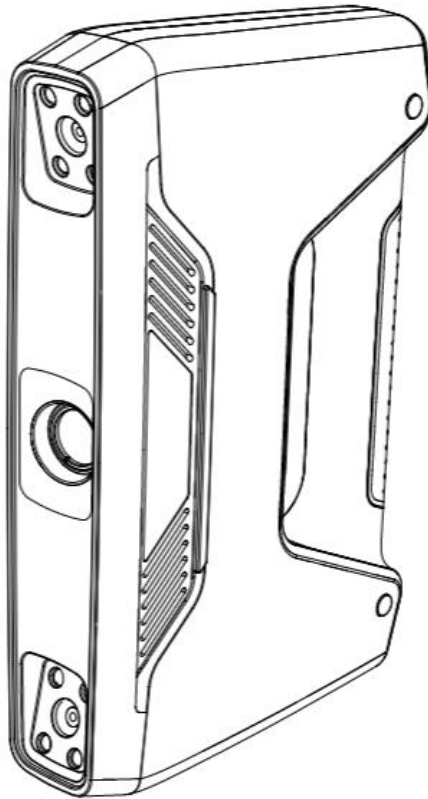




**SHINING 3D<sup>®</sup>**

# EinScan Pro 2X & HD Series User Manual



V3.7.1




**SHINING 3D<sup>®</sup>**

# Foreword

## General

The user manual (hereinafter referred to as "the Manual") introduces the functions, installation, usage and maintenance of the EinScan Pro 2X & HD Series (hereinafter referred to as "the Scanner") and the EXScan Pro software (hereinafter referred to as "EXScan Pro").

## Safety Instructions

Signal	Meaning
	Additional information to give you a prompt.
	Improper actions or conditions that may damage the product or cause injury, and consequently void your warranty or service contract or lose the patient data or system data.
	The safety instructions that you must precisely follow to avoid injury. Failure to observe can cause damages to your product, or result in personal injuries, or even death.

## Revision History

No.	Version	Revision Content	Release Date
1	V3.7.1	Add content of Shining Pass. Adjust the title and sequence of chapters.	April, 2022
2	V3.7.0	Modify content of creating a new project. Change chapter sequence.	October, 2021
3	V3.6.0	Combine EinScan 2X series manual and EinScan E7 series manual into one.	October, 2020

## About the User Manual

The Manual is related to your safety, lawful rights and responsibilities. Please read it carefully before installing and using the product.

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- Images and diagrams in the Manual are presented to provide convenience to readers. If any of them is inconsistent with the actual product, the actual product shall prevail.
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- If you have any ambiguity or suggestion about the contents of the Manual, please contact us by the contact information provided in the Manual.

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# 1. Product Introduction

The Scanner is a unique multi-functional 3D digitizing device with multiple 3D Scanning modes. It's designed to improve the efficiency in generating high-quality 3D models, which makes 3D scanning technology accessible to either professional users or new users. The modular design provides a professional, yet still easy to use 3D digitizing solution for versatile applications.

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

## 2. Notes

Check the package according to the following checklist. If you find device damage or any loss, contact the after-sales.

Item	Quantity
Scanner body(with USB 3.0 cable)	1
Power adapter	1
Power cable	1
USB flash drive	1
Calibration board	1
Calibration board bracket	1
Markers	1
Phone screen mount	1
Cable clip	1
Markers remover	1
SolidEdge License Card	1

