



SHINING 3D[®]

USER MANUAL

EinScan Pro HD

EXScan Pro Software V3.5



Nov 2020

SHINING 3D[®]

Table of Contents

About SHINING 3D	6
1. Hardware.....	7
1.1. Packing List.....	7
1.2. Specifications	8
1.3. Hardware introduction.....	9
1.4. PC requirements	9
1.5. Set Up.....	10
2. Software.....	12
2.1. Download	12
2.2. Software installation	12
2.3. Uninstall Software.....	17
2.4. Update.....	18
2.5. Firmware Upgrade	19
2.6. Device activation.....	22
2.7. Interface and Parameters.....	25
2.7.1. Navigate	25
2.7.2. Device reconnect	25
2.7.3. Settings.....	26
2.7.4. EinScan community.....	28
2.7.5. Help Mode	28
2.7.6. Alerts.....	30
3. Calibration.....	33
3.1. Precautions and Use	33
3.2. Operation	33
3.2.1. Camera Calibration.....	34
3.2.2. Accuracy test.....	37
4. Before Scan	39
4.1. Object.....	39
4.2. Preparation	39
4.3. Select Scan Mode.....	40
4.4. Scan Workflow	42
5. Fixed Mode (Industrial Pack Required).....	43
5.1. Set Up.....	43
5.1.1. Create a Work	43
5.1.2. Working Distance	44
5.1.3. Interface	46
5.1.4. Adjust Brightness	46
5.2. Scan with Fixed Mode	47
5.2.1. Capture.....	47
5.2.2. Edit Scan.....	47
5.3. Scans, Groups and Projects.....	48
5.3.1. Create Groups	49
5.3.2. Projects	49
5.3.3. Edit data	51
5.3.4. Alignment.....	51

6.	HD Mode	54
6.1.	Handheld Scanner Key Function	54
6.2.	Before Scan	54
6.2.1.	Alignment Conditions	55
6.2.2.	Choose operation mode	56
6.2.3.	Resolution	57
6.2.4.	Global Marker File	57
6.2.5.	Accuracy Protected Scan	57
6.2.6.	Flat Detection	58
6.3.	Scan	58
6.3.1.	Preview	58
6.3.2.	Scan Distance	59
6.3.3.	Brightness	60
6.3.4.	Start Scan	61
6.3.5.	Alignment	62
6.4.	Pause Menu	64
6.4.1.	Auto Save	64
6.4.2.	Point cloud optimization	64
6.4.3.	Edit Menu	65
6.5.	Projects	65
6.5.1.	New project / Load project	66
6.5.2.	Current project	66
6.5.3.	Rename project	67
6.5.4.	Remove/Delete	67
6.5.5.	Duplicate a project	67
6.5.6.	Alignment	68
7.	Rapid Mode	70
7.1.	Handheld Scanner Key Functions	70
7.2.	Before Scan	71
7.2.1.	Alignment Conditions	71
7.2.2.	Operation Mode	73
7.2.3.	Resolution	73
7.2.4.	Flat Detection	74
7.3.	Scan	74
7.3.1.	Preview	74
7.3.2.	Scan Distance	75
7.3.3.	Brightness	76
7.3.4.	Start Scan	77
7.3.5.	Alignment	78
7.4.	Pause Menu	80
7.4.1.	Auto Save	80
7.4.2.	Point cloud optimization	80
7.4.3.	Edit Menu	81
7.5.	Generate Point-cloud	82
7.5.1.	Priority (for Rapid: Feature or Hybrid Alignment Settings)	82
7.5.2.	Refine (for Rapid Mode: Lightning + Refine Option Mode)	83
7.6.	Projects	83

7.6.1.	New project / Load project	84
7.6.2.	Current project.....	84
7.6.3.	Rename project.....	85
7.6.4.	Remove/Delete	85
7.6.5.	Alignment.....	86
8.	Post Processing	88
8.1.	Edit Data.....	88
8.1.1.	Pause Menu	88
8.1.2.	Edit Menu.....	88
8.2.	Create mesh	89
8.2.1.	Watertight / Unwatertight	89
8.3.	Mesh Editing	91
8.3.1.	Select and delete.....	91
8.3.2.	Data Simplification	92
8.3.3.	Hole Filling.....	93
8.3.4.	Smooth.....	95
8.3.5.	Sharpen	97
8.3.6.	Go back to scan	98
8.4.	Measurement.....	98
8.4.1.	Create feature	98
8.4.2.	Movement.....	101
8.4.3.	Measurement.....	103
8.5.	Save	105
8.5.1.	Export Data	105
8.5.2.	Scale Data.....	107
8.5.3.	Share Data.....	107
8.5.4.	Third-party Software	108
8.5.5.	Model Preview	109
9.	Color pack	111
9.1.	Hardware.....	111
9.1.1.	Content.....	111
9.1.2.	Installation	111
9.2.	Calibration	112
9.2.1.	Normal Calibration	112
9.2.2.	White Balance	113
9.3.	Fixed Mode.....	115
9.3.1.	Scan	115
9.3.2.	Alignment.....	116
9.4.	HD Mode	117
9.4.1.	Scan with texture	117
9.4.2.	Texture matching.....	118
9.5.	Rapid Mode.....	119
9.5.1.	Scan with texture	119
9.5.2.	Texture Alignment.....	120
9.5.3.	Texture matching.....	122
9.6.	Post Processing	122
9.6.1.	Point-cloud Editing.....	122

9.6.2.	Create Mesh	123
9.6.3.	Texture remapping	123
9.6.4.	Texture Layout Optimization	125
9.6.5.	Brightness & Contrast	125
9.6.6.	Export Data	126
9.7.	Best Practice	126
10.	Industrial Pack	128
10.1.	Content	128
10.2.	Installation	128
10.3.	Scan	129
10.3.1.	With/Without Turntable	129
10.4.	Turntable Steps	129
10.5.	Alignment Condition	130
10.5.1.	Turntable Coded Target Alignment	130
10.5.2.	Feature Alignment	131
10.5.3.	Markers Alignment and Global Markers Alignment	132
11.	Support and Contact	134
11.1.	User Community	134
11.1.1.	Log In	134
11.1.2.	Validate Your Warranty	135
11.1.3.	Submit a Ticket	136
11.2.	Contact Us	138

About SHINING 3D

SHINING 3D, founded in 2004, rapidly became China's first listed OTC stock company in the 3D digitizing and printing industries segment. SHINING 3D develops, manufactures and commercializes a wide range of 3D technologies, including 3D scanners for multiple industries and applications, 3D printers for both additive manufacturing and consumer markets, 3D materials, 3D design and manufacturing services, and an online 3D cloud platform. SHINING 3D is well-positioned in the market and has the capacity to handle large sales volumes, offer powerful 3D technologies, and provide strong service support. As the leader among Chinese 3D printing companies, SHINING 3D has currently extended a strong international influence with customers in more than 70 different countries in Asia and Pacific, Europe, North America, South America, Africa and the Middle East.

EinScan Pro 2X series 3D scanners are unique multi-functional 3D Digitizing devices with multiple 3D Scanning modes. They are designed to improve the efficiency in generating high-quality 3D models, which makes 3D Scanning technology accessible to either professional users or new users. It is based on the feedback from thousands of 3D Scanner users and the valuable input of SHINING 3D's R&D team. The modular design of EinScan handheld 3D scanners provide a professional, yet still easy to use 3D digitizing solution for versatile applications.

EXScan Pro is our self-developed high-performance 3D scanning software, allowing users a faster experience during scanning and data processing.

Please review this document to help you operate your scanner. If you have more questions that are not answered here, please feel free to email us at einscan_support@shining3d.com.

1. Hardware

1.1. Packing List

Item	quantity	unit	
Standard Version	Scan body (USB 3.0 cable included)	1	set
	Power adapter	1	piece
	Power cable	1	piece
	USB drive	1	piece
	Calibration board	1	piece
	Calibration board support	1	piece
	Markers	1	pack
	Phone screen mount	1	piece
	Cable clip	1	piece
	Markers remover/ Module port cap lifter	1	piece
Dongle (Solid Edge Shining3D Version)	1	piece	

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.

1.2. Specifications

Model	EinScan Pro HD			
Scan Mode	Handheld HD Scan	Handheld Rapid Scan	Fixed Scan with Turntable (with Add-on: industrial pack)	Fixed Scan without Turntable (with Add-on: industrial pack)
Scan Accuracy	Up to 0.045 mm	Up to 0.1 mm	0.04mm (Single shot accuracy)	0.04mm (Single shot accuracy)
Volumetric Accuracy	0.3 mm/m (Markers Alignment)		N/A	N/A
Scan Speed	10 frames /sec 3.0 mil points /sec	30 frames /sec 1.5 mil points /sec	Single Scan: <0.5sec	Single Scan: <0.5sec
Point Distance	0.2mm~3.0mm	0.25mm~3.0mm	0.24mm	
Single Scan Range	208*136mm—312*204mm			
Depth of Field	±100 mm			
Working Distance	510mm			
Light source	LED			
Align Mode	Markers Alignment Feature Alignment Hybrid Alignment	Markers Alignment, Feature Alignment (geometrical features) Hybrid Alignment (Markers and Feature) Texture Alignment (With Color Pack add-on)	Turntable Coded Targets, Feature, Markers, Manual Alignment	Markers, Feature, Manual Alignment
Texture Scan	Yes (With Color Pack add-on)			
Outdoor Operation	Set up shelter or cover to avoid direct sunlight			
Special Scan Object	For transparent, highly reflective or some dark objects, please spray with powder before scanning.			
Printable Data Output	Able to export watertight 3D model directly to 3D printing			
Data Format	OBJ, STL, ASC, PLY, 3MF, P3			
Scanner Body Weight	1.13 kg (including the USB3.0 cable)			
Supported OS	Win10,64 bit			

1.3. Hardware introduction



Serial number



+/- buttons
Play button



USB port for add-ons
(Output voltage and current:12V/500mA)

1.4. PC requirements

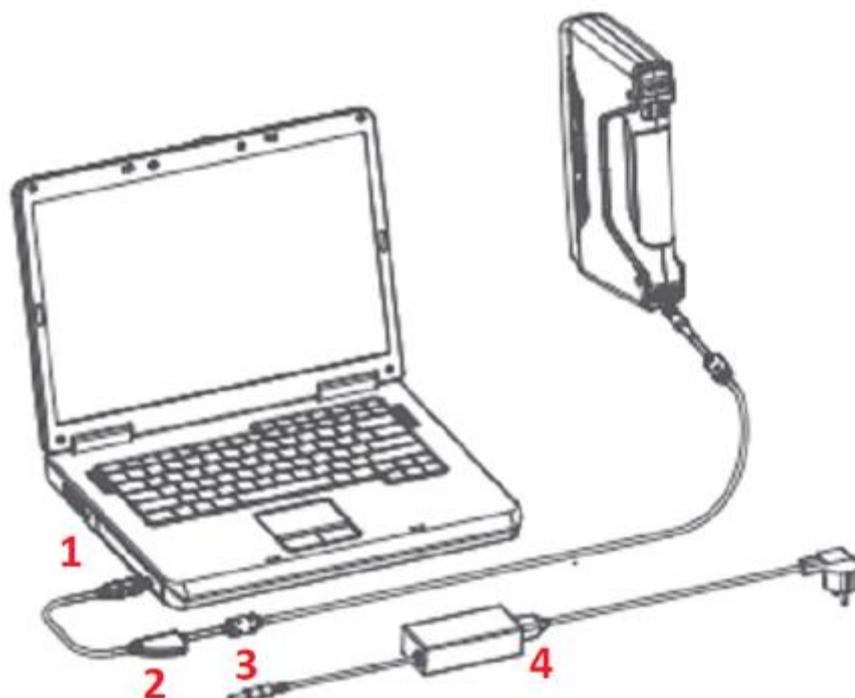
Required configuration

Model	Requirements
Processor	Intel [®] xeon E3-1230, Intel [®] I5-3470, Intel [®] I7-3770
Display card	Nvidia Quadro P1000 or higher; Nvidia GTX660 or higher
Display memory	>4G
Memory Storage	8G
USB	At least one USB 3.0
Screen display	1920*1080 DPI: 100%; 125% 3840*2106 DPI: 100%; 200%

Recommended configuration

Model	Requirements
Processor	I7-8700
Display card	NVIDIA GTX1060 or higher
Display memory	>4G
Memory Storage	32G or more
USB	At least one USB 3.0
Screen display	1920*1080 DPI: 100%; 125% 3840*2106 DPI: 100%; 200%

1.5. Set Up



Hardware set-up

Connect the scanner cable to a USB 3.0 port. (1)



USB 3.0 should be blue, and/or present the SuperSpeed logo

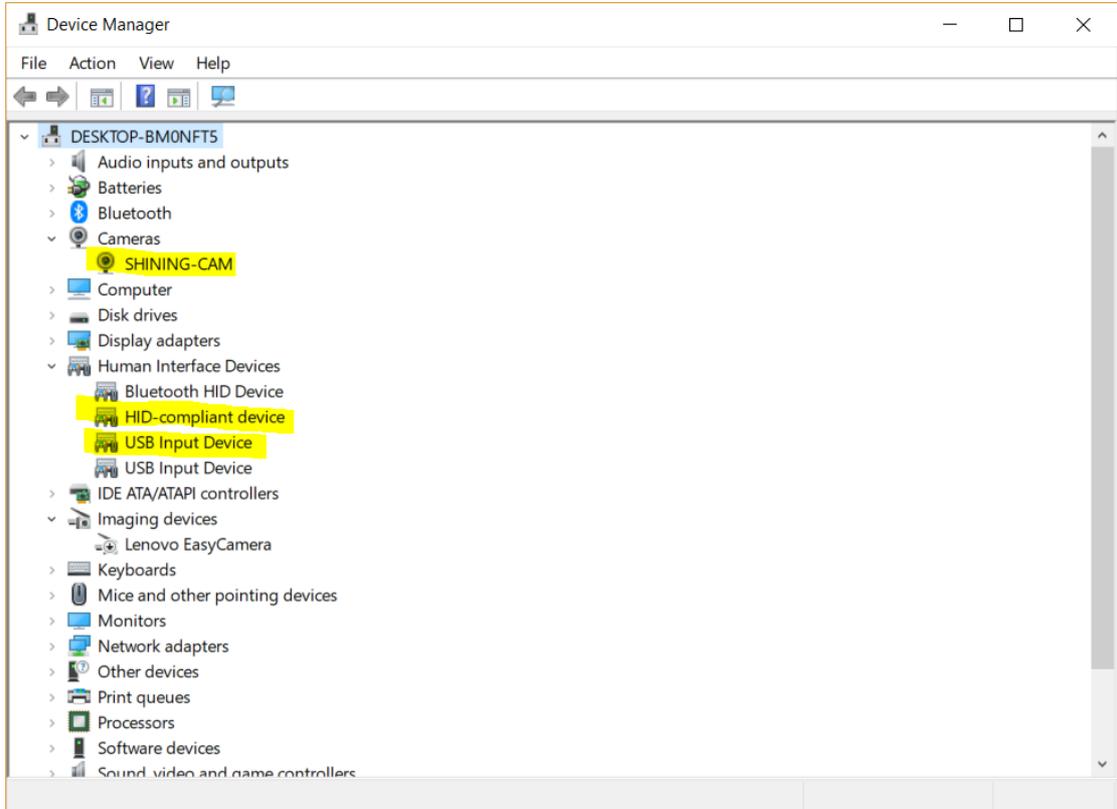
Connect the power cable and power adapter. (4)

Plug the power cable into the power port of the cable. (2-3)

Note: Make sure the cable will stay well plugged in during the operation. You can use the cable clip to fix it in place on the table to avoid cable loose alert.



After plugged into the computer, check the Device Manager. The scanner should be displayed like the following picture.



Device Manager, display of the scanner

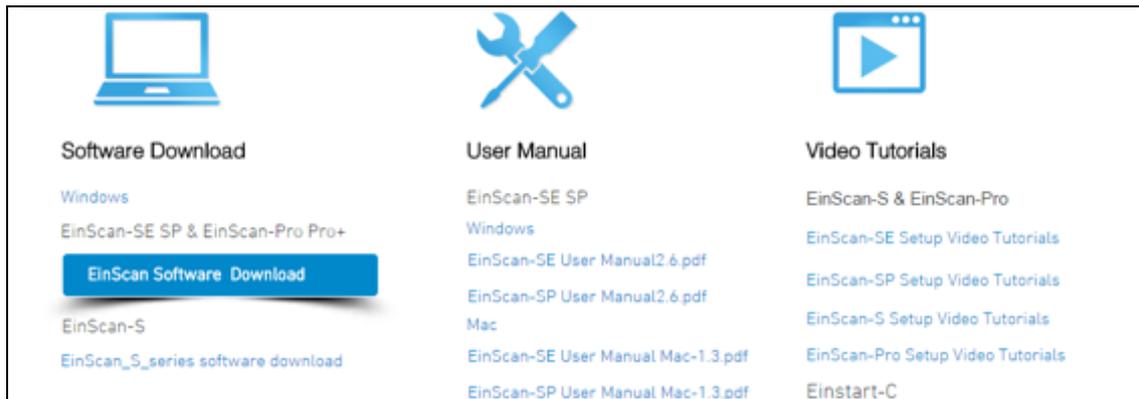
If the drivers are not installed properly, or the Alert “device off-line” keeps coming back. Right click on the SHINING-CAM and uninstall the driver. Unplug and replug the USB, Windows will reinstall the drivers by itself.

2. Software

2.1. Download

Step 1: Go to <https://www.einscan.com/software-download>.

Click “EinScan Software Download” to download the latest version software for EinScan.



Step 2: Register using the form. All filed with * must be filled in.

Name *

Email *

Country *

Please choose your scanner model *

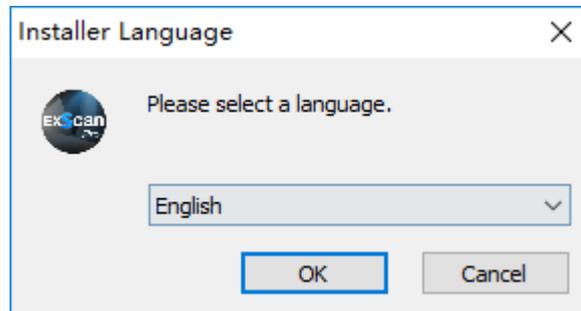
Step 3: Download the installer. Save or Save as in the desired location on your computer.

2.2. Software installation

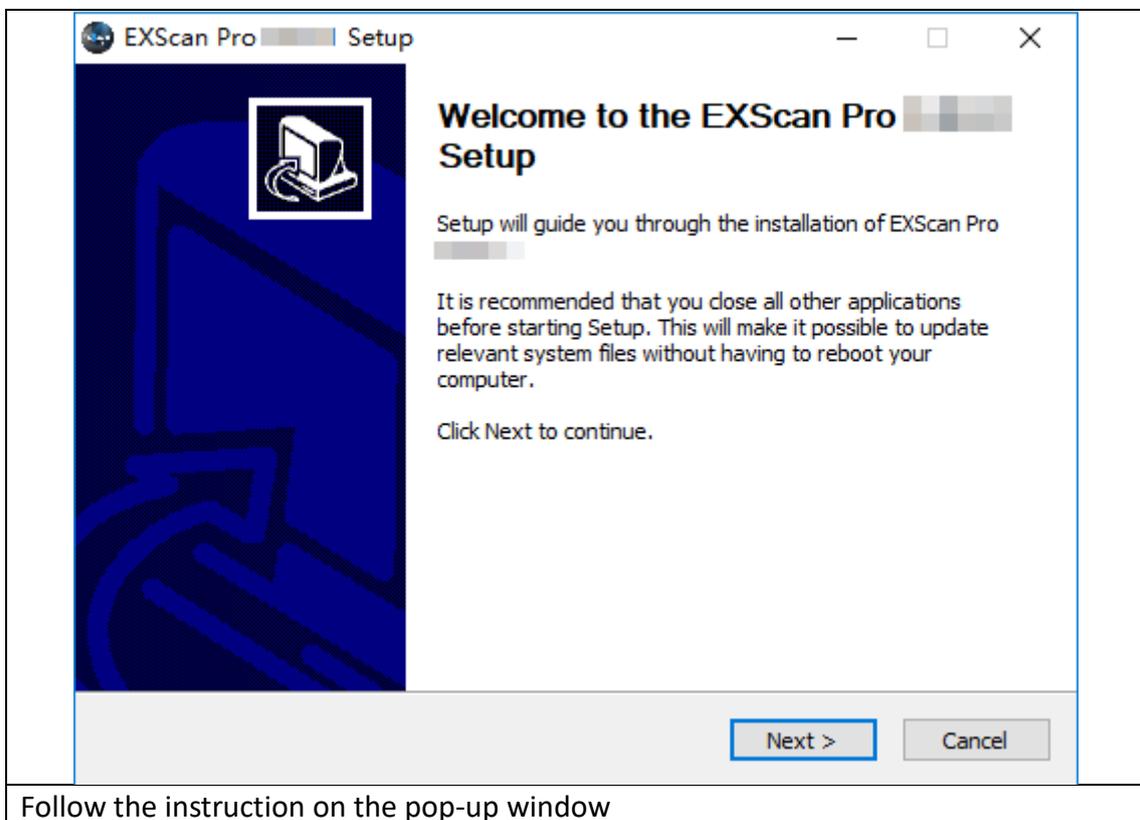
Note: Administrator rights are required for the installation of the software only.

 Double click installation package, accept the modification on your computer

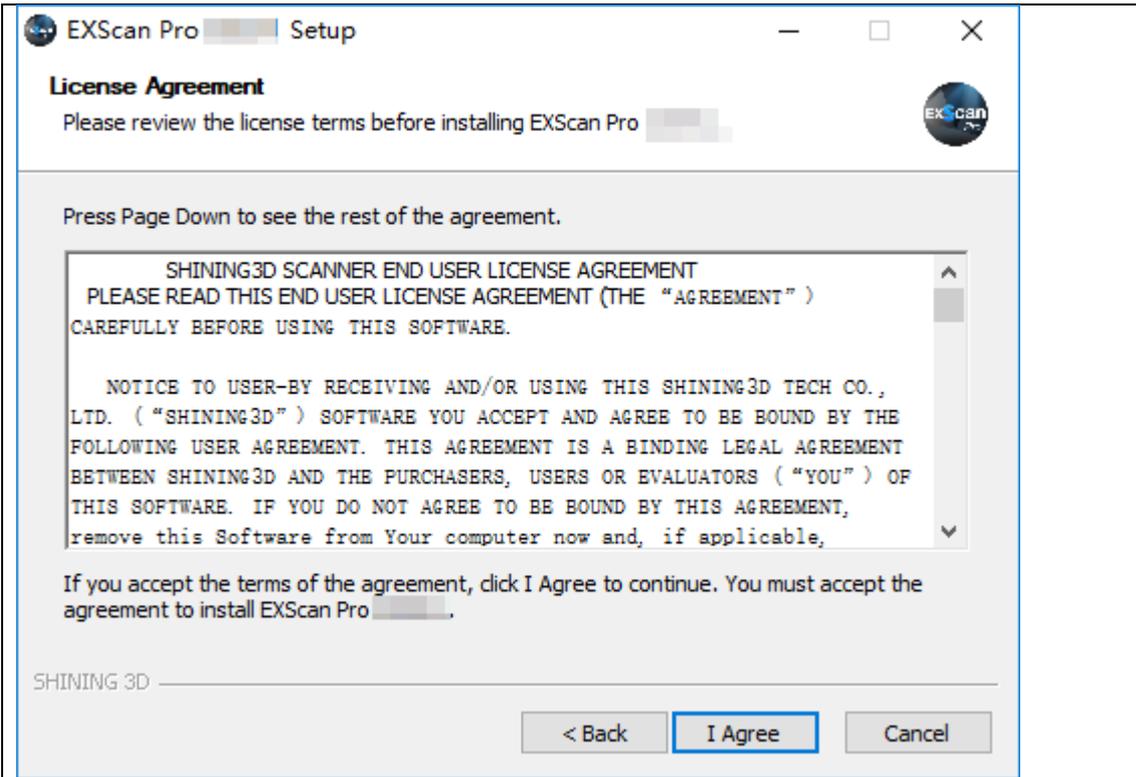
Choose the installation language, then click OK.



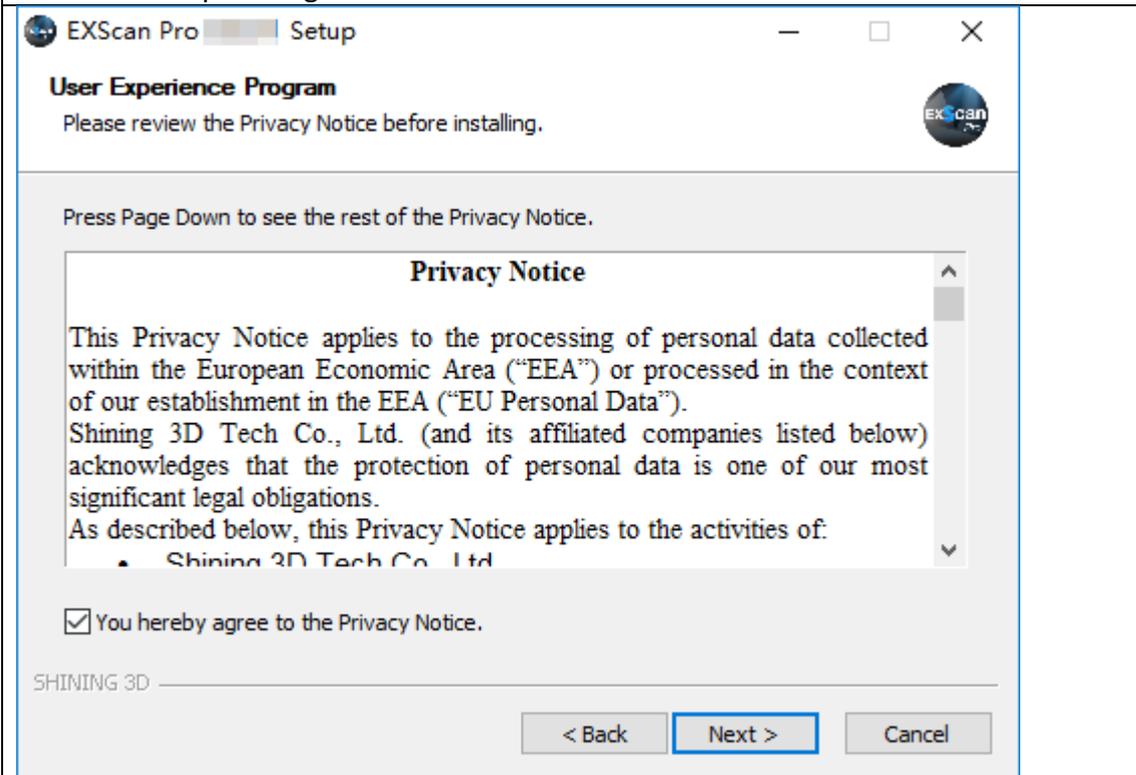
Select installation language



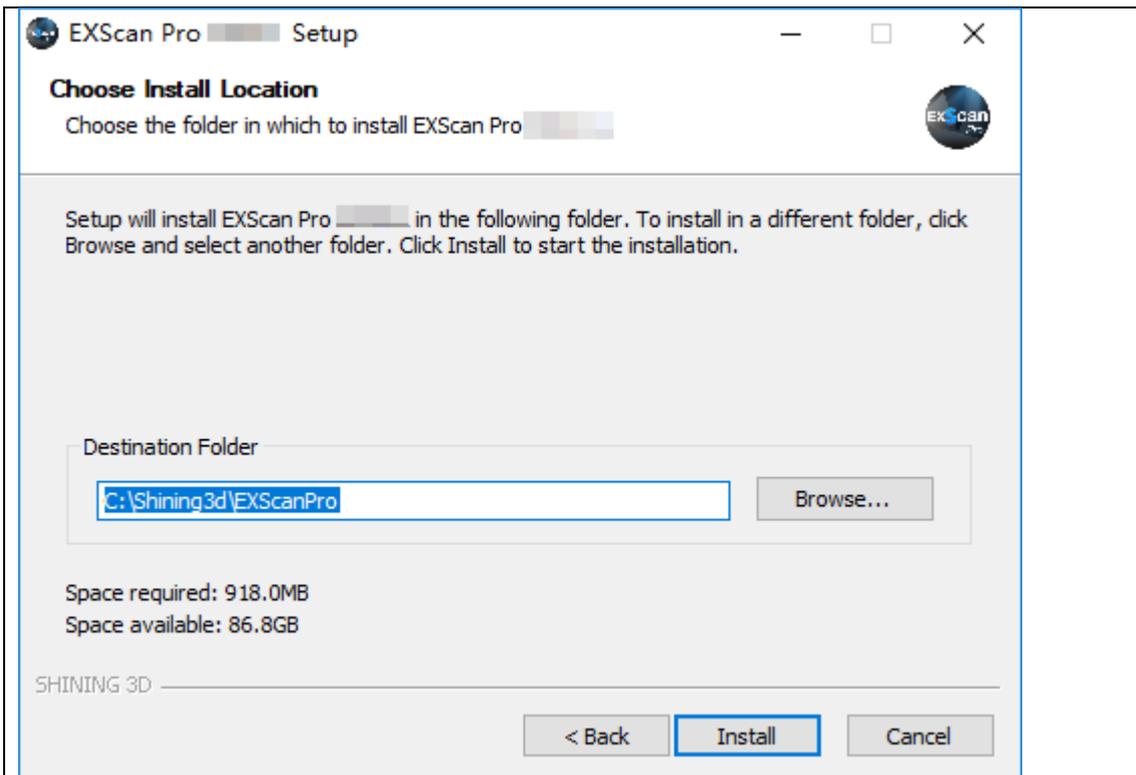
Follow the instruction on the pop-up window



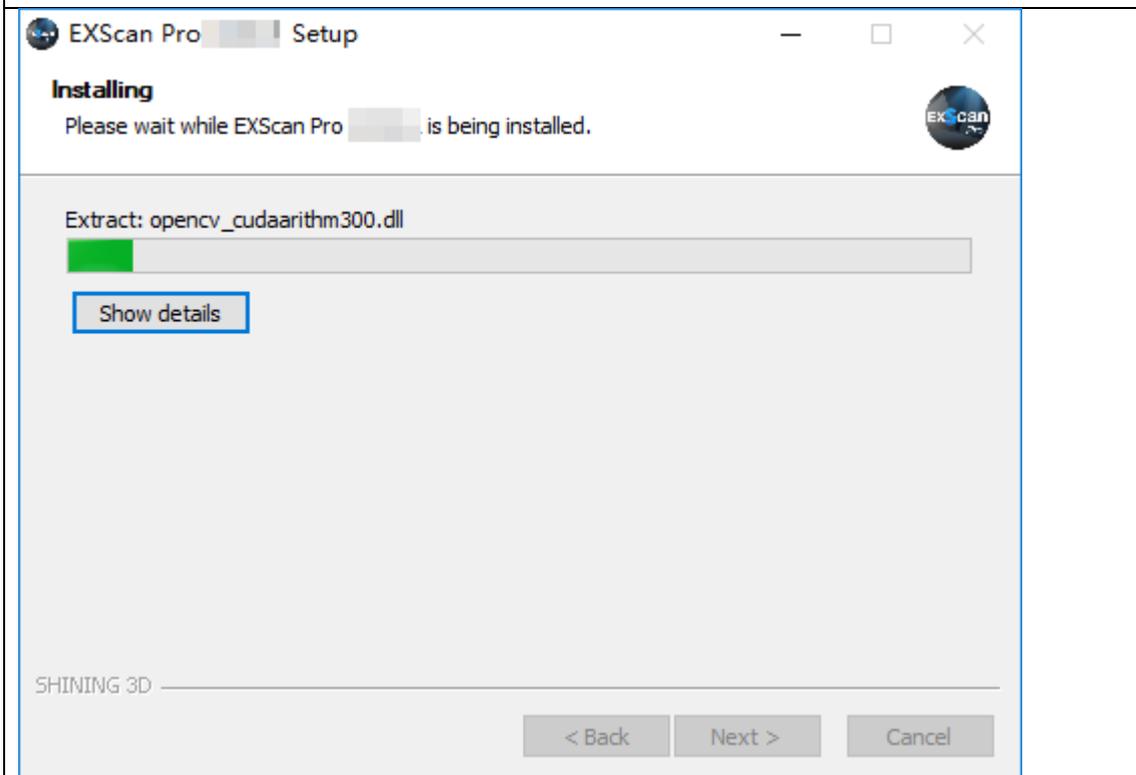
You must accept the agreement to install EXScan Pro.



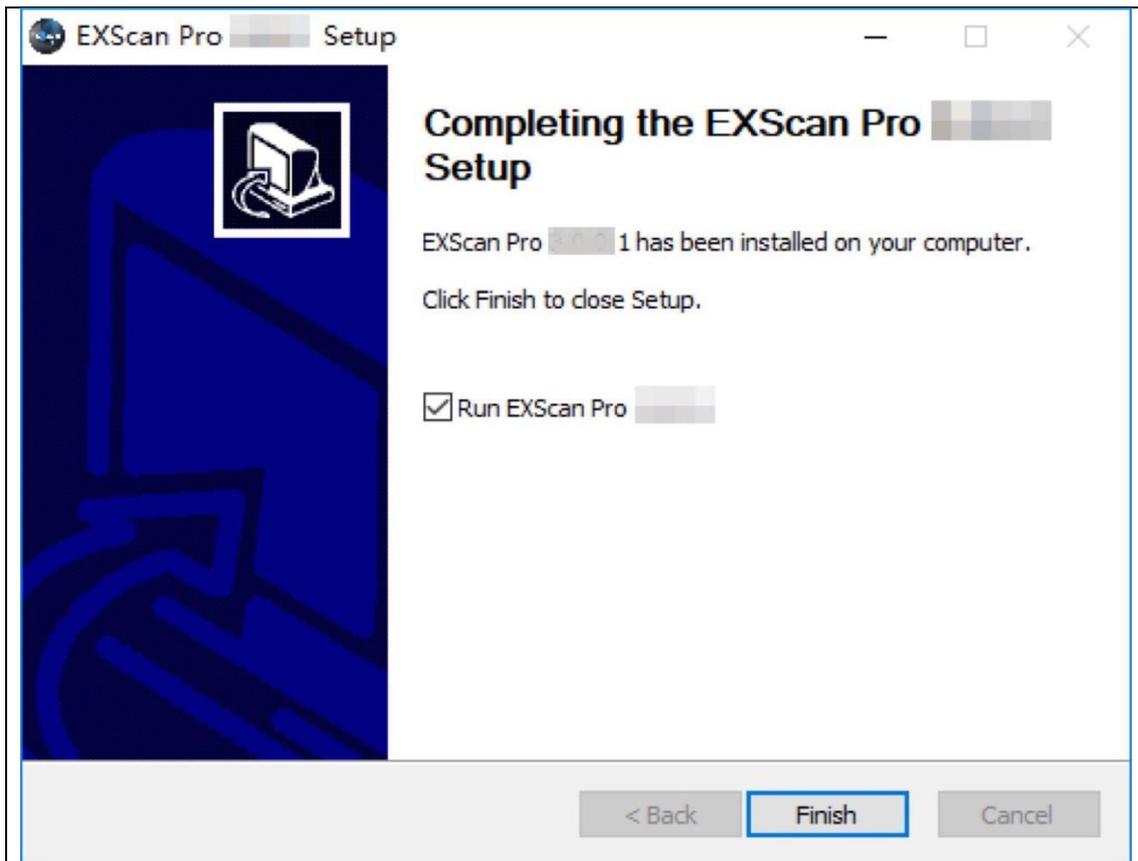
Click the Checkbox and click Next to approve the Privacy Notice



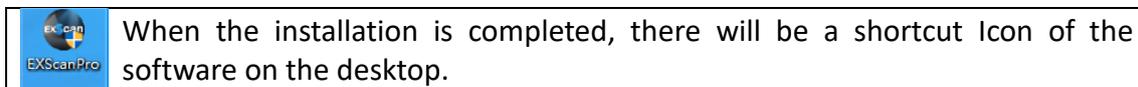
Choose the default installation path or click the Browse button to select the installation path. Default installation path is recommended.



