help Mode

- When you are at calibration interface, click ？ to show the following image. Then follow the interface guide to calibrate the Scanner.

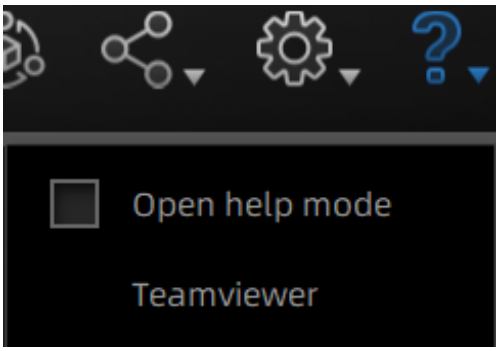


Drop down menu

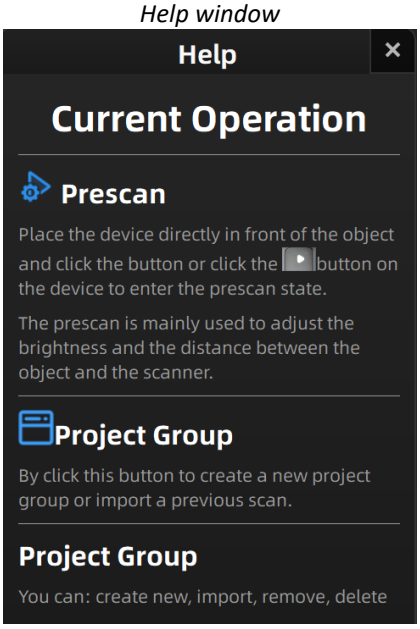


Follow the interface guide

- When you are at other interfaces, click ？ to show the following image. Then follow the interface guide to operate the Scanner.



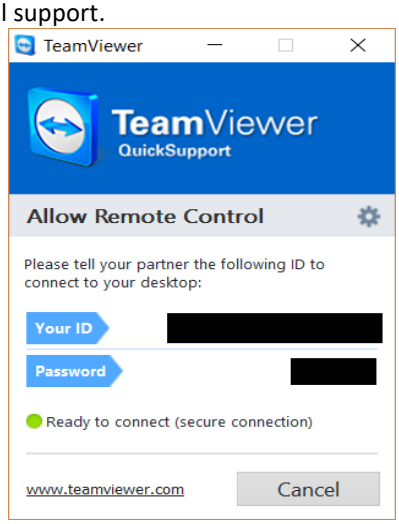
Help window



Follow the interface guide

Teamviewer

It opens S3D_teamviewer.exe, for online customer support access or display to other screen or portable screen. Share your ID and password to allow our technicians to remote control of your computer during online technical support.



Share the Your ID and password to allow access

2.6.6. Alerts

A pop-up alert will notify the user of a hardware or configuration issue. Check and restart the software. If the error persists, please contact support by emailing einscan_support@shining3d.com.

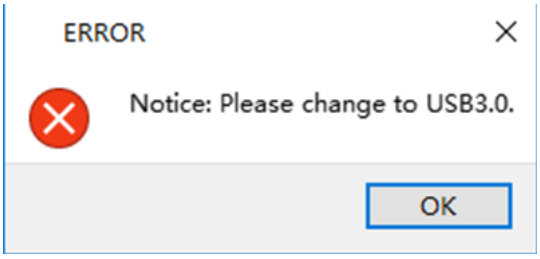
Fail to Activate

For activation failure, make sure the scanner is well connected. Redo the activation.

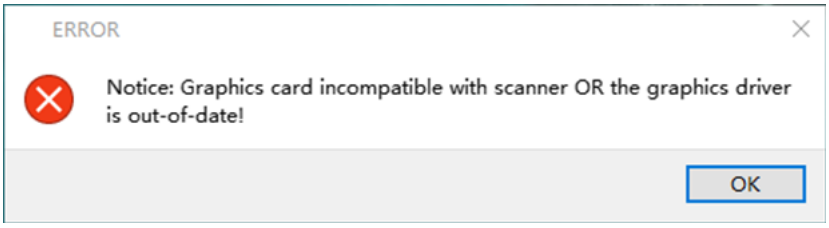
Device fails to activate

Incorrect Configuration

For prompt of USB port error, switch to USB 3.0 port; for prompt of graphics card, update your graphics card drivers and restart the software.

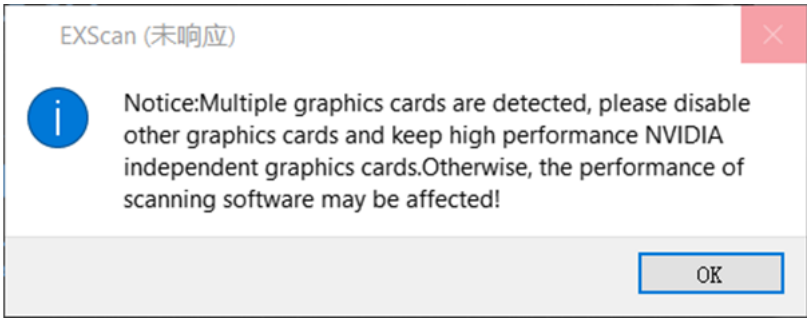


USB not 3.0

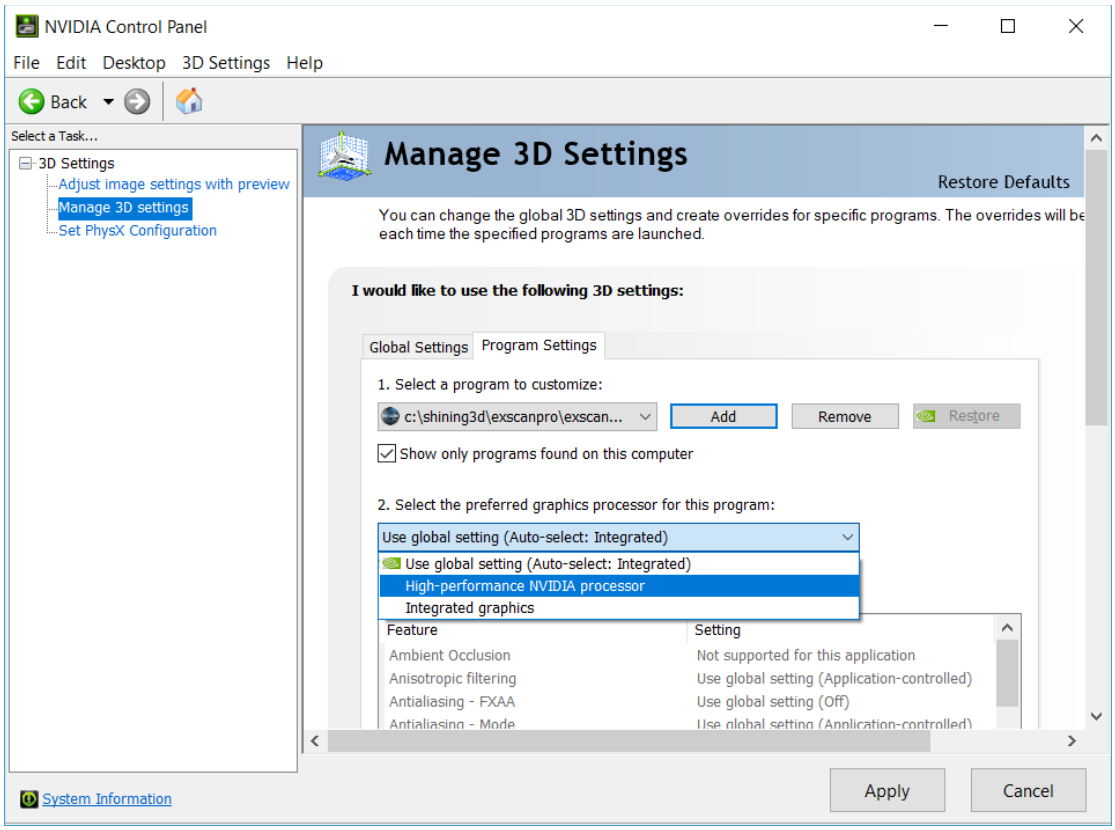


Graphics card incompatible

If the computer has multiple graphic card, access to the NVIDIA Control Panel (right click on the desktop). In Manage 3D Settings > Program Settings, Add EXScan software. Then change the preferred graphic processor for this program. Select NVIDIA processor. Click Apply to save the settings.

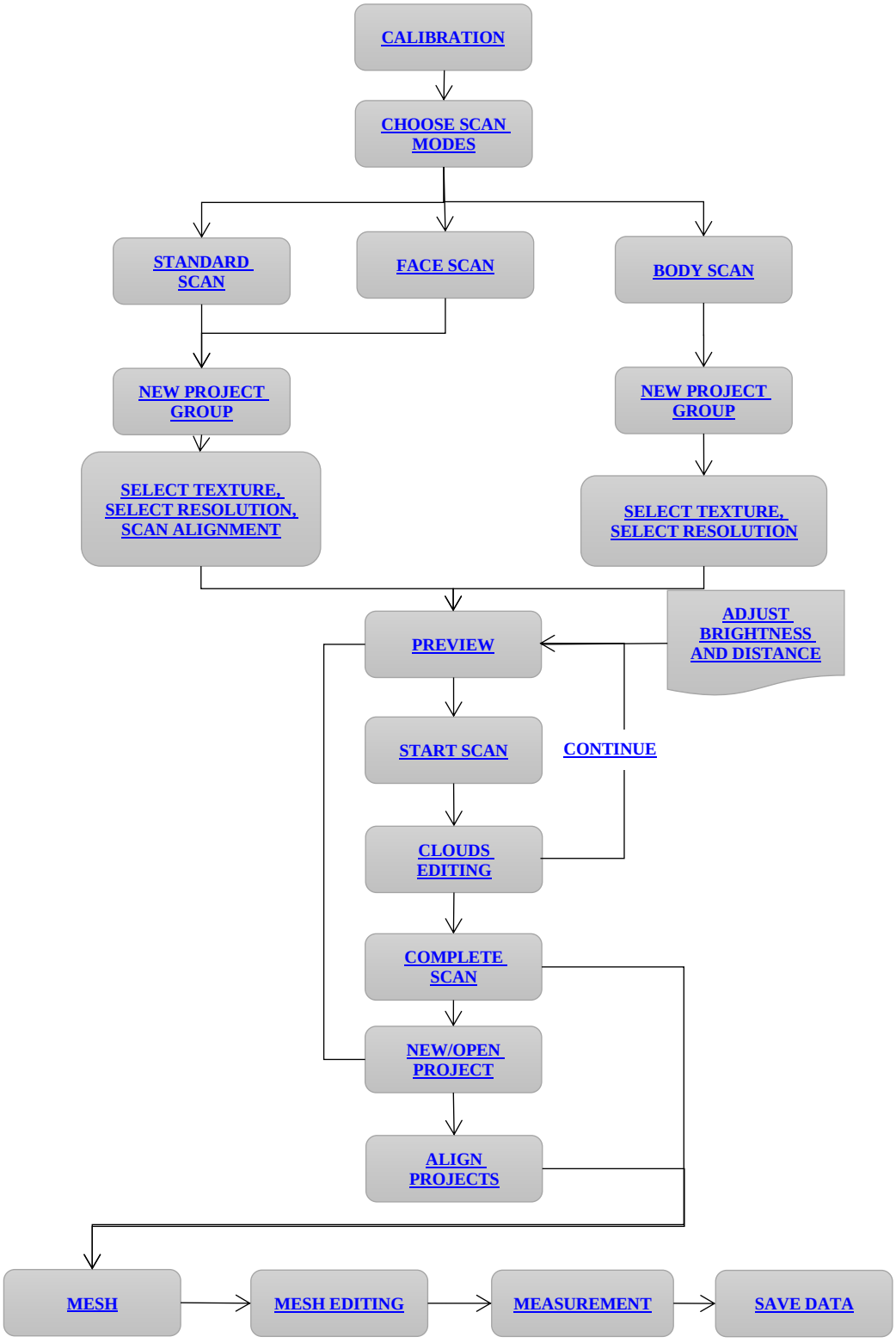


Multiple graphic card detected



Change graphic card preferences for EinScan H

3. Software Scan Workflow



4. Calibration

4.1. Precautions and Use

Calibration is the process to ensure the device will scan with the optimal accuracy and scan quality. Each EinScan 3d scanner was factory-tested and achieved, at least, the listed accuracy from the technical specification according to VDI/VDE 2634 standards.