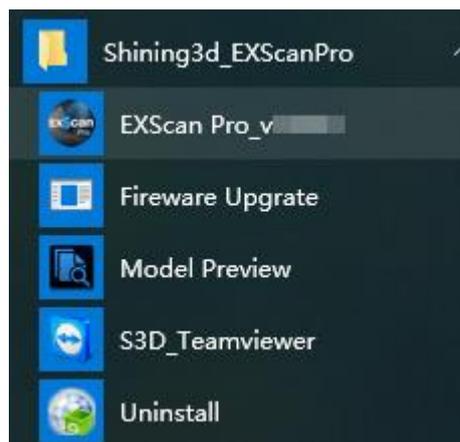
Wait for the installation to be completed



Click the Checkbox and click Finish. The software will start automatically



The shortcut in the Start Menu is shown as below:



EXScan Pro on the start menu

2.3. Uninstall Software

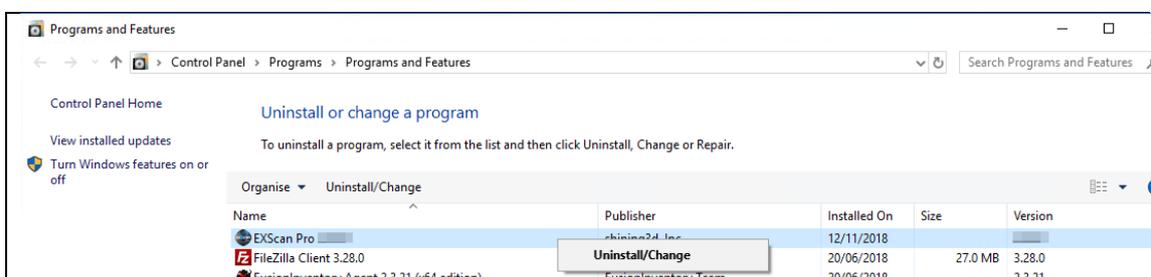
To install upgraded version of EXScan in the future, you may need uninstall previous software first.

To uninstall the software, when the software is closed, in the start menu Click Uninstall.

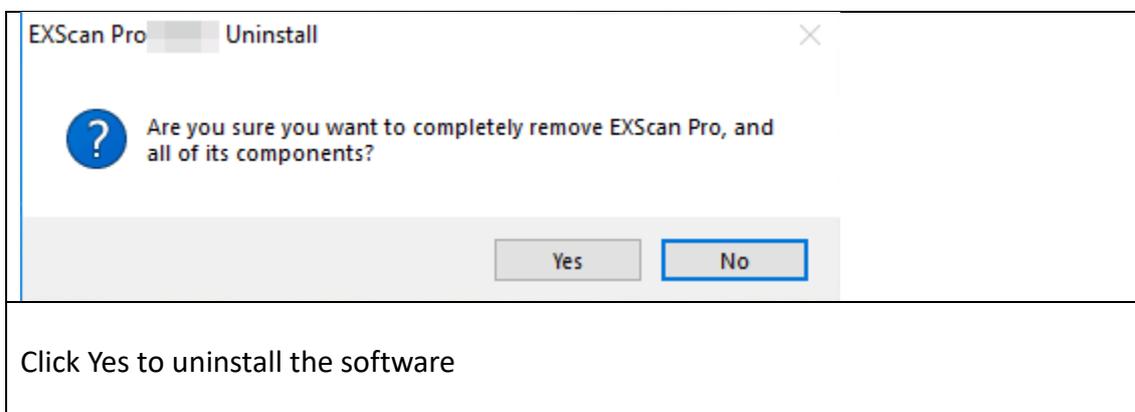


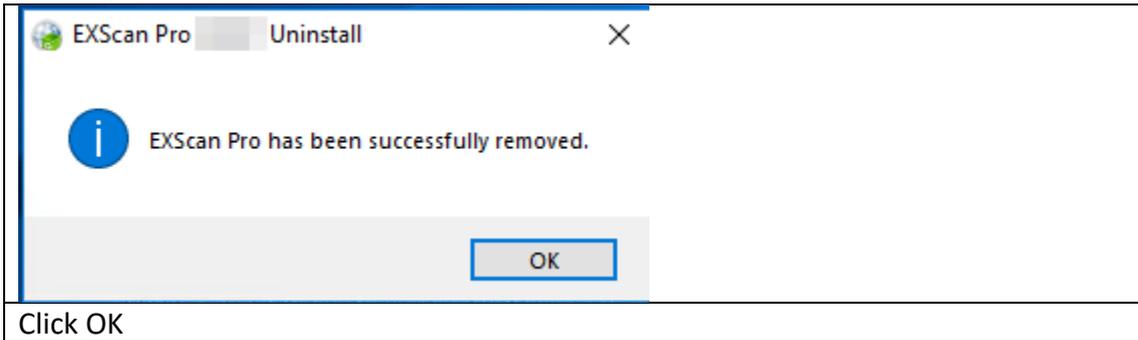
start menu > Shining3d_EXScanPro > Uninstall

Or go to Control Panel > Programs > Program and Features, choose EXScan Pro and right click to uninstall.



Follow the instructions step by step.



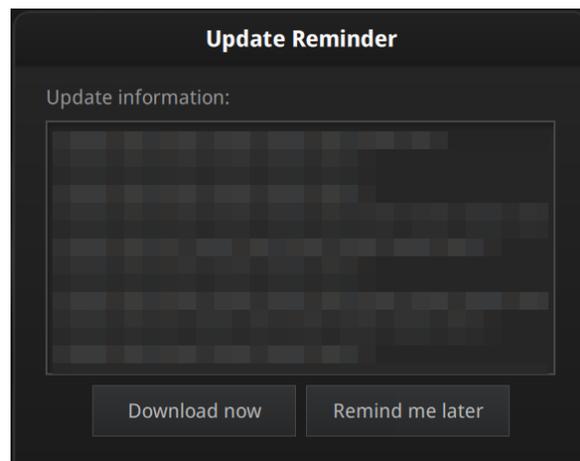


Then delete the Shining3D folder and its content in (C:).

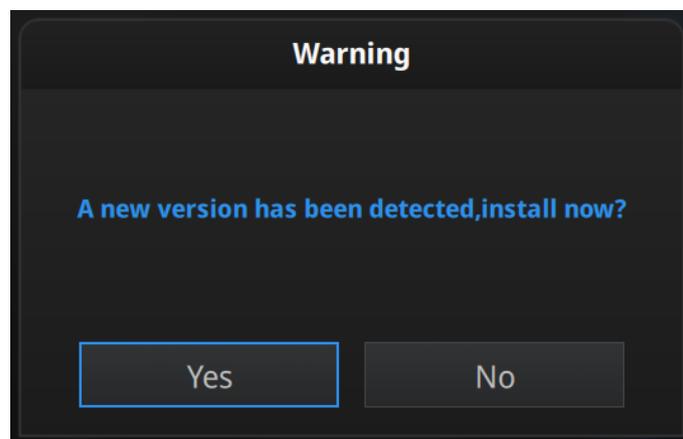
2.4. Update

Make sure to run the latest version of EXScan Pro.

If a new version is available, a pop-up will show when you start the software.



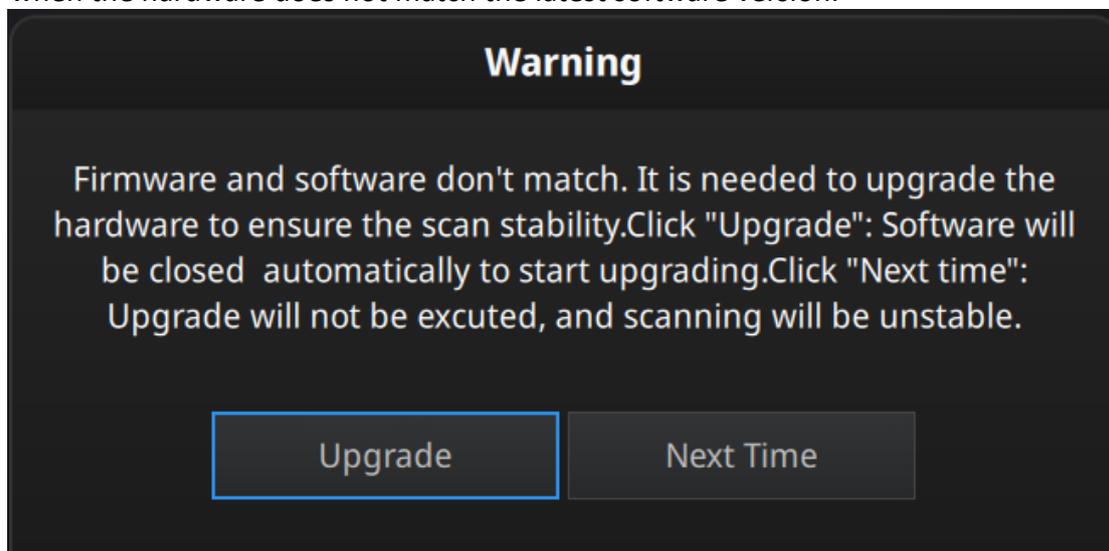
Update Reminder



Click Yes to update the software version

2.5. Firmware Upgrade

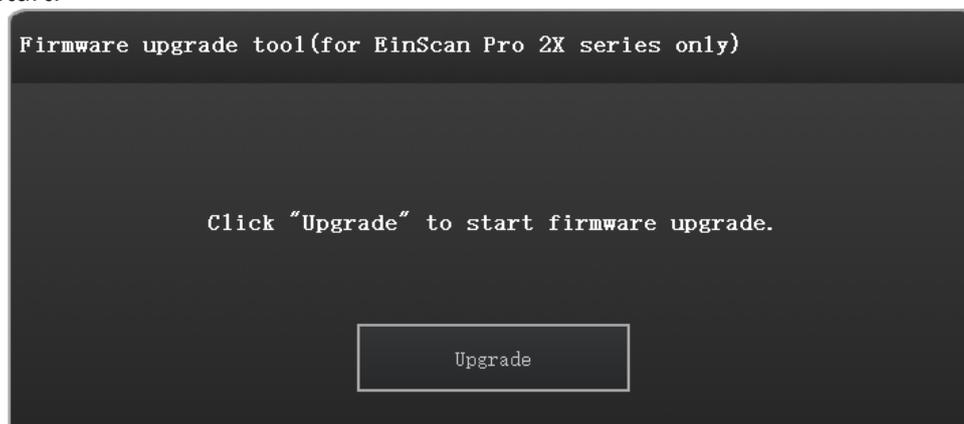
Firmware detection will run when opening software. Firmware upgrading is required when the hardware does not match the latest software version.



When firmware doesn't match

Warning: Loosing connection during Firmware upgrade can cause damages on the hardware, make sure a well connection (USB and Power) during the upgrade

Click "Upgrade", software will close automatically, and firmware upgrade program will start.



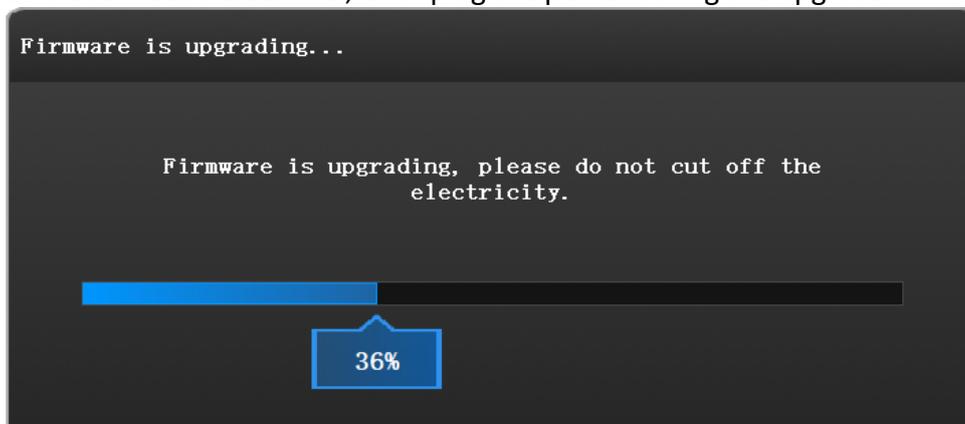
Firmware upgrade program

Click "Upgrade", wait around 1 minute, the firmware starts to upgrade.



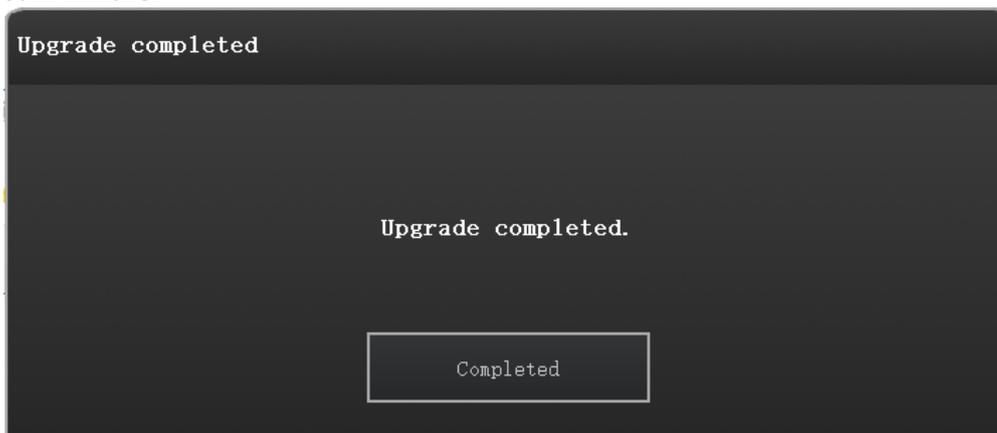
Waiting to upgrade firmware

Do NOT disconnect the scanner, or unplug the power during the upgrade



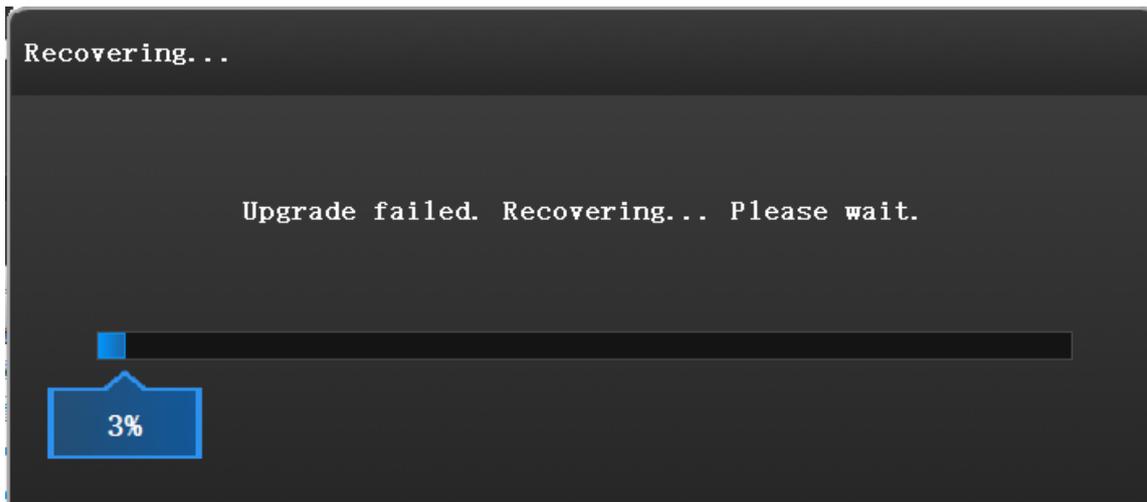
Firmware Upgrading

Upgrade takes 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.



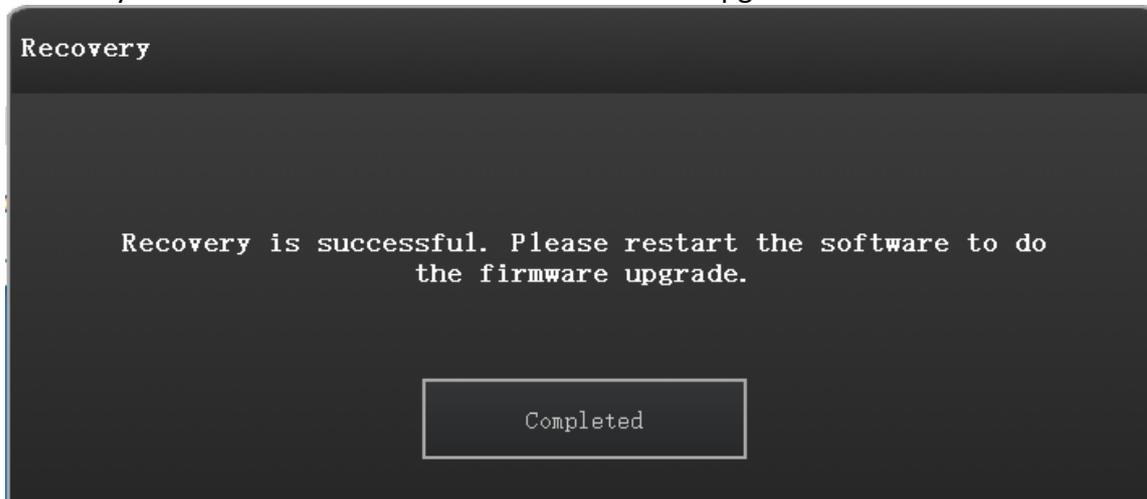
Firmware Upgrading Complete

If the upgrading is failed, recovery will run.



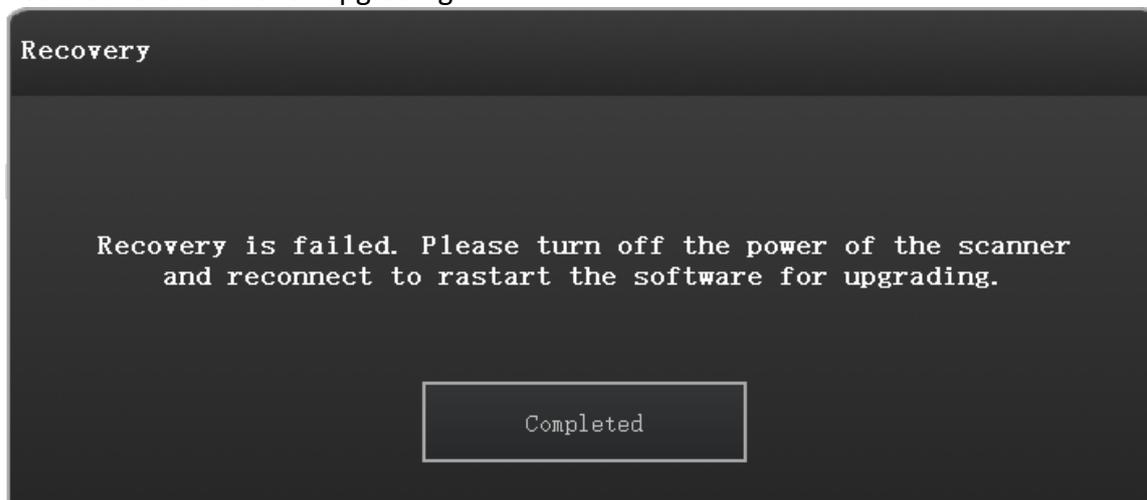
Recovering from a failed upgrade

Recovery is successful. Please restart the software to upgrade the firmware.



A successful recovery

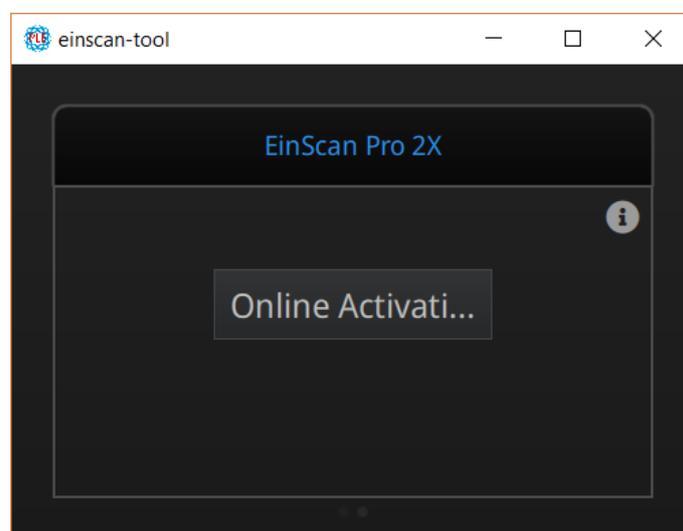
If recovery fails, turn off the power of the scanner and reconnect the scanner to restart the software for upgrading.



A failed recovery

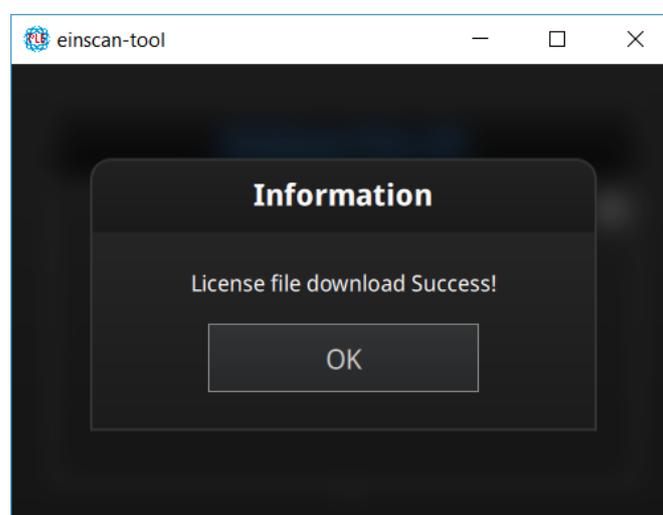
2.6. Device activation

When you use the device for the first time, hardware activation will be required.



Activation tool

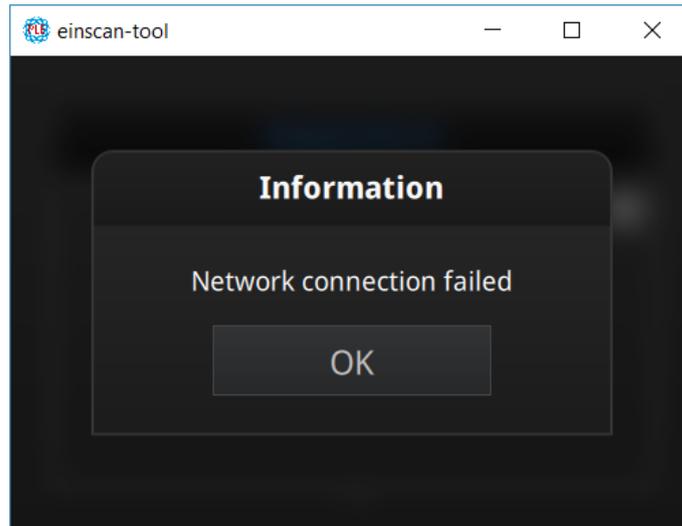
If your computer is connected to the internet, click “online activation”.



Click OK to continue

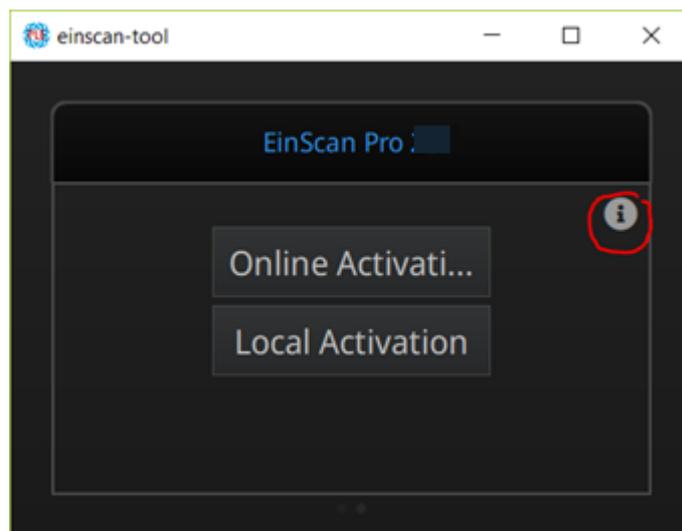
If the computer is not connected to the internet, you can also find the Ple file from the USB drive.

If the activation fails, send a request for activation file to einscan_support@shining3d.com and mention your serial number. You can find the serial number from the sticker on the scanner or label on packing box listing as “EinscanXXX-XXXXXXXXXX”.

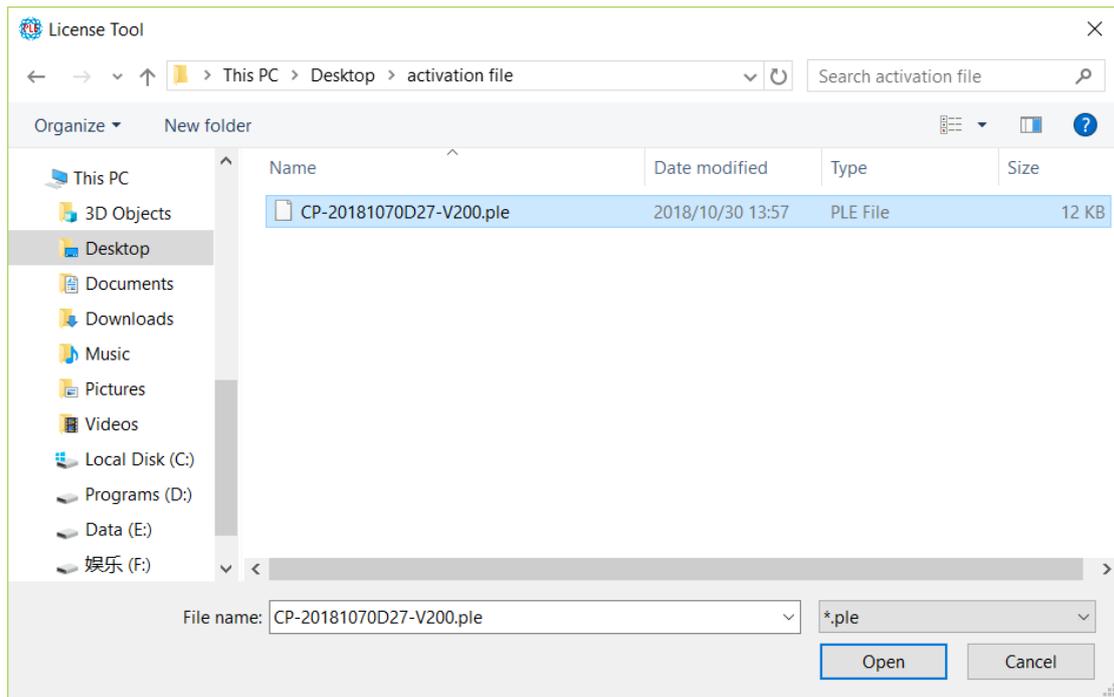


Connection failed, check your internet connection or do local activation

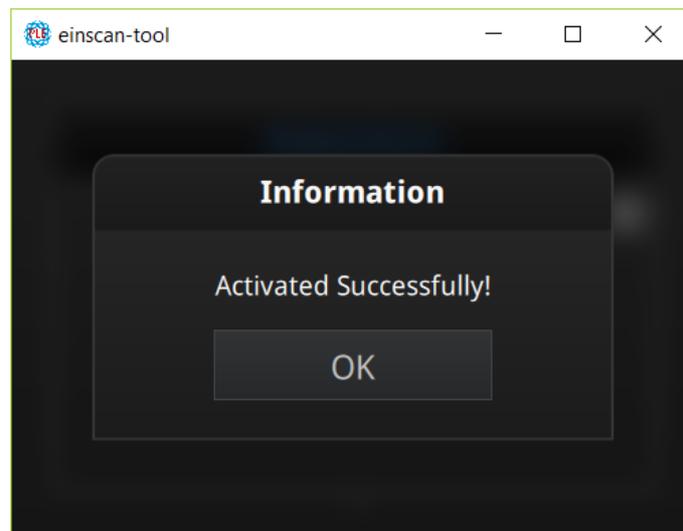
Save the .PLE file on your PC, then on the activation menu.



click “” to reveal the “Local activation” button

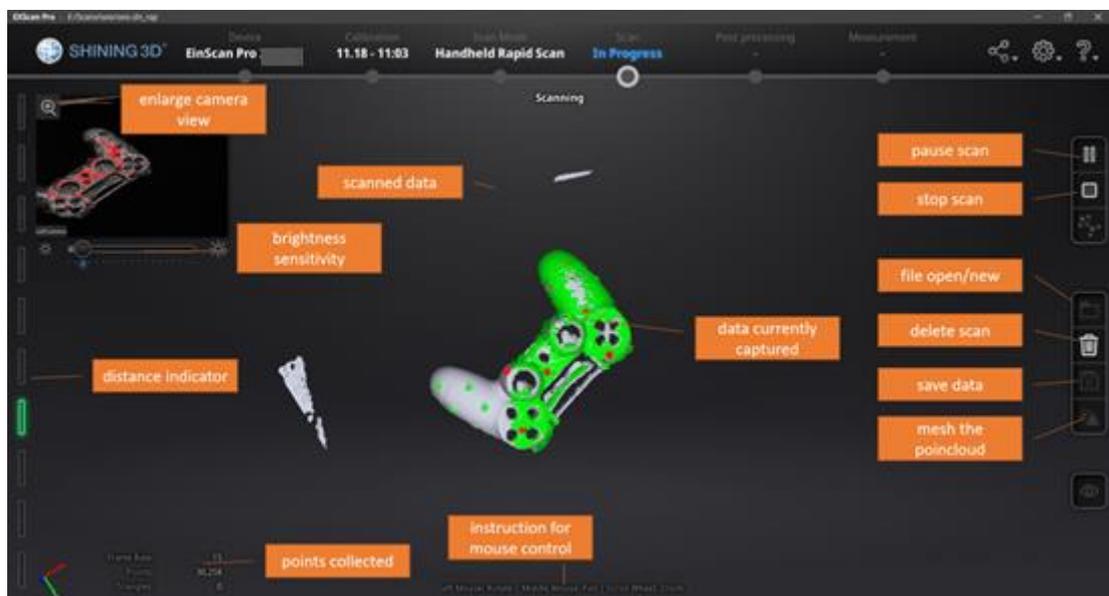


Browse and import the .PLE file.



2.7. Interface and Parameters

2.7.1. Navigate



Interface navigation

Left mouse: rotate

Middle mouse: move the data

Scroll up and down: zoom in or out

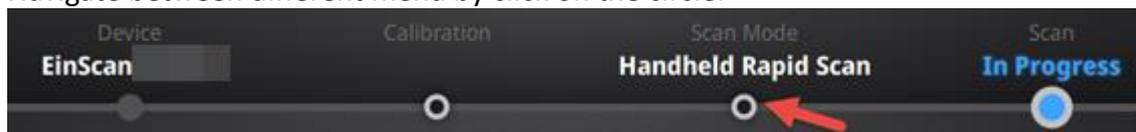
Keyboard:

Spacebar to scan again or restart the scan & validate

Delete key to delete selected data

Esc key to exit current pop-up

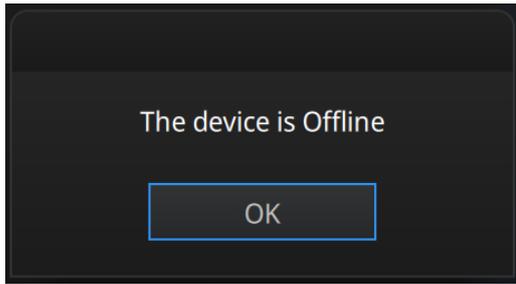
Navigate between different menu by click on the circle.



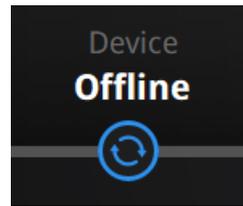
Navigation bar

2.7.2. Device reconnect

When the device is offline, meaning the scanner is not connected to PC, please check the connection and click on the refresh connection button to reconnect.

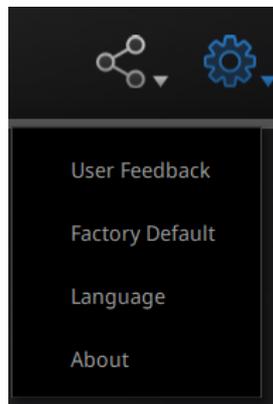
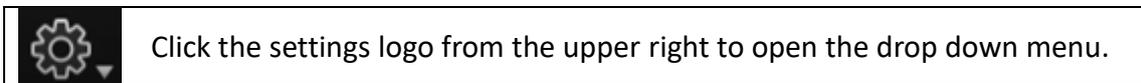


Device offline or connection loose



Refresh the connection on the status bar

2.7.3. Settings



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".

User Feedback

Do you have any questions or suggestions for us ?

* My email:

* Industry: Unselected ▼

* Content:

Description

Attachments:

(<50M)

+

Evaluation: ★ ★ ★ ★ ★

User experience enhancement program [Learn more](#)

Technical Support: einscan_support@shining3d.com

Submit
Cancel

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.

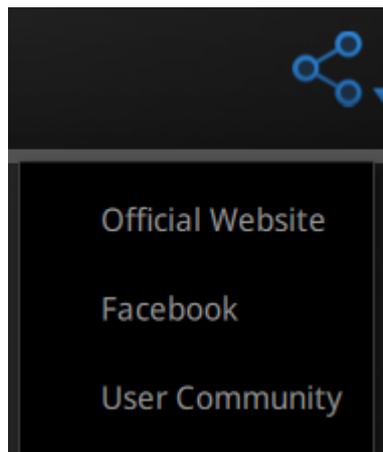
Language

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.

2.7.4. EinScan community



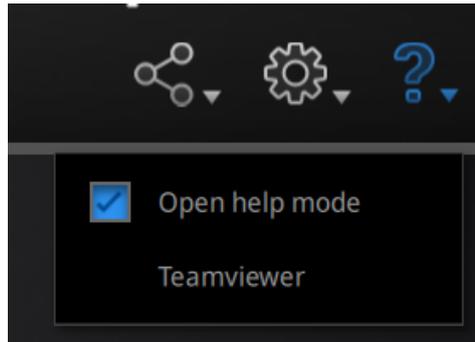
Community drop down menu

- **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.
- **User Community** 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 user community. Register your EinScan at community.shining3d.com

2.7.5. Help Mode

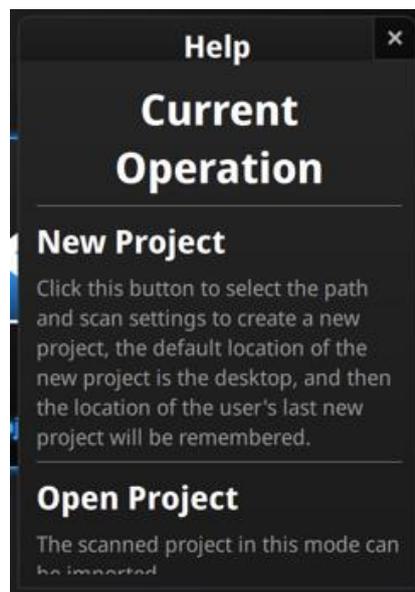
Open Help Mode

Click the question mark in the upper right bar, and open the help mode from the drop-down menu.



Drop down menu

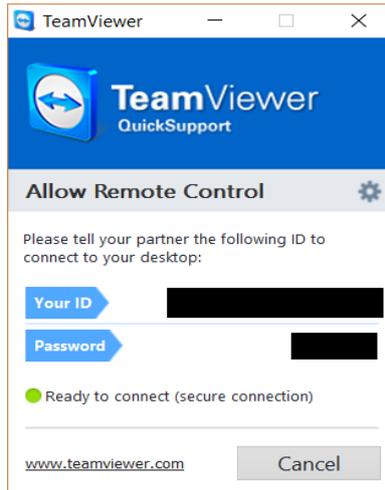
Display the help tool related to the current interface.



Help window

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

2.7.6. 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

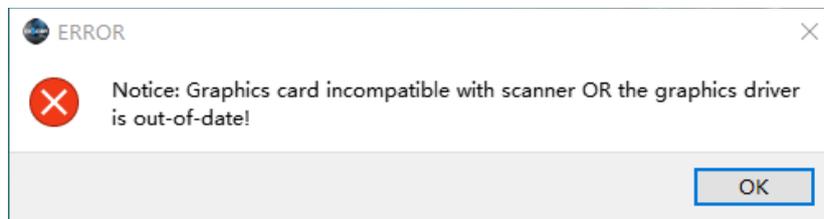
For activation failure, make sure the scanner is well connected. Redo the activation.

WARNING: The license file doesn't match the scanner. [Activate](#)

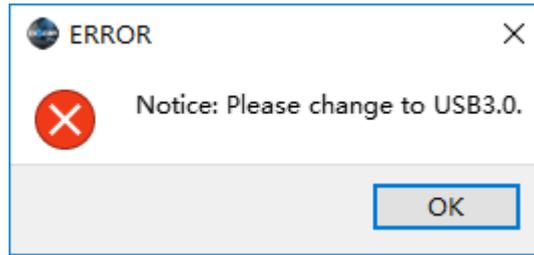
Device fails to activate

Incorrect configuration

try another USB port and update your graphics card drivers and restart the software.

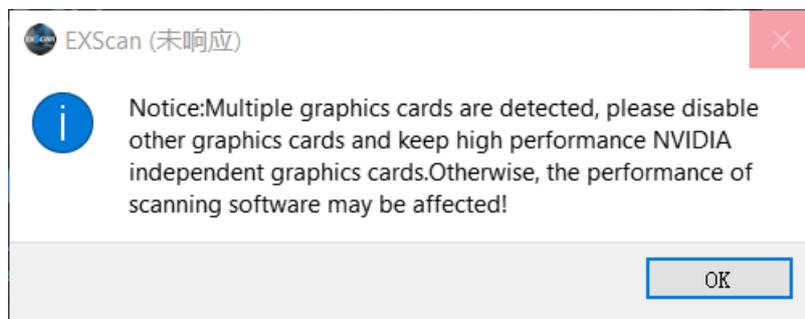


Graphics card incompatible

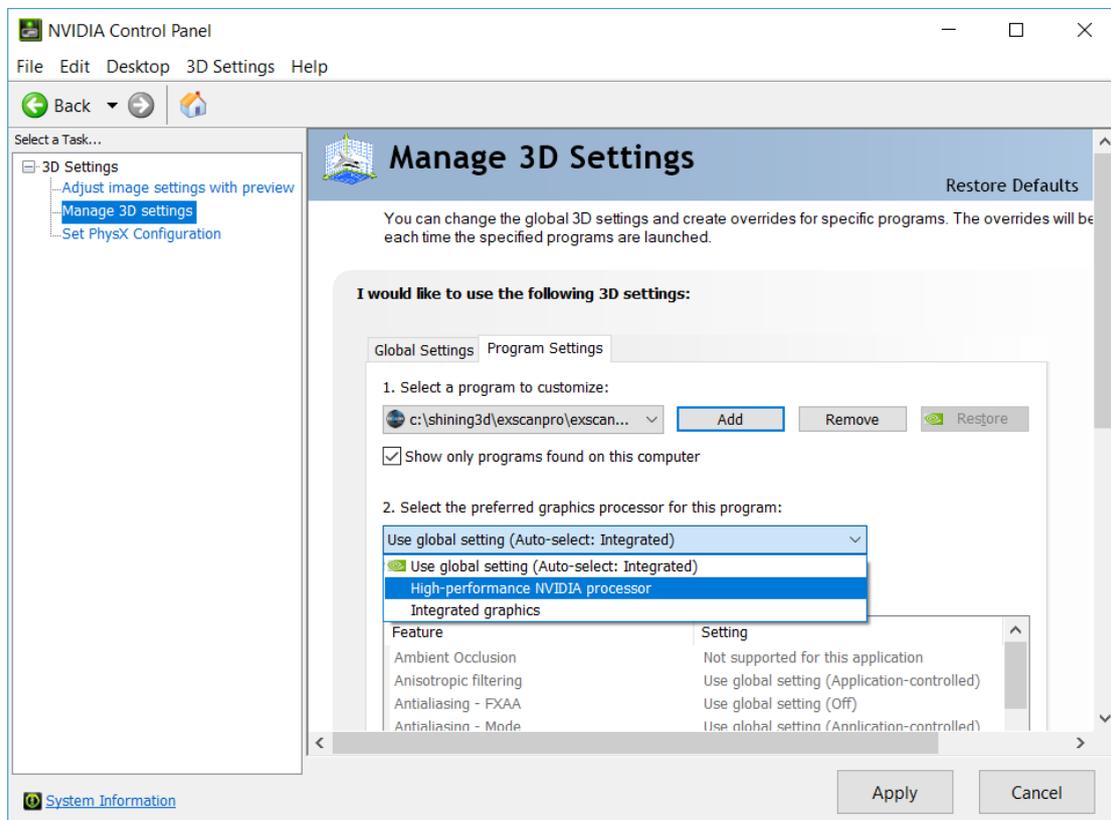


USB not 3.0

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.

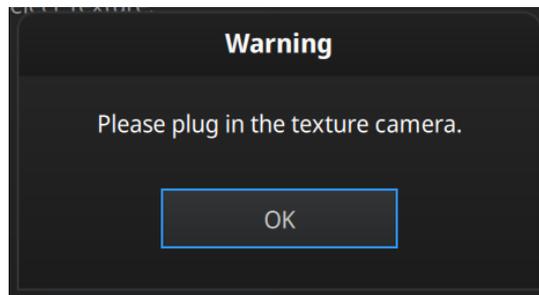


Multiple graphic card detected



Change graphic card preferences for EXScan

Mode not available



Add-on is required for this function

3. Calibration

3.1. Precautions and Use

Calibration is the process to ensure the device will scan with the optimal accuracy and scan quality. The parameters of the scanner will be recalculated during the calibration.

Under the following situations, you should calibrate the device:

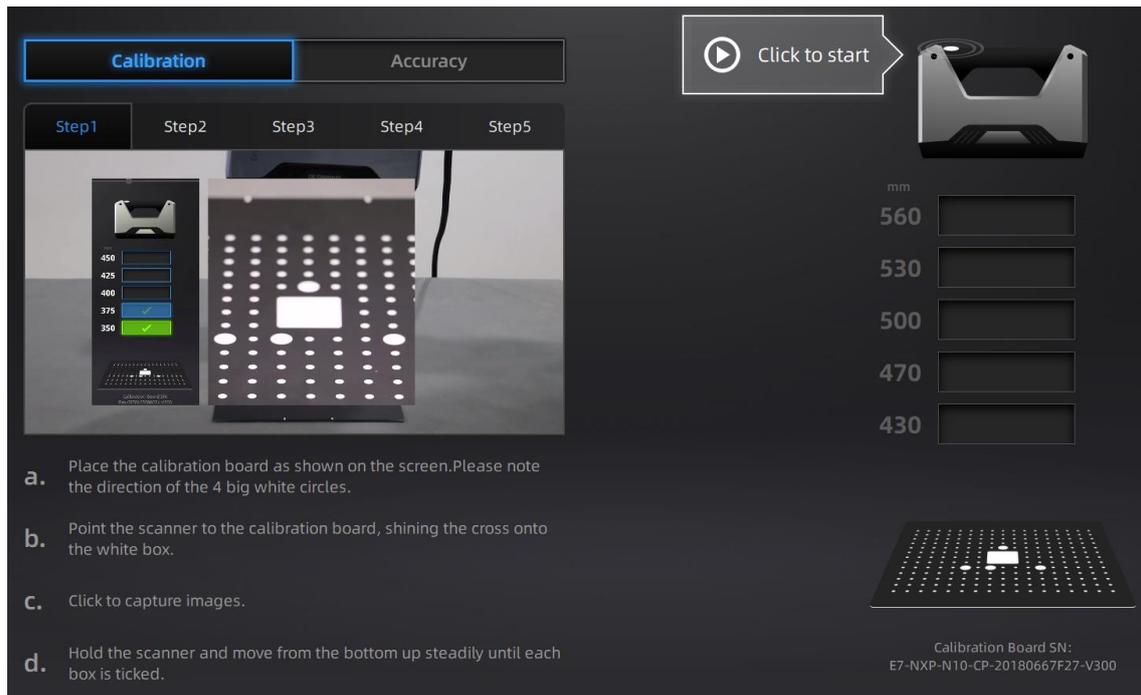
- ◆ Device change
- ◆ After device enduring bumpy transportation
- ◆ After device accuracy decreases
- ◆ The device has not been calibrated for 15 days or more
- ◆ After device plugged in with color camera

📌Notes:

- Make sure to protect the calibration board and keep it clean, no scratches or stains on the black surface with white circles.
- 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.
- Clean with clear water only, do not use alcohol or chemical liquid to clean the calibration board

3.2. Operation

After installation, when you open the software for the first time the software will enter the calibration mode by default. You can also choose Calibration on the navigation bar to enter calibration process later.



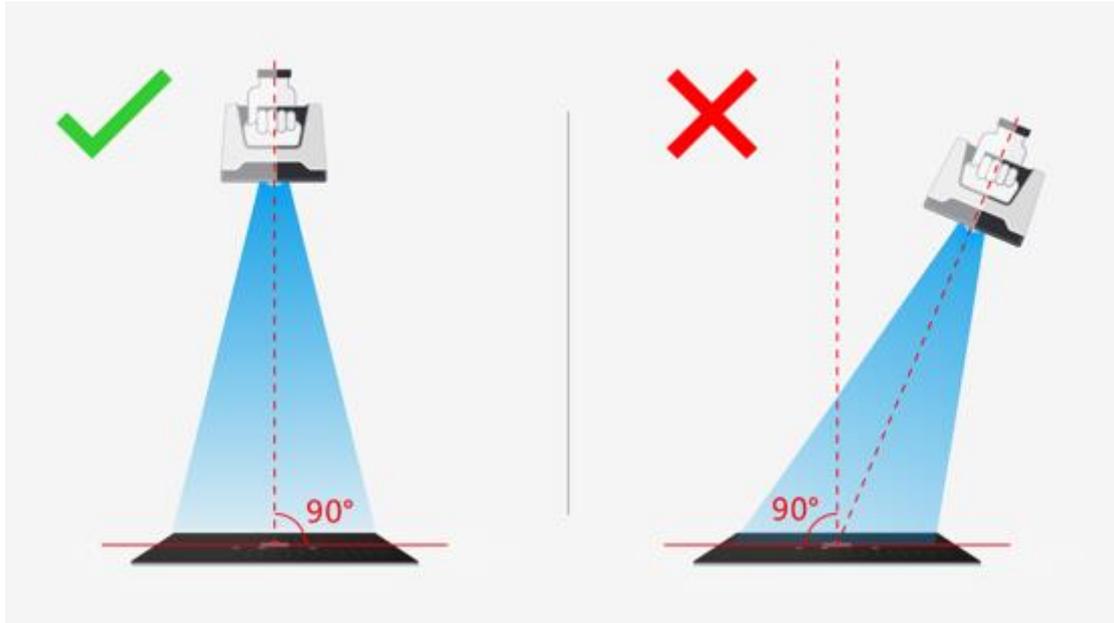
Calibration interface

3.2.1. Camera Calibration

Scan on the front side of the board (black surface with white circles) for calibration. Follow the instructions video on the screen to capture the 5 different steps. The calibration board needs to be placed in five positions of different heights during calibration, each captures five pictures. Place the board according to the software guide.

Step 1, place the calibration board flat in accordance with the direction in the picture, keep the cross pattern projected by the scanner in the white frame on the calibration board.

Then lift the scanner to change the distance between the projector and calibration board according to the software guide.



On-screen instruction during calibration step 1



Click Start in the software or press Play button on the scanner to capture automatically

or play button 

During the capture process, LED rings blink and a cross is projected. Move the scanner from top to bottom or from bottom to top slowly and steadily, until every step in the rangefinder is green, which means the first capture is complete. The software will play a beep sign. During capture, lift the scanner up when software shows “too close”; move the scanner down when software shows “too far”.

Notes:

- When the distance bar is ticked, it means pictures of this position are collected. Blue means the current position.
- Keep the cross in the white square area when moving the scanner
- During calibration, keep the scanner vertical, not parallel to the calibration board.
- Do not move the board during the capture

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

Calibration
Accuracy

Step1
Step2
Step3
Step4
Step5

- a. Place the calibration board as shown on the screen. Please note the direction of the 4 big white circles.
- b. Point the scanner to the calibration board, shining the cross onto the white box.
- c. Click to capture images.
- d. Hold the scanner and move from the bottom up steadily until each box is ticked.

mm
560

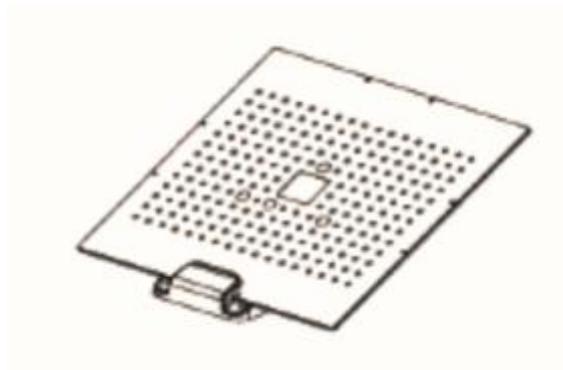
530

500

470

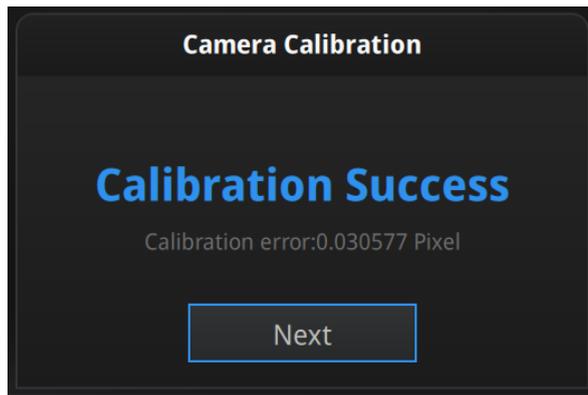
430

Calibration Board SN:
E7-NXP-N10-CP-20180667F27-V300



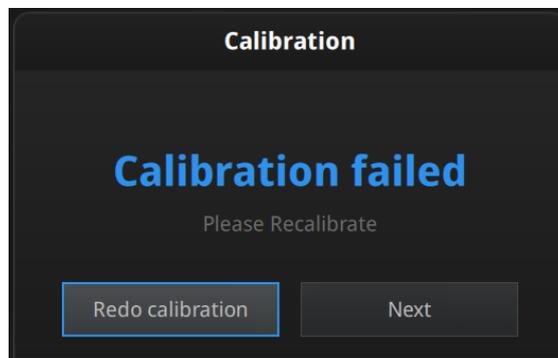
Calibration board on its support for step 2

Place the calibration board on the support according to the instruction. The collection is the same as above. When all five positions photos are captured, the software will calibrate the camera automatically. You will see the result as below. Calibration will take longer or fail if you did not follow all instructions properly. When calibration succeeds, click “Next” to move on to the HD calibration or white balance as the software indicates. Or it will go back to the scan mode selection interface if there is no other calibration required.



Camera calibration result

If calibration fails, click “Redo calibration” to start the same calibration again from the beginning.

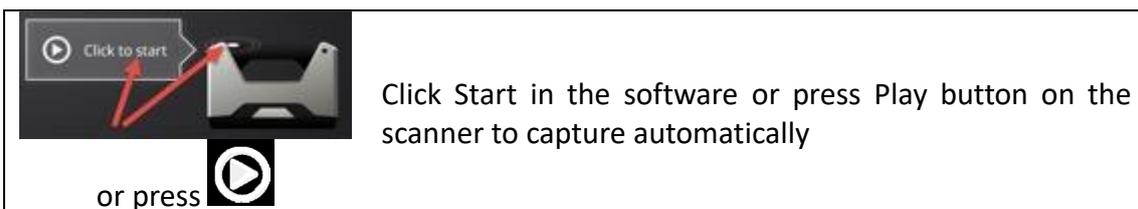


Calibration failed

Click “Next” to perform HD calibration or white balance as the software indicates. Or it will go back to the scan mode selection interface if there is no other calibration required.

3.2.2. Accuracy test

While scanning, if markers cannot be recognized, tracking is easily lost or misalignment happens often, we suggest doing the Accuracy Diagnostic. This will feel similar to the calibration process. Scan on the front side of the calibration board (black) to do an accuracy test.



During the capture process, LED rings blink and a cross is projected. Move the scanner from top to bottom or from bottom to top slowly and steadily, until the rangefinder is completely filled with green bars. Follow the instructions on the video and on the screen to capture the different pictures.

Calibration Accuracy

Evaluate accuracy

a. Place the calibration board as shown on the screen. Please note the direction of the 4 big white circles.

b. Point the scanner to the calibration board, shining the cross onto the white box.

c. Click to capture images.

d. Hold the scanner and move from the bottom up steadily until each box is ticked.

mm

560

530

500

470

430

Calibration Board SN:
E7-NXP-N10-CP-20180667F27-V300

Accuracy

Error:0.050527 mm

Accuracy Next

Accuracy error result

How it works: The software calculates point position and compare it to the known value. The deviation is display as result

If the result is more than 0.05mm (accuracy for handheld mode), redo the calibration, and test again.

Go back to scan mode selection page by clicking “Next”.

4. Before Scan

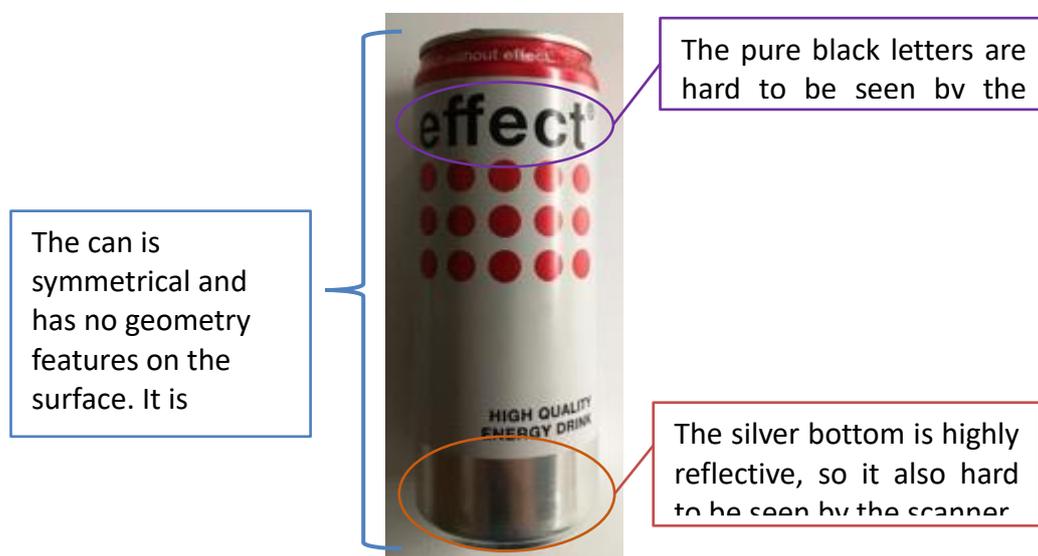
4.1. Object

EinScan Pro series can scan objects from 30*30*30mm ^{^3} to 4m length.

We do not recommend scanning:

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

During scanning the shape of the object needs to be maintained without any changes (human bodies must be held still, for example).



Example of object that is difficult to scan

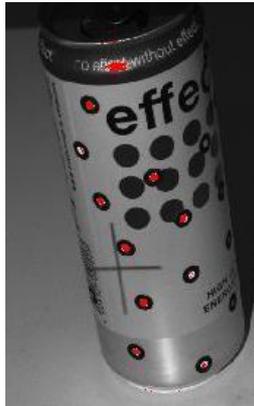
4.2. Preparation

To align data if geometry features are not sufficient, you need to stick markers or pieces of clay on the surface of scanned objects to create extra “features”.

When you stick markers on the surface of the object, you need to follow the following rules:

- (1) Make sure sticking at least 4 markers in each frame (one scanning field of view). Control the number of markers seen on the camera view.
- (2) Stick markers in a random, non-linear pattern (see example below).
- (3) Markers should be stuck on the flat surface area and keep the marker surface flat.

- (4) Use the markers provided with the device only. Other markers can result bad accuracy or not to be seen.



Object with markers

If the object is small enough for each frame (scanning field of view), markers can be placed around the object. Make sure the object will not move from its support during the scan, which means the position relationship between the object and markers should not be changed.



Markers surrounding the object

Before scanning transparent, highly reflective and black objects, you should spray white powder on the surface (see example above).

4.3. Select Scan Mode

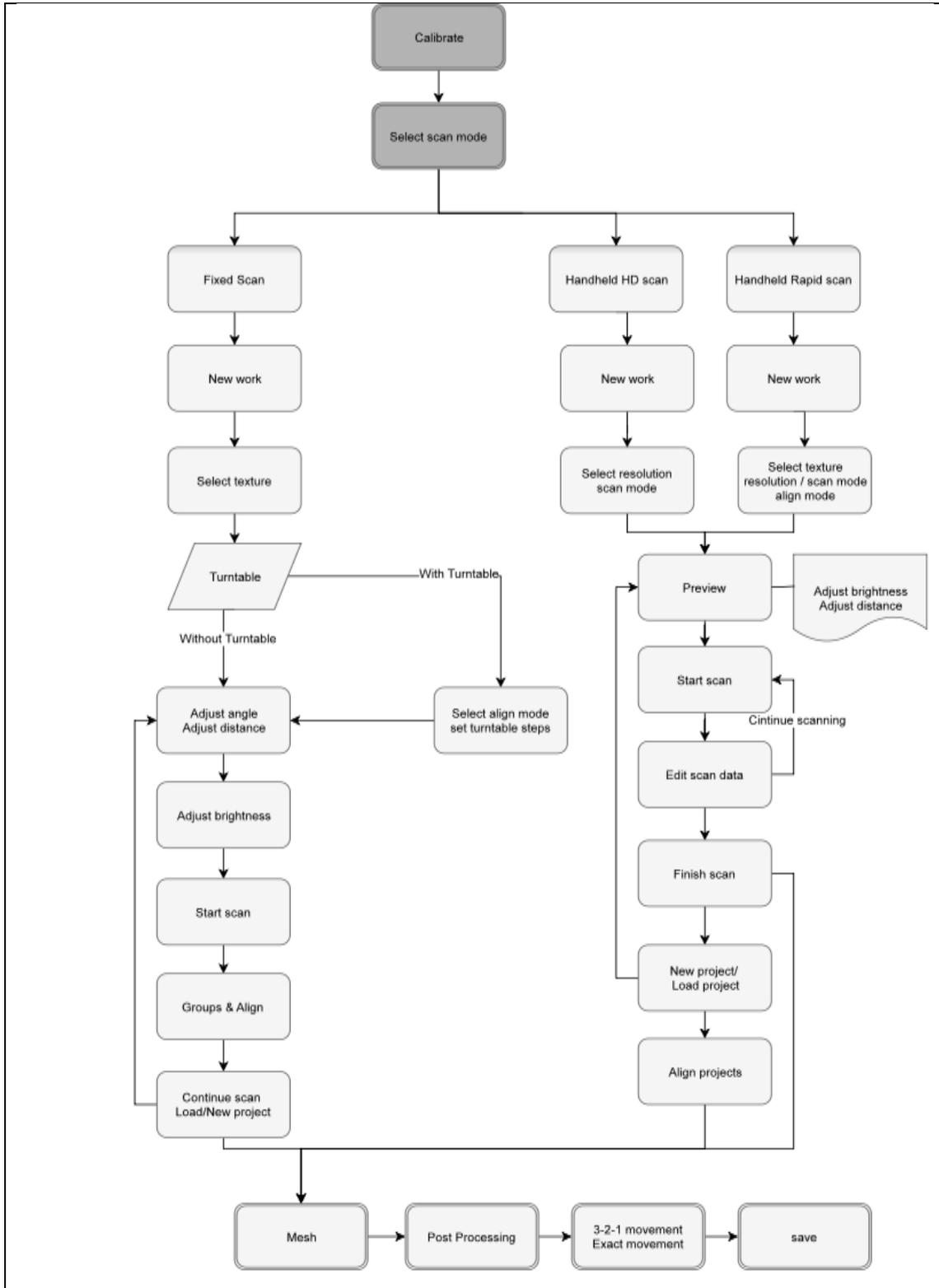
The following table show the strength of each scan mode that can be selected. For the limitations of each scan mode refer to the specifications presented previously.

Mode	Accuracy	Speed	Resolution	Align mode
Fixed scan With turntable (industrial pack)				<i>Turntable coded target, features. markers, manual</i>
Fixed scan				<i>Markers, features,</i>

No turntable				<i>manual</i>
Handheld HD scan				<i>Features, markers, hybrid; Color pack: texture</i>
Handheld Rapid scan				<i>Features, markers, hybrid; Color pack: texture</i>

Summary of selection mode

4.4. Scan Workflow



5. Fixed Mode (Industrial Pack Required)

Fixed Scan Mode is designed for achieving high resolution and high accuracy scanning for small (from 30*30*30 mm³) to medium size objects.

In this mode, the scanner and the object are fixed during a single scan. The relative position between the scanner and the object can be changed to capture different area of the object on separated single scans. Successive single scans are aligned automatically or manually based on the common area or markers to generate a whole scanned data.

The add-on “Industrial Pack” is dedicated to this mode, with a tripod and a turntable Perfect for object fitting on a Φ 150mm disc.

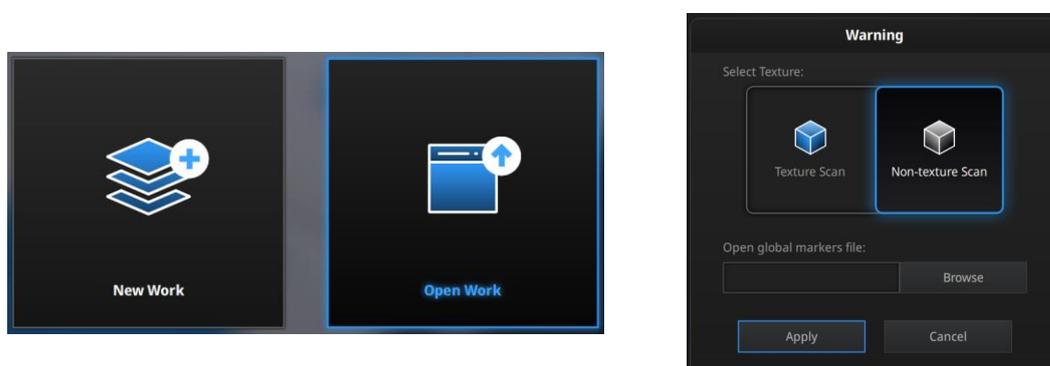
Tips: The objects’ footprint can be bigger than 150mm in Fixed Scan with Turntable if you do not need to use codes on the turntable for auto alignment. You can instead use geometry features or markers on the object’s surface for automatic alignment, or use manual alignment mode to get the whole scanned data.

The texture camera (Color Pack add-on) can be used in this mode.

5.1. Set Up

5.1.1. Create a Work

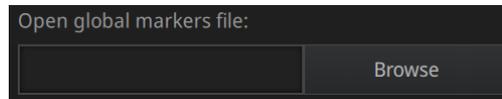
Enter the interface of New Work and Open Work. The initial default work save location is on the desktop unless the user opts to change this. Click “New Work”, enter the work name, then click ‘Save’ to enter the scan parameters window. Texture scan is only active when the texture camera (Color Pack) is attached to the scanner.



Create a work, fixed scan

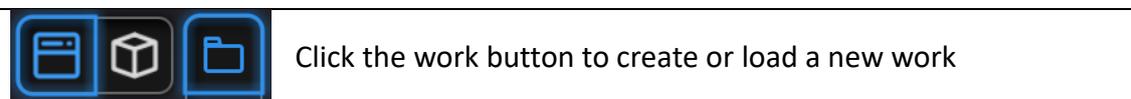
In the new project interface, you have the option to click browse to import a Global Marker File (GMF) as .ASC, .TCT or .P3. Global Marker File is normally captured by a

Photogrammetry System to achieve a high accuracy Markers Frame for large object, in which you can scan the object in detail and match the global accuracy of Markers Frame.



Browse to load a GMF

Note: We suggest you use GMF file for task of scanning large size object with high accuracy. When using the global markers file, new markers cannot be scanned. Global markers points can be deleted.



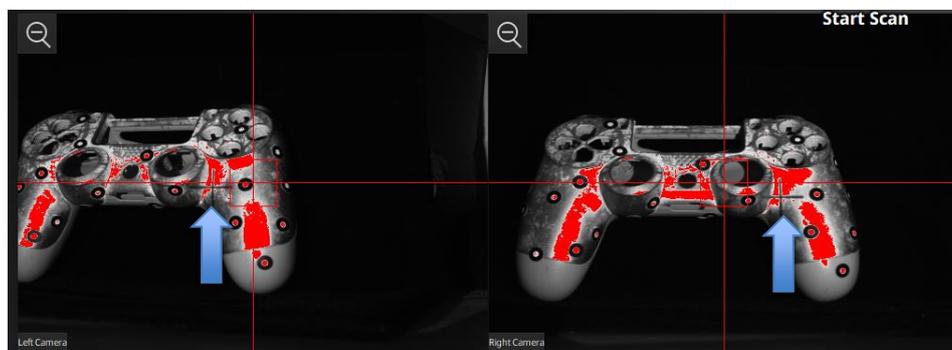
When a project is open, click the **work button** to create or load a new work. The new work will be with the same scan mode. Unsaved changes will be lost.

5.1.2. Working Distance

Adjust the distance between the object and device. Make sure the scanner will not move during the scanning.

	HD
Closer limit (mm)	410
Optimal distance (mm)	510
Upper limit (mm)	610

Check the projected cross on the on the preview windows. Adjust the working distance until the cross is inside the central box. At the proper working distance, the cross should be seen clearly with a sharp contour on the surface.



On the Right camera, at a too close distance the projected cross will be shifted to the left , to the right when too far



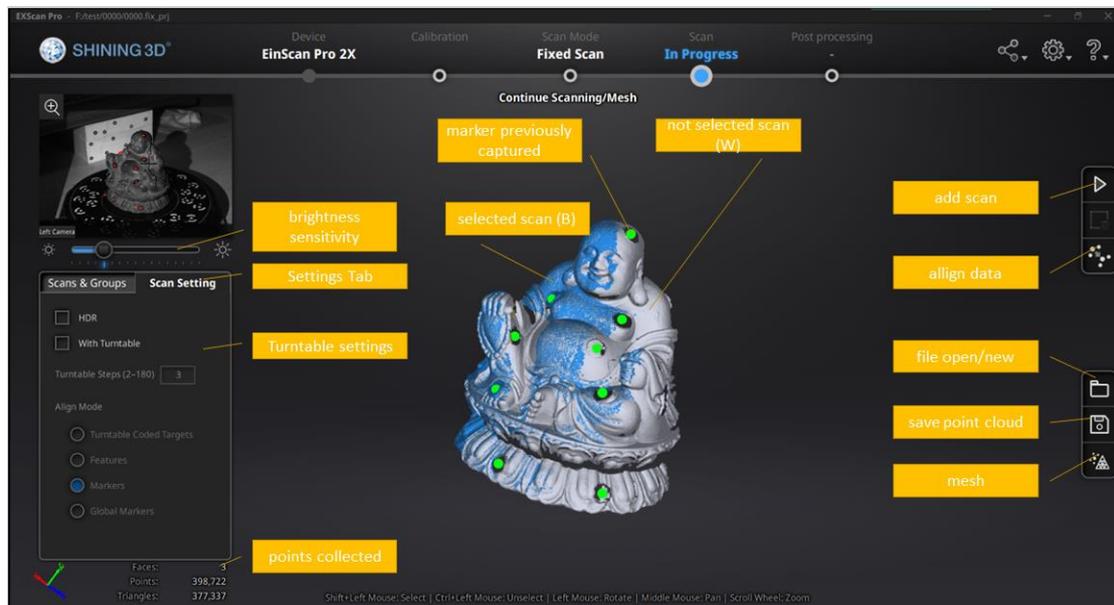
At optimal distance the projected cross is within the central box on both cameras



Set up for fixed mode

Note: The tripod is NOT included in the Standard Pack, but it is included in Industrial Pack together with a turntable.

5.1.3. Interface



Scan interface, Fixed mode

Note: Right Click on the camera preview to display the Right camera in the window. You will see the parts shown in the window from right camera. The parts which can be seen by both cameras will be captured. Adjust the position and orientation of the scanner or the object accordingly to finish the scan from different direction.

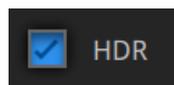
5.1.4. Adjust Brightness

Click and drag the button to adjust the brightness. The correct brightness setting will depend on the lighting in the environment and the texture of the object.



Drag to adjust the brightness setting

To scan an object with high contrasting texture, such as something white and black, use HDR. Each single scan will take longer to capture.



Turn HDR ON to scan contrasting textures

5.2. Scan with Fixed Mode

5.2.1. Capture

	Click the button or press space bar to start scanning
	Click the pause button, and the scanning will pause; Click again to resume scanning.

When the scan is completed the data is automatically saved in the project file. Make sure the relative position does not change during the scan.

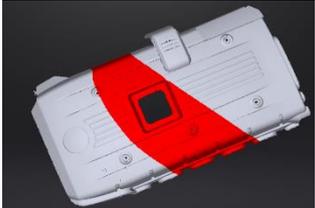
During the scan you should see LED flashing followed by projected stripes.

5.2.2. Edit Scan

After the single scan is completed you can edit the data.

SHIFT + Left mouse: Select unwanted points, the selected points will turn red, as shown below.

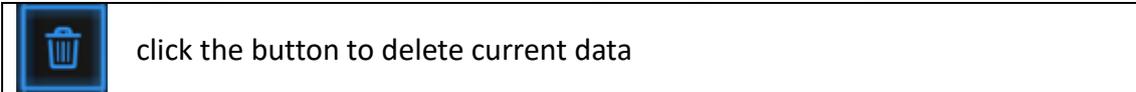
Ctrl + Left mouse: Deselect selected data.

	Edit buttons: ① Deselect ② Revert ③ Delete ④ Undo ⑤ Show/Hide texture (color pack only) ⑥ Shift + Left mouse: choose data ⑦ Ctrl + Left mouse: deselect selected data	
---	---	---

	Delete selected data Click the button or the “DELETE” key on the keyboard to delete selected data.
	Undo You can only undo the most recent deleted data.
	Show/Hide Stripes (for data with color texture only) Click the button to switch the texture option between display and hide.
	Press the space bar on the keyboard to save data and exit the single-scan editing. The edited data is saved in the project file



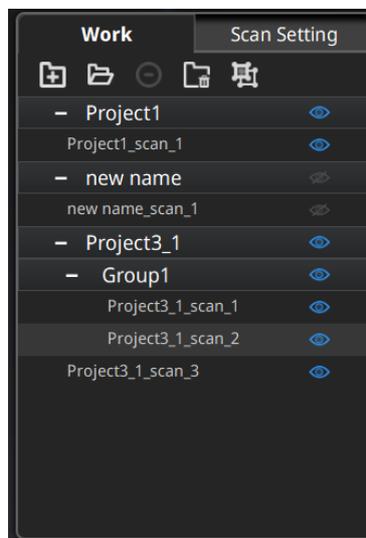
If you are not satisfied with current scanning data, or there is not enough overlapping regions or markers between neighboring scans for registration,



Then change the position of the scanner or the object to scan again.

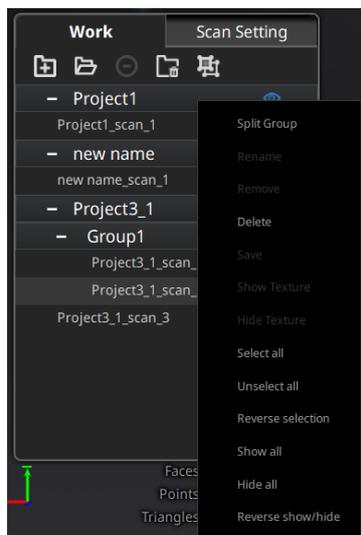
5.3. Scans, Groups and Projects

When the scan data is saved, you can manage data and projects on the project tree



Project tree, fixed mode

5.3.1. Create Groups



Project tree dropdown menu

Left mouse: Select scan/group on the scan list or on the 3d view

SHIFT/Ctrl + Left mouse: Select multiple scans/groups

	Create a group with the selected scans and or group(s)
	Click the button to delete the selected scans, group(s) and/or project(s)
	Scan, group, project visible / invisible

A new group will be generated by all selected scans from a single project.

Right click on the selected scan/group to access more options on drop down menu.

Notes:

- By default, the scanned data in one rotation of turntable (industrial pack) belong to one group. The group can be deleted or split to realign with other group data or single data.
- Disable texture (color pack) to select scan by left mouse on the 3d view

5.3.2. Projects

New project / Load project

	Click the project button to create or load a new data
Or	

Click on the project tree or on the **project button** create a new project or import a previous fixed scan into the work.
 Only projects from the same scan mode can be imported.

*Imported data will be copied in the work folder and appear on the project tree
 New project will create a new entry in the project tree and a new project file in the work folder*

Current project

The last loaded project is the Current project, new data will be added and align with the current project. The current project is the last listed on the project tree.
 Reopen a previous project to make it as the current project.

Rename project

Right click on the project on the tree to rename it. The new name will be updated in the work folder



Rename projects

in case of name interference in the work folder when load a project, the loaded project will be automatically renamed: "Name" → "Name_1"

Remove/Delete

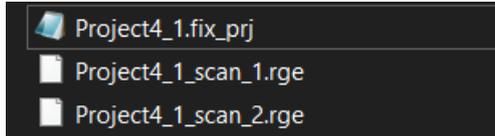
	Remove the project
	Delete the selected data, group(s) or project(s)

Select one or many projects Click **remove** to remove the project(s) from the project tree, but not from the work folder.
 Click **Delete** or right click and delete to delete the selected data, group(s) or project(s) from the project tree and the work folder.
 If you remove or delete the current project the last project will reload and become the new current project.

Note: Delete only affects the data in the work. If the project is imported from other work, only the created copy is deleted.