Besides factory tested guarantee of accuracy, to assure high scanning accuracy, each EinScan is also coming with a calibration board for customer calibration. This customer calibration is not required daily often. Only when the first time after scanner and software are installed. Or, when you are in the following situations, you should calibrate the device:

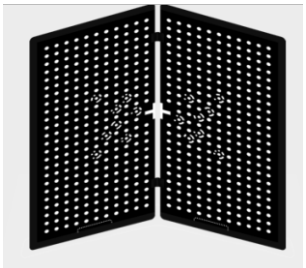
- Device change
- After device enduring bumpy transportation
- After device accuracy decreases
- When data misaligned very often

Note:

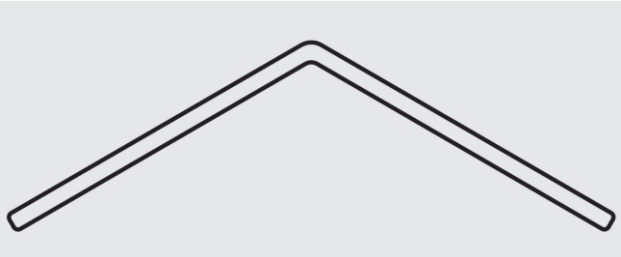
1. Customer calibration is recommended to do twice a week for daily use.
2. Make sure to protect the calibration board and keep it clean, no scratches or stains on the black surface with white circles.
3. The Calibration board is matched to the Device with same Serial Number. Doing the calibration with an incorrect calibration board will fail to generate good scan data or optimum accuracy.
4. For common use, you are not suggested to wipe calibration board. If you still need to clean it, clean with clear water only and do not use chemical liquid (alcohol, for example).

4.2. Preparation for Calibration

Take out the calibration board, and the position paper.



Calibration board



Position paper

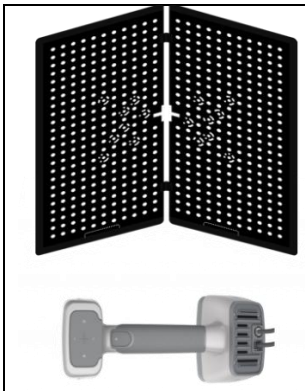
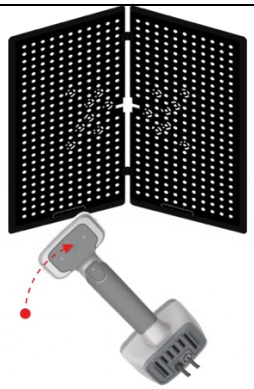
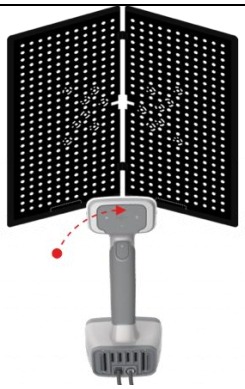
4.3. How to do Calibration

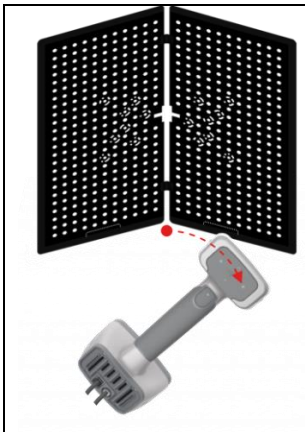
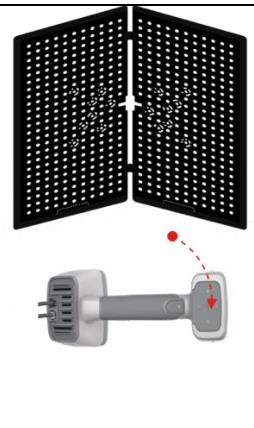
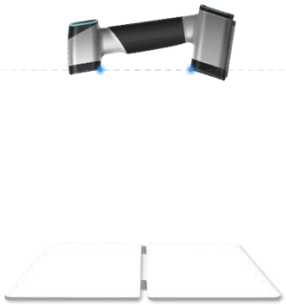
Select Calibration to enter calibration interface. For first-time use, you will be guided to **STANDARD CALIBRATION** directly.

1. Put the calibration board vertically onto the paper position.
2. Follow the instructions from the software to finish 5 positions.
3. While holding the scanner, make sure it is upright to the center of the board. Bring the scanner closer or farther to the board till all the required distance captured.

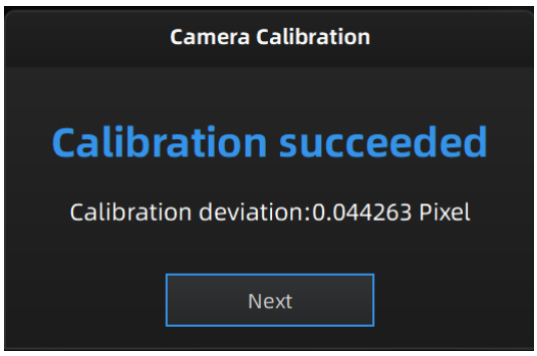
A pop-up of Calibration succeeded will appear. Click **Next** on the pop-up, software will take you to the next step: **WHITE BALANCE**. Put the back side of the board on a stable and level table, and point the scanner upright to the board. Move the scanner up and down till middle distance bar is highly bright and scanner light projection ends. Hold the Scanner still when the Scanner is projecting light.

A pop-up of White balance calibration succeeded will appear. Click Next on the pop-up, you will enter to scan mode.

<table>
<tr><td>  </td><td>  </td><td>  </td></tr>
<tr><td>Position 1</td><td>Position 2</td><td>Position 3</td></tr>
<tr><td colspan="3">STANDARD CALIBRATION</td></tr>
</table>

<table>
<tr><td>  </td><td>  </td><td>  </td></tr>
<tr><td>Position 4</td><td>Position 5</td><td>White back side of the board</td></tr>
<tr><td colspan="2">STANDARD CALIBRATION</td><td>WHITE BALANCE</td></tr>
</table>

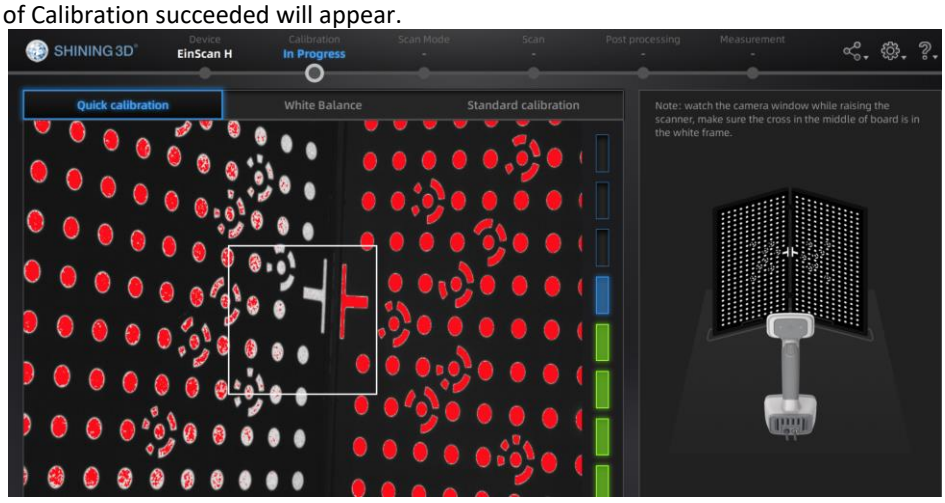
Standard calibration (Point the scanner at the center of the board)



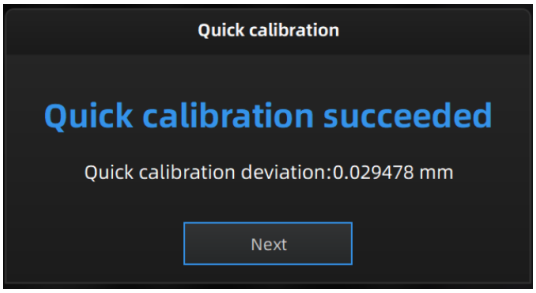
Calibration succeeded

QUICK CALIBRATION is recommended when recalibration is required. Only one position is required.

A pop-up of Calibration succeeded will appear.



Quick Calibration (Point the scanner at the center of the board)



Quick calibration succeeded

Note:

1. Customer calibration is recommended to do twice a week for daily use.
2. Move the scanner at a steady and slow speed.
3. Make sure to protect the calibration board and keep it clean, no scratches or stains on the black surface with white circles.
4. The Calibration board is matched to the Device with same Serial Number. Doing the calibration with an incorrect calibration board will fail to generate good scan data or optimum accuracy.
5. For common use, you are not suggested to wipe calibration board. If you still need to clean it, clean with clear water only and do not use chemical liquid (alcohol, for example).

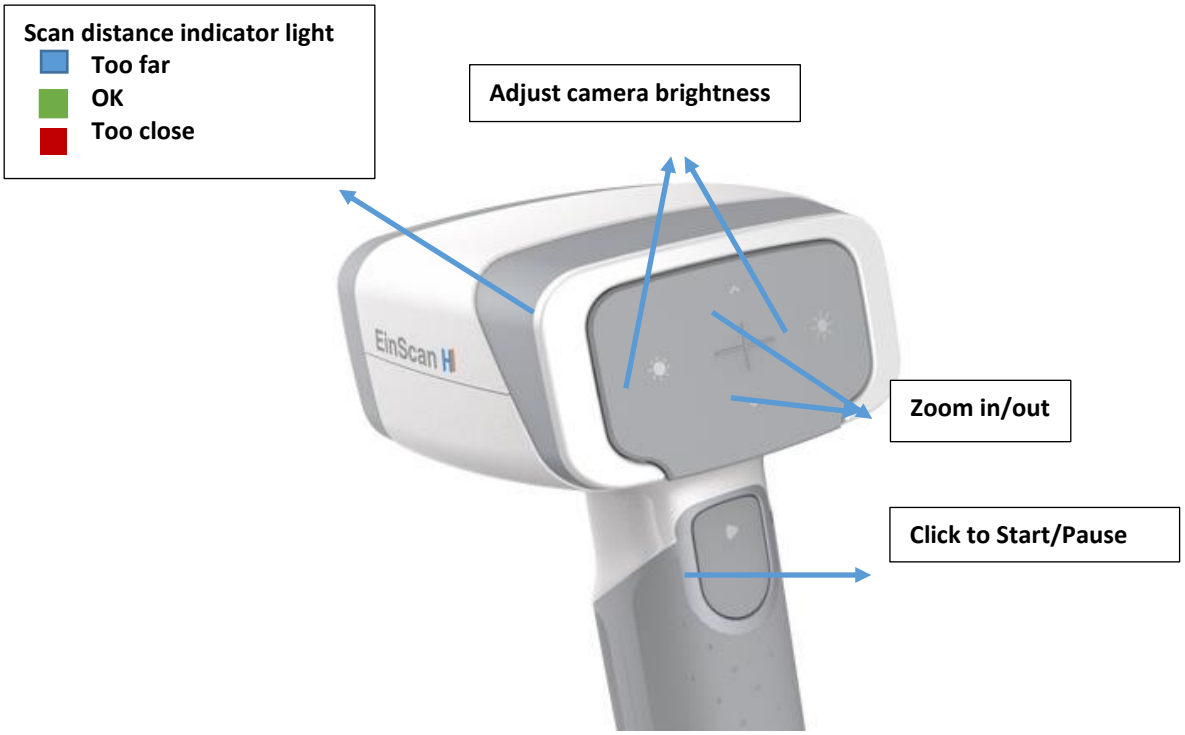
If the calibration failed, please check:

- If there are any reflective object or strong light nearby, recalibrate to avoid the reflective and strong light.
- If the positions were followed as suggested, recalibrate according to the suggested steps.
- If the board is clear and clean without scratches or stains.