Tip: Duplicate a project

To duplicate a project in the workspace, in the work folder, copy the project file (.prj_fix) and all associated data file (.rge) into a separated folder without changing the name. Then import the file as a new project in the work.



create a copy of the project files on a new folder

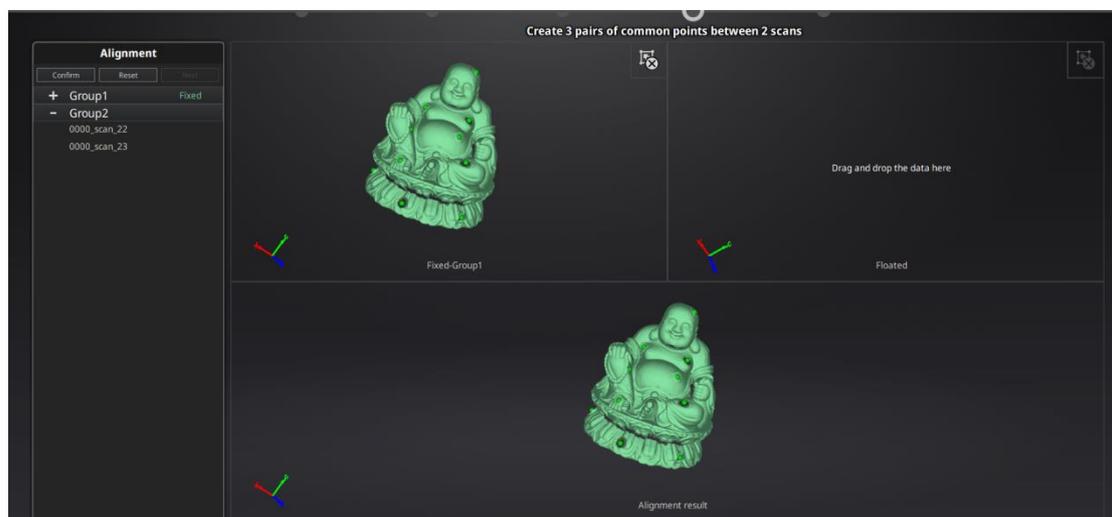
5.3.3. Edit data

Double click on a project, group or a scan, to enter the edition mode. The edition are applied to the selected data only. Modifications will not affect the rest of the data.
Shift + left mouse: select data on the 3d view, and enter the edition mode. the edition are applied on the visible data only.

See [5.2.2] for the edition functions.

5.3.4. Alignment

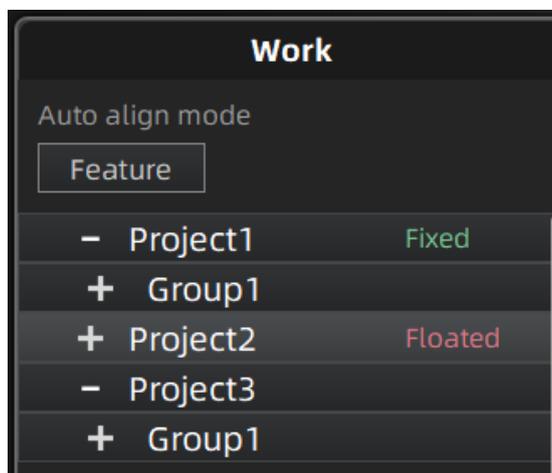
Enter the align interface, you could choose either feature align or manual align.



Drag and drop single scan, group or project to the float and fixed window

Single scan, group or project can be dropped into both windows. Scans in the group or are not allowed, split the group first.

Alignment can be used between projects, load the full projects on the float and fixed window. A single data can not be aligned with another project.



	click to remove the scan, group or project from fixed or float window
	Texture visible or invisible (color pack only)

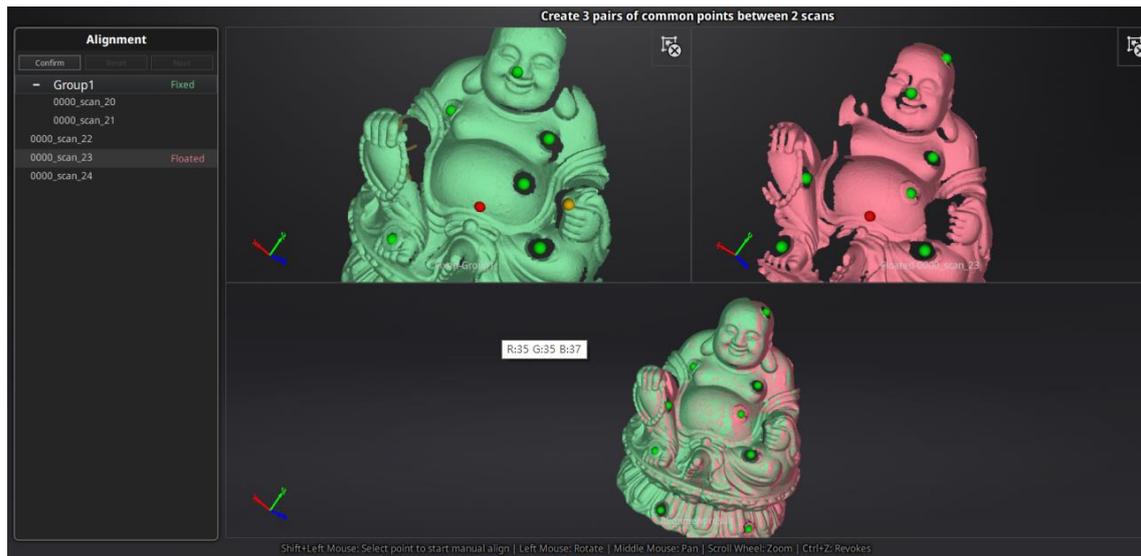
Auto align

Drag the data into the fixed and floated viewport, click the feature align button on the right, 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



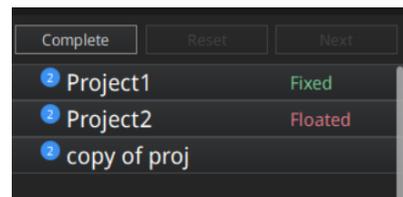
Select 3 points to align the data

How it works: The software calculates the best fit alignment from the picked points, and refine the alignment by best fit of all the points of the floating to the points of the fixed.

After data are aligned the blue number represent the alignment reference.

The floated data is transferred to the reference of the fixed.

it is recommended to keep data with the same reference into a same group.



Alignment reference

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

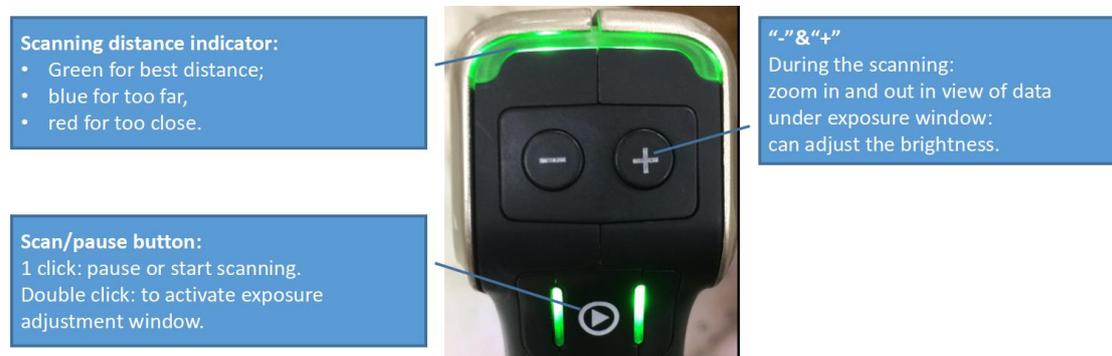
6. HD Mode

HD mode means the hand-held scan mode with high resolution and high accuracy. When the operator holds the scanner in hand and moves around the object, the data is instantaneously captured and matched with previously captured data.

HD mode uses markers to align the data during the scanning process.

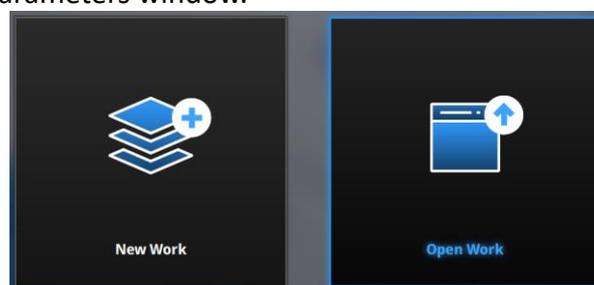
The texture camera (color pack add-on) can be used in this mode to scan 3D data in color texture.

6.1. Handheld Scanner Key Function

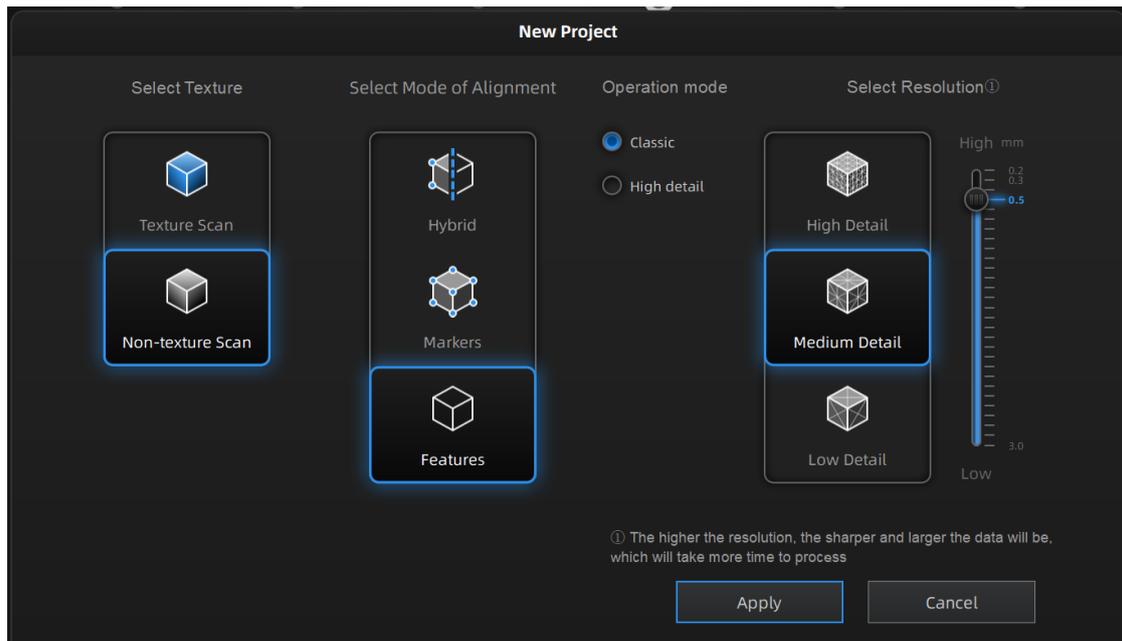


6.2. Before Scan

Enter the interface of New Work or Open Work. The default work is saved to the desktop. You can change the saving path, and then the newly created work will be saved to the new location. Click “New work”, input the work name, then click ‘Save’ to enter the scan parameters window.



Work interface



HD mode scan parameters window

6.2.1. Alignment Conditions

Marker Alignment:

the surface of the object requires markers. When the scan starts the markers are required, otherwise “Track lost” will be displayed.

At least 4 markers captured previously need to be seen by the scanner in each current scanning frame to be aligned. If not, “Track Lost” will be displayed.

When scanning a large object, Marker Alignment is the best mode at mitigating the cumulative errors caused by large amounts of data. This results in a higher global accuracy of the complete scanned data and is the reason we recommend this alignment mode for large objects.

Feature Alignment:

the data currently captured is “best fit” and aligned to the previously captured data according to the geometric features of the object. “Track lost” will be displayed if there is not enough common area captured in neighboring scans or the scanned area has few geometric features to allow for the alignment. Rich features on the object are required for this mode.

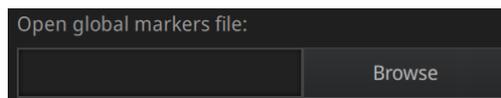
Hybrid Alignment:

the software can switch between feature and marker alignment automatically during scanning according to whether the surface of the scanned object has markers or not.

So you can put markers only on surfaces with little geometry. There is no need to stick markers all over the object. (See the example below)
 For some parts which are difficult for Feature Alignment, a reminder will show up to suggest you stick markers on the area with limited geometric features.

GMF:

With Markers and Mixed alignment, you may click browse to import a previously created Global Marker File (GMF) as .ASC, .TCT or .P3.

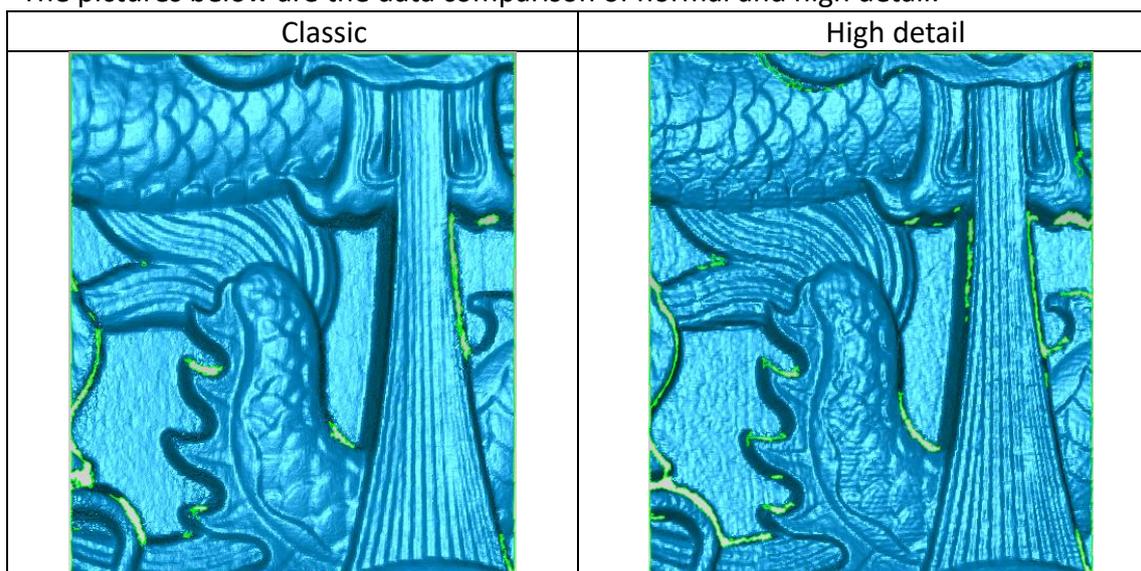


Browse to load a GMF

6.2.2. Choose operation mode

- **Classic**
 The scan speed is 10 fps.
- **High detail**
 The scan speed is 10 fps under high detail mode, and the details are finer than normal mode. While the scan range of high detail mode is around half of that of normal mode, the scan speed is also relatively slower. This mode is suitable for scanning relatively small objects with rich features on the surface(not suitable for size over 1 meter). And it is not suggested to use markers under this scan mode, as the density of the markers shall be high, which will result in lots of markers holes on the scan result.

The pictures below are the data comparison of normal and high detail:

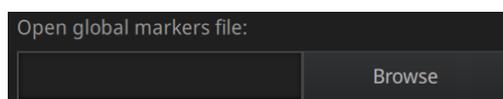


6.2.3. Resolution

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 (0.2mm), Medium (0.5mm) or Low (1.0mm) or drag the cursor to choose another point-distance setting from 0.2mm to 3.0mm.

6.2.4. Global Marker File

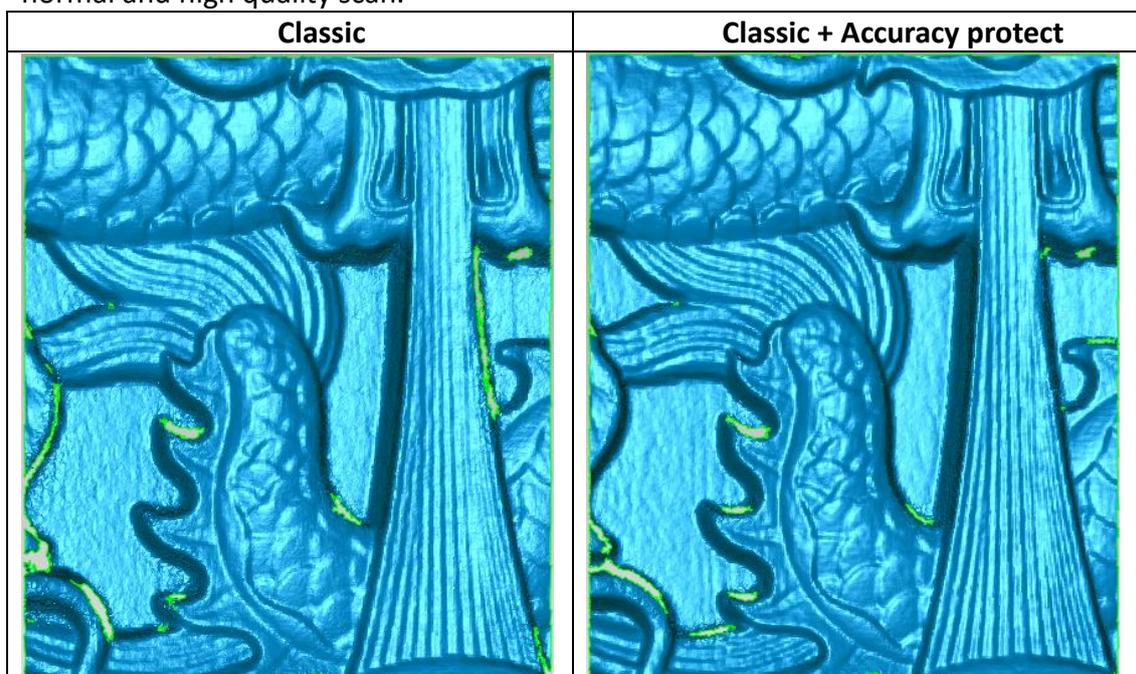
If you want to use a previously created Global Marker File (GMF), you may click browse to import one as .ASC, .TCT or .P3.



Browse to load a GMF

6.2.5. Accuracy Protected Scan

The fps is 5 frames/second when you choose high quality scan, which will result in slower scan speed, but higher details and resolution. You could choose depends on your requirement of the scan result. Below are the pictures of the comparison of normal and high quality scan.



6.2.6. Flat Detection

Under feature align or hybrid align, you could choose whether to detect the plane or not.

- If you do not choose the plane detection, you could still scan flat surface, but the misalignment will happen.
- Plane detection could reduce the possibility of misalignment, but it cannot scan plane or surface with little features, the software will prompts “please scan the non-plane area”

6.3. Scan

6.3.1. Preview



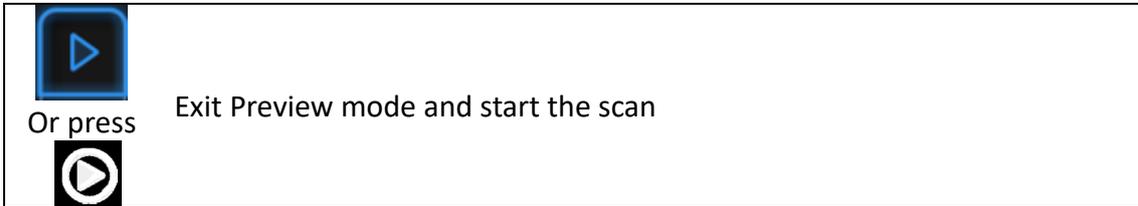
Hold the scanner to face the object (there must be enough markers on the surface), press the Play button or click Preview to run into Preview mode. In this mode, it will start to show data for preview, but not record this data.



Preview mode on HD mode

In this mode, you can:

- Check the working distance
- Adjust the brightness sensitivity
- Ensure that the markers are well captured.



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

Notes:

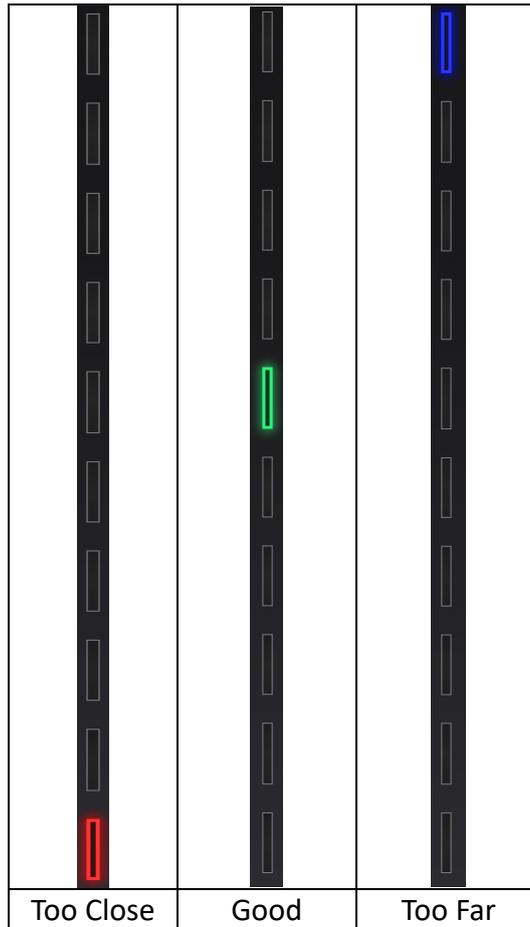
- Preview mode will start every time a new project is built or an existing project is imported.
- After exiting preview and starting the scan, the preview mode will not be shown again in this scanning project.
- To access preview mode on a current project, reopen it.

6.3.2. Scan Distance

The rangefinder on the left side reveals different colors based on the distance between the scanner and the object. At the correct distance, it will show green. It shows red if the distance is too close or blue when the distance is too far. On the scanner, the information is displayed on the colored LED. As with the rangefinder on the screen, if it is too close it will show red and if it is too far it will show blue, and green is perfect.

Adjust the scanner position until the range finder's color turns green.

	HD
Closer limit (mm)	410
Optimal distance (mm)	510
Upper limit (mm)	610



6.3.3. Brightness

Double-click	Enter/Exit the exposure adjustment menu
--------------	---

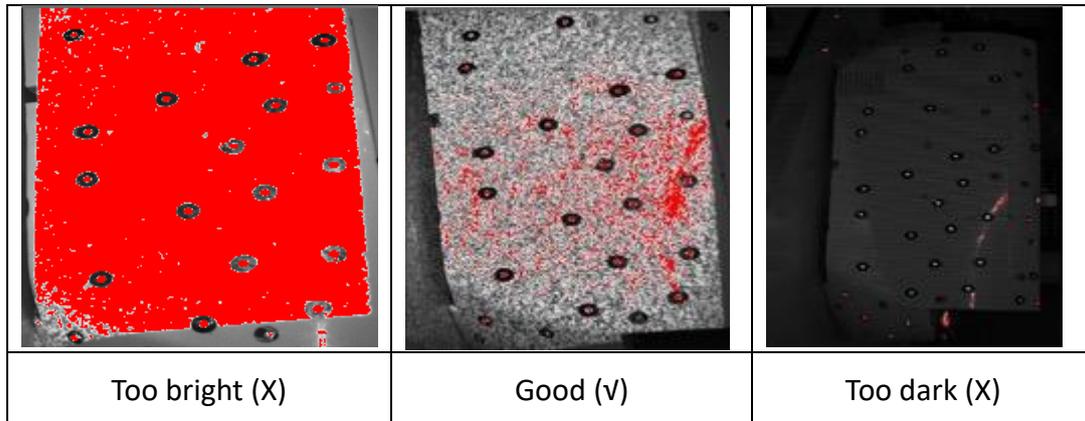
When scanning or in Preview mode, double-click the Play button to adjust the brightness by pressing “+” or “-” buttons on the scanner, or click and drag the cursor under the camera preview to the left (-) or right (+).



Exposure adjustment menu, press +/- or click and drag the cursor

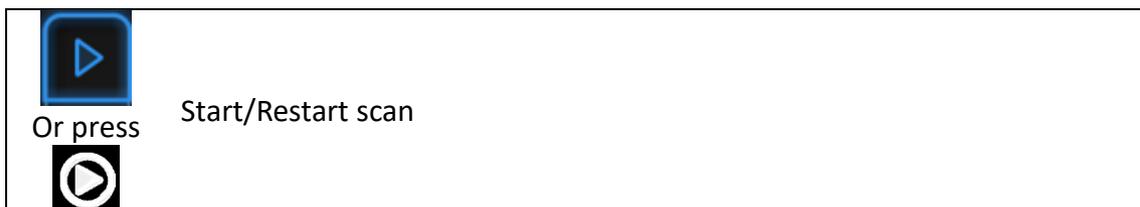
Adjust the brightness according to the following illustration: Red means overexposed, black is underexposed, and white or light grey is good.

The lines and the markers should be seen clearly, the lowest brightness where this is possible is optimal. An overexposed scan will capture more noise.

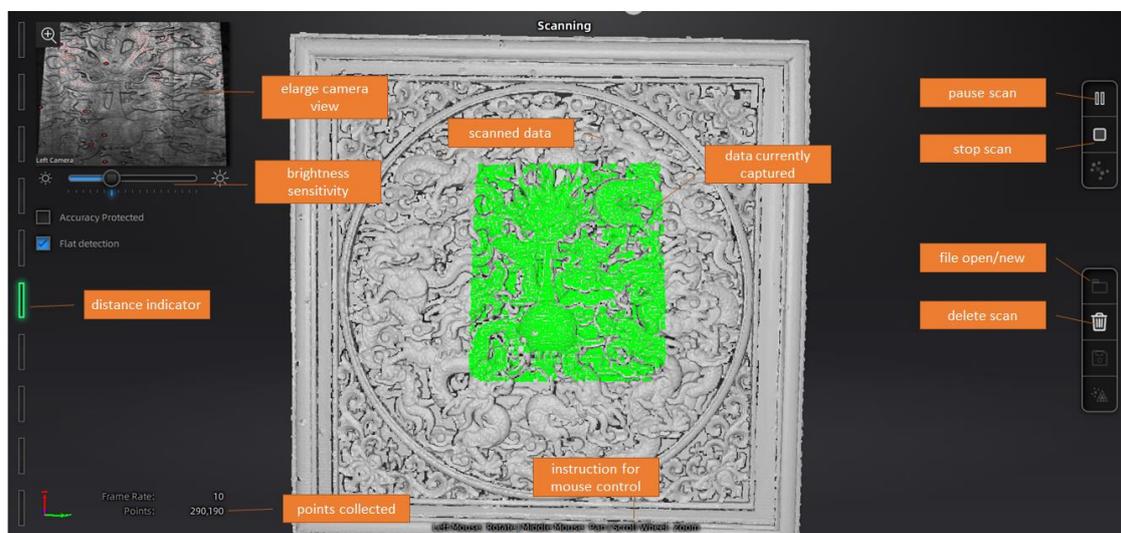


Double-click the Play button to exit the brightness adjustment window.

6.3.4. Start Scan



Press the Play button or click Start in software to start scanning and recording data. 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.





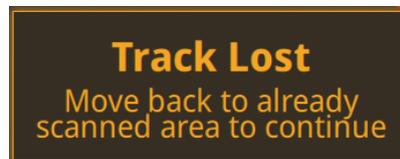
Press the Play button or click Pause in the software to pause the scan.

6.3.5. Alignment

Feature Alignment:

When you start scanning, shine the scanner on the object for around 3 seconds, and start to move when the scan data shows on the computer. The currently captured area is green, and previously captured data is grey. To improve the scan efficiency, the scanner movement should be continuous and uniform.

If the scan presents purple color and a “Track lost” alert appears, it indicates that the scan cannot match the current data with your previous data. You need to go back to any previously scanned area to recover the tracking again and continue scanning.



Track lost alert

The software will prevent from misalignment when scanning featureless surfaces



Not enough feature alert

Marker Alignment:

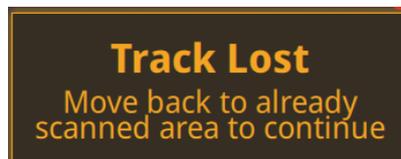
If the surface of the object has markers, the software will recognize the markers (displayed in red), record data and align with previously collected markers (displayed in green). The green area is the current scan, as shown below. To record data a minimum of 4 markers (display in red) has to be captured.



Interface with markers

Stick markers on the object in a random pattern, and avoiding sticking all markers in one line. You can check the rules of sticking markers by referring to section 4.2 Preparation.

If the position tracking fails, “Track lost” alert will appear, meaning you need to go back to an area with previously recorded markers to recover the tracking again and continue scan.

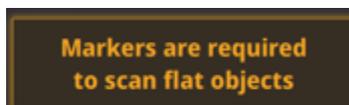


Track lost alert

Note: If you have imported a global marker file, new markers cannot be added during the scan

Hybrid Alignment:

The software switches between features and marker alignment automatically if at least 4 markers are collected simultaneously. For objects with few geometric features which are difficult for feature alignment, an alert will suggest sticking markers on these areas.



Add-markers alert

Here the “**flat objects**” means areas with few geometric features.

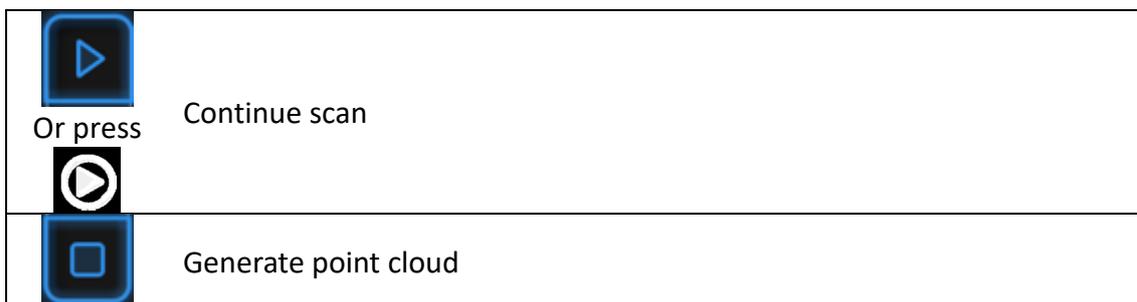
6.4. Pause Menu

In offline mode, the data can be loaded at this step for editing.

6.4.1. Auto Save



Press the Play button or click Pause in the software to enter the Pause menu. The data will be automatically saved in the project file.



Press the **Play** button or click **Start** in the software to continue the scan,
Click **Stop** to generate a point cloud: an optimized 3D point cloud will be generated.
Or you may select data to use the Edit tools.

6.4.2. Point cloud optimization



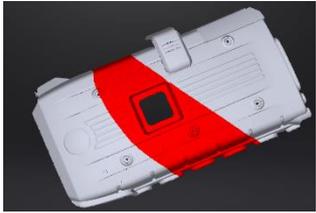
Click Stop to generate a point cloud: an optimized 3D point cloud will be generated.

The optimization includes a realignment of the data by markers position recalculation. In case of thin objects with 2 opposite faces, markers should be registered following a closed loop to allow re-positioning.

6.4.3. Edit Menu

SHIFT + Left mouse: Select redundant area, the selected section will be displayed in red, as shown below.

Ctrl + Left mouse: Deselect the selected data

	<p>Edit buttons:</p> <ul style="list-style-type: none"> ① Deselect ② Revert ③ Delete ④ Undo ⑤ Show/Hide texture (color pack only) ⑥ Shift + Left mouse: choose data ⑦ Ctrl + Left mouse: deselect selected data 	
---	---	---

	<p>Delete selected data Click the button or “DELETE” on the keyboard to delete the selected data.</p>
	<p>Undo You can only undo the most recently deleted data.</p>

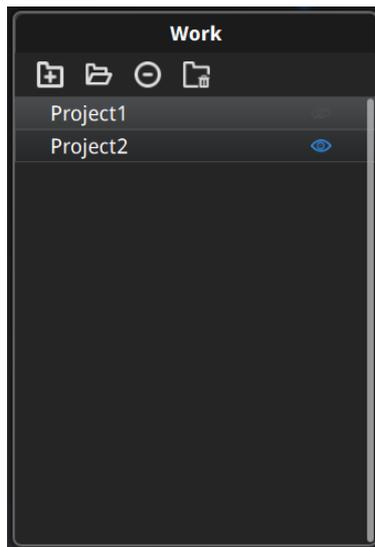
Note: Handheld scan mode does not support the deletion of markers.

	<p>End the editing</p>
	<p>Revoke all and exit editing</p>

Click Check to End the editing and confirm to save the edition in the project file and go back to the Previous menu.

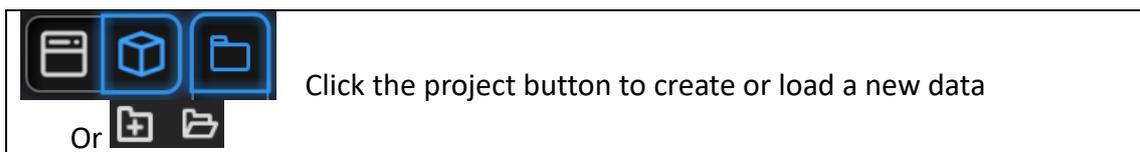
6.5. Projects

When the scan data is saved, you can manage data and projects on the project tree



Project tree, handheld mode

6.5.1. New project / Load project



On the project tree or on the **project button** create a new project or import a previous fixed scan into the work.

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

*Imported data will be copied in the work folder and appear on the project tree
New project will create a new entry in the project tree and a new project file in the work folder*

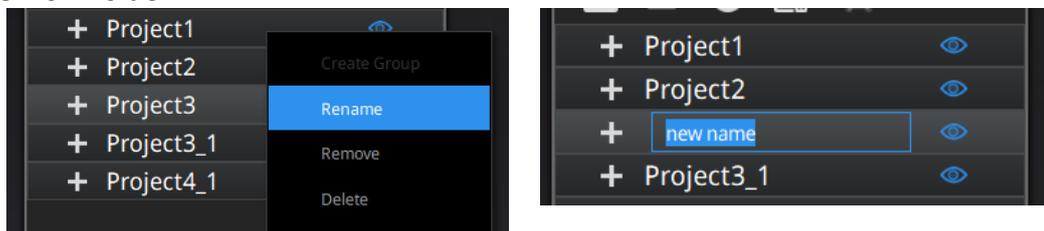
6.5.2. Current project

The last loaded project is the Current project, new data will be added and align with the current project. The current project is the last listed on the project tree.

Reopen a previous project to make it as the current project.

6.5.3. Rename project

Right click on the project on the tree to rename it. The new name will be updated in the work folder



Rename projects

in case of name interference in the work folder when load a project, the loaded project will be automatically renamed: "Name" → "Name_1"

6.5.4. Remove/Delete

	Remove the project
	Delete the selected project(s)

Select one or many projects Click remove to remove the project(s) from the project tree, but not from the work folder.

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

If you remove or delete the current project the last project will reload and become the new current project.

Note: Delete only affects the data in the work. If the project is imported from other work, only the created copy is deleted.

6.5.5. Duplicate a project

To duplicate a project in the workspace, in the work folder, copy all the project file (.hd_prj) an associated data file (.lines) into a separated folder without changing the name. Then import the file as a new project in the work.



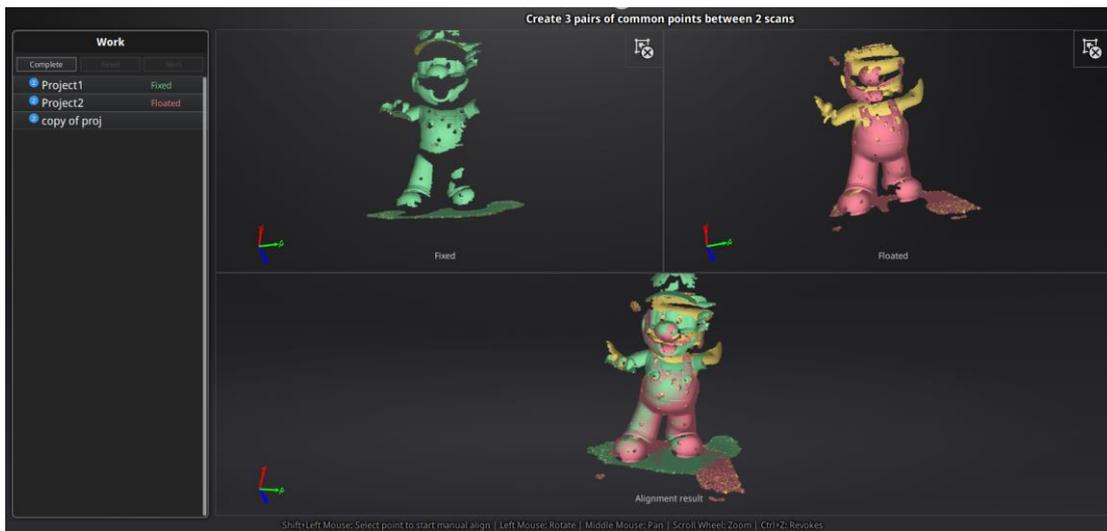
create a copy of the project files on a new folder

6.5.6. Alignment

When two or more projects are loaded and with all pointcloud generated, use align to fit a project on the other(s).