For successful calibration, click **Next** to do white balance calibration.

5. Before Scan

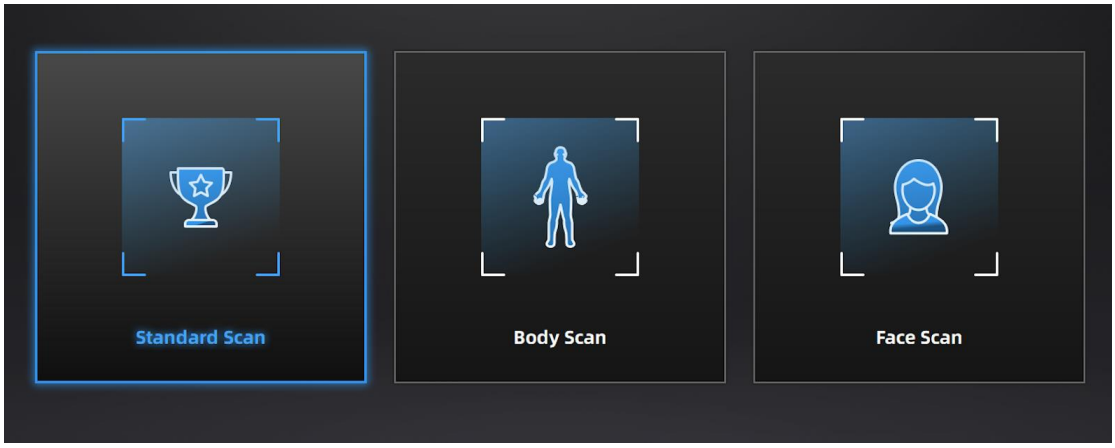
5.1. Scanner Buttons



Scan buttons

5.2. Scan Modes

Now you can start to scan. Use EinScan H, you can scan objects, human body or face. There are 3 different modes for you to select.



Scan mode

	Standard Scan	Body Scan	Face Scan
What to scan?	300mm - 4m objects	Human body	Face or body incl. hair
Light source	LED	LED	Invisible infrared
Accuracy	0.05mm	/	/
Resolution	0.25~3mm	0.25~3mm	0.5~3mm
Alignment	Markers/features/ hybrid/texture	Feature	Feature/ markers
Scanning speed	15fps (non-texture); 10fps (texture)		
Texture Scan	Yes	Yes	Yes

5.3. Preparation

5.3.1. Standard Scan

We do not recommend scanning:

- moving or vibrating objects, which cause the shape of object changed during scanning process.
- Soft material object
- lattice structures with many small deep holes

The objects, which has good geometry or texture features will get scanned very easily and fast with good quality.

If you have to scan the items like below, there are some preparation to be prepared before scanning and notes during scanning.

	Preparation	Notes while scanning
Black, transparent, shiny, reflective surface objects	Use washable or vanishing scanning spray	Scan as normal
Objects with less features or repetitive features	Place markers on the objects	Select marker alignment
	Mark/draw on the surface to add features	Select texture alignment
Thin wall objects	Place markers on and around the objects	Choose global marker alignment

5.3.2. Body Scan

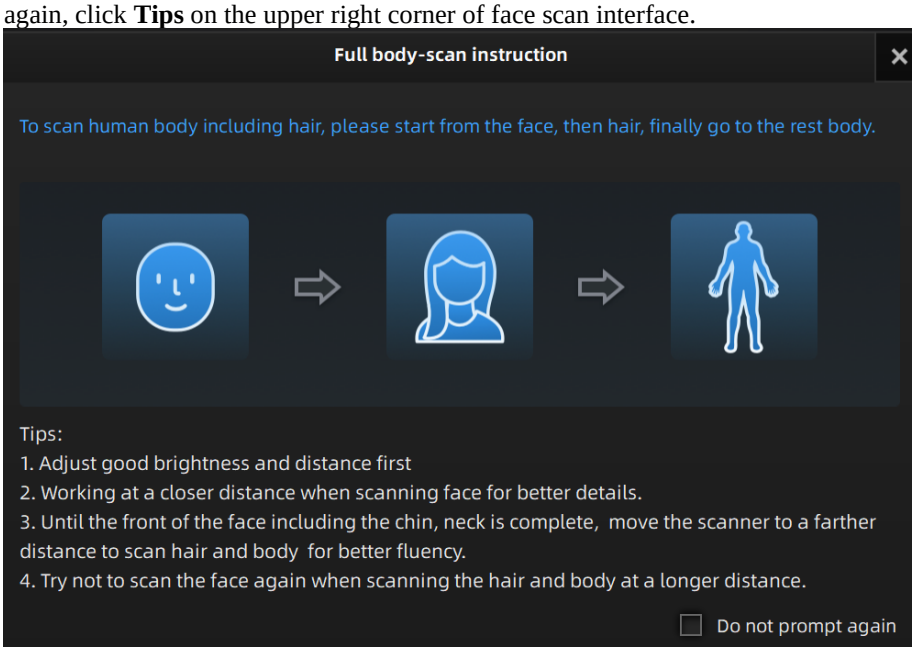
Body scan mode is recommended to scan human body. The alignment algorithm under this mode was defaulted set to process non-rigid objects those shapes may change a little bit due to breathing or slight deviation.
Note:

- For better performance, wearing clothes with low contrast. For example, scan white and black color, it requests brightness adjustment when switching to each other. Hair cannot be captured in good quality in this mode.
- For long hair covering your body, wrap your hair before scan.

5.3.3. Face Scan

Operation Guide

After creating a new face scan project (Feature alignment), a prompt interface shows. To not show prompt interface again, click **Do not prompt again** and close the interface. To show the prompt interface again, click **Tips** on the upper right corner of face scan interface.



Function and Requirements of Scanned Objects

Face Scan mode is utilizing infrared light source for 3d capturing, which is good to scan human face without any visible light, very comfortable to eyes. Face scan contains feature scan mode and marker scan mode, and feature align mode uses non-rigid body scan. It can help capture hair data. Straight, silky hair is easier to be scanned. Under face scan mode, you can still scan other targets, not only human face.
Stick markers onto the object and use marker align when there is not enough feature for feature align. See Standard scan.

Can’t scan (X)	Good to scan(√)

6. Project

You can start with a new project or open an existing project to continue scanning.

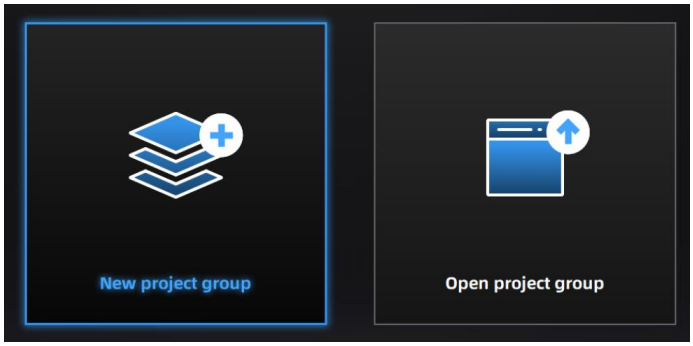
6.1. New Project Group

Select the file, and name the project to create a new project. The default project is saved to the desktop. You can change the saving path, and then the newly created Work will be saved to the new location you chose.

6.2. Open Project Group

To open an existing project, Select the file, and choose the project has been saved.

Note: The projects should be scanned under the same scan mode.



Create/Open a project group

6.3. Pre-setting

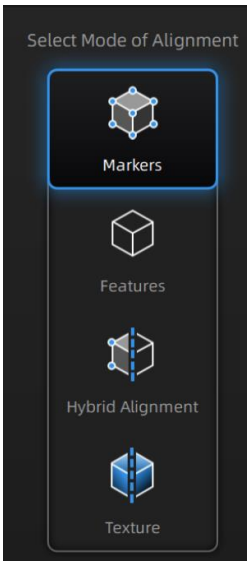
6.3.1. Select Texture

TEXTURE SCAN: the scan will be with color, and it also allows texture alignment.
NON-TEXTURE SCAN: the scan will be without color.

Note: Texture scan requires the objects to have colorful texture surface, and it takes longer time for data processing when meshing.

6.3.2. Alignments

STANDARD SCAN allows 4 alignments by markers/features/ hybrid/texture. **FACE SCAN** has 2 align modes: feature align and marker align (only for non-texture). **BODY SCAN** only has feature align, so no alignment selection.



FEATURE ALIGNMENT uses object geometric features for auto aligning during scanning. Rich features on the object are required for this mode.

MARKER ALIGNMENT uses markers to align the scans. It will help tracking for some object with non-feature regions like flat, spherical surface or objects with repetitive features. Preparation of marker on the object is required before scanning.

HYBRID ALIGNMENT uses features and markers to align the scans. Use the function to avoid alignment error in some target parts. By this alignment, we don't need to place the markers all over the part, but only on the region where has less geometry.

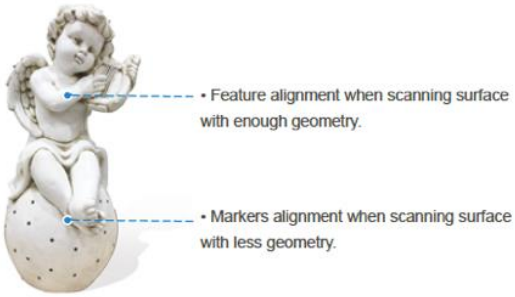
TEXTURE ALIGNMENT uses objects surface texture to align the scans. Texture Scan is required to select if you want to use texture align.
Note:
During texture align, gray area represents no texture collected. Scan the area again.

No texture collected (red box)

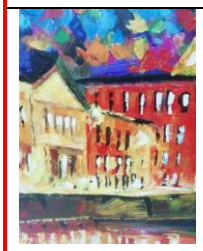
NOTES:

Marker alignment:

1. place on flat regions.
2. avoid the geometric regions.
3. stick the markers in a random, non-linear pattern.
4. use the markers coming with your device. Other markers can result bad accuracy or not be able to be detected for scanning.
5. while scanning, make sure at least 4 markers in each frame can be taken.



Example of use of hybrid alignment



Rich-colored

High color contrast

Texture align result:

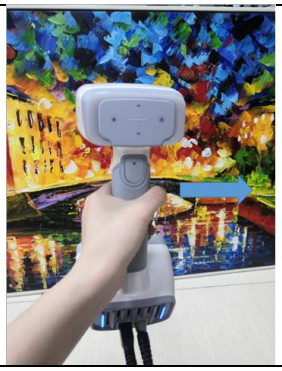
☆☆☆

not colorful

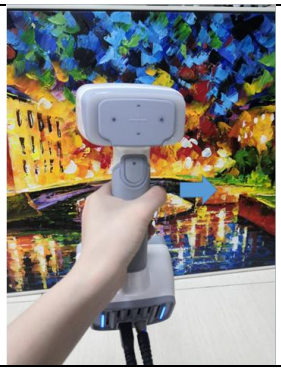
Solid color

Texture align result:

☆



✕ Avoid moving too fast



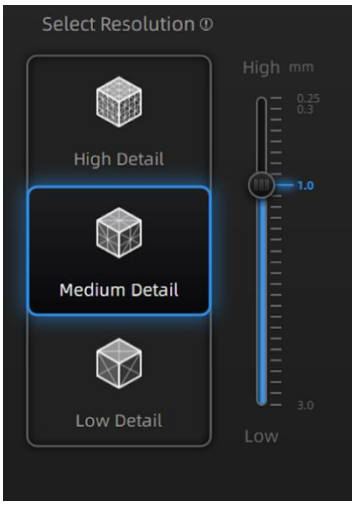
✔ Move evenly steady

Note: When selecting texture alignment, hold the scanner to move evenly steady.