Click the button to open the Manual Alignment interface



Drag and drop a project to the float and fixed window

Drop projects on both windows. Float will move to a new reference



click to remove the project from fixed or float window

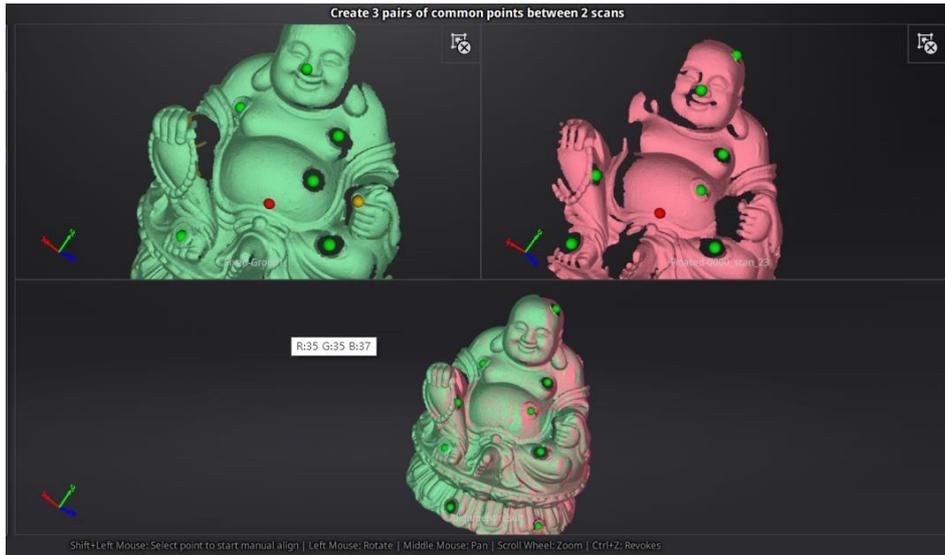
Auto align

Drag the data into the fixed and floated viewport, click the feature align button on the right, 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



Select 3 points to align the data

How it works: The software calculates the best fit alignment from the picked points, and refine the alignment by best fit of all the points of the floating to the points of the fixed.

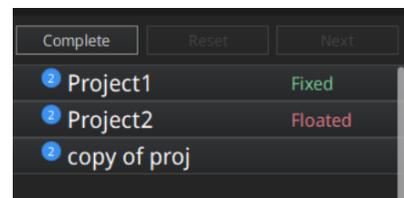
Click **Complete** to validate and leave the Alignment interface

Click **Reset** to cancel all alignments done in this session

Click **Next** to validate the alignment and continue to use the Alignment interface

After data are aligned the blue number represent the alignment reference.

The floated data is transferred to the reference of the fixed



Alignment reference

7. Rapid Mode

Rapid mode means Handheld Rapid Mode which is the fastest handheld scanning mode but has a resolution and accuracy that are lower than the HD mode. This mode is handheld, so the operator moves the scanner around the object, and the data is instantaneously captured and matched with previously captured data.

Features or markers can be used for alignment. **Hybrid Alignment** (Markers and Feature) is also valid in this mode.

The texture camera (color pack add-on) can be used in this mode to scan 3D **data in color texture** and for **Texture Alignment**.

Rapid mode can be used on objects from 30mm to 4m. With Rapid mode, you can achieve a large size scan efficiently. In this example, the statue is 1m*1.5m*1.5m.



Scan example with Rapid mode

7.1. Handheld Scanner Key Functions

Scanning distance indicator:

- Green for best distance;
- blue for too far,
- red for too close.

Scan/pause button:

- 1 click: pause or start scanning.
- Double click: to activate exposure adjustment window.

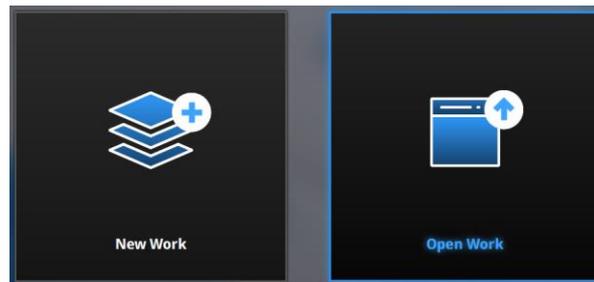


“_” & “+”

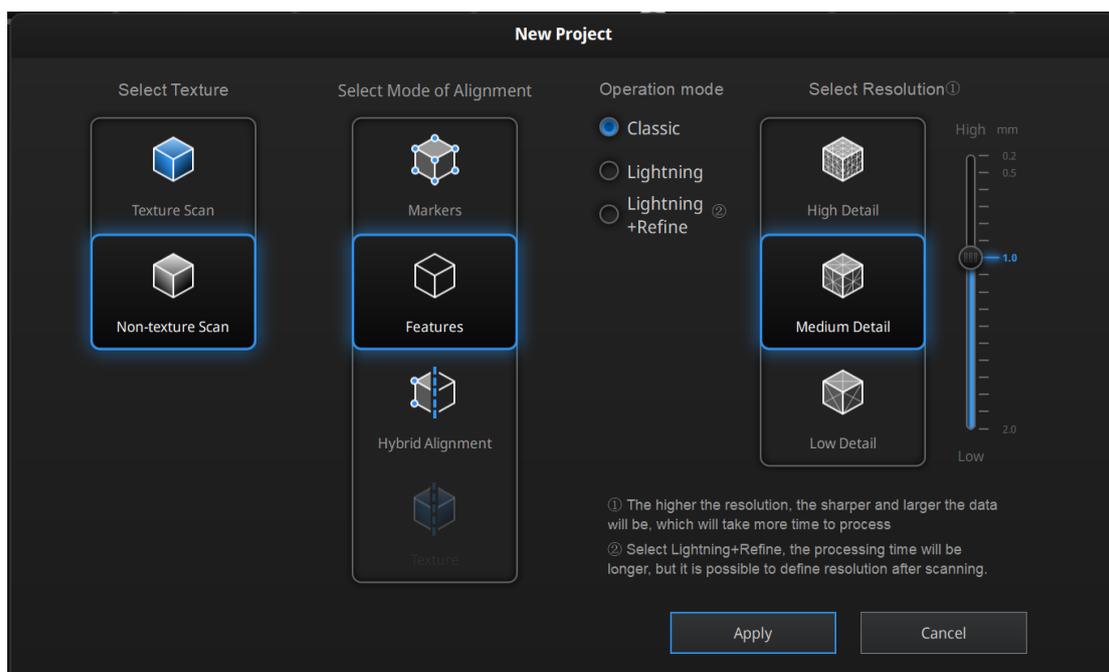
- During the scanning:
- zoom in and out in view of data
- under exposure window:
- can adjust the brightness.

7.2. Before Scan

Enter the New Work or Open Work interface. 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. Click “New Work”, input the project name, then click ‘Save’ to enter the scan parameters window.



Work interface



Rapid mode scan parameters window

7.2.1. Alignment Conditions

Marker Alignment:

the surface of the object requires markers. When the scan starts the markers are required, otherwise “Track lost” will be displayed.

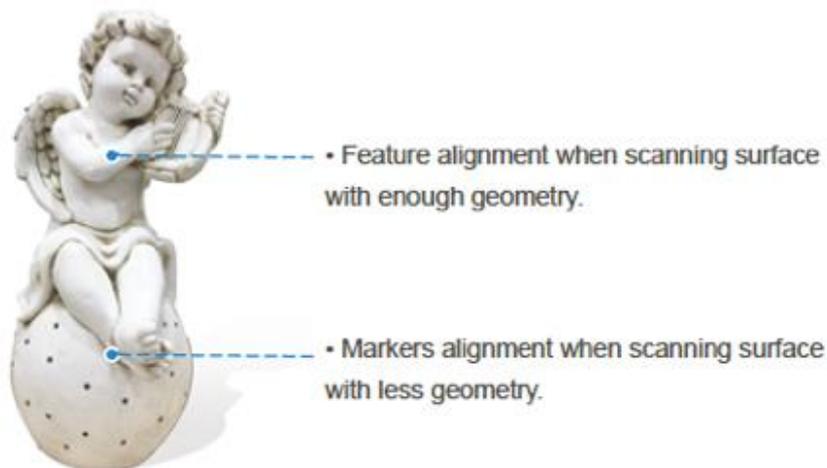
At least 4 markers captured previously need to be seen by the scanner in each current scanning frame to be aligned. If not, “Track Lost” will be displayed. When scanning a large object, Marker Alignment is the best mode at mitigating the cumulative errors caused by large amounts of data. This results in a higher global accuracy of the complete scanned data and is the reason we recommend this alignment mode for large objects.

Feature Alignment:

the data currently captured is “best fit” and aligned to the previously captured data according to the geometric features of the object. “Track lost” will be displayed if there is not enough common area captured in neighboring scans or the scanned area has few geometric features to allow for the alignment. Rich features on the object are required for this mode.

Hybrid Alignment:

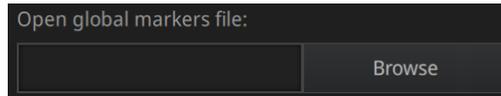
the software can switch between feature and marker alignment automatically during scanning according to whether the surface of the scanned object has markers or not. So you can put markers only on surfaces with little geometry. There is no need to stick markers all over the object. (See the example below) For some parts which are difficult for Feature Alignment, a reminder will show up to suggest you stick markers on the area with limited geometric features.



Example of use of hybrid alignment

GMF:

With Markers and Mixed alignment, you may click browse to import a previously created Global Marker File (GMF) as .ASC, .TCT or .P3.



Browse to load a GMF

7.2.2. Operation Mode

Classic:

- Scanning speed: 15 frames/second
- Scan with the selected resolution
- Direct Data processing according to the selected resolution

Lightning:

- Scanning speed: 30 frames/second
- Scan with a 1mm resolution to ensure fast scanning process
- Interpolation to selected resolution after the scan ends

Lightning + Refine:

- Scanning speed: 30 frames/second
- Scan with 1mm resolution
- Refine to select resolution after the scan ends by retopology

Scanning Speed: Lightning = Lightning + Refine > Classic

Data Resolution: Classic = Lightning + Refine > Lightning

Data Processing time: Lightning + Refine > Lightning > Classic

7.2.3. Resolution

Select a resolution for the project. The higher the resolution, the better the details. Choose High (0.5mm), Medium (1.0mm) or Low (1.5mm) or drag the cursor to choose another point distance setting from 0.25 to 3.0mm

Notes:

- A higher resolution takes more time to scan and consumes more graphics card memory.
- With high resolution, the size of the object to be scanned will be limited. In theory, the maximum size of scan = point distance*8192/mm. In the actual process, the size of the object that can be scanned depends on the computer graphics card.
- When importing a project, and continuing to scan, the scanning resolution and alignment mode will be the same as the previous setting of the imported project.

7.2.4. Flat Detection

Under feature align or hybrid align, you could choose whether to detect the plane or not.

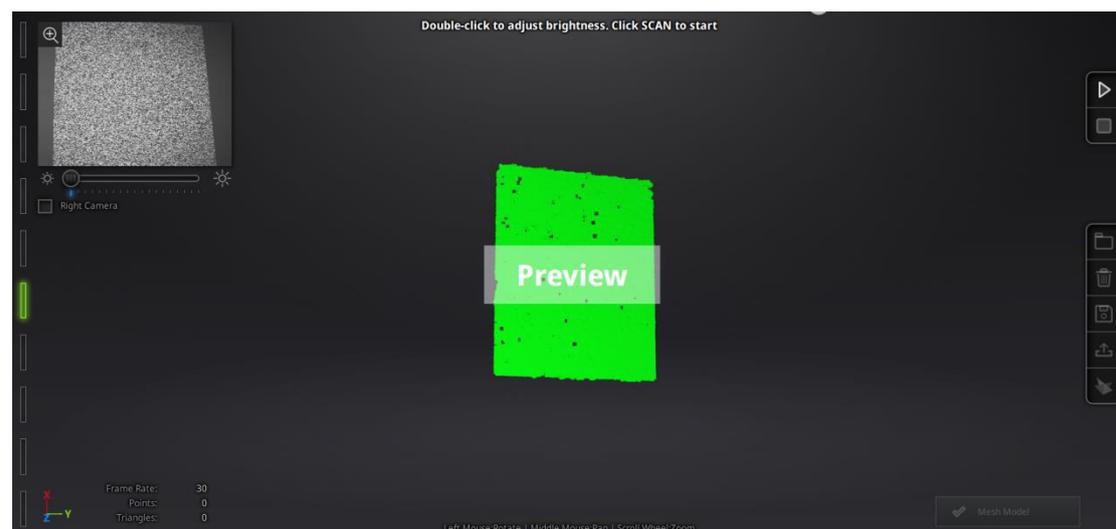
- If you do not choose the plane detection, you could still scan flat surface, but the misalignment will happen.
- Plane detection could reduce the possibility of misalignment, but it cannot scan plane or surface with little features, the software will prompts “please scan the non-plane area”

7.3. Scan

7.3.1. Preview



Hold the scanner to face the object, Press the Play button or click Preview to run into Preview mode. In this mode, it will start to show data for preview, but not record this data.

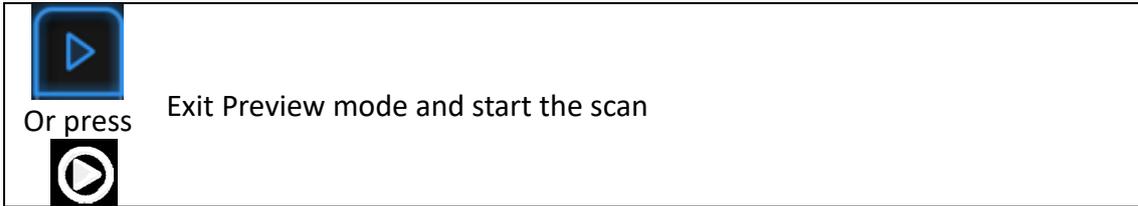


Preview mode on Rapid Mode

In this mode, you can:

- Check the working distance

- Adjust the brightness sensitivity
- Ensure that the markers are captured well.



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

Notes:

- Preview mode will start every time a new project is built or an existing project is imported.
- After exiting preview and starting the scan, the preview mode will not show again for this scanning project.
- To access preview mode on a current project, reopen it.

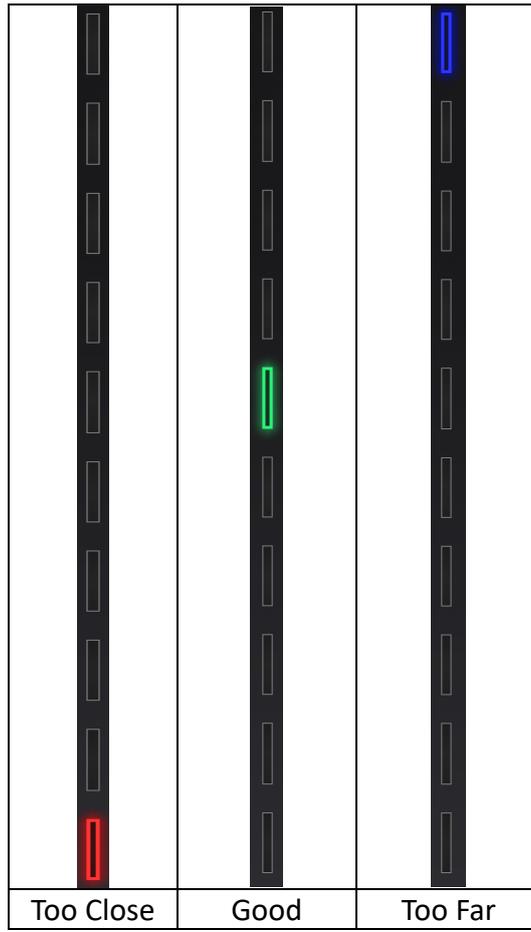
7.3.2. Scan Distance

The rangefinder on the left side reveals different colors based on the distance between the scanner and the object. At the correct distance, it will show green. It shows red if the distance is too close or blue if it is too far.

On the scanner, the information displays on the colored LED. If it is too close it will show red and if it is too far it will show blue. Green shows it is a good distance away from the object.

Adjust the scanner position until the rangefinder color turns green.

	HD
Closer limit (mm)	410
Optimal distance (mm)	510
Upper limit (mm)	610



7.3.3. Brightness

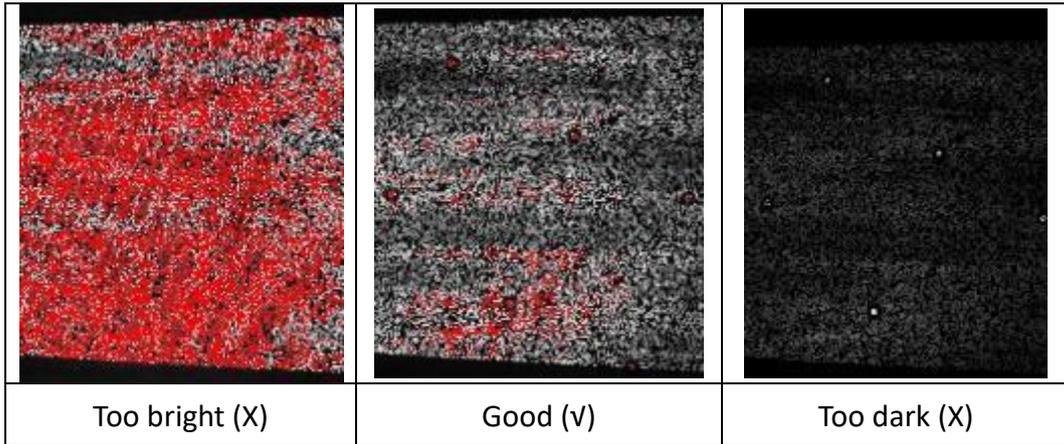
Double-click	Enter/Exit the exposure adjustment menu
--------------	---

When scanning or in Preview mode double press Play button, you can adjust the brightness by pressing “+” or “-” button on the scanner, or click and drag the cursor under the camera preview to left (-) or right (+).



Exposure adjustment menu, Press +/- or drag the cursor

Adjust the brightness according to the following illustration: Red means overexposed, Black is underexposed, white or light grey is good.



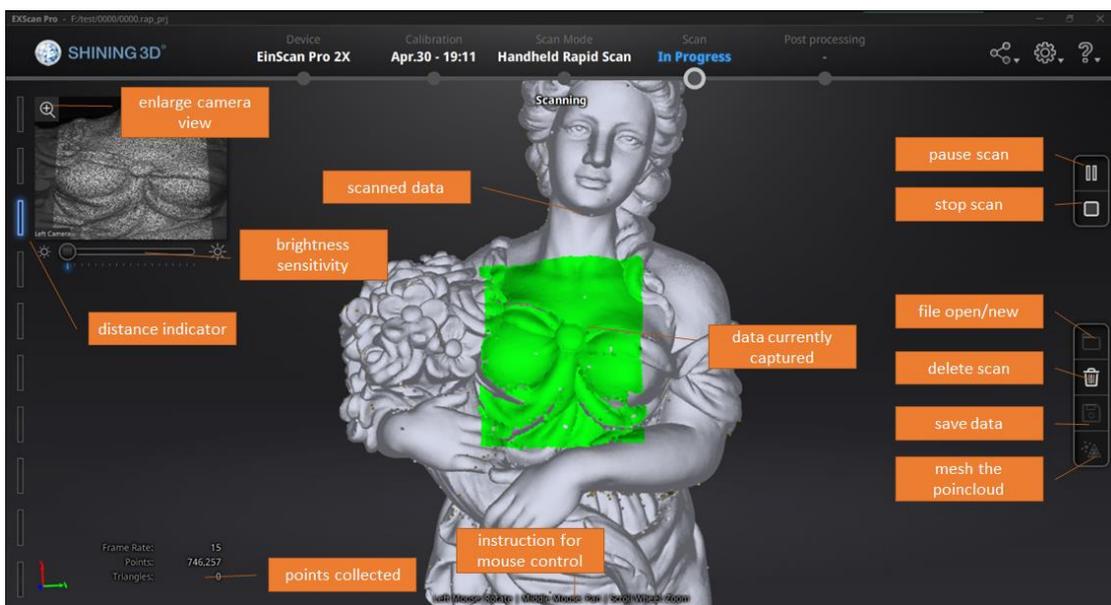
Double click Play button to exit the brightness adjustment window.

7.3.4. Start Scan



Press the Play button or Click Start in software to start scanning and recording data.

During scanning, make sure to keep the scanner perpendicular to the surface, keep the distance in a proper range, and adjust the brightness depending on the ambient light and texture of the object.



Scan interface, Rapid Mode



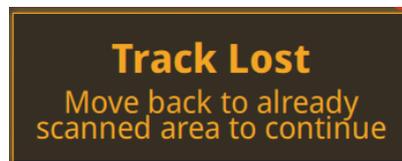
Press the Play button or click Pause in the software to pause the scan.

7.3.5. Alignment

Feature Alignment:

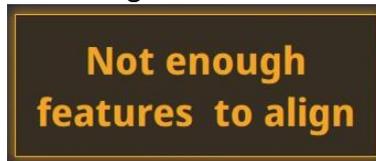
When you start scanning, shine the scanner on the object for around 3 seconds, and start to move when the scan data shows on the computer. The currently captured area is green, and previously captured data is grey. To improve the scan efficiency, the scanner movement should be continuous and uniform.

If the scan presents purple color and a “Track lost” alert appears, it indicates that the scan cannot match the current data with your previous data. You need to go back to any previously scanned area to recover the tracking again and continue scanning.



Track lost alert

The software will prevent from misalignment when scanning featureless surfaces



Not enough feature alert

Marker Alignment:

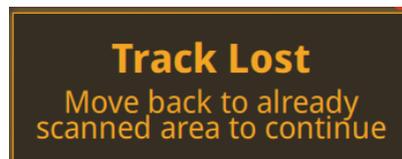
If the surface of the object has markers, the software will recognize the markers (displayed in red), record data and align with previously collected markers (displayed in green). The green area is the current scan, as shown below. To record data a minimum of 4 markers (display in red) has to be captured.



Interface with markers

Stick markers on the object in a random pattern, and avoiding sticking all markers in one line. You can check the rules of sticking markers by referring to section 4.2 Preparation.

If the position tracking fails, “Track lost” alert will appear, meaning you need to go back to an area with previously recorded markers to recover the tracking again and continue scan.

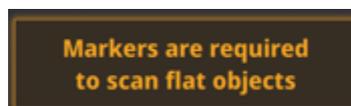


Track lost alert

Note: If you have imported a global marker file, new markers cannot be added during the scan

Hybrid Alignment:

The software switches between features and marker alignment automatically if at least 4 markers are collected simultaneously. For objects with few geometric features which are difficult for feature alignment, an alert will suggest sticking markers on these areas.



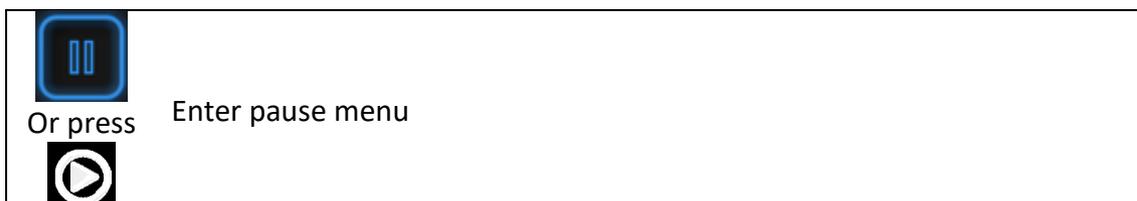
Add-markers alert

Here the “**flat objects**” means areas with few geometric features.

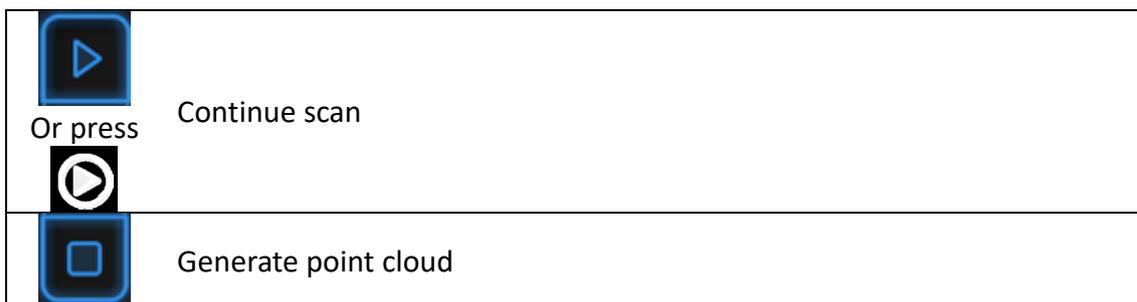
7.4. Pause Menu

In offline mode, the data can be loaded at this step for editing.

7.4.1. Auto Save



Click Pause in the software or press Play button to enter the Pause menu. The data will be automatically saved in the project file.



Press the Play button or click Start in the software to continue scanning.
Click Stop to generate point cloud: an optimized 3D point cloud will be generated.
Or select data to use editing tools.

7.4.2. Point cloud optimization



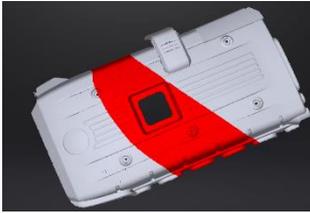
Click **Stop** to generate a point cloud: an optimized 3D point cloud will be generated.

The optimization includes a realignment of the data by markers position recalculation. In case of thin objects with 2 opposite faces, markers should be registered following a closed loop to allow re-positioning.

7.4.3. Edit Menu

SHIFT + Left mouse: Select unwanted data, the selected section will be displayed in red, as shown below.

Ctrl + Left mouse: Deselect the selected data

	<p>Edit buttons:</p> <ul style="list-style-type: none"> ① Deselect ② Revert ③ Delete ④ Undo ⑤ Show/Hide texture (when installed with a color pack) ⑥ Shift + Left mouse: choose data ⑦ Ctrl + Left mouse: deselect selected data 	
--	--	---

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

Notes:

- Handheld scan modes do not support the deletion of markers.
- In Rapid Mode using feature alignment, if you use the edit button to delete all the data, the most recently deleted data will be restored when you continue scanning.

	<p>End the editing</p>
	<p>Revoke all and exit editing</p>

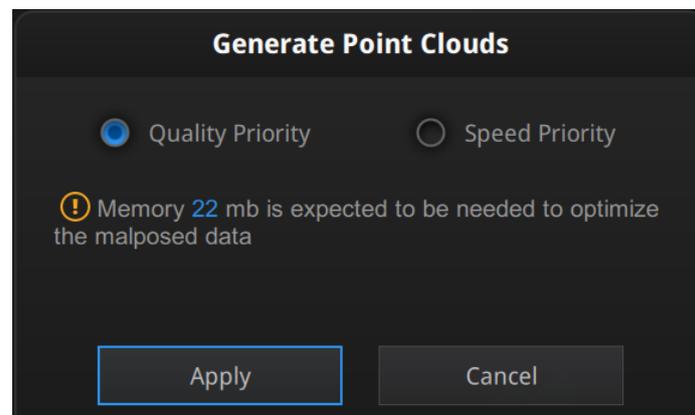
Click Check to End the editing and confirm to save the edition in the project file and go back to the Previous menu.

7.5. Generate Point-cloud

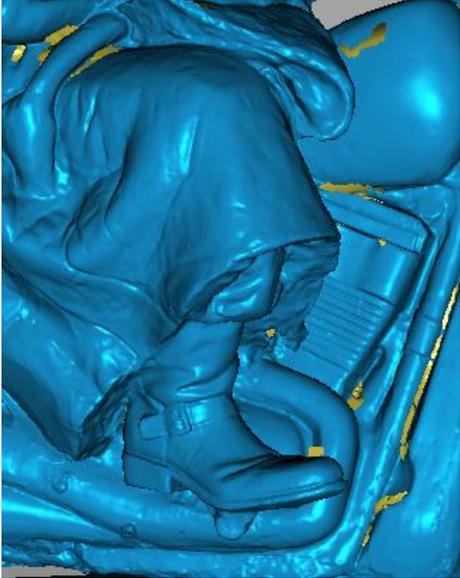
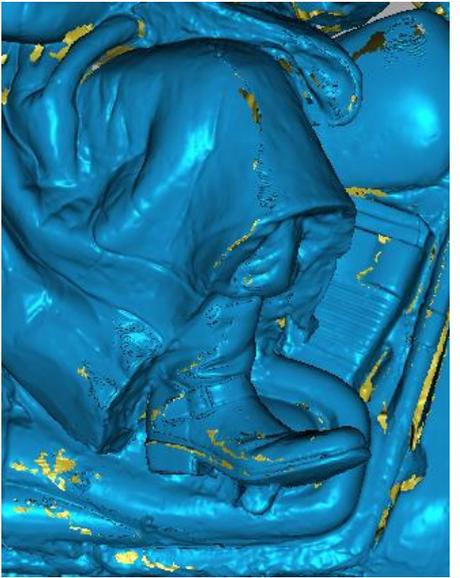
When finished editing, an optimized point-cloud will be generated. This step is accessible in Offline mode.

7.5.1. Priority (for Rapid: Feature or Hybrid Alignment Settings)

When scanning without markers, choose between Quality and Speed priority for the point-cloud optimization and click Apply.



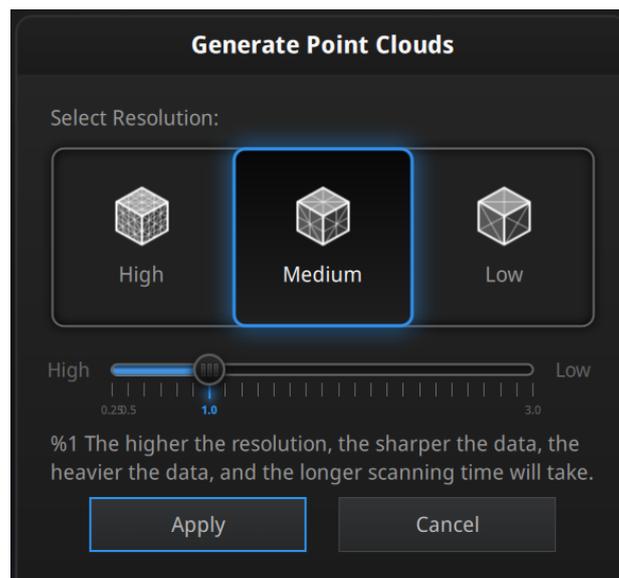
Generate Point-Cloud options

	
<p>Quality Priority The misaligned data of the rigid object can be optimized. If the non-rigid body such as a human body is scanned, the degree of optimization depends on the degree of misalignment of the scanned data. This</p>	<p>Speed Priority If the scanned data is not misaligned during the scan, you can select this option for a faster processing of point cloud data.</p>

optimization process consumes memory and takes a long time.	
---	--

7.5.2. Refine (for Rapid Mode: Lightning + Refine Option Mode)

With using Lightning + Refine mode, select the final resolution to refine the scanned data by retopology. Choose High, Medium or Low or drag the cursor to the exact point distance value setting, and click Apply.

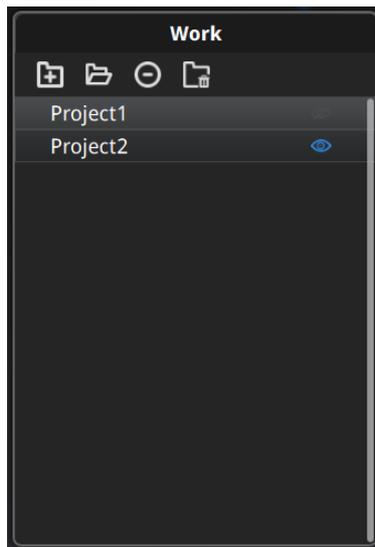


Choose resolution

The processing time depends on the resolution requested and the amount of points captured.

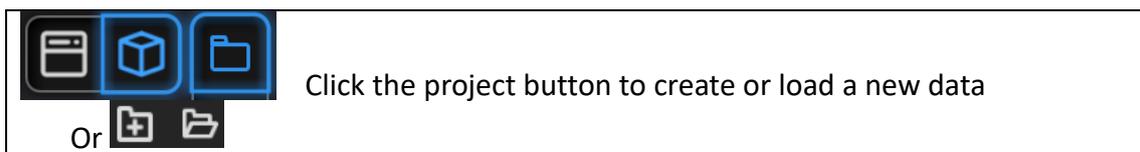
7.6. Projects

When the scan data is saved, you can manage projects on the project tree



Project tree, handheld mode

7.6.1. New project / Load project



On the project tree or on the **project button** create a new project or import a previous scan into the work.

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

*Imported data will be copied in the work folder and appear on the project tree
New project will create a new entry in the project tree and a new project file in the work folder*

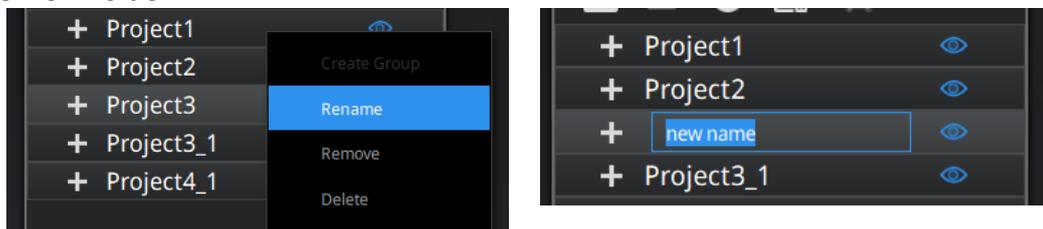
7.6.2. Current project

The last loaded project will appear as the current project listed in last on the project tree, so new data will be added and aligned to the last loaded project.

Reopen a previous project to make it as the current project.

7.6.3. Rename project

Right click on the project on the tree to rename it. The new name will be updated in the work folder



Rename projects

In case of name interference in the work folder when load a project, the loaded project will be automatically renamed: "Name" → "Name_1"

7.6.4. Remove/Delete

	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 work folder.

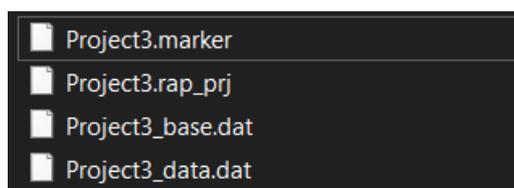
Click Delete or right click and delete to delete the selected project(s) from the project tree and the work folder.

If you remove or delete the current project the last project will reload and become the new current project.

Note: Delete only affects the data in the work. If the project is imported from other work, only the created copy is deleted.

Tips: how to duplicate a project

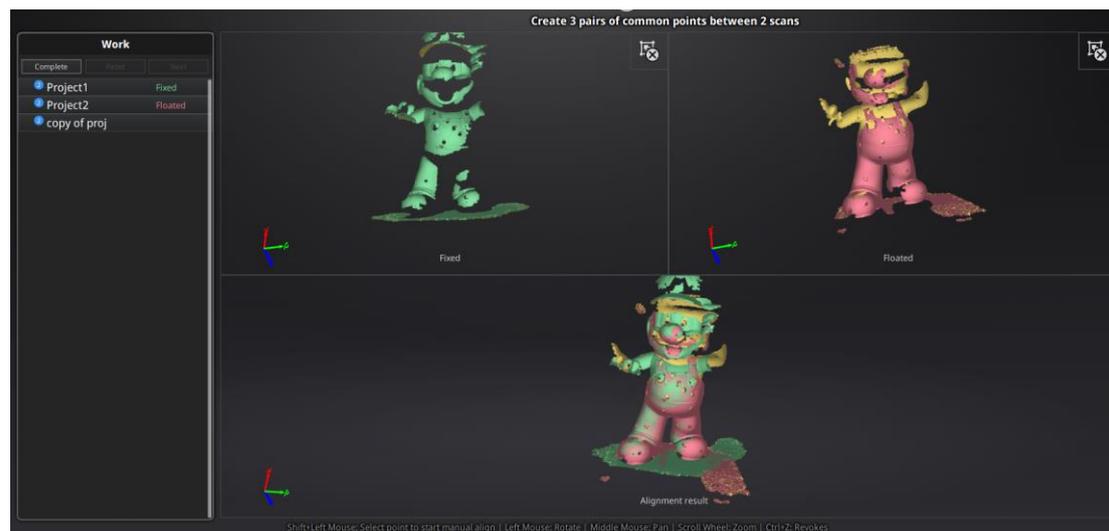
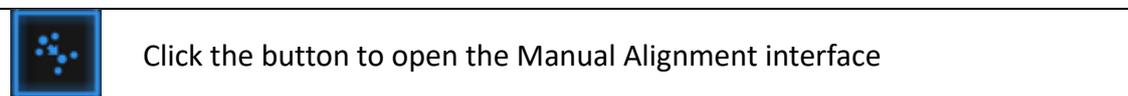
To duplicate a project in the work folder, copy all the project file (.rap_prj) an associated data file (.dat & .marker) into a separated folder without changing the name. Then import the file as a new project in the work.



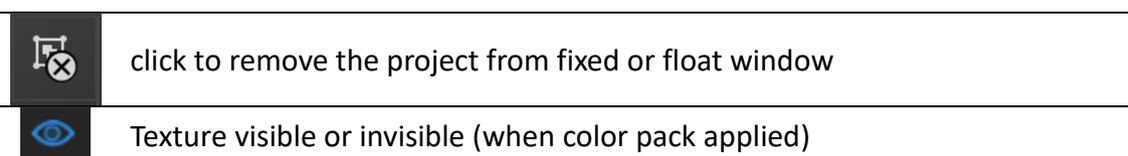
create a copy of the project files on a new folder

7.6.5. Alignment

When multiple projects are loaded, use align to best fit a project on the other(s).



Single project can be dropped into both windows.



Auto align

Drag the data into the fixed and floated viewport, click the feature align button on the right, 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.

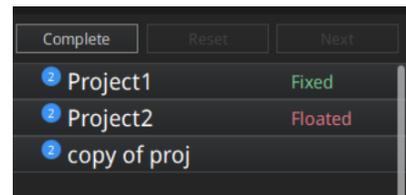
Ctrl+Z: cancel last point picked



Select 3 points to align the data

How it works: The software calculates the best fit alignment from the picked points, and refine the alignment by best fit of all the points of the floating to the points of the fixed.