6.3.3. Resolution

Select a resolution for the project. The higher the resolution, the better the details, but this may lead to larger files and processing times.

Choose High (0.7mm), Medium (1.0mm) or Low (1.5mm) or drag the cursor to choose another point-distance setting from 0.25mm to 3.0mm.

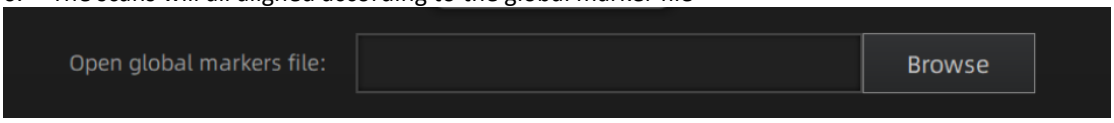


Select Resolution

6.3.4. Global Marker File

When selecting marker alignment in Standard Scan, you will find an option of **"open global markers file"**. It allows you to import .asc, .p3 marker files by using a combination of marker frame or photogrammetry measurements. By this method, we can scan wide range objects for a better accuracy. It will also help scan thin-wall objects to merge the front and the back side more accurately.

1. Follow your photogrammetry system operation; you can also set up a marker frame on the object, scan it by marker alignment
2. Save the point model in .asc or .p3 file
3. Open new project group and marker alignment
4. Import the saved .asc or .p3 file
5. Scan the object
6. The scans will all aligned according to the global marker file



open global markers file

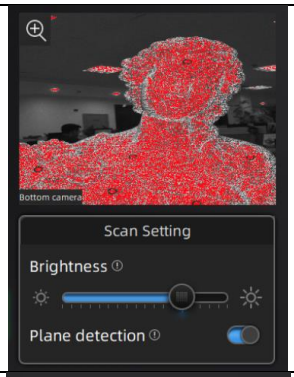
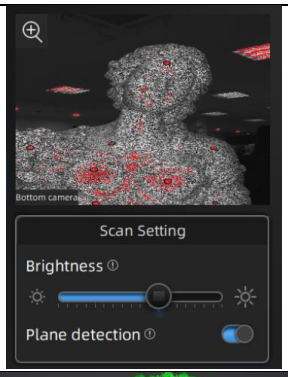
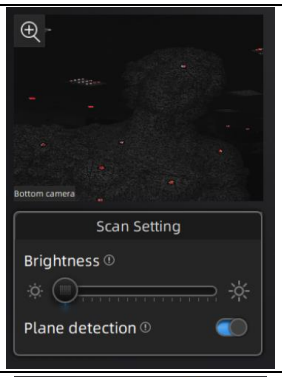
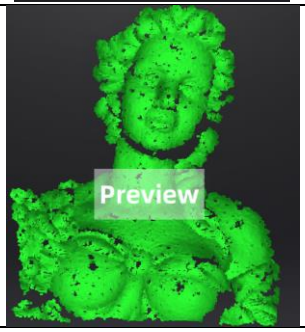
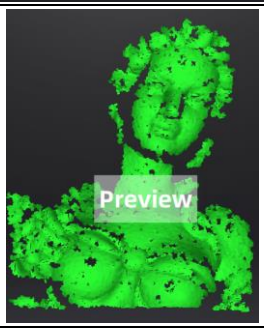
Note: Global marker file is only available under Standard scan when selecting marker or hybrid alignment.

6.4. Scan Setting

Entering to SCAN interface, there are some settings to be noticed before scanning:

6.4.1. Brightness Adjustment

You can adjust the brightness by clicking "" or "" on the scanner, or drag the cursor under the camera preview to left (-) or right (+).
On **Scan Setting** interface, adjust brightness until you can see clear data and markers. Overbrightness causes much noise on scan data.

Camera window			
Preview display			
	Too bright (X)	**Good (√)**	**Too dark (X)**

6.4.2. Optimal Distance Range

Distance color bar		
Red Too close	Green Optimal	Blue Too Far

Distance color on scanner		
Red Too close	Green Optimal	Blue Too Far

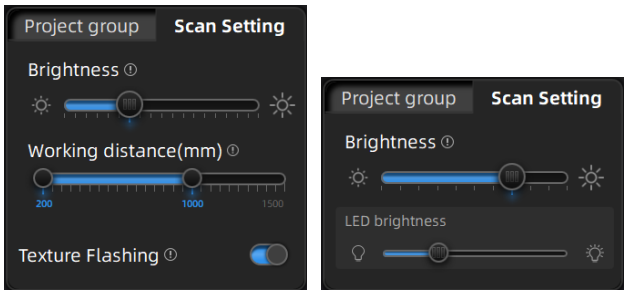
Scan mode	Resolution	Minimum distance	Optimal distance	Maximum distance
Standard scan	0.25~0.5mm	200mm	300mm	400mm
	0.5~0.7mm	200mm	325mm	450mm
	0.7~3.0mm	200mm	470mm	600mm
Body scan	\	370mm	470mm	570mm
Face scan	\	200mm	—	1500mm

6.4.3. Other Settings

TEXTURE FLASHING: LED on/off. Suggest to always on for texture uniformity. When OFF must be chosen, make sure your ambient light is well distributed. Only available when selecting scanning with texture. And, only available when you stop scanning or you are at other scan status.
PLANE DETECTION: Enable to detect the surface flatness. Suggest ON when selecting feature or hybrid alignment. When there is less geometry, software will remind “not enough features to align”. If you do not choose the plane detection, you could still scan flat surface, but the misalignment will happen.

Plane detection ON when not enough features to align

DISTANCE SWITCHING:
Distance switching function works only for face scan mode. Not available under face marker mode. Adjust the distance by sliders, the one on the left sets the closest distance to get scan data, the one on the right sets the farthest.



Scan setting

Note:

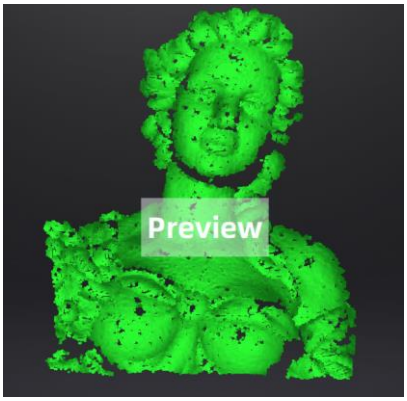
- For complete body scan under face scan mode, set brightness and distance first. To scan face, move the Scanner near and to scan hair and head top, move the Scanner far. For other human part scan, move the Scanner near or far according to your needs.
- Do not scan face repeatedly.

7. Scan

7.1. Preview

Click the trigger on the scanner or in the software, you will enter the Preview mode. In this mode, it will start to show data for preview, but not record this data.
In this mode, you can:

- Adjust the brightness sensitivity, refer to BRIGHTNESS ADJUSTMENT
- Check the working distance, refer to OPTIMAL DISTANCE



Preview

7.2. Start/Pause/Continue/Stop Scan

Click the trigger again, scan will start, and data is recorded. During scanning make sure to keep the scanner perpendicular to the surface, keep a proper distance from the object, and adjust the brightness depending on the ambient light and texture of the object.

Click Start in software or press the Play button to exit the preview mode and start the scan

NOTES:

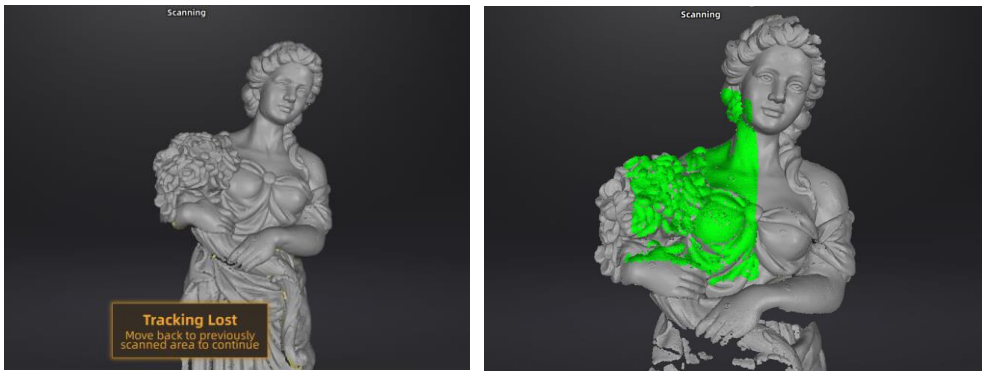
1. Preview mode will start every time a new project is built or an existing project is imported, or continue scanning after each pause.
2. Click Start in software or press the Play button to exit the preview mode and start the scan

7.3. Resume Scanning After Tracking Loss

If the scanner can't capture common features (when feature alignment is selected), miss enough markers (when marker alignment is selected), or with unclear texture(when texture alignment is

selected), it will stop data capturing. The software will remind tracking lost on the interface with sound. You can point the scanner at any scanned regions, and the scanning will be resumed.

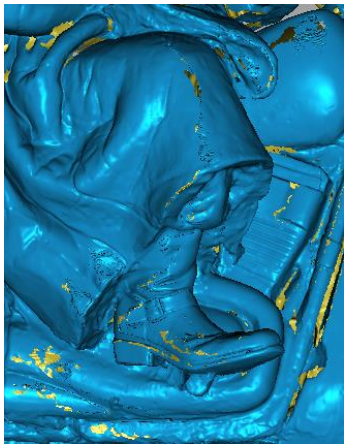
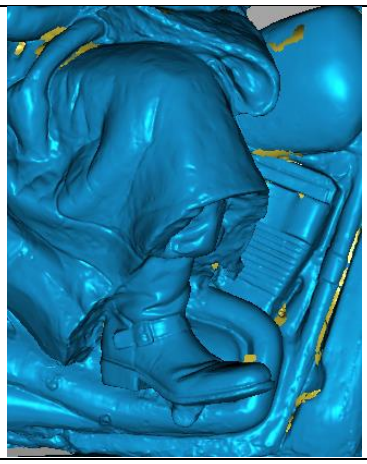
Besides of the above alignment requirements, moving too fast, scanning distance, and the object surface too dark or shiny will also cause the tracking lost. Refer to PREPARATION, DISTANCE, BRIGHTNESS ADJUSTMENT for more tips.

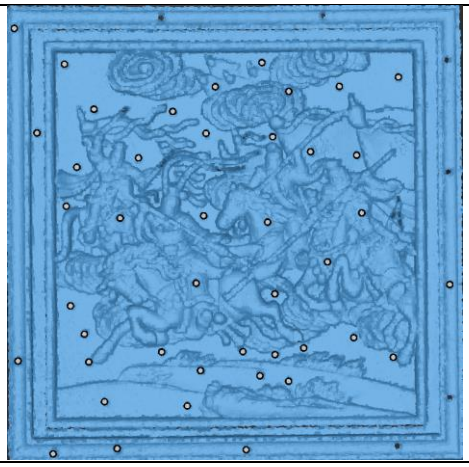
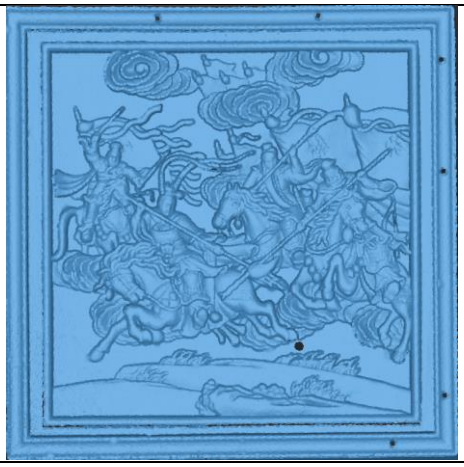


The green color on the data shows the current captured region.

7.4. Generate Point Cloud

Click to generate point cloud: an optimized 3d point clouds with markers hole filling function will be generated. The optimization includes a realignment of the data by recalculation. You can also use the function offline.

	
Before optimization	After optimization

	
Marker data before generating point cloud	Marker data after generating point cloud

Then you can select, delete data to use the edit tools.

7.5. Clous Editing

CLOUDS SELECT/DELETE
SHIFT + Left mouse： Select unwanted data, the selected section will be displayed in red, as shown below.
CTRL+ Left mouse： Deselect a selected region.

	Edit buttons: **①Deselect** **②Revert** **③Delete** **④Undo** **⑤Show/Hide texture (when installed with a color pack)**	

	Delete selected data Click the button or “DELETE” on the keyboard to delete selected data.
	Undo You can only undo the most recently deleted data.
	Show/Hide texture (when Color Pack is attached) Click the button to switch between displaying and hiding the texture.
	End the editing
	Revoke all and exit editing

Click Check to End the editing and confirm to save the edition in the project file.

8. Project Group

8.1. Create/Import Projects

When the scan data is saved, you can create new projects with more scans, or import the saved projects and manage all projects on the project tree.

	Create a new project
	Import the saved projects.

Note: Only projects from the same scan mode and with the same resolution can be imported.

Right click menu

8.2. Remove/Delete Projects

	Remove the project
	Delete the selected project(s)

Select one or multiple projects by click remove to remove the project(s) from the project tree, but not from the local folder. It can be imported when it is needed.

Click Delete or right click and delete to delete the selected project(s) from the project tree and the local folder.

8.3. Align Projects

Click to open the Manual Alignment interface. There are two ways to align:

Aligned result

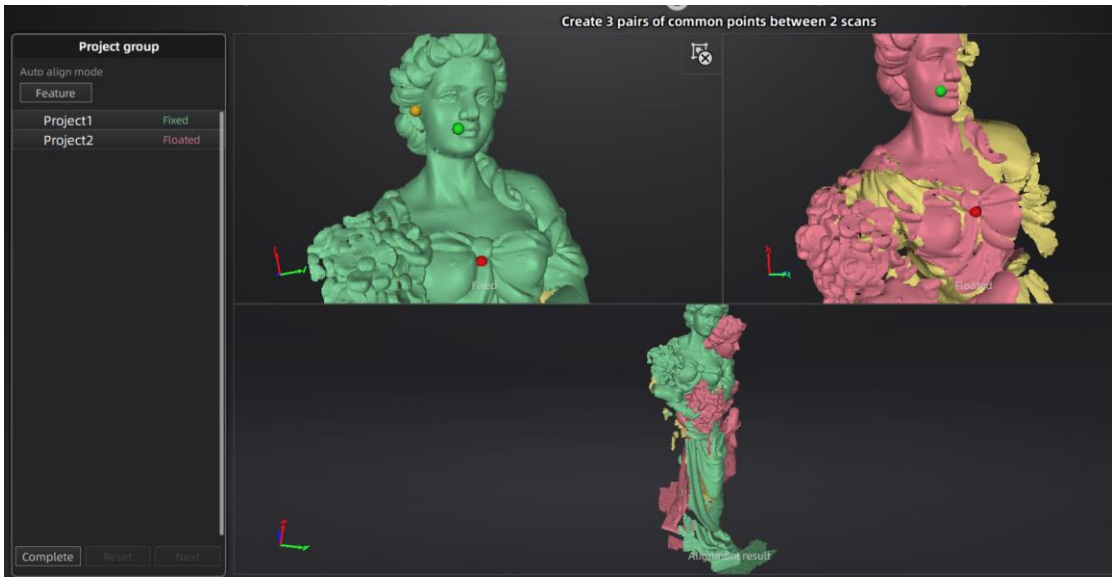
- **Auto align**

Drag the data into the fixed and floated viewport, click the feature align button on the left, the software will align based on the features automatically.

- **Manual align**

SHIFT + click left mouse button to select at least 3 non-collinear corresponding points in the 3D preview windows for Manual Alignment, as shown below.
Ctrl+Z: cancel last point picked

Click **Complete** to validate and leave the Alignment interface
Click **Reset** to cancel all alignments done in this session
Click **Next** to validate the alignment and continue to use the alignment interface



Drag and drop a project to the float and fixed window

9. Meshing

9.1. Create Mesh (Watertight/Unwatertight)

When scanning and editing are completed, click to create mesh. 2 types of mesh are available: Watertight and Unwatertight.

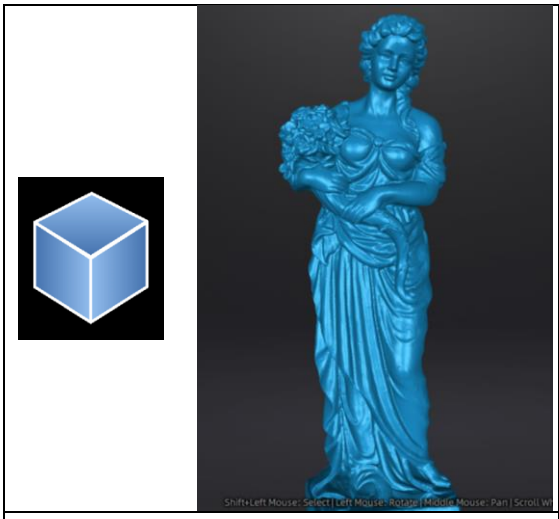
- Under Standard Scan, Body Scan or Face marker align modes, if there are non-texture projects, there will be a data optimization option. If it's under face feature align mode, there is no simplified data and simplification will not be implemented. After clicking it, the number of triangles will be optimized as below:

Original Numbers of Polygons (million triangles)	Optimized Polygons (million triangles)
15	6
12~15	5
8~12	4
5~8	3
2.5~5	2.5
2.5	No optimization

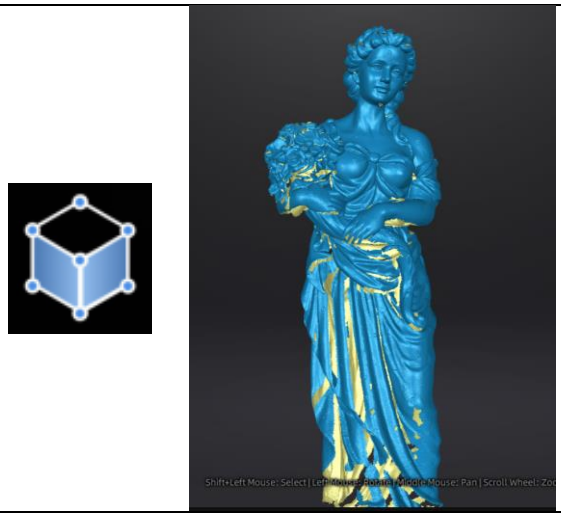
- If the projects are all with texture, the data optimization option will be unavailable. The software will simply the data by default.

Mesh Mode

Watertight	Unwatertight



All holes will be filled automatically. The data can directly be 3D printed.



Unclosed model stays the way it is scanned. Processing time is quicker than Watertight.

DETAIL SELECTION UNDER WATERTIGHT MESH

TEXTURE WATERTIGHT

The texture capture is separate from the 3d data capture. If the texture has been captured, it will still be displayed on areas where holes are filled in the mesh processing. If the texture is missing, the corresponding mesh data will be in black.

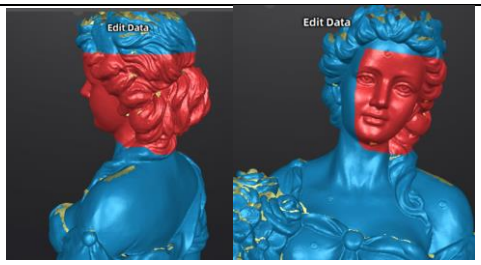
This region were missing in the scanning, and the texture can't match the original texture.

9.2. Mesh Editing

The mesh can be edited: Select/delete, Hole filling, Sharpen, Smooth, Simplification, Multiview.

MESH SELECT/DELETE

Press **Shift + Left mouse** to select data and enter the selection menu
CTRL+ Left mouse： Deselect an selected region

	Edit buttons: **①Deselect** **②Revert** **③Delete** **④Undo** **⑤Select Trough** **⑥Select Visible** **⑦Hide/Show color**	 Select **Visible** to select data on the front view only Select **Through** to select data all though

	Click **End** button to return to the Post-processing menu
	Click **Revoke**, to cancel and return to the Post processing menu

9.3. Hole Filling

When selecting meshing in unwatertight, the 3d model will keep the missing scanned regions as holes.

You can click use the hole filling tools.

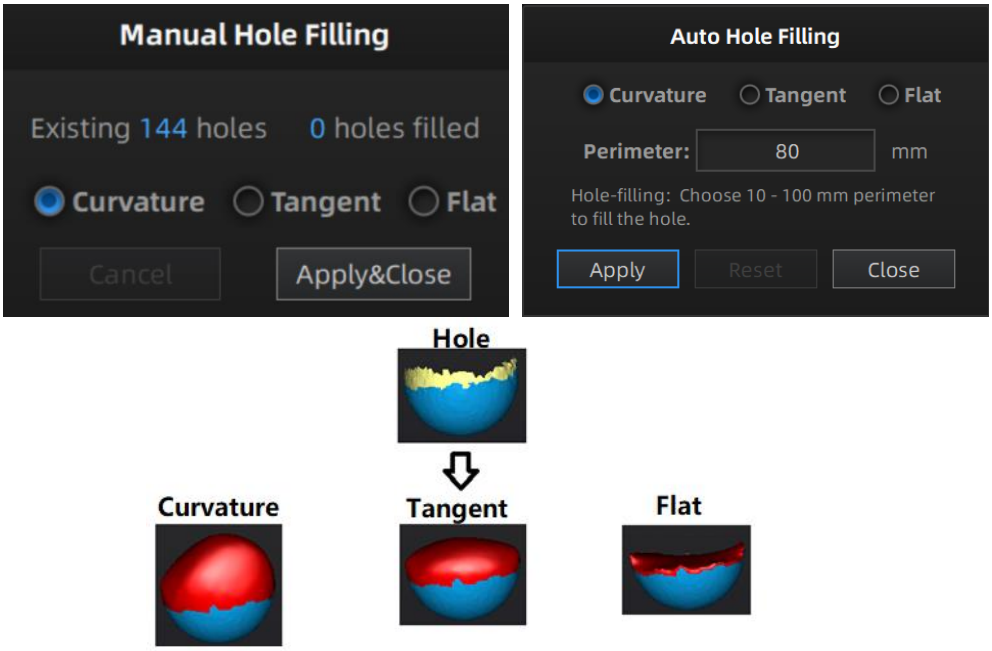
Click for **Manual hole filling**. The hole edges are displayed green, and get red after picking. Click the edge of the hole to fill it

Click for **Auto filling**. Input the perimeter of the biggest hole to be filled. Less than 100mm is recommended. This function will fill every hole with a smaller perimeter than the number input.

The hole edges are displayed green.