After data are aligned the blue number represent the alignment reference.
The floated data is transferred to the reference of the fixed



Alignment reference

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

8. Post Processing

This step is accessible in Offline mode.

8.1. Edit Data

8.1.1. Pause Menu

	Continue scan
Or press 	
	Delete the scan
	Save the current data
	Open/Create project

Press the Play button or click Pause in software to continue the scan.

Click Delete to delete the whole scan.

At this step, only point-cloud (or separated point-cloud in fixed mode) can be exported. Click Save to export the current project data as *.ASC or the Global Marker File as *.P3.

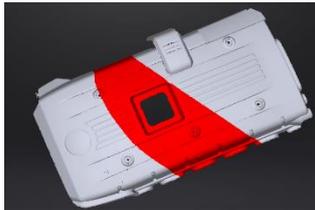
Open or create a new project in the same scan mode currently used.

Or select data to enter use Edit menu.

8.1.2. Edit Menu

SHIFT + Left mouse: Select redundant area, the selected section will be displayed in red, as shown below.

Ctrl + Left mouse: Deselect selected data.

	<p>Edit buttons:</p> <ul style="list-style-type: none"> ① Deselect ② Revert ③ Delete ④ Undo ⑤ Show/Hide texture (when installed color pack) ⑥ Shift + Left mouse: choose data ⑦ Ctrl + Left mouse: deselect selected data 	
---	---	---

	<p>Delete selected data Click this button or “DELETE” in the keyboard to delete selected data.</p>
	<p>Undo You can only undo the last deleted data.</p>
	<p>Show/Hide texture (when installed with Color Pack) Click the button to switch the texture display and hide.</p>

Notes: During post processing of the point cloud, markers are not displayed.

	<p>End the editing</p>
	<p>Revoke all and exit editing</p>

Click Check to End the editing and confirm to save the edition in the project file and go back to the Previous menu.

8.2. Create mesh

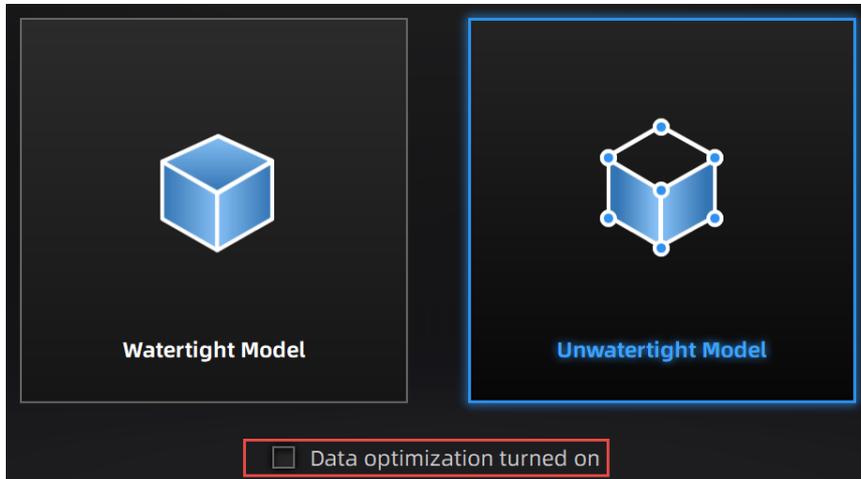
	<p>Generate the mesh model from the scanned point cloud data</p>
---	--

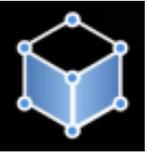
When the scan is completed, click Mesh Model. All projects present in the work will generate the mesh. Make sure the relative alignment is correct first

8.2.1. Watertight / Unwatertight

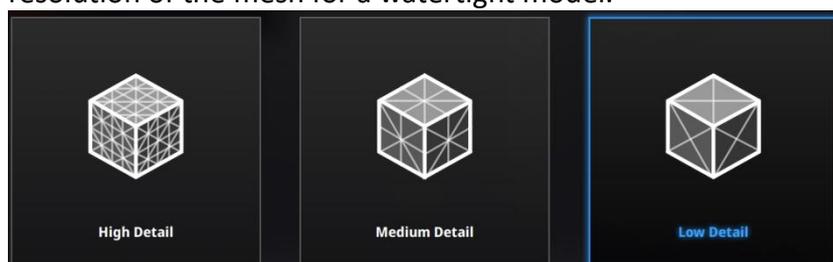
2 types of mesh are available: Watertight and Unwatertight.

- If there are non-texture projects, there will be a data simplification option. After clicking it, the amount of triangles will be less than 250w.
- If the projects are all with texture, the simplification option will be unavailable. The software will simply the data by default. After meshing, the triangles amount will be less than 250W.



Watertight	Unwatertight
 	 
<p>Every hole will be filled automatically. The data can directly be 3D printed.</p>	<p>Unclosed model stays the way it is scanned. Processing time is quicker than Watertight.</p>

Select the resolution of the mesh for a watertight model.



Choose mesh resolution

Note: If some data are not connected. Watertight will keep only the biggest data.

8.3. Mesh Editing

After meshing, the mesh edition menu will show.
Or edit a file without opening a project.



Click **Open file** and browse a mesh file to edit. STL and OBJ are supported. Non-EinScan native files are supported too.

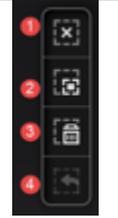
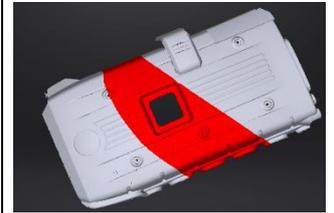


Click **Multiview** to change the view of the data, from 6 orientation, normal to the original coordinates.

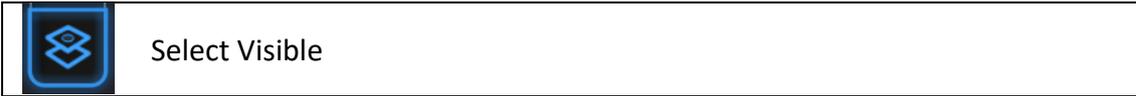
Once an edition is confirmed the old version can not be recovered, only by reload the file. EXScan Pro includes the following mesh editing tools.

8.3.1. Select and delete

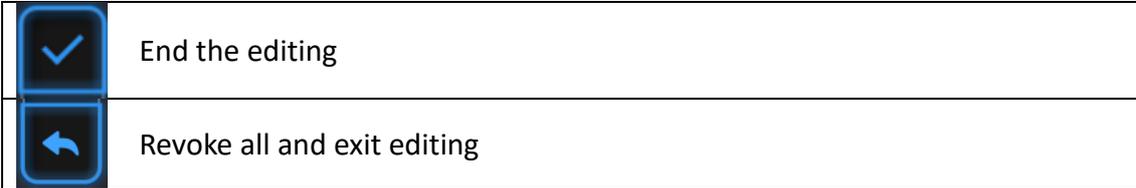
Press **Shif+LMB** to select data and enter the selection menu

 A vertical toolbar with four icons: a red 'X' (Deselect), a red square with a white 'X' (Revert), a red trash can (Delete), and a red circular arrow (Undo).	<p>Edit buttons:</p> <ul style="list-style-type: none">① Deselect② Revert③ Delete④ Undo⑥ Shift + Left mouse: choose data⑦ Ctrl + Left mouse: deselect selected data	 A 3D rendered image of a white plastic case with a red diagonal stripe and a red latch.
--	---	---





Select **Visible** to select data on the front view only



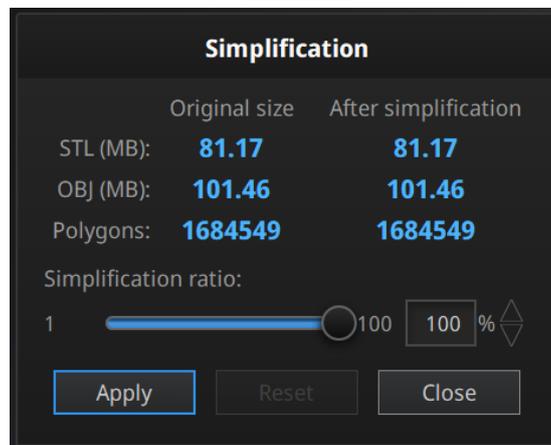
After deletion of the unwanted data, Click **End** button to return to the Post-processing menu

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

8.3.2. Data Simplification



Click the Data simplification button to display the simplification menu, click again to close the menu



Simplification menu

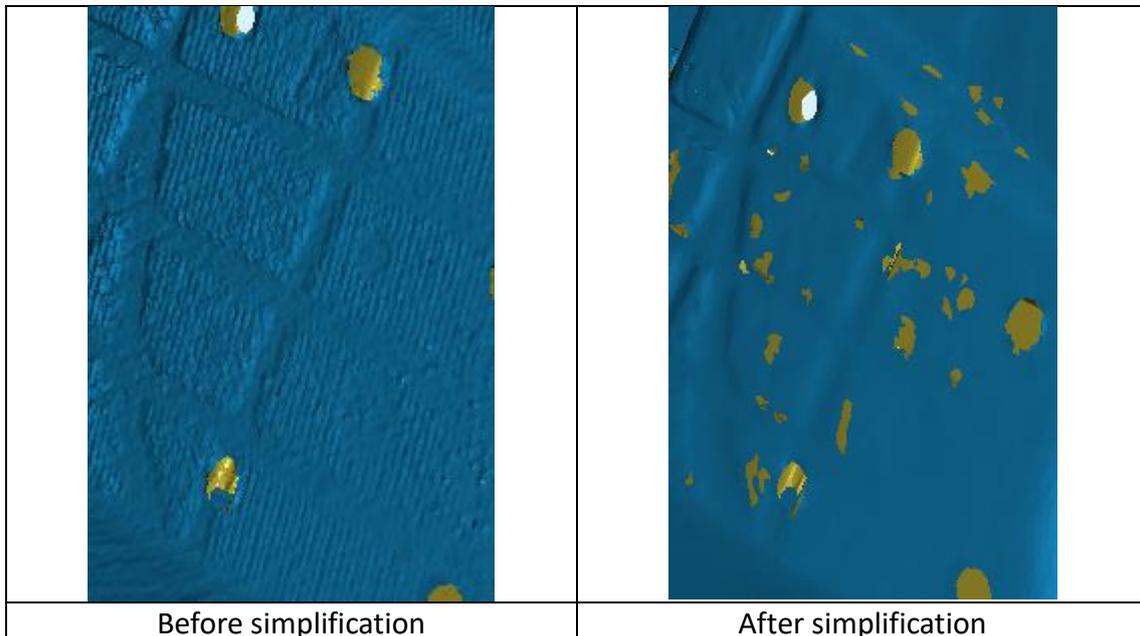
After simplification, the polygon numbers, file size and level of detail of data will be reduced accordingly. Set the ratio from 1 to 100, the default is 100%.

Click **Apply** to validate the modification

Click **Cancel** to undo the modification

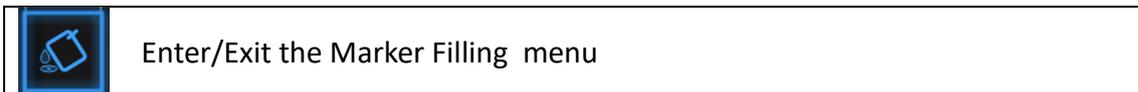
Clicking **Apply** twice, the data will be simplified 2 times.

The comparison of detail between before simplification and after simplification (at 30% simplify proportion).

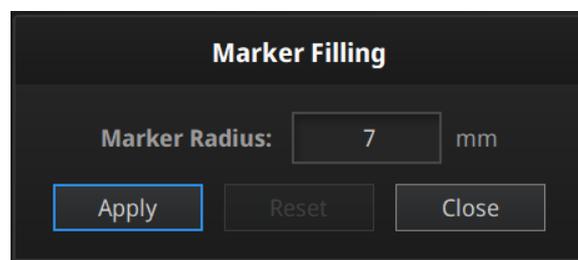


8.3.3. Hole Filling

Marker Filling



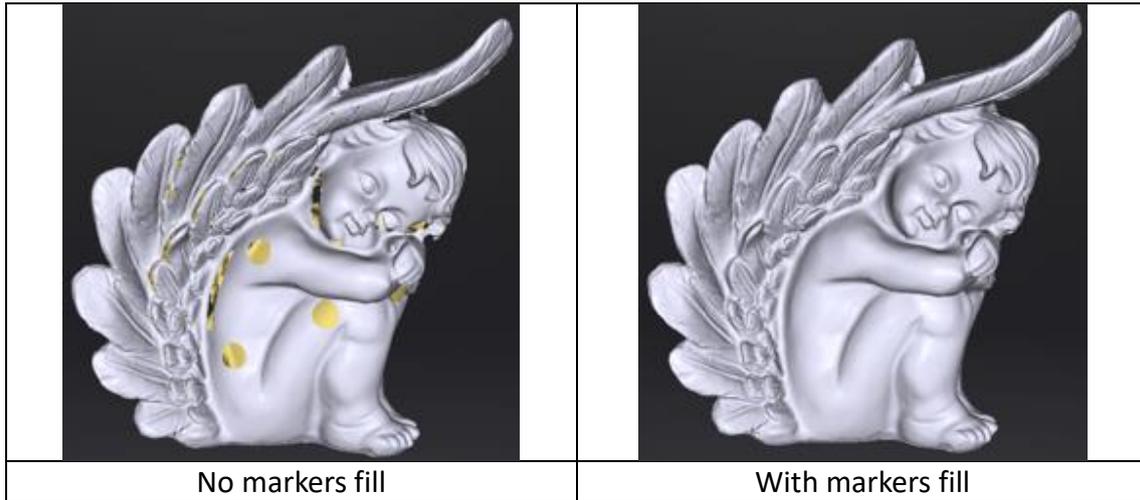
Click the Marker Filling button to display the marker filling menu, click again to close the menu



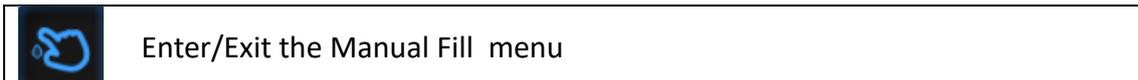
Marker Hole Filling menu

Input the radius of the marker used.
All holes generated by markers will be automatically filled.

Click **Apply** to validate the modification
Click **Cancel** to undo the modification



Manual Fill



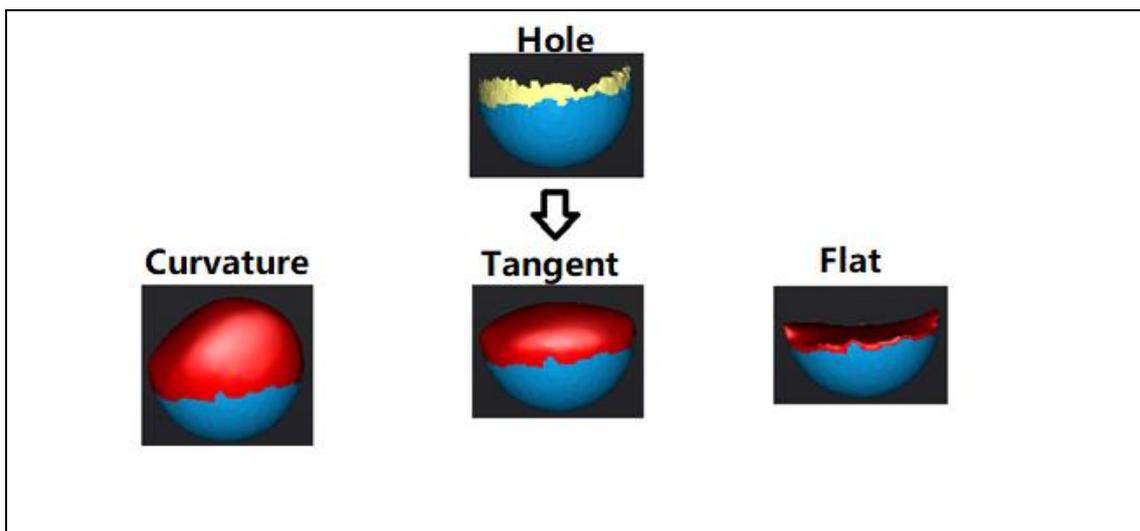
Click the Manual Fill button to display the Manual Fill menu, click again to close the menu.

In this mode the hole edges are displayed green. It will get red after selected

Choose Curvature, Tangent or Flat before picking a hole

Click the edge of the hole to fill it

Click **Cancel** to undo the last hole filling



How it works:

Flat calculates the solution for the hole filling considering the point position on the boundary

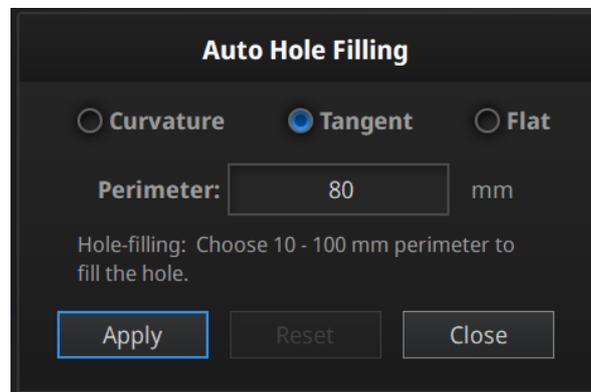
Tangent calculates the solution considering the point position and the normal of the last row of triangles forming the boundary

Curvature calculates the solution considering the point position and the normal of the 2 last rows of triangles forming the boundary

Auto fill



Click the Auto Fill button to display the Auto Fill menu, click again to close the menu



Auto Hole Filling menu

Choose the hole filling type: Curvature, Tangent or Flat
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

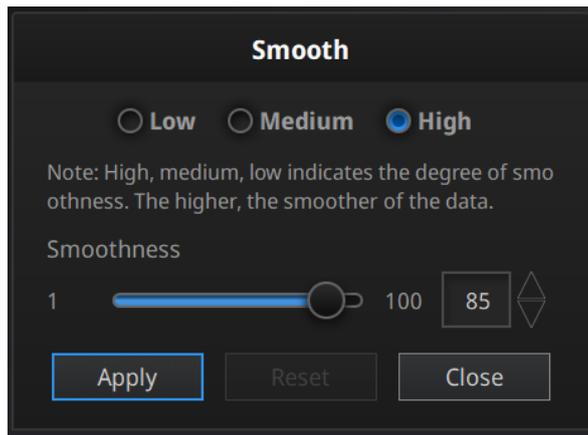
Click **Apply** to validate the modification

Click **Reset** to undo the modification

8.3.4. Smooth

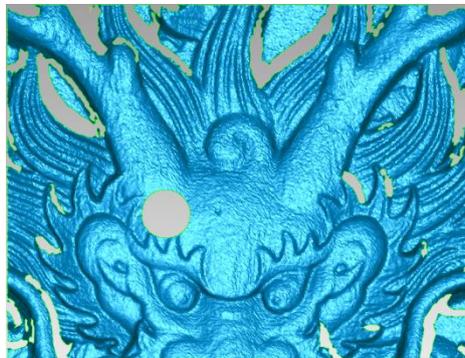


Click the Smooth button to display the smooth menu, click again to close the menu

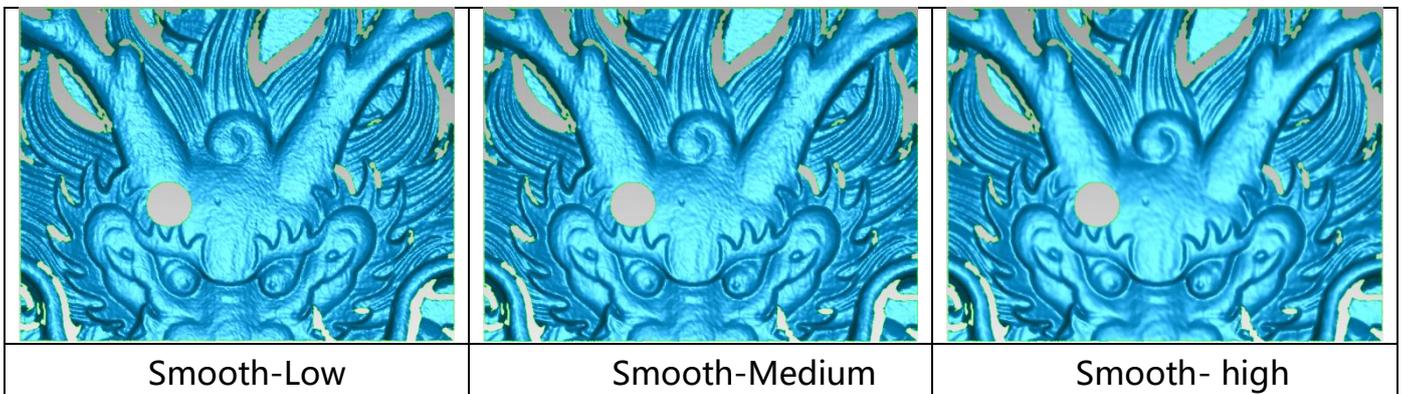


Smooth menu

Pick High (85%), Medium (50%) or Low (15%) or set the ratio from 1 to 100



Original



Click **Apply** to validate the modification

Click **Reset** to undo the modification

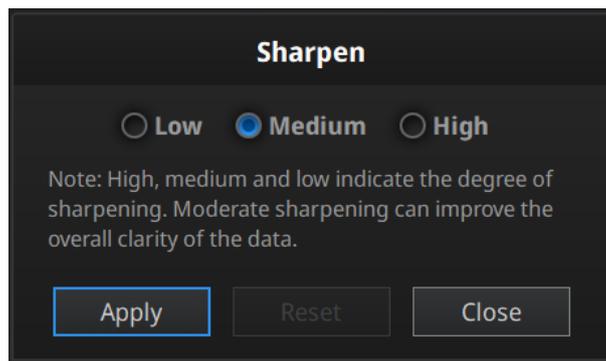
Click **Apply** twice, the data will be smoothed 2 times

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.

8.3.5. Sharpen

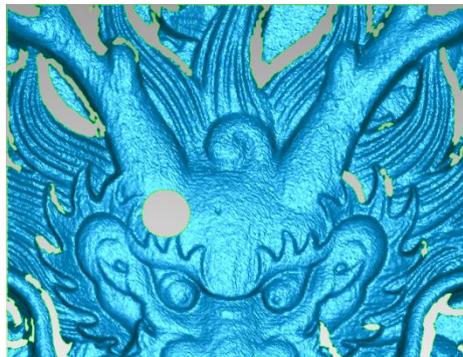


Click the Sharpen button to display the menu, click again to close the menu

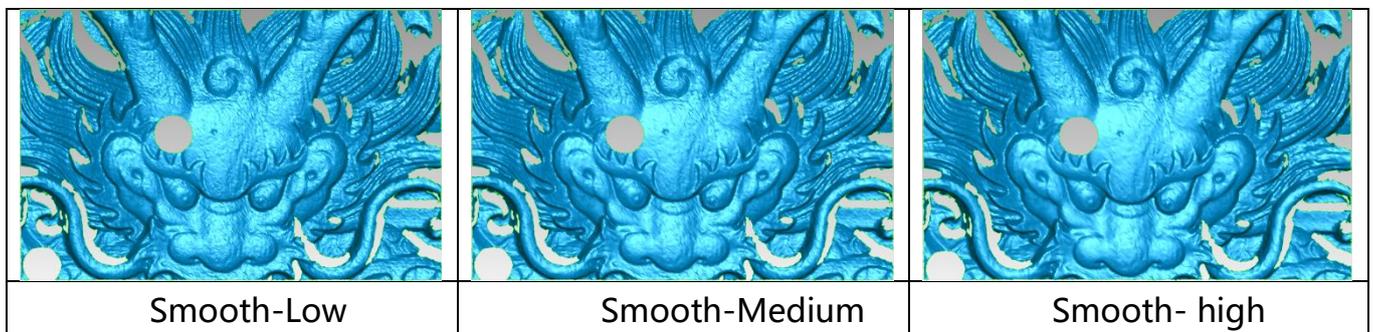


Sharpen menu

Pick High, Medium or Low



Original



Click **Apply** to validate the modification

Click **Reset** to undo the modification

Click **Apply** twice, the data is sharpen 2 times

8.3.6. Go back to scan

Click Scan on the navigation bar to go back to scan interface and exit the post processing status, the mesh data will be discarded. You can do more scans, redo editions, or remesh.

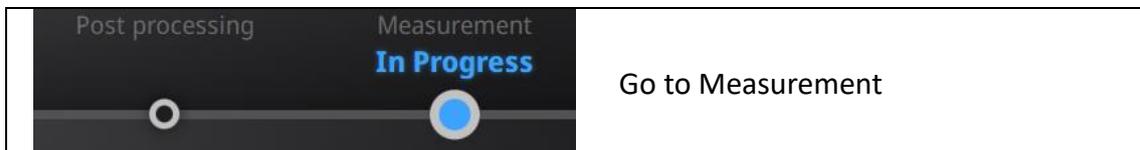
Note: The mesh data will NOT be saved automatically.



Click on the navigation bar to exit the edition mode

8.4. Measurement

After meshing, the Measurement menu will be available on the top.

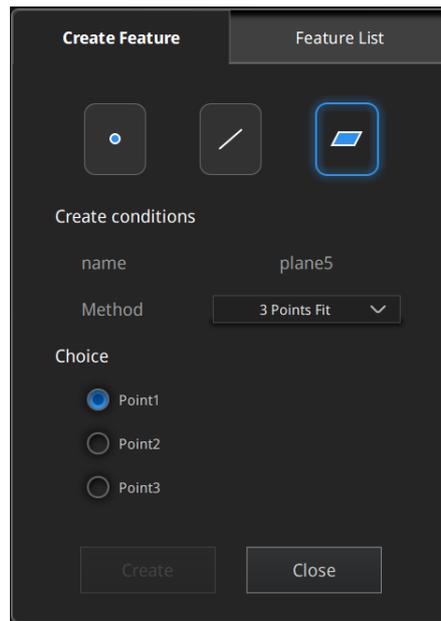


Click **Open file**, a STL or OBJ file can be import to edit.

8.4.1. Create feature

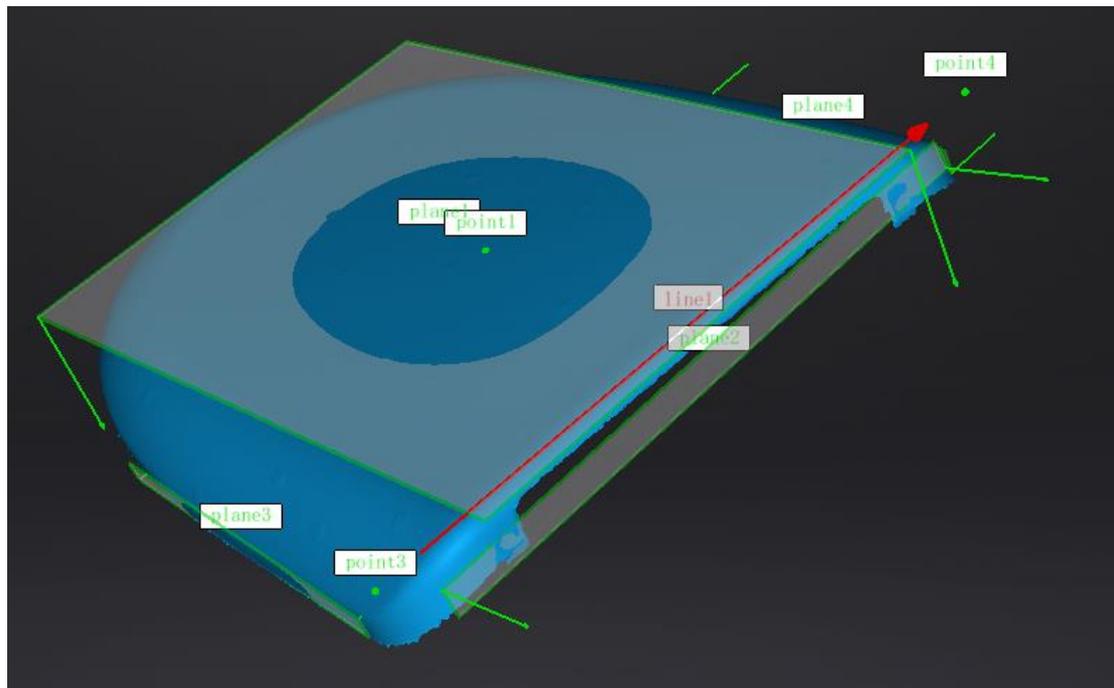


Click the Feature button to display the menu, click again to close the menu



Feature menu

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



Display of Features

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

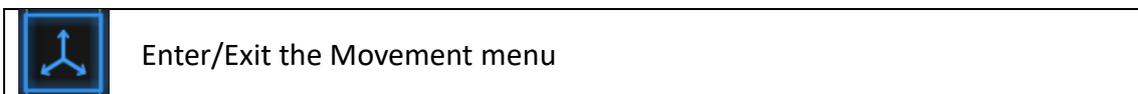
Feature	Creation method	Requirement	description
Plane 	3 Points Fit		<p>The plane is generated by 3 points not co-linear.</p> <p>Click on the data to select one point or click on a previous created feature point; In the Choice list select one of the point to reselect it</p> <p><i>Feature creation failed! Error code 6= the points selected are co-linear</i></p>
	Point-Line Fit	Line should be created in advanced	<p>The plane generated includes the point and the line (The line should be created in advanced)</p> <p>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</p> <p><i>Feature creation failed! Error code 6= the point selected belongs to the line</i></p>
	Best Fit		<p>Press Shift+ LMB to select an area, press ctrl+ LMB to unselect</p> <p>The plane generated is the position with the smallest deviation from the selected area</p> <p>Recommend method to create plane</p>
Line 	Point-Point		<p>Pick 2 points.</p> <p>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</p> <p>The line generated is define as point From to point To</p>
	Plane-Plane Intersection	2 Planes should be created in advanced	<p>Click on the plane previously created, or select it on the dropdown, repeat for the second plane.</p> <p>The line generated is the intersection between the 2 non-parallel planes</p> <p><i>Feature creation failed! Error code 1: the planes are parallel</i></p>
Point 	Selected Points		Click on the data to select a point
	Line-Plane Interface	Line and Plane should be created in	Click on the line previously created, or select it on the dropdown, repeat for the plane.

		advanced	The point generated is the intersection between the non-parallel line and plane <i>Feature creation failed! Error code 9: the line is parallel to the plane</i>
--	--	----------	--

8.4.2. Movement

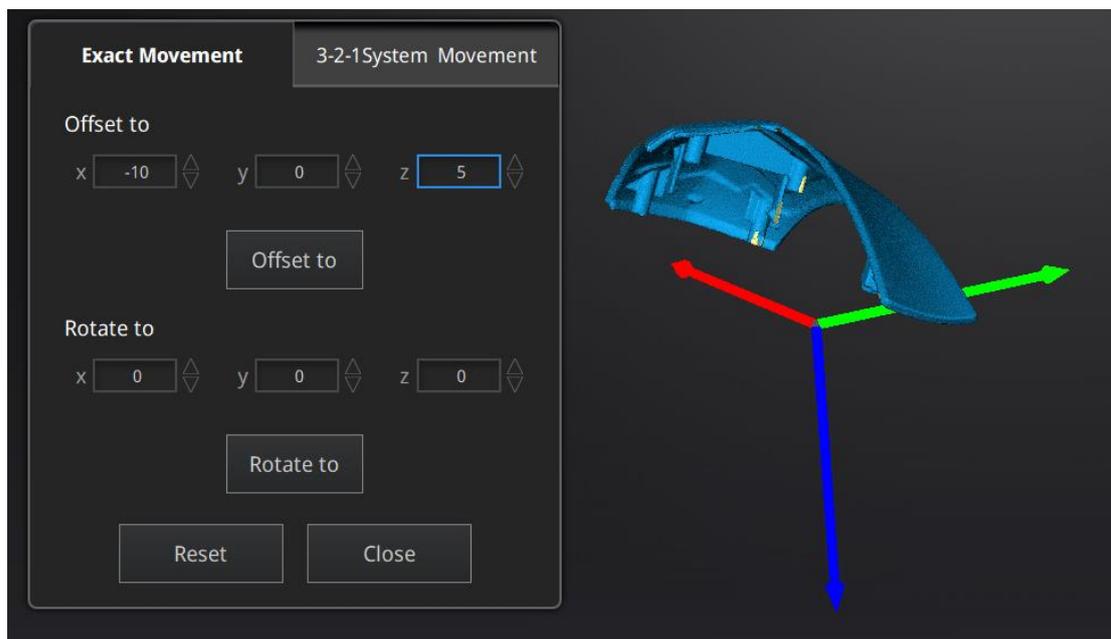
Use this mode to modify the alignment of the data to the global coordinate. This action is useful for post processing or reverse engineering.

The transformations do not affect the shape and size.



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

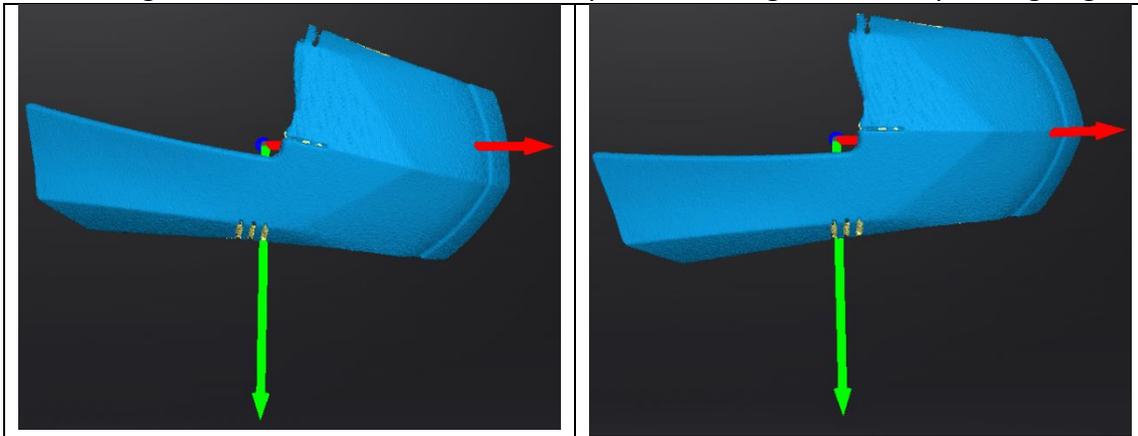
The arrows represent the global coordinate system, Red=X+, Green=Y+, Blue=Z+

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

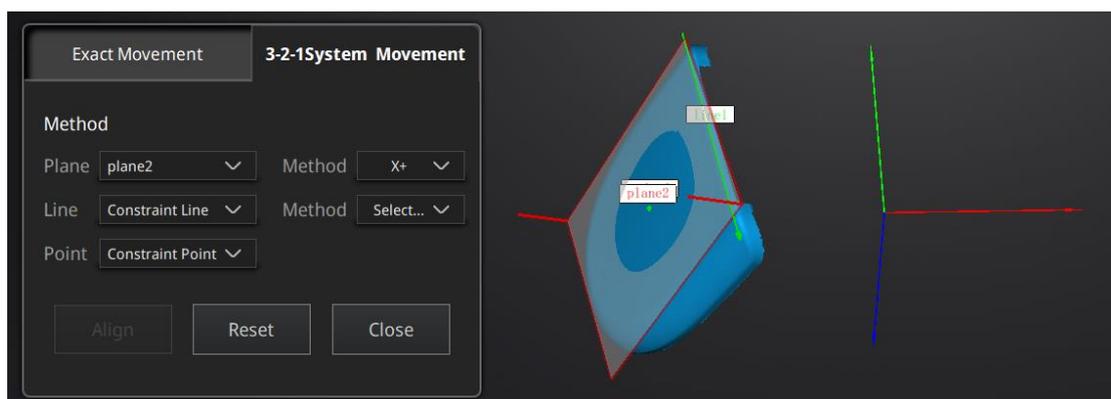


3-2-1 Movement

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+

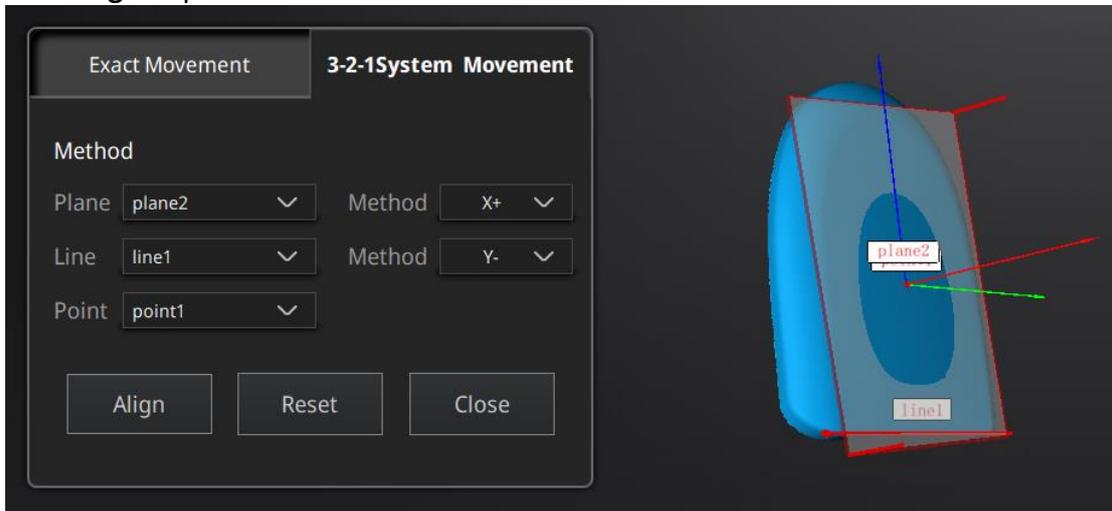


3-2-1 Movement menu

- 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

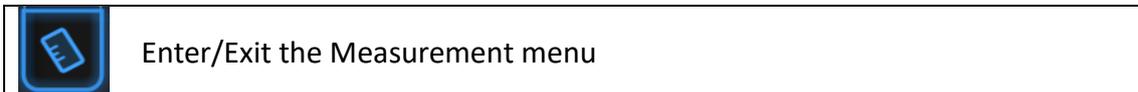


Data after 3-2-1 movement

Click **Reset** to cancel

Click **Apply** to confirm the transformation.