Choose **Curvature, Tangent or Flat** before picking a hole

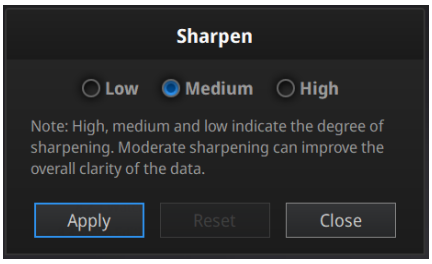
- **FLAT** calculates the solution for the hole filling considering the point position on the boundary
- **TANGENT** calculates the solution considering the point position and the normal of the last row of triangles forming the boundary
- **CURVATURE** calculates the solution considering the point position and the normal of the 2 last rows of triangles forming the boundary



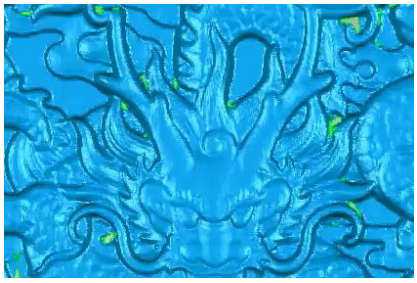
Effect of Curvature, Tangent or Flat

9.4. Sharpen

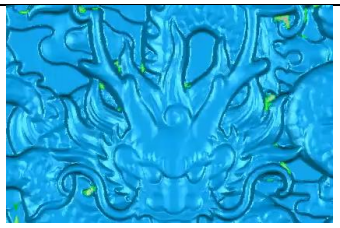
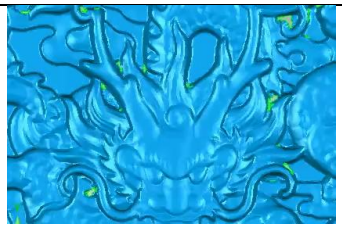
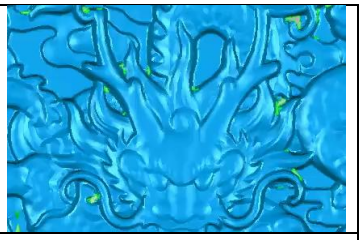
Click Smooth button to display the sharpen menu, click again to close the menu.



Sharpen men



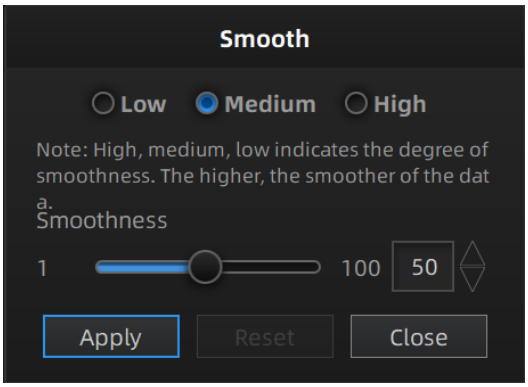
Original

		
Sharpen-Low	Sharpen-Medium	Sharpen- high

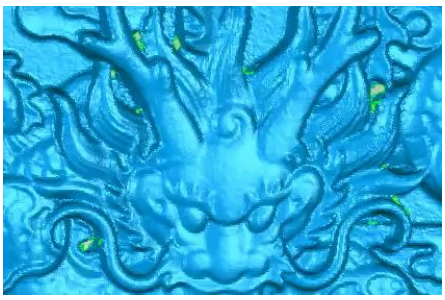
9.5. Smooth

Click Smooth button to display the smooth menu, click again to close the menu.

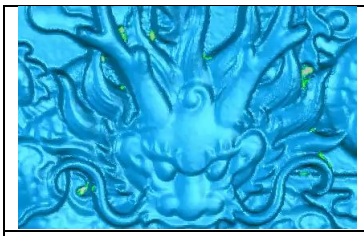
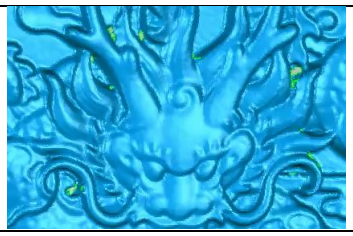
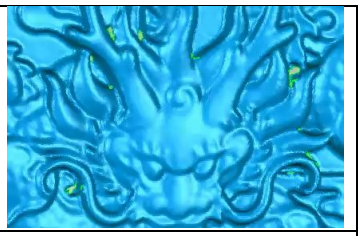
Smooth the possible noise on the surface of the scan data. It might remove some small details or smooth some sharp edges at the same time. The example of before and after smoothing is shown below. Run 2 times, data will be smoothed twice.



smooth menu



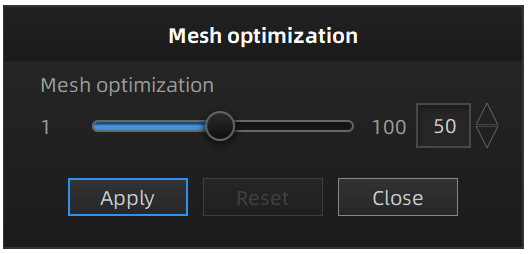
Original

		
Smooth-Low	Smooth-Medium	Smooth- high

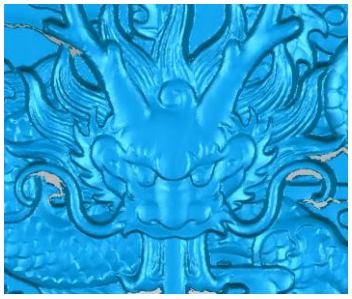
9.6. Mesh Optimization

Click mesh optimization button to display the mesh optimization menu, click again to close the menu.

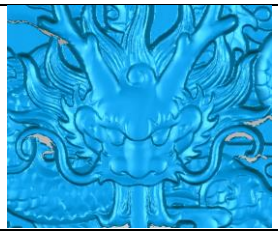
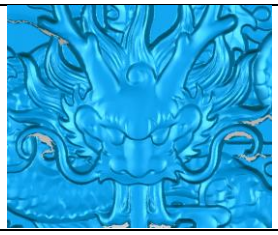
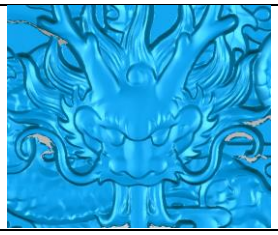
There are 3 ratio options of mesh optimization. Processing time will be different. Below shows the result of 3 different ratios.



mesh optimization menu



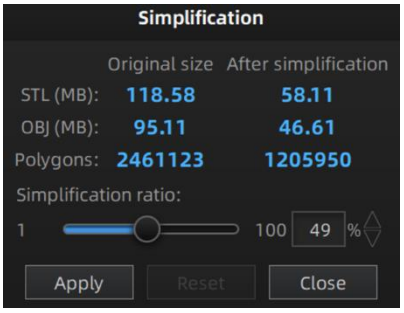
Original

		
Mesh optimization-10	Mesh optimization-50	Mesh optimization-100

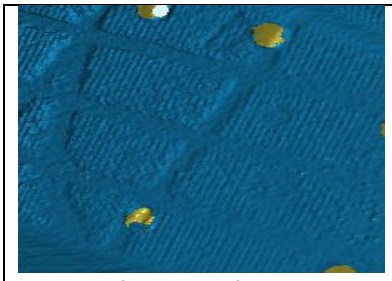
9.7. Simplification

Click Data simplification button to display the simplification menu.

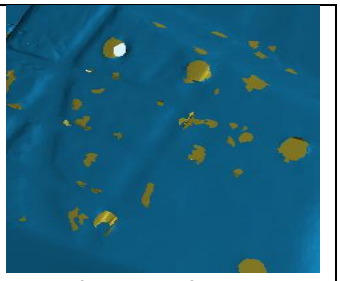
After simplification, the polygon numbers, file size and level of detail of data will be reduced accordingly. Set the ratio from 1 to 100, the default is 100%.
The comparison of detail between before simplification and after simplification (at 30% simplify proportion).



simplification menu



Before simplification



After simplification

9.8. Texture Remapping

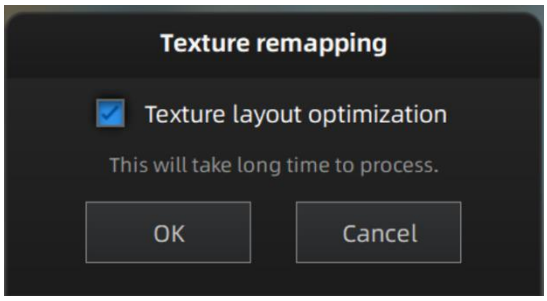
Click Texture Remapping to display the Texture menu

Mesh edition of simplification, hole filling on texture scanned data will affect the texture render. By doing the texture remapping, the texture information will be reapplied on the mesh.

Texture remapping is accessible before saving the data.

Choose "**Texture Layout Optimization**" (TLO) to create an optimized arrangement for the texture file. It will make the texture manual editing much more convenient if you are going to process the texture in a 3rd party software.

This option has no effect on the texture itself.



Texture Layout Optimization

No Texture layout optimization

Texture layout optimization

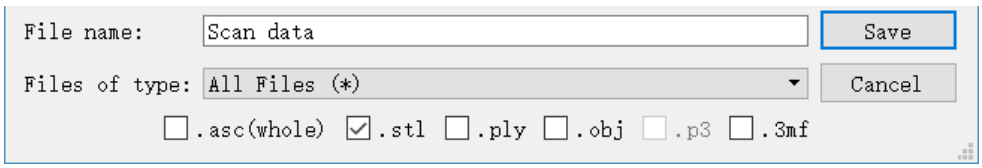
Notes:

1. TLO requires a longer time to compute
2. TLO is used only with OBJ output

10. Export Data

10.1. Data Formats

Click to export the data. Navigate to choose a save folder. And input the file name. Select one of the formats below. By default, the saving path is the project folder, the file name is “Scan data”, and the format is .stl.



save folder

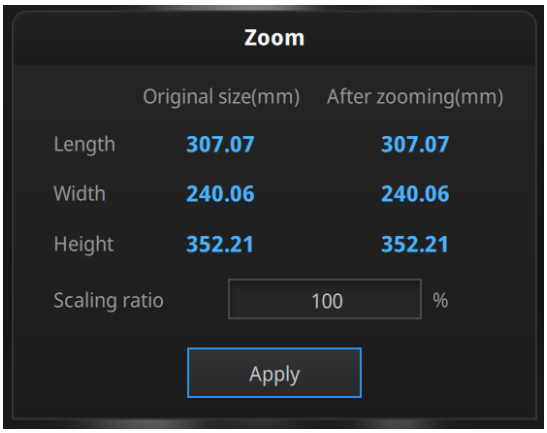
Format	Texture	Data type	Saves as	Recommended for
ASC (separated) (fixed mode only)	No	Separated point-clouds, with calculated alignment	scan_0.asc scan_1.asc scan_2.asc etc…	◆ Inspection ◆ Fast export (no post-processing needed) ◆ Complex data to post process in another software
ASC (whole)	No	optimized point-cloud	scan.asc	◆ Inspection ◆ Fast export (no post-processing needed in hand-held mode) ◆ Large data to post process in another software ◆ Complex data to post process in another software
STL	No	Mesh	scan.stl	◆ 3D printing (watertight mesh data) ◆ Reverse Engineering ◆ Compatibility with most mesh editing software
OBJ	Yes (separated)	Mesh, Texture & Matching file	scan.obj scan.jpg scan.mtl	◆ Artistic applications ◆ 3D rendering ◆ Compatibility with most mesh editing software
PLY	Yes	Mesh	scan.ply	◆ Low storage ◆ Easy texture editing
3MF	Yes	Mesh	scan.3mf	◆ Low storage ◆ Compatibility with Microsoft paint3d
P3	No	Marker position	scan.p3	◆ Global Marker File in EXScan software ◆ Measurement of the marker position

10.2. Scale Data

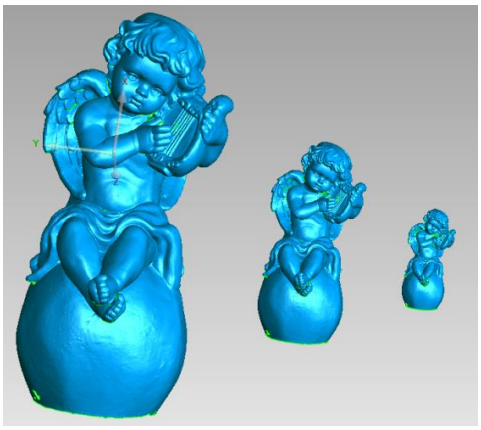
Scaling the volume of scanned data, while the number of triangles, the level of detail of the scan and size of data will not be actually changed.

By default, the scale is 100% and will be exported with millimeters for reference.

The value display represents the dimensions of the smallest box containing the data oriented to the reference axis.



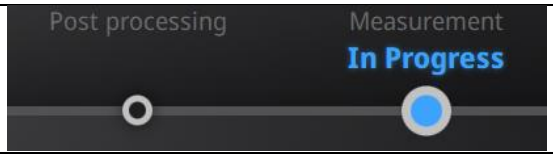
Scale window



Scale result

10.3. Measurement

After meshing, the Measurement menu will be available on the top. Or click Measurement on the navigation bar, and import a data.

	Go to Measurement

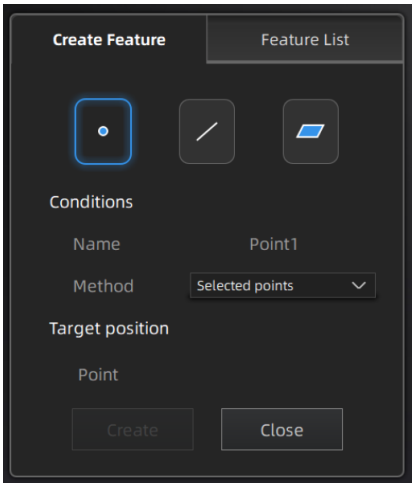
	Open file

Click **Open file**, a STL or OBJ file can be import to edit.

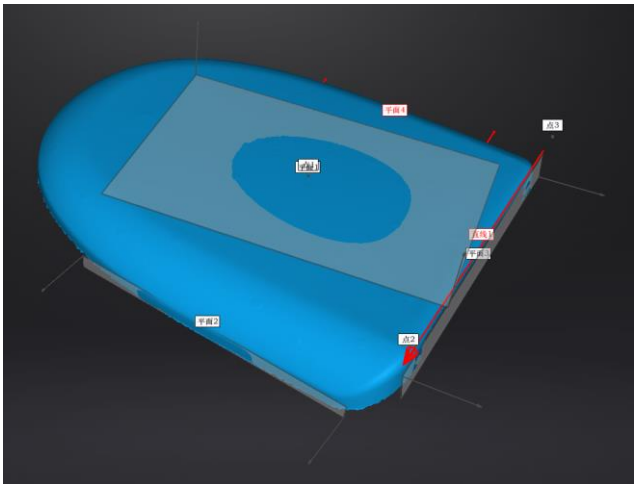
10.3.1. Create Feature

	Enter/Exit the Feature menu.

Click the Feature button to display the menu, click again to close the menu.



Feature menu



Display of Features

Click on the corresponding icon to create points, lines, planes.
Then select the creation method and follow the instructions, click “Create” to generate, or “Close” to cancel and close the window

The features created displaying in gray, the selected feature are in Red. In the feature list, click “delete button” to remove (Delete action cannot undo).

Feature	Creation method	Requirement	Description
Point	Selected Points		● Click on the data to select a point ● Click create to create a point
	Line-Plane Interface	Line and Plane should be created in advanced	● Click on the created line, or select it on the dropdown ● Click on the created plane, or select it on the dropdown The point generated is the intersection between the non-parallel line and plane **Feature creation failed! Error code 9**: the line is parallel to the plane
Line	Point-Point		● Pick 2 points. ● Click on the data to select a point or click on a feature point previously created In the Choice list select one of the point to redo it The line generated is define as point From to point to point
	Plane-Plane Intersection	2 Planes should be created in advanced	● Click on the plane previously created, or select it on the dropdown, repeat for the second plane. ● The created line is the intersection between the 2 non-parallel planes **Feature creation failed! Error code 1**: the planes are parallel
Plane	3 Points Fit		● The plane is generated by 3 points not co-linear. ● Click on the data to select one point or click on a previous created feature point; ● In the Choice list select one of the point to

			reselect it **Feature creation failed! Error code 6=** the points selected are co-linear
	Point-Line Fit	Line should be created in advanced	● The plane generated includes the point and the line (The line should be created in advanced) ● Click on the line previously created, or select it from the drop-down ● Click on the data to select a point or click on a feature point previously created ● In the Choice list select one of the element to reselect it **Feature creation failed! Error code 6=** the point selected belongs to the line
	Best Fit		● Press Shift+ LMB to select an area, press ctrl+ LMB to unselect ● The plane generated is the position with the smallest deviation from the selected area **Recommend method to create plane**

10.3.2. Movement

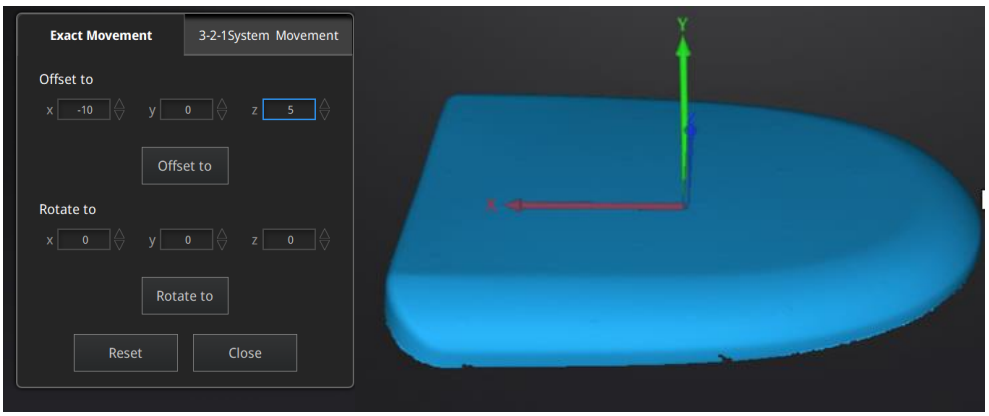
Use this mode to modify the alignment of the data to the global coordinate. This action is useful for post processing or reverse engineering.

The transformations do not affect the shape and size.

	Enter/Exit the Movement menu.

Click the Movement button to display the menu, click again to close the menu.

Exact movement



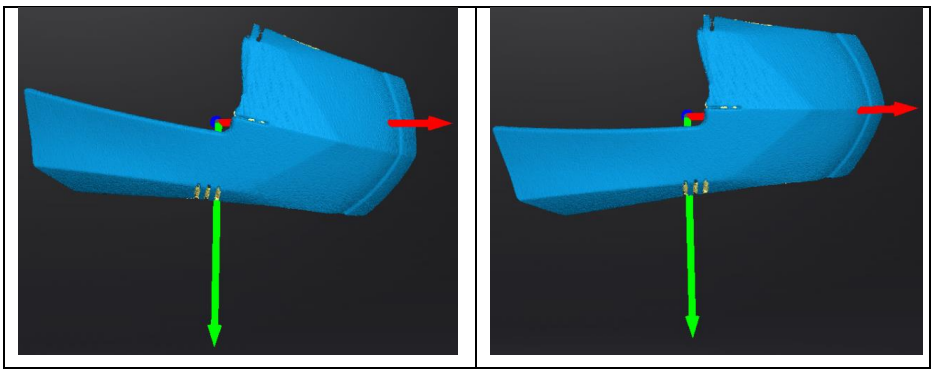
Exact Movement Menu

Enter the value in mm and degrees, click **Apply** to match the data origin to the input coordinate and orientation.
The arrows represent the global coordinate system, Red=X+, Green=Y+, Blue=Z+

Click **Reset** to cancel the transformation to original position.
Click **OK** to confirm the transformation.

Tips:

- Start from data reposition (offset to 0,0,0).
- Edit rotations prior to transformation.
- Change the view normal to a reference plane to change the corresponding angle.

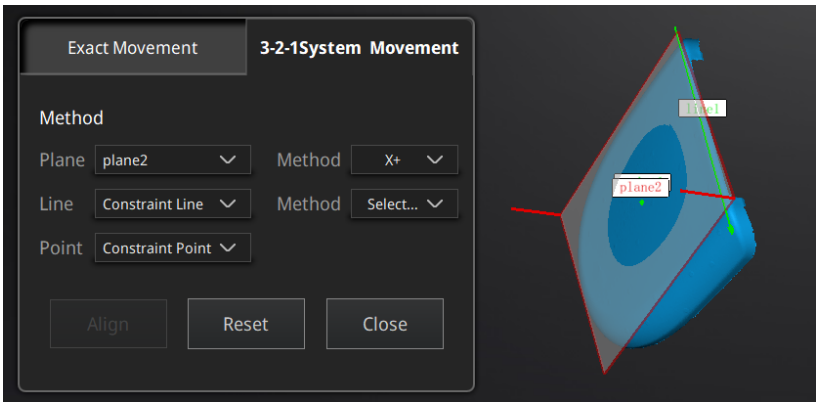


3-2-1 Movement

Prior to 3-2-1 movement, the creation of a plane, line not normal to the plane and point are required.

3-2-1 movement (plane-line-point alignment) aligns the data by deletion of the Degrees of Freedom.

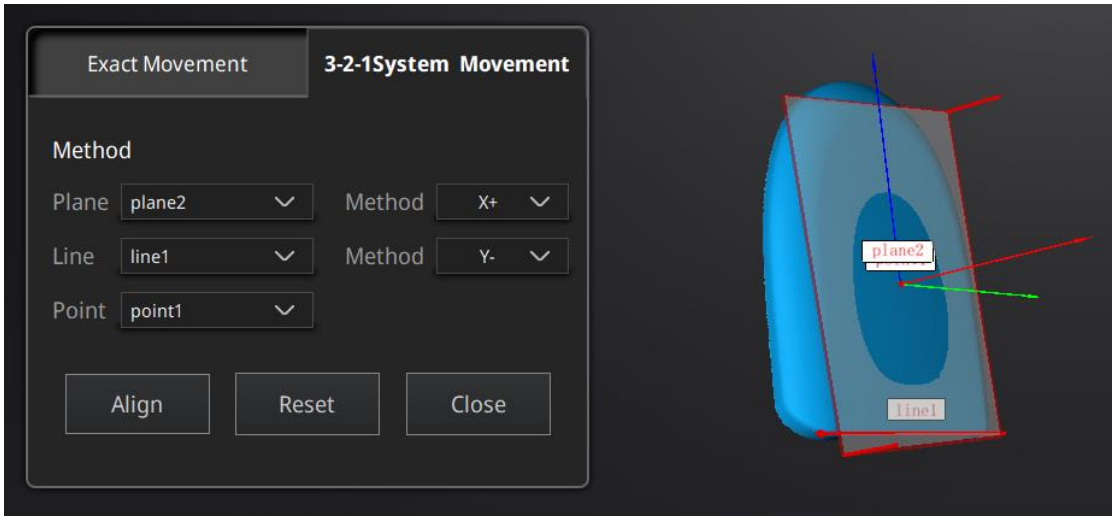
The arrows represent the global coordinate system, Red=X+, Green=Y+, Blue=Z+.



3-2-1 Movement menu

- Select a Plane in the drop-down menu, match it to the first axis in the Method drop-down. The arrows on the corners of the plane represent the plane positive direction. The normal vector of the plane will match the axis direction.
- Select a Line in the drop-down menu, match it to the first axis in the Method drop-down. Beware the direction of the line to match it to the + or - axis. The projection of the line to the first plane will be parallel to the corresponding axis.
- Select a Point in the drop-down menu. The data will be translated to match the point with the origin point (coordinate 0,0,0).

Click **Align** to perform the transformation.