8.4.3. Measurement

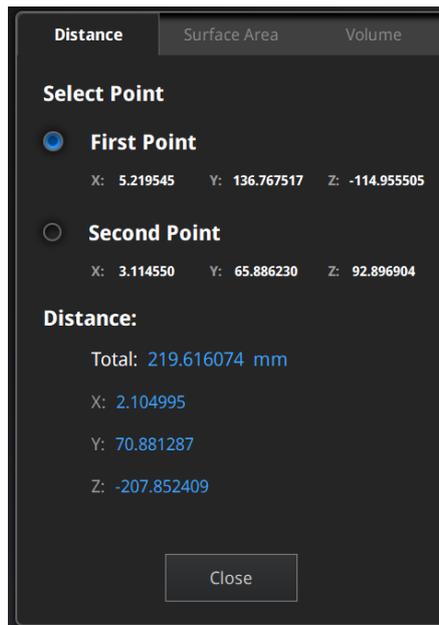


Click the Measurement button to display the menu, click again to close the menu

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.

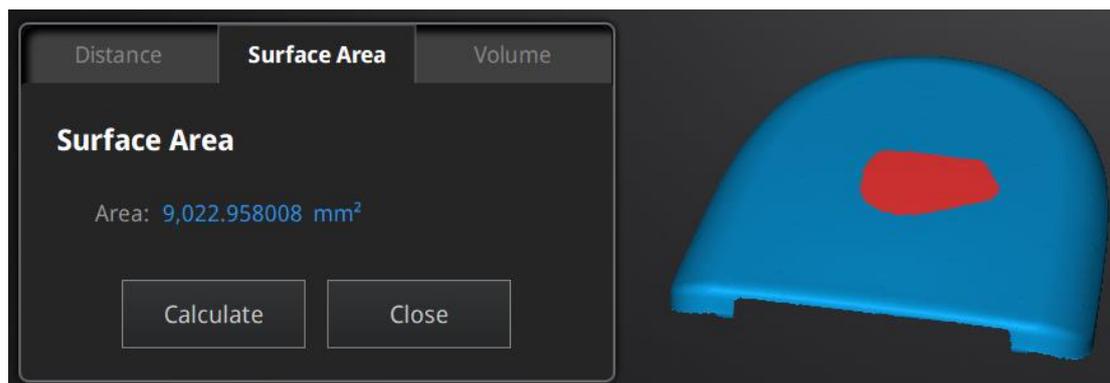
Surface Area

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 mm²

Redo the selection and click calculate again to update

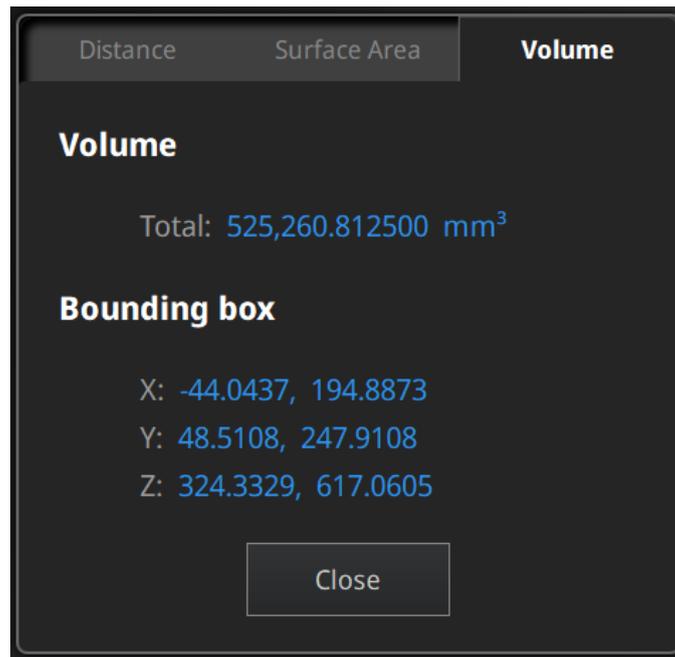


Surface Area menu

Volume

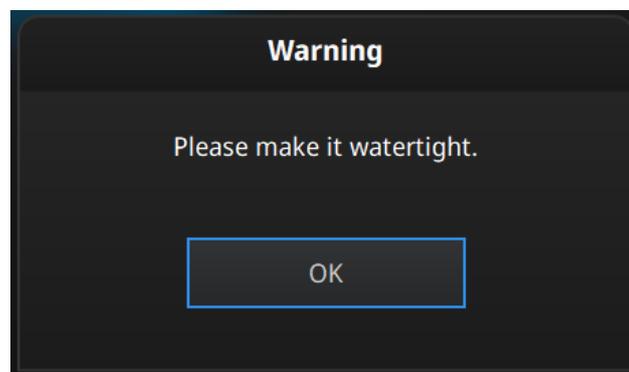
This tool calculates the volume contains in a watertight mesh.

It returns the volume in mm³ and the coordinates of the smallest box, parallel to the global coordinates, containing all the data.



Volume menu

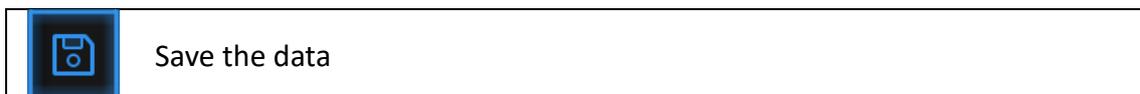
Prior to the calculation make sure the file is watertight (no holes).
See [8.3.3] to fill holes on your data



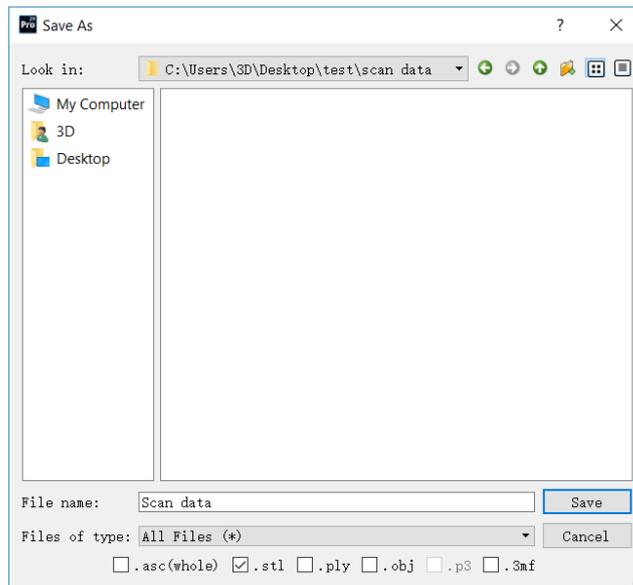
File not watertight alert

8.5. Save

8.5.1. Export Data



Click Save to export the data.



Export data

Navigate to choose a save folder.

Input the file name.

Choose at least one file format as listed.

By default, the saving path is the project folder, the file name is “Scan data”, and the format is .stl.

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...	<ul style="list-style-type: none"> ◆ Inspection ◆ Fast export (no post-processing needed) ◆ Complex data to post process in another software
ASC (whole)	No	optimized point-cloud	scan.asc	<ul style="list-style-type: none"> ◆ 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	<ul style="list-style-type: none"> ◆ 3D printing (watertight mesh data) ◆ Reverse Engineering ◆ Compatibility with most mesh editing software
OBJ	Yes (separated)	Mesh, Texture &	scan.obj scan.jpg	<ul style="list-style-type: none"> ◆ Artistic applications ◆ 3D rendering

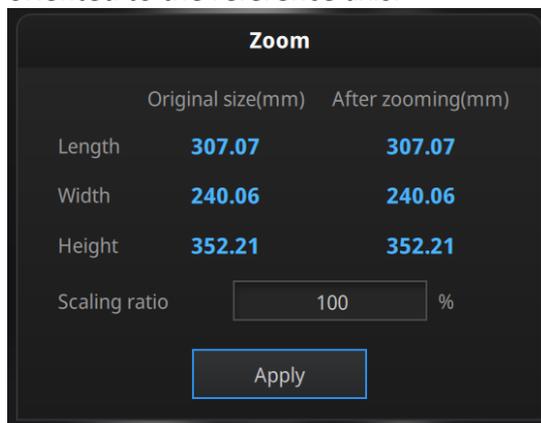
)	Matching file	scan.mtl	◆ Compatibility with most mesh editing software
PLY	Yes	Mesh	scan.ply	◆ Low storage ◆ Easy texture editing
3MF	Yes	Mesh	scan.3mf	◆ Low storage ◆ Compatibility with Microsoft paint3d
P3	No	Marker position	scan.p3	◆ Global Marker File in EinScan software ◆ Measurement of the marker position

8.5.2. Scale Data

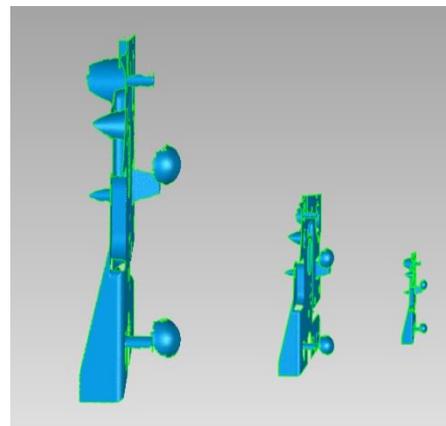
Scaling the volume of scanned data, while the number of triangles, the level of detail of the scan and size of data will not be actually changed.

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

8.5.3. Share Data



Upload the data to Sketchfab.com directly, which is a famous online 3D data store.

Click Upload after mesh to share data, it will show the dialog as below.

PRO account required'; 'Password:' with an empty input; 'Sketchfab username: *' with an empty input; and 'Sketchfab password: *' with an empty input. At the bottom are 'Submit Model' and 'Cancel' buttons."/>

Sketchfab uploader window

You can share your model on Sketchfab.com. A model title, username and user password are required. Register and view the shared model at <http://sketchfab.com>.

Notes:

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

8.5.4. Third-party Software

It contains Geomagic and Solid Edge, you can import the data into the third-party software.

Geomagic

	Import the scanned 3D data to Geomagic SHINING 3D Edition from EXScan Pro software
--	--

Geomagic is mainly used in reverse design of grid data. If the Geomagic has been installed, click this button to open the Geomagic and import the merged stl data into the Geomagic.

Solid Edge SHINING 3D Edition



Import the scanned 3D data to Solid Edge SHINING 3D Edition from EXScan Pro software

Solid Edge SHINING 3D Edition is an OEM design software by SIEMENS PLM, specially tailored for SHINING 3D's customers. Solid Edge SHINING 3D Edition is an innovative 3D Digital Design platform, including Reverse Engineering, Convergent Modeling, Synchronous Modeling, Generative Design, Simulation, as well as powerful 3D/2D CAD functions.

If Solid Edge SHINING 3D Edition software is already installed, click Solid Edge logo from Exscan Pro software to open Solid Edge SHINING 3D Edition. The meshed STL data will also be imported to Solid Edge SHINING 3D Edition in a new part project directly. In the USB drive, there are videos for reverse engineering cases of EinScan scan data processed by Solid Edge SHINING 3D Edition. For more information about Solid Edge, please refer to following links:

[Siemens Solid Edge Global Forum](#)

[See What's new in Solid Edge 2019](#)

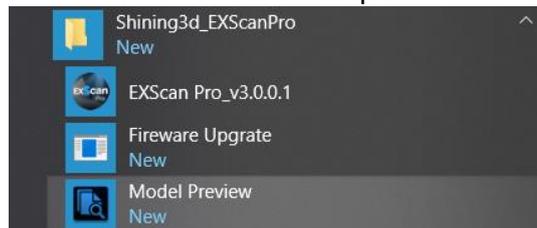
[Find Solid Edge related tutorial video on YouTube channel](#)

8.5.5. Model Preview



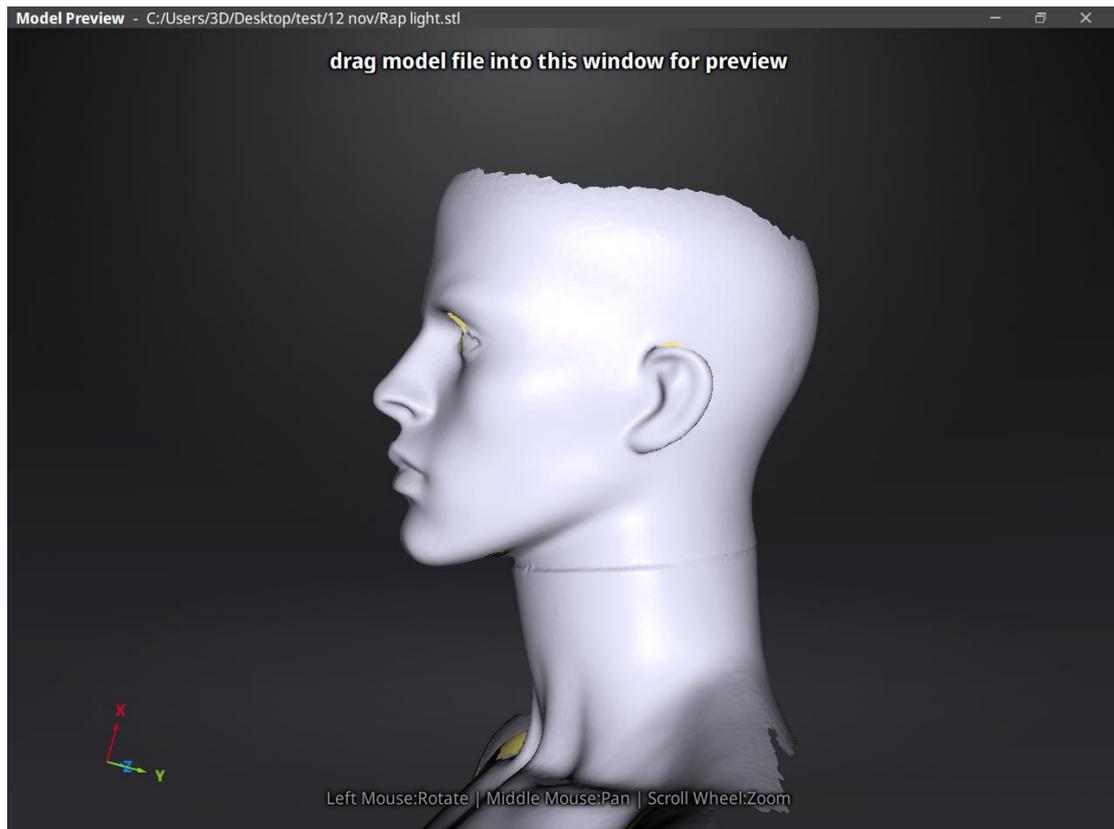
Double click on the Model Preview short-cut on the desktop

Open the Model Preview software on the desktop or in the start menu



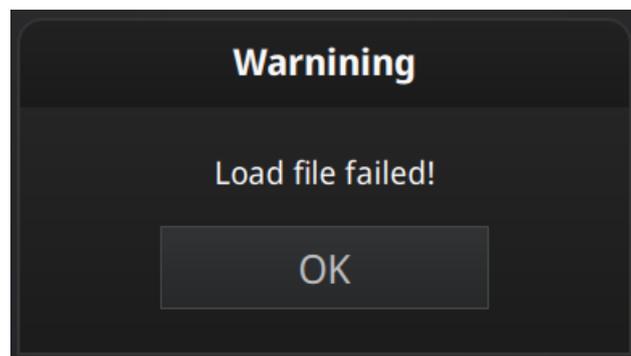
start menu > Shining3d_EXScanPro > Model Preview

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.



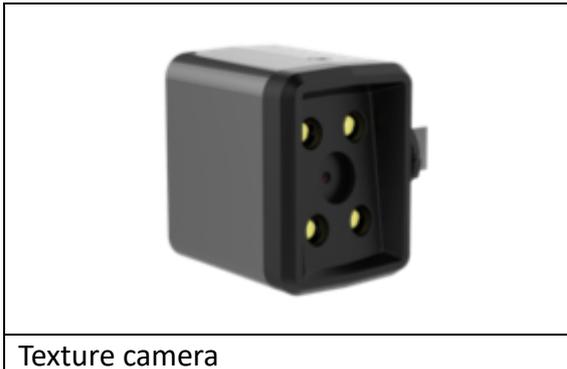
Fail to load the mesh data

Note: 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

9. Color pack

9.1. Hardware

9.1.1. Content



9.1.2. Installation

Before installation, make sure the device is powered off.

Remove the add-on port cover on the top of the scanner. (1)

Rotate the hook (rotary lever) to the left side.

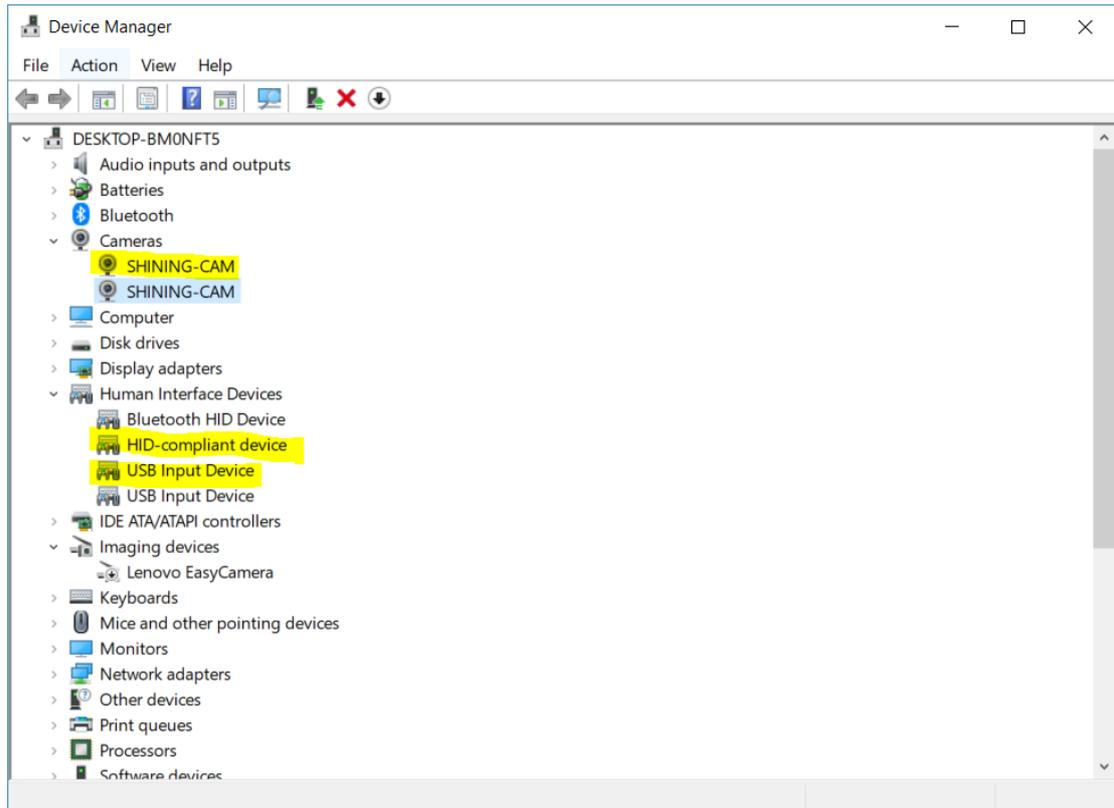
Plug the texture camera (Color Pack). (2)

Turn the hook (rotary lever) to the right to lock the camera in position. (3)

Power on the scanner and the camera driver will start by itself.



Check the device manager to see if the texture camera will show the following

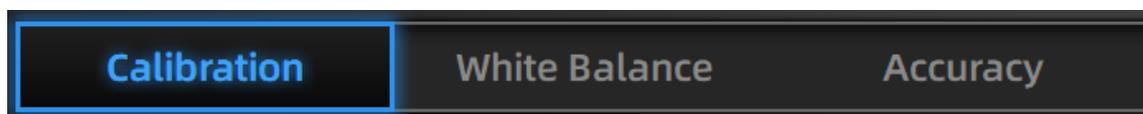


Device manager with EinScan and texture camera connected

9.2. Calibration

9.2.1. Normal Calibration

In order to ensure the matching between the texture and the 3D data, calibration should be performed when the texture camera is plugged in.



Calibration steps with Texture camera plugged.

Use the front side (black) of the calibration board for texture camera calibration. In the calibration interface, run the Calibration with the normal method (see “camera calibration”). The LED rings of EinScan and the texture camera will blink synchronously.

If the calibration keeps failing, check whether the texture camera is well locked in position.

HD calibration can be skipped if the scanner is already calibrated. (full calibration is recommended).

After HD calibration, White Balance is suggested.

If the texture is misaligned to the 3d data during the scan, check whether the camera is well locked, and redo the calibration.

9.2.2. White Balance

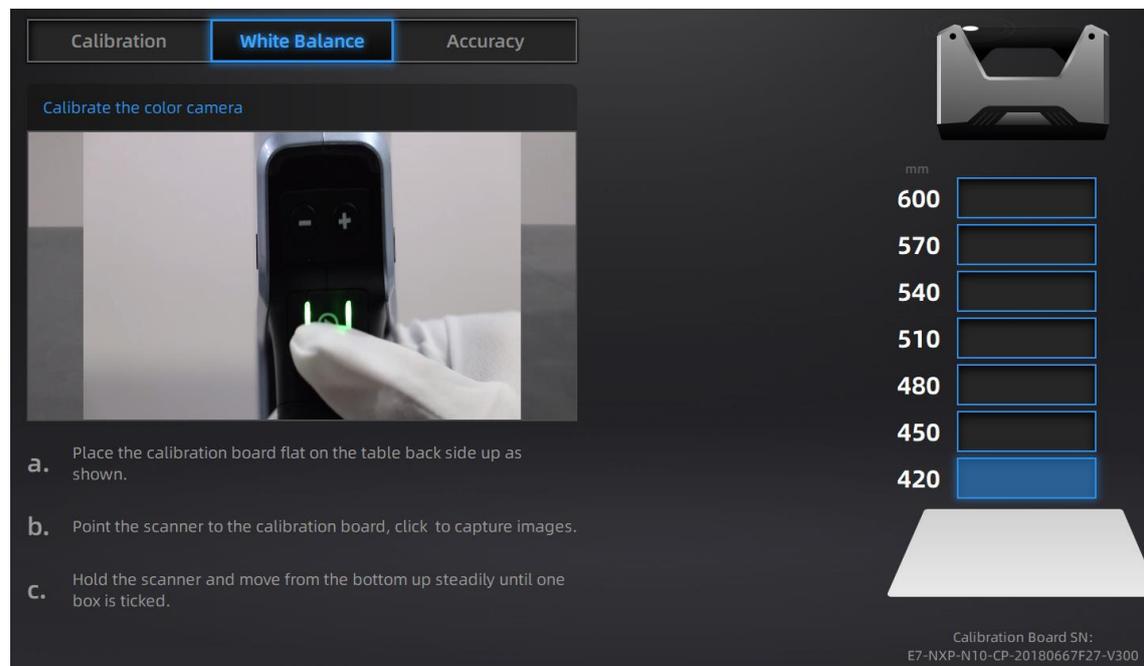
To capture an accurate color texture, White Balance calibration should be done every time when you plug the texture camera, or when the lighting environment is changed. The White balance can be done separately without running the full calibration.



Click Start in the software or press the Play button on the scanner to start the calibration

or press 

On the White side of the calibration board, under the same working lighting environment. Click Start or Press Play, move up and down until you find the optimal distance position. Stay still. While LED and white light are projected



Calibration White Balance Accuracy

Calibrate the color camera

a. Place the calibration board flat on the table back side up as shown.

b. Point the scanner to the calibration board, click to capture images.

c. Hold the scanner and move from the bottom up steadily until one box is ticked.

mm

600

570

540

510

480

450

420

Calibration Board SN:
E7-NXP-N10-CP-20180667F27-V300

White Balance calibration interface

To guarantee a good texture, the calibration board must be kept clean. If needed, wipe with clear water only. Do not use alcohol or chemical liquid to clean the calibration board.

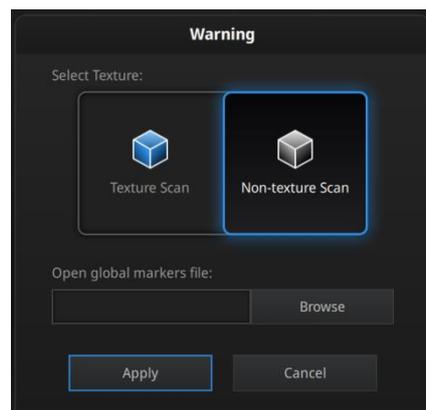
Similar to taking high-quality picture in the photo studio, the professional lighting environment setting is key to achieve high-quality texture data.

If the texture doesn't give you satisfaction, please optimize the lighting environment and redo White balance.

9.3. Fixed Mode

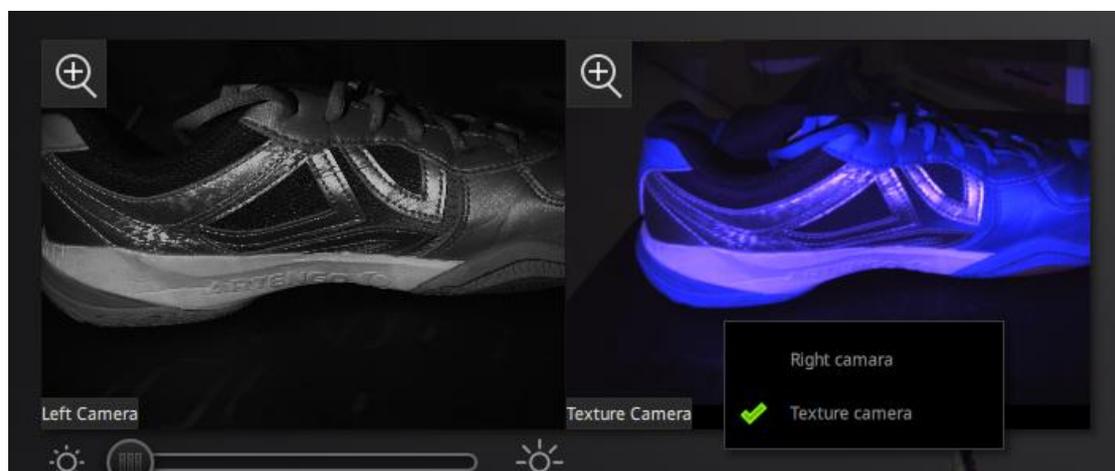
9.3.1. Scan

Create a project and choose “Texture scan”. Non-texture is selected by default, click Apply to continue.



Texture/Non-texture scan option

During scanning, display the texture camera view by **Right click** “Texture Camera”.



Display Cameras

Run the same way that described above. After every single scan, the LED of the texture camera will flash and the texture camera will record one frame data.

9.3.2. Alignment

The texture is not used during automatic alignment. However, it can be helpful to select corresponding points in manual alignment.

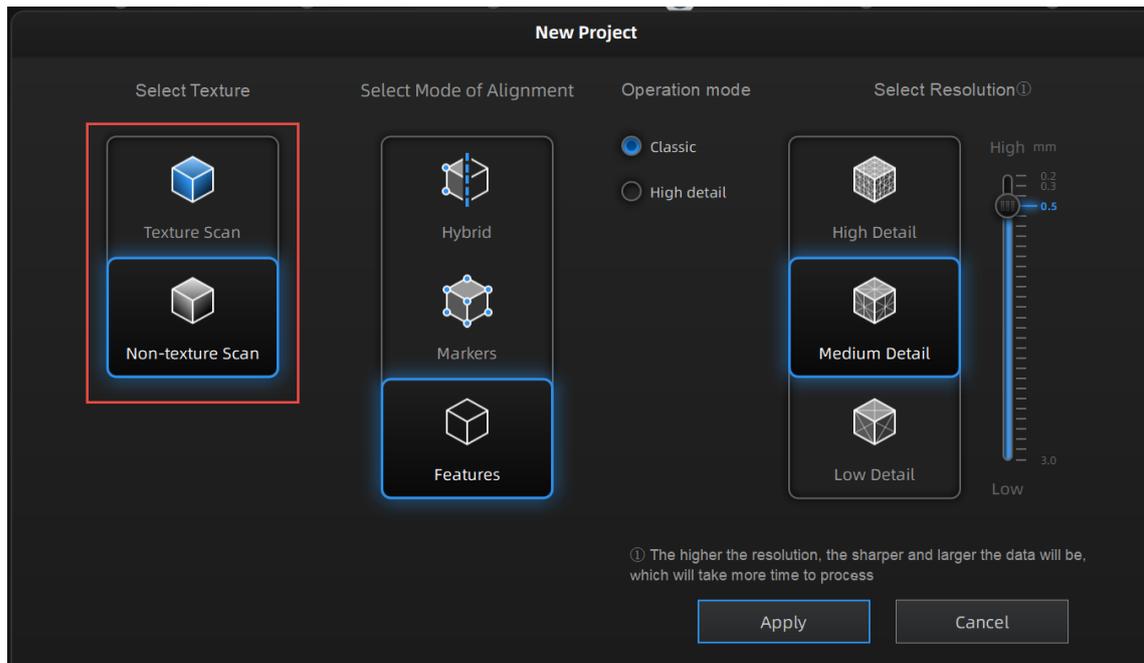
Data and texture are captured from a different angle. In case of sharp edges, texture-data can be misaligned, try to scan from a different angle.

If the texture is misaligned to the data, check that the camera is well placed and locked. And redo the calibration.

9.4. HD Mode

9.4.1. Scan with texture

Create a project and choose “Texture scan”. By default, Non-texture is selected, Click Apply to continue.

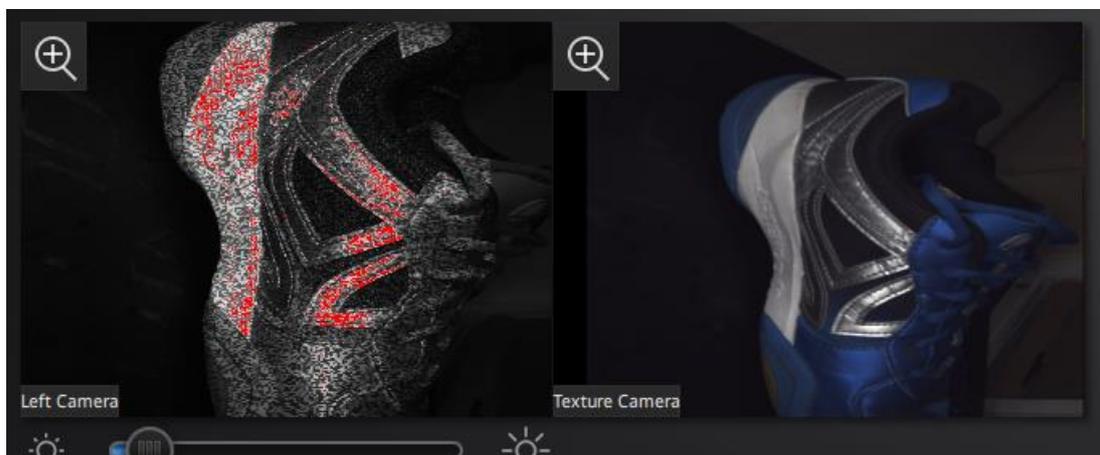


Texture/Non-texture scan option

Run the same way that described above.

During the preview, the texture will not show.

During the scan, display the texture camera view by right click, select “Texture Camera”



Display Cameras

Notes:

- If other option is selected The texture is not used to calculate the data alignment.
- Data and texture are captured from a different angle. In case of sharp edges, texture-data can be misaligned, try to scan from a different angle.

Notice: If there are some missing texture areas after the texture project is generated into point clouds, show as the picture below, it could be the reason that the data scan is overlarge and your current PC configuration could not process it. You could change to a computer with higher configuration to process and the project won't be damaged.



9.4.2. Texture matching

If the texture is misaligned to the data, check whether the texture camera is well placed and locked. And redo the calibration.

If blue areas appear on the data (usually on the edge of the scan frame), it means the texture information is missing at these areas, do another scan on the same area from a different path.

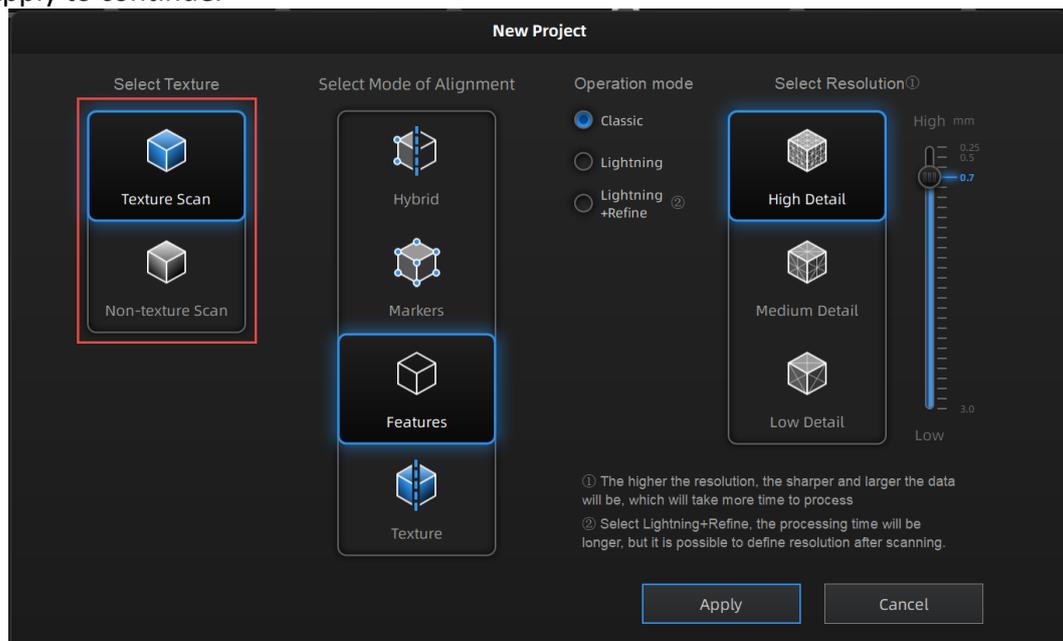


An area with texture missing

9.5. Rapid Mode

9.5.1. Scan with texture

Create a project and choose “Texture scan”. By default, Non-texture is selected, Click Apply to continue.

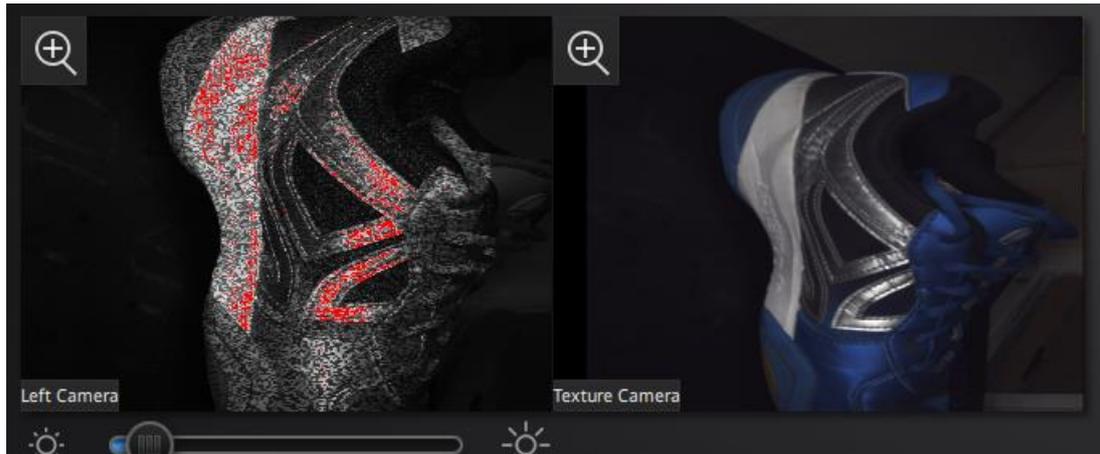


Texture/Non-texture scan option

Run the same way that described above.