Data after 3-2-1 movement

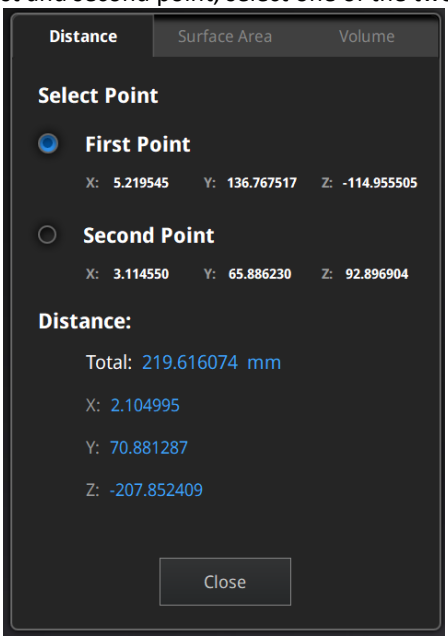
Click **Reset** to cancel.
Click **Apply** to confirm the transformation.

10.3.3. Measuring

Click Measurement button to display the menu, click again to close the menu.

DISTANCE

This tool calculates the distance between two points belonging to the surface of the data.
Click on the data to pick the first and second point, select one of the two points to redo it.

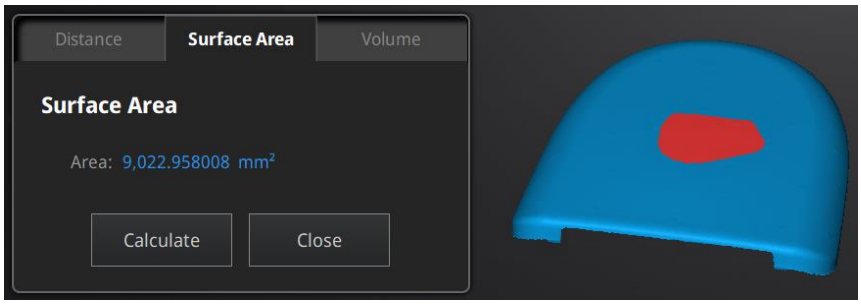


Distance menu

Total is the 3D distance, X, Y and Z are the projection of the segment to the respective planes.

SURFACE AREA

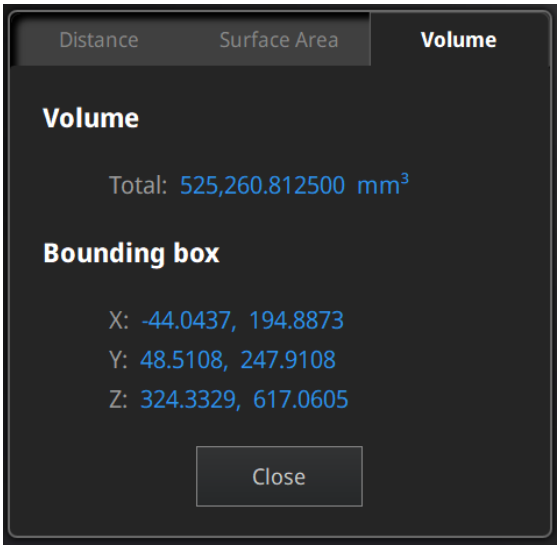
Press **Shift+ LMB** to select an area, press **ctrl+LMB** to unselect.
Ctrl+A to select all.
Click **Calculate** to display the Area value of the selected data in mm^2.
Redo the selection and click calculate again to update.



Surface Area menu

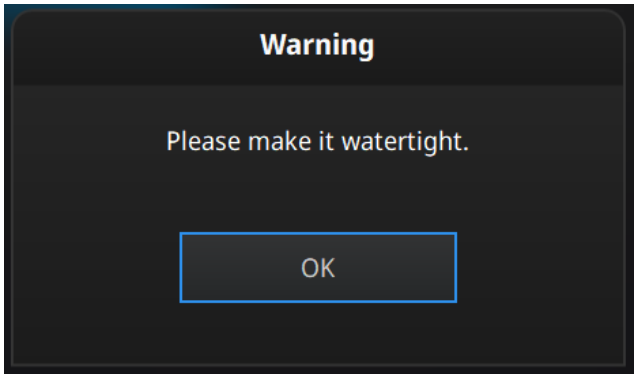
VOLUME

This tool calculates the volume contains in a watertight mesh.
It returns the volume in mm^3 and the coordinates of the smallest box, parallel to the global coordinates, containing all the data.



Volume menu

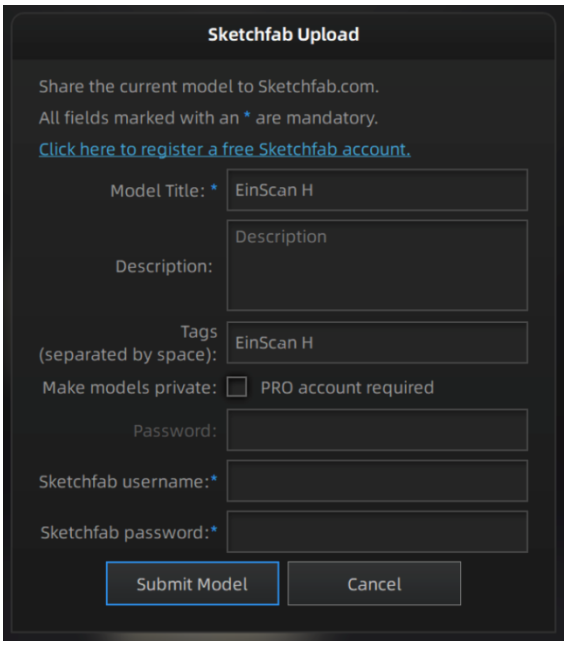
Prior to the calculation make sure the file is watertight (no holes).



File not watertight alert

11. Share Data

Click after mesh to share data to Sketchfab, it will show the dialog as below. A model title, username and user password are required. Register and view the shared model at http://sketchfab.com.



Notes:

1. Sketchfab basic plan accounts can only upload data less than 50M, while Pro plan account can share with a maximum of 200M.
2. Data is saved as .STL does NOT contain texture

12. Third-party Software

If you have installed Geomagic Essential or Solid Edge, click corresponding icon after mesh to import the mesh to a third-party software.

GEOMAGIC ESSENTIALS and **SOLID EDGE SHINING 3D EDITION** can be started.

Notes:
1. The third party software should be installed and activated in advanced.
2. Solid Edge Shining 3D Edition is included in the scanner.
3. Geomagic Essentials is not included in the scanner. Please contact us if you are interested to buy.
4. Both software needs to obtain the license for an online activation.

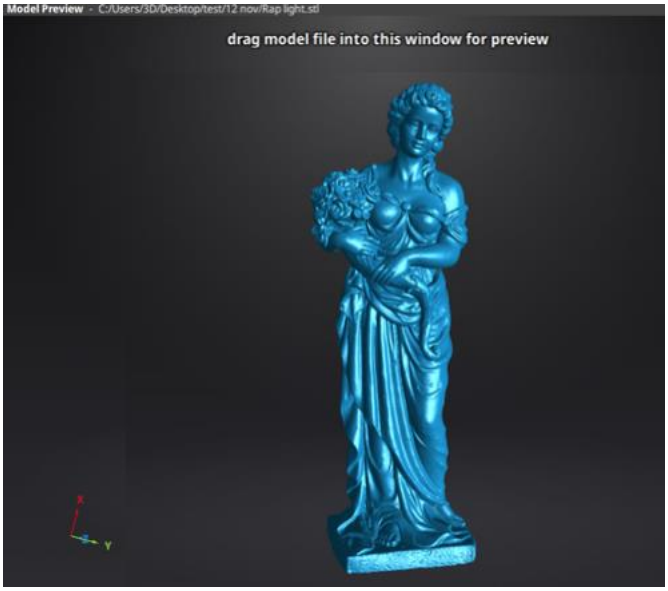
GEOMAGIC ESSENTIALS is the essential bridge between 3d scanning and design. Once 3d scan is finished in EinScan 3d scanning software-EXScan H, take the 3d scan data to Geomagic essentials, extract the feature you want, and create solid models and complex profiles to your CAD design environment.

Solid Edge is a design tool from SIEMENS PLM Software. Partnered with SIEMENS PLM Software, EinScan users is able to use Solid Edge SHINING 3D Edition, which includes reverse engineering, generative design (optional modular), and simulation (optional modular) with CAD functions in one platform.

13. Model Preview

Double click the short-cut

on the desktop. Drag files into the window for preview. Manipulate the data with the same control as EXScan software.



Model Preview

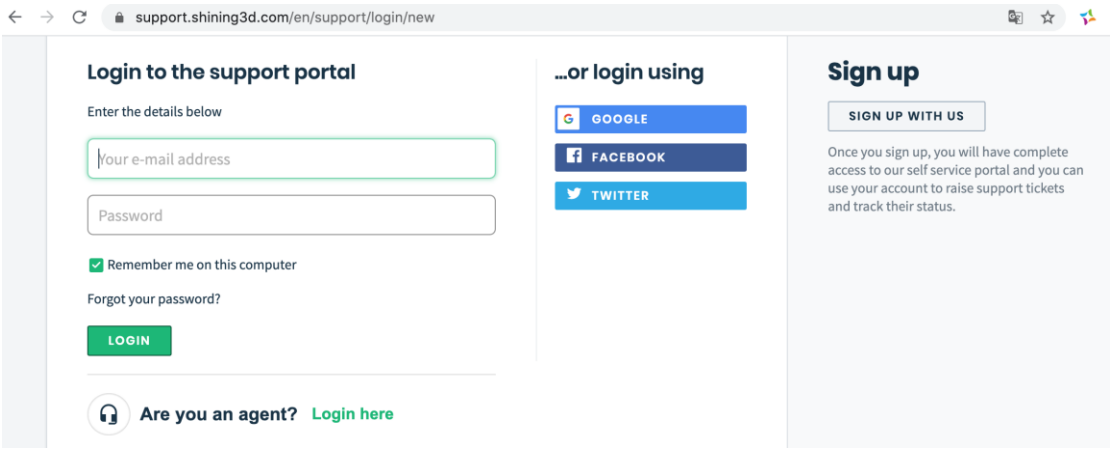
STL, OBJ, PLY, ASC, or 3MF can be loaded, files from 3rd party software might fail to be loaded. In this case we recommend Meshlab, a free mesh software editor, or upload to sketchfab.

Notes:
To load a OBJ textured file make sure to have the MTL and JPG files with the same name and in the same folder than the OBJ.

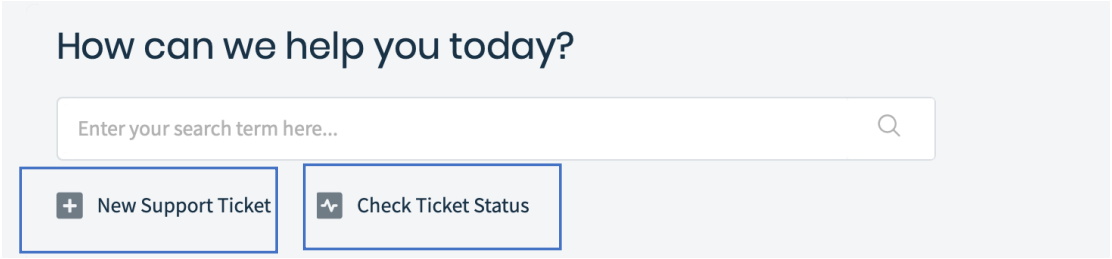
14. Support and Contact

14.1. Submit a Ticket

Sign up in Shining 3D Support Platform support.shining3d.com.
Or send email directly to einscan_support@shining3d.com.



Log in with your account. Click New Ticket on the tab bar to submit a ticket and check the status



14.2. Contact Us

By email
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sales@shining3d.com

Skype: EinScan_support

Facebook Group: EinScanexpert

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