During the preview, the texture will not show.

During the scan, display the texture camera view by right click, select “Texture Camera”



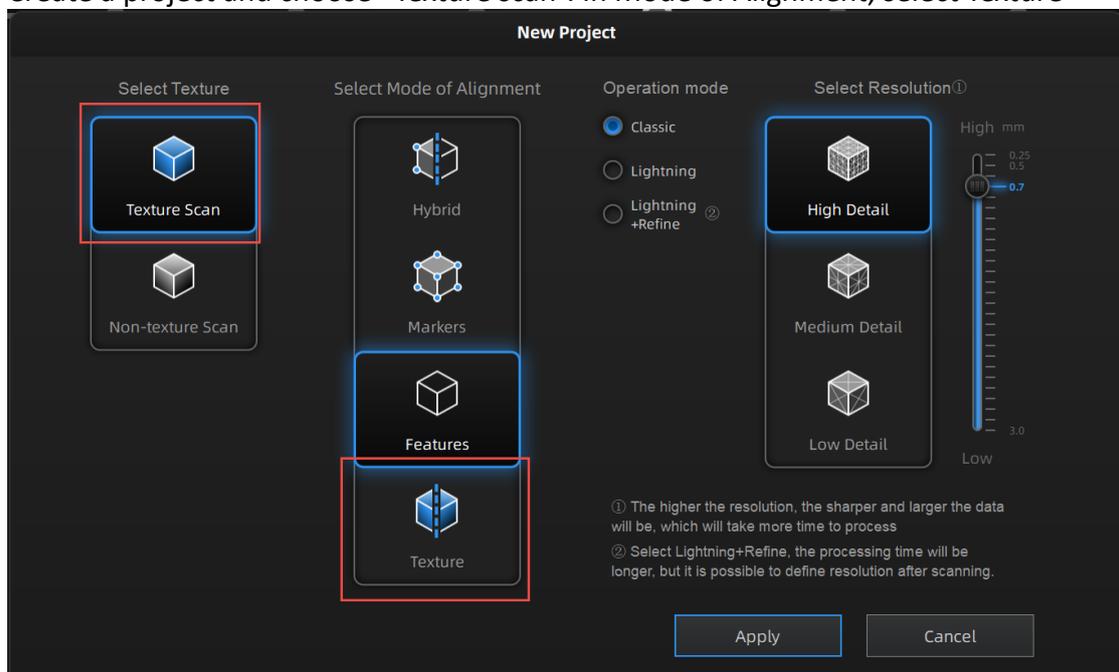
Display Cameras

Notes:

- If other option is selected The texture is not used to calculate the data alignment.
- Data and texture are captured from a different angle. In case of sharp edges, texture-data can be misaligned, try to scan from a different angle.

9.5.2. Texture Alignment

Create a project and choose “Texture scan”. In Mode of Alignment, select Texture

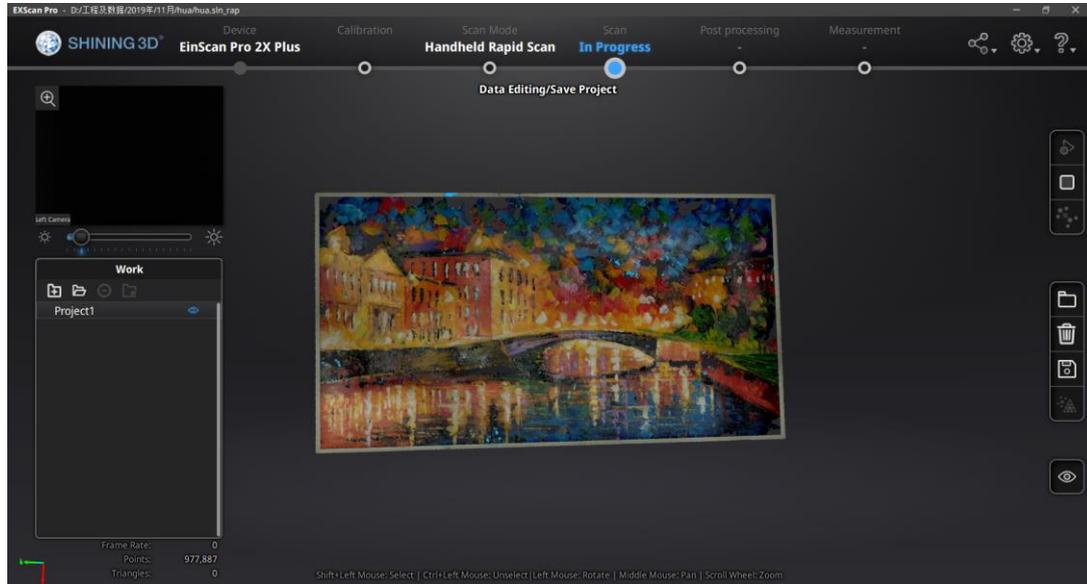


Texture alignment selection

Notes:

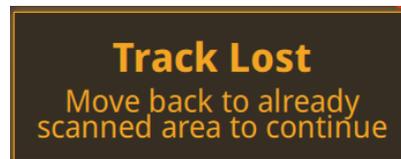
- When texture alignment is used, all operation mode are reduce to 10 FPS. The function is unchanged

How it works: differences of level of gray in the texture image are marked to separate color areas. The successive frame alignment is done between those points. The green markers displayed are a sample of those points



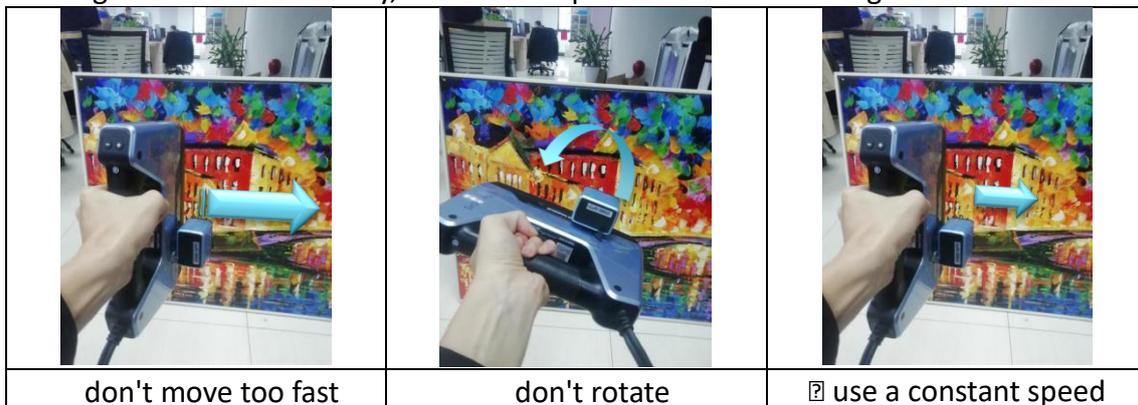
Interface during rapid scan mode, texture alignment

If the position tracking fails, “Track lost” alert will appear, meaning you need to go back to a scanned area to recover the tracking and continue scan.



Track lost alert

During the scan move slowly, at constant speed and avoid rotating.



For a successful alignment, the richness of the texture is more important than the contrast between colors.



9.5.3. Texture matching

If the texture is misaligned to the data, check whether the texture camera is well placed and locked. And redo the calibration.

If blue areas appear on the data (usually on the edge of the scan frame), it means the texture information is missing at these areas, do another scan on the same area from a different path.



An area with texture missing

9.6. Post Processing

9.6.1. Point-cloud Editing



During data editing, click texture to display or hide the texture.

9.6.2. Create Mesh



Generate the mesh model from the scanned point cloud data

Click Mesh Model to generate the Mesh (watertight or unwatertight). 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.



Example of a watertight model with texture

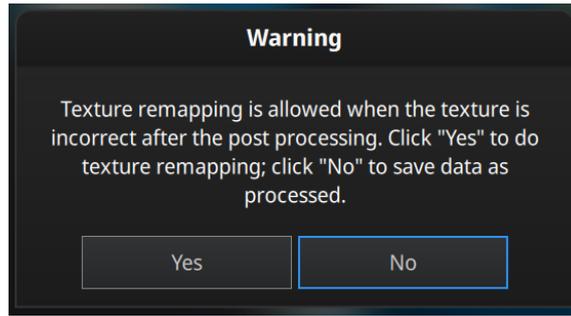
9.6.3. Texture remapping



Enter the texture remapping menu

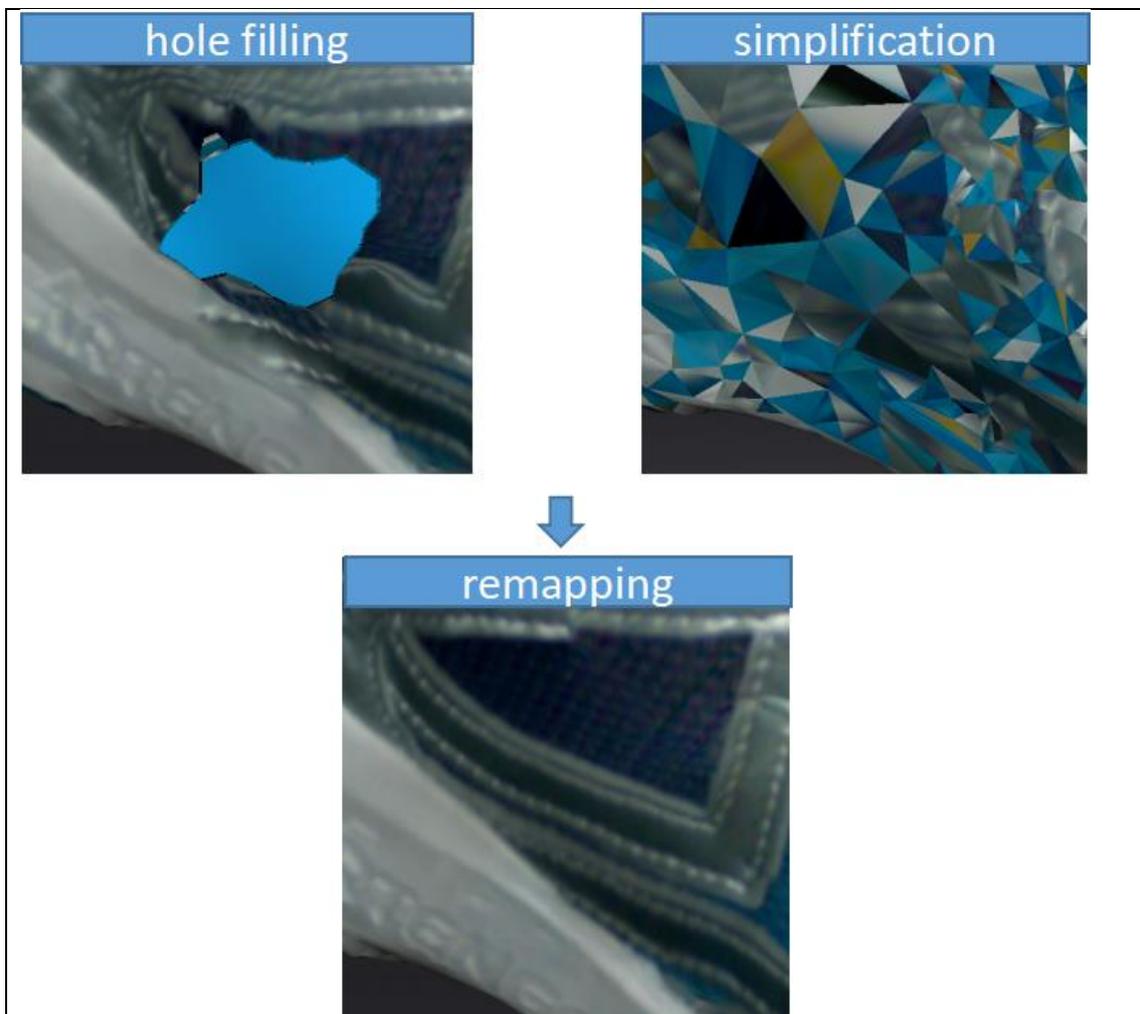
Click the Texture Remapping to display the Texture menu, click again to close the menu

Texture remapping is accessible before saving the data



Confirm texture remapping before saving

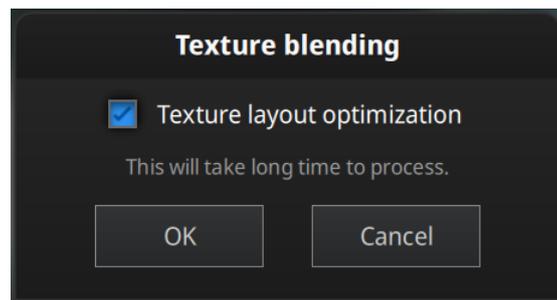
Edition on the mesh (simplification, hole filling) will affect the texture rendering. By doing the texture remapping, the texture information will be reapplied on the mesh.



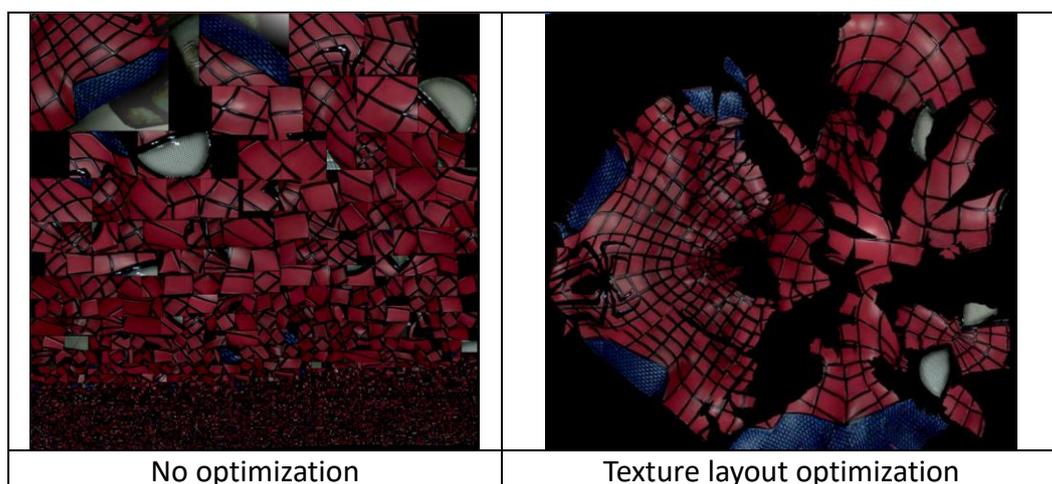
9.6.4. Texture Layout Optimization

When generating the mesh model (watertight or unwatertight), 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. Click Apply to continue.



TLO option in texture blending

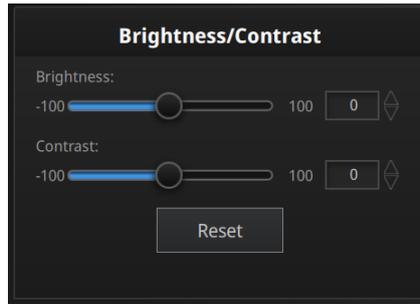


Notes:

- TLO requires a longer time to compute
- In Fixed Mode for one single scan, TLO is the same as normal texture file.
- TLO is used only with OBJ output

9.6.5. Brightness & Contrast

When the mesh model has been generated, use the cursors to change the Brightness and/or contrast of the texture from -100 to +100. Click Reset to return to 0. The default value is 0 for both.



Modify texture

This modification is not saved in the project file. Export the data to save the texture editing.

9.6.6. Export Data



Click Save to export the data. Navigate to choose a save folder. And input the file name. Select one of the formats below.

Format	Texture	Data type	Saves as	Recommended for
OBJ	Yes (separated)	Mesh, Texture & Matching file	scan.obj scan.jpg scan.mtl	<ul style="list-style-type: none"> ◆ Artistic applications ◆ 3D rendering ◆ Compatibility with most mesh editing software
PLY	Yes	Mesh	scan.ply	<ul style="list-style-type: none"> ◆ Low storage ◆ Easy texture editing
3MF	Yes	Mesh	scan.3mf	<ul style="list-style-type: none"> ◆ Low storage ◆ Compatibility with Microsoft paint3d

9.7. Best Practice

How to avoid light halo with reflective texture?

Place the scanner at around 30 degrees from the normal. And avoid the reflection from light sources in the room.

How to edit or remove markers on the texture?

Use a 3rd party software like Photoshop or Gimp, save as OBJ and erase the markers on the matching JPG file.

How to use projected texture?

To scan a large object with no feature or without markers. Use a separated projector to create a virtual texture on the object.

Place the projector close enough to the object to have a light as bright as possible.

Make sure the separated projector will not move during the scan.



10. Industrial Pack

10.1. Content

Turntable	1	piece
Tripod	1	piece
Scanner tray (Cradle switch stand)	1	piece
USB cable	1	piece
Power adapter	1	piece
Power cable	1	piece

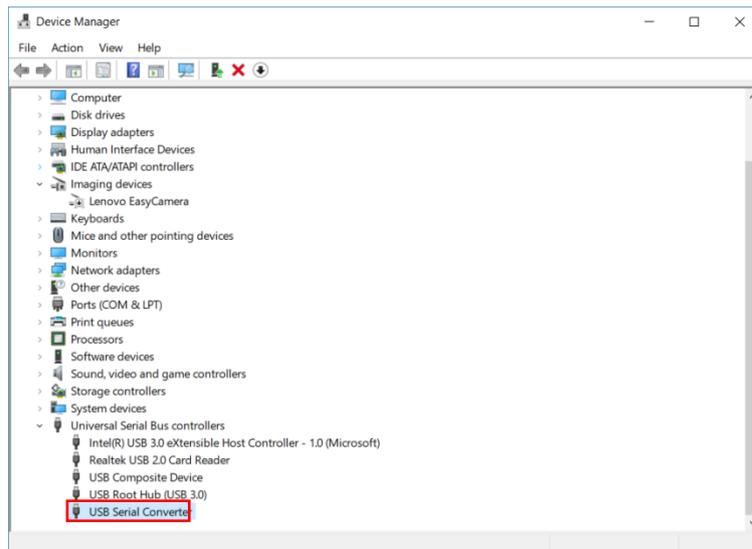
10.2. Installation



Industrial pack set up

Put the scanner on the tripod after the installation is finished. Connect the flat end of USB cable to the computer (USB 2.0 or USB 3.0), the square-opening end to the turntable. Then connect the power adapter to the turntable and adjust the position of scanner body and turntable. Make sure to check the advice for **Fixed Mode** when using the turntable (see above).

Check the Device manager. The turntable will be displayed as below.



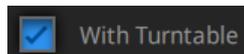
Device manager with turntable

10.3. Scan

10.3.1. With/Without Turntable

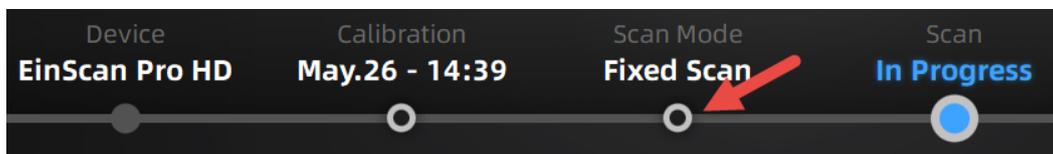
Create or Import a fixed scan project.

On the top right, Check the box to use the turntable, or Uncheck to not use the turntable.



Fixed scan with turntable

If you add the turntable during a fixed scan project, click Scan Mode selection in the navigation bar, and reopen the project.



Go back to Scan mode selection menu

10.4. Turntable Steps

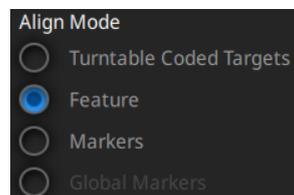


Turntable step input

Before scanning, set the turntable steps between 4 and 180. The number shows the times of steps that the turntable will stop and data will be captured during the 360° full rotation. The default setting, 8 steps, is recommended. You can change the number of steps according to the features of the objects.

Note: Using more turntable steps will help scan more complete data in some angles, but NOT more accurate.

10.5. Alignment Condition

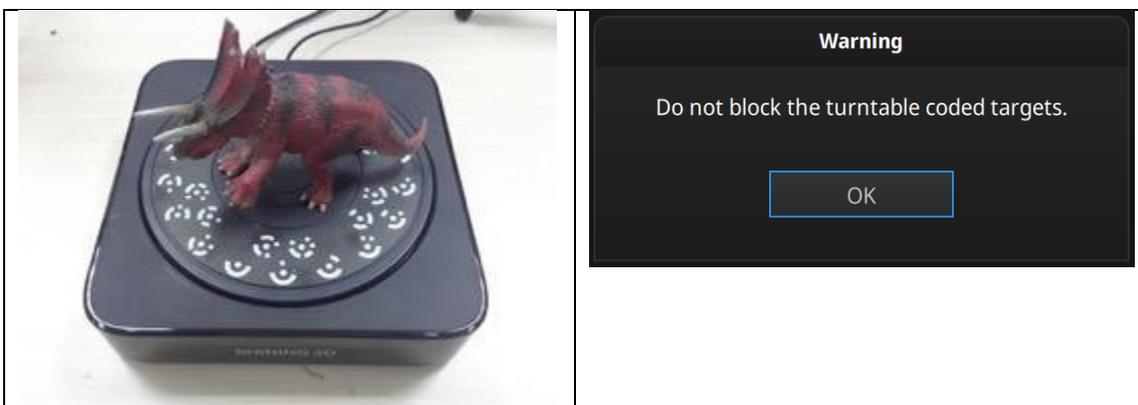


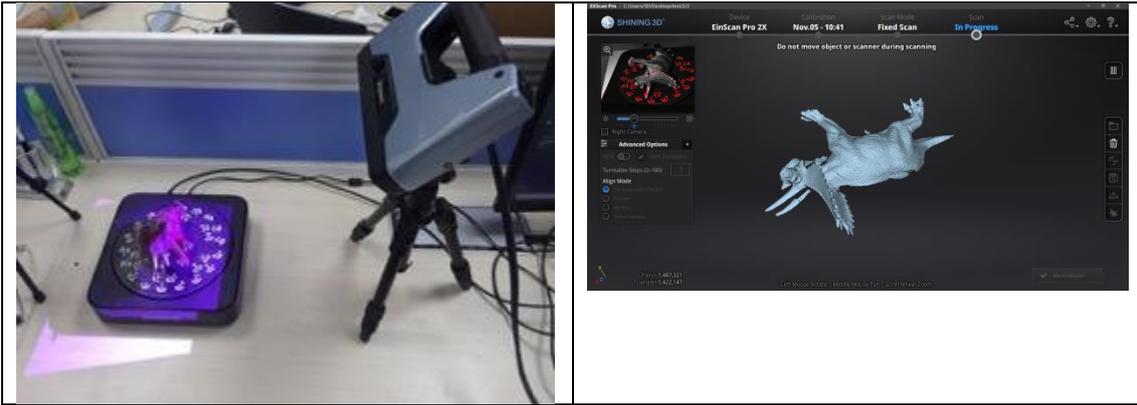
Alignment mode selection with the turntable

Select an alignment mode condition for the turntable scan.

10.5.1. Turntable Coded Target Alignment

It is the easiest mode among the four modes for scanning small sized objects. It is highly recommended to use in cases requiring high accuracy and high resolution. The turntable coded target alignment works as follows: on every step of the turntable, the scanner recognizes common coded targets on the turntable to calculate the new position of the object. At least 4 common targets need to be recognized between 2 neighboring scans.





If the object's diameter is smaller than 150mm, it will not cover most coded targets on the turntable surface. Place the object on the middle of the turntable and make sure it will not shake or move during the rotation.

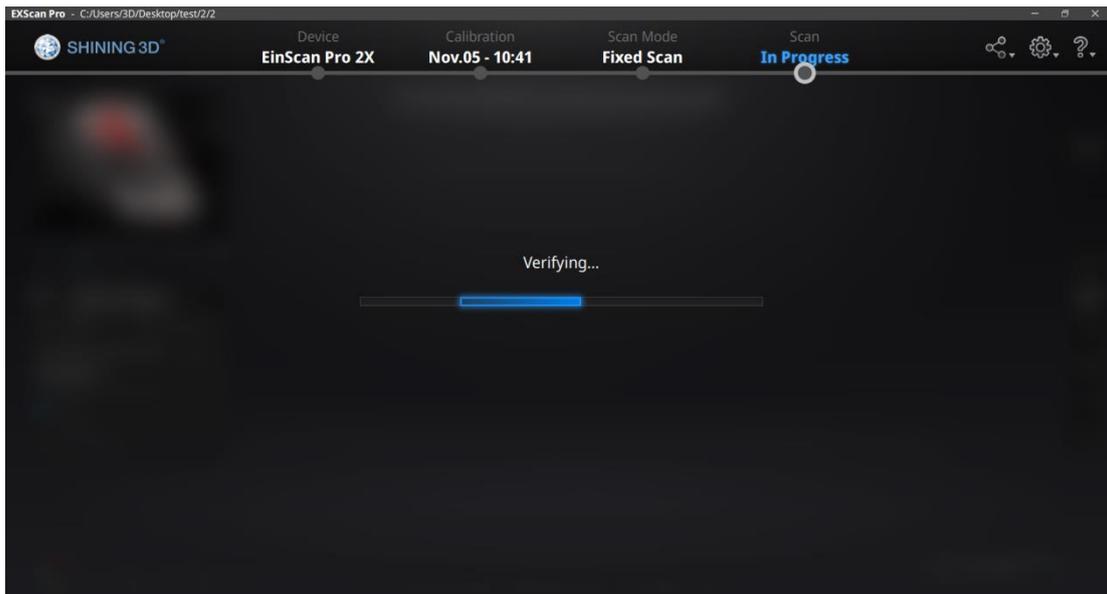
10.5.2. Feature Alignment

When the object you need to scan is big and will cover most coded targets on the turntable, and you do not want to or cannot stick markers on it, then feature alignment will be helpful. With feature alignment, the software recognizes geometry features on three successive preliminary scans and then calculates the position of the turntable. The scans are matched by knowing the center and angle of rotation between successive captures.

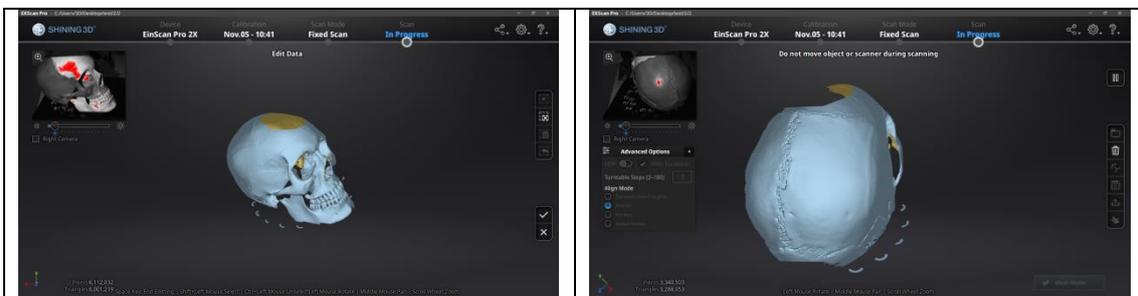
An object with simple features like plain, symmetric surface such as a sphere or cylinder is not recommended for this mode. It is better to use markers to facilitate the alignment for an object with few geometry features.



Using feature alignment, make sure that the object is kept still on the turntable, and the first view should contain enough features to allow the initialization.

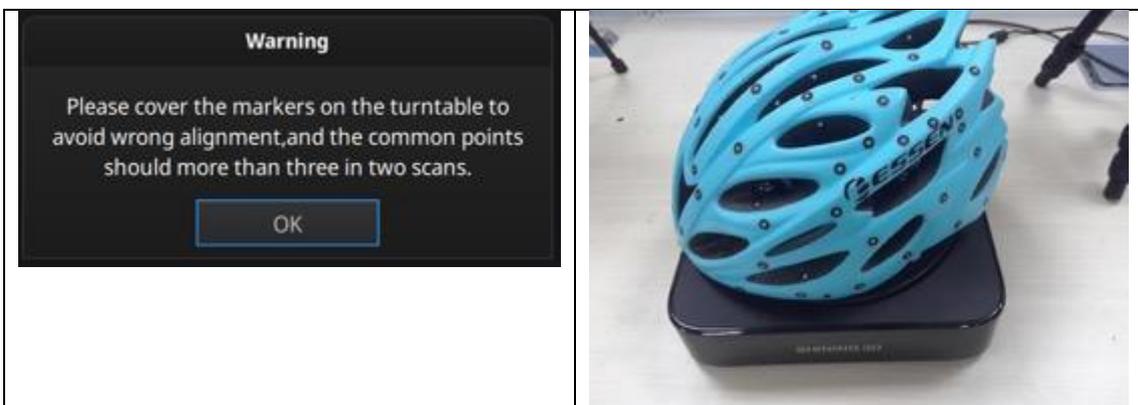


During the “verifying” steps, the software calculates the position of the turntable



10.5.3. Markers Alignment and Global Markers Alignment

Markers alignment is used when the scanner cannot see enough coded targets on the turntable for auto alignment. Markers alignment works in a similar way as turntable coded target alignment; the software matches 2 neighboring scans by recognizing at least 4 common markers.



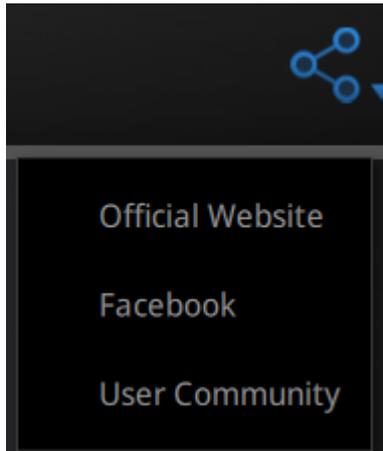


Global Markers is accessible if a Global Marker File has been loaded during the project creation.

11. Support and Contact

11.1. User Community

Find the User Community tab in www.einscan.com, or from the Community menu. Register your EinScan at community.shining3d.com to validate your warranty and get more service for software updates, manual, video, and submit request.



11.1.1. Log In

To register a user account, please enter the serial number of the scanner and your contact information including a valid email.

A screenshot of the SHINING 3D Register page. The page has a white background with a blue header containing the SHINING 3D logo and the text "Welcome to SHINING 3D USER COMMUNITY". Below the header, there are two links: "Register" and "Sign In >>". The registration form includes four input fields: "Email", "Password", "Confirm Password" (with an eye icon for visibility), and "Serial Number". A blue "Submit" button is located below the form. At the bottom, there is a link for "Privacy Policy & Cookie Policy".

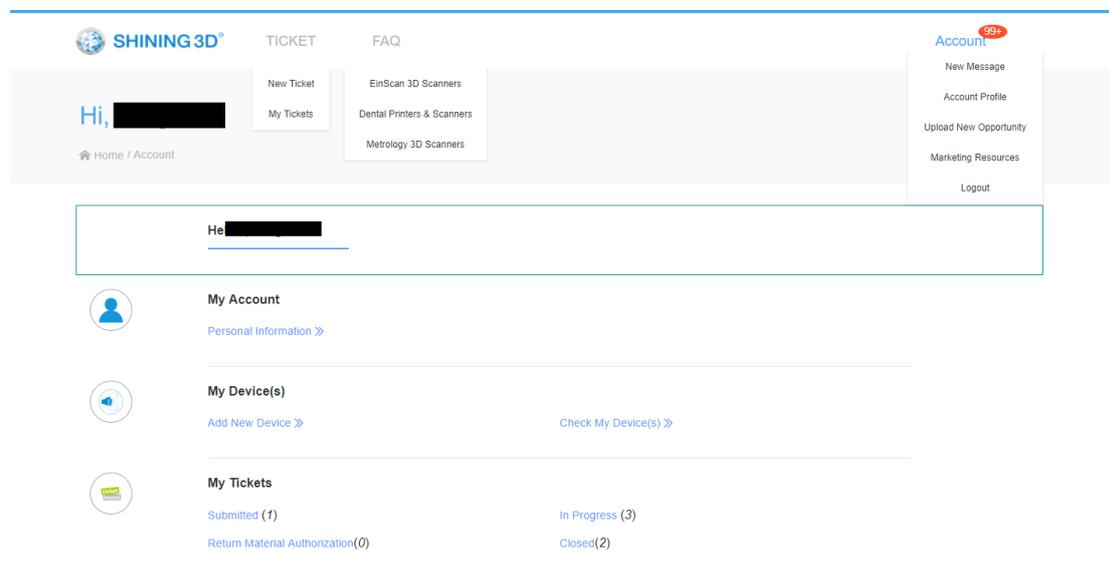
Register

A screenshot of the SHINING 3D Sign In page. The page has a white background with a blue header containing the SHINING 3D logo and the text "Welcome to SHINING 3D USER COMMUNITY". Below the header, there are two links: "Sign In" and "Register >>". The sign-in form includes two input fields: "Email" and "Password" (with a lock icon for visibility). Below the form, there is a link for "Forgot Password?". A blue "Sign In" button is located below the form. At the bottom, there is a link for "Help".

Log-in

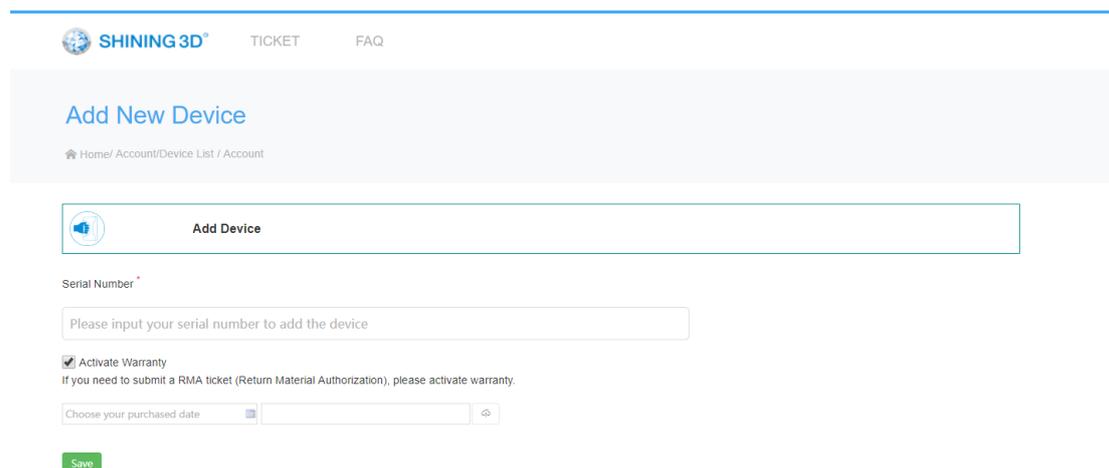
11.1.2. Validate Your Warranty

To validate the warranty of your device, click add new device in My Account.



Account page

Input the serial number, input the date of purchase and upload the copy of the invoice.



Add device page

Repeat the operation for all add-ons with the corresponding serial number. Without warranty activation the default warranty starts on the shipping date.

11.1.3. Submit a Ticket

Log in with your Community account. Click New Ticket on the tab bar. Select the serial number among the registered accounts and describe your problem.

 [TICKET](#) [FAQ](#)

Submit A New Ticket

Home/ Ticket Center / Submit A New Ticket

Owner : ██████████ [SHINING3D]

*Email : ██████████

*If your device is not on the selected list, please forward to Device Manager to [bind your device](#)

*Serial Number:

APAC EMEA AMERICAS

*Please tell us about your project or application, so that we can analyze it, target your needs and provide valuable, customized information for your ticket

*Subject:

*Description: /400

Files : 

Submit a ticket

Check your submitted tickets under the account page or the Ticket > My tickets.

Ticket Number : T201807170001100031

Serial Number : ██████████

Model : EinScan-Pro

Created Date : 2018-07-17 10:00:31

Full Name : ██████████

Owner : Individual

Engineer :

No Return Material Authorization Service

gaoming
2018-07-17 10:00:31

Subject: my scanner doesn't work

Description: can't start software. please help

 2018-07-19 18:08:26
Hello, How can I help you?

 2018-07-19 18:10:28
Are you using the latest software version?

Opened ticket

11.2. Contact Us

By email

einscan_support@shining3d.com

sales@shining3d.com

Skype: Einscan_support

Facebook Group: EinScanexpert

SHINING 3D Offices:

APAC Region & Headquarters

SHINING 3D Tech. Co., Ltd.

Hangzhou, China

Phone: +86 571 82999050

Add: No. 1398, Xiangbin Road, Wenyan, Xiaoshan, Hangzhou, Zhejiang, China, 311258

EMEA Region

SHINING 3D Technology GmbH.

Stuttgart, Germany

Phone: +49 711 28444089

Add: Panorama, Heilbronner straÙe 86, 70191, Stuttgart, Germany

Americas Region

SHINING 3D Technology Inc.

San Francisco, United States

Phone: +1 415 259 4787

Add: 1740 Cesar Chavez St. Unit D. San Francisco, CA 94124