### 2.1 Buttons



Serial number



+/- buttons  
Play button



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

#### 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.

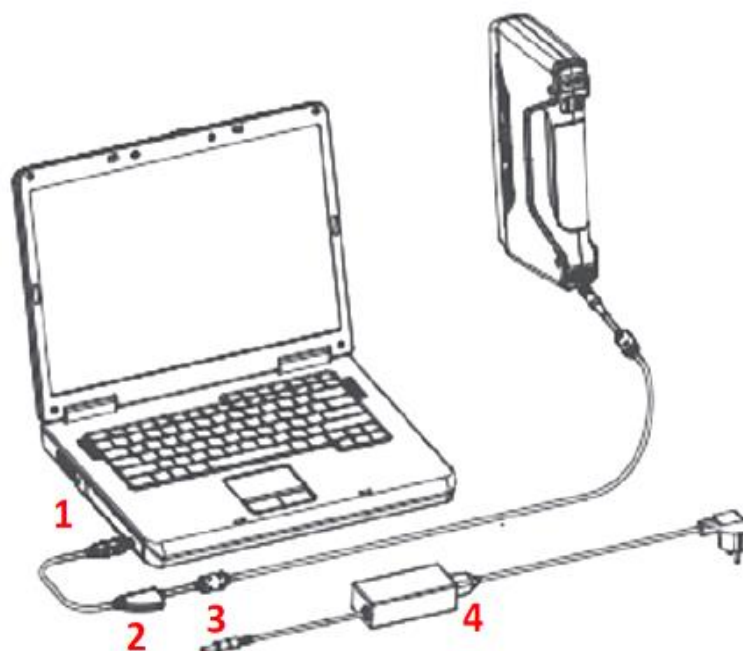


#### "-" & "+"

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



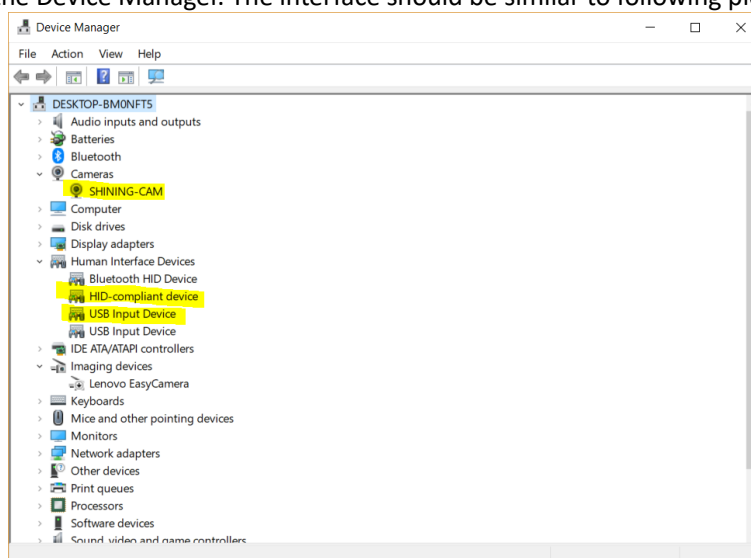
## 2.2 Connection



Step 1 Connect the scanner cable to PC USB 3.0 port "1".

Step 2 Connect the power port "2" to port "3" and connect the power adapter "4" to power source.

Step 3 Check the Device Manager. The interface should be similar to following picture.



### Note:

- USB 3.0 should be blue, and/or present the "SS" logo.



- Ensure that all the cables are not loose during the scanning operation. You are suggested to use fastening tools to prevent the device from being offline.
- 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 the USB and plug it again, Windows will reinstall the drivers by itself.

## 2.3 Installation to Add-on

There are color pack, HD prime pack, and industrial pack for different models.

### 2.3.1 Color Pack



#### Steps

Before installation, make sure the device is powered off.



(1)

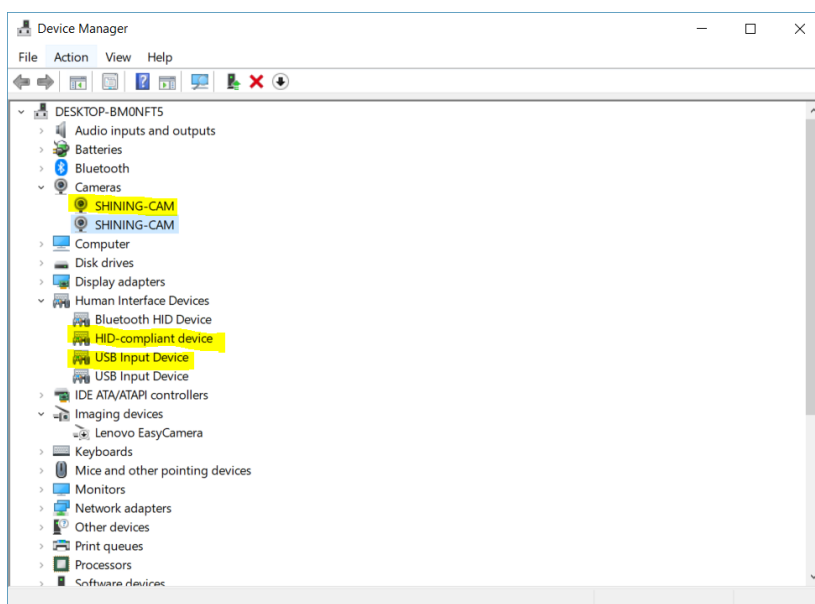


(2)



(3)

- 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.



## 2.3.2 HD Prime

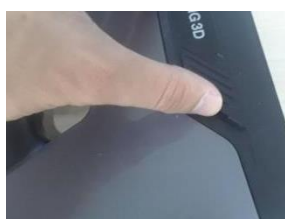


**Note:** HD prime is available only for EinScan 2X Plus and EP.

### Installation

#### Steps

Before installation, make sure the device is powered off.



(1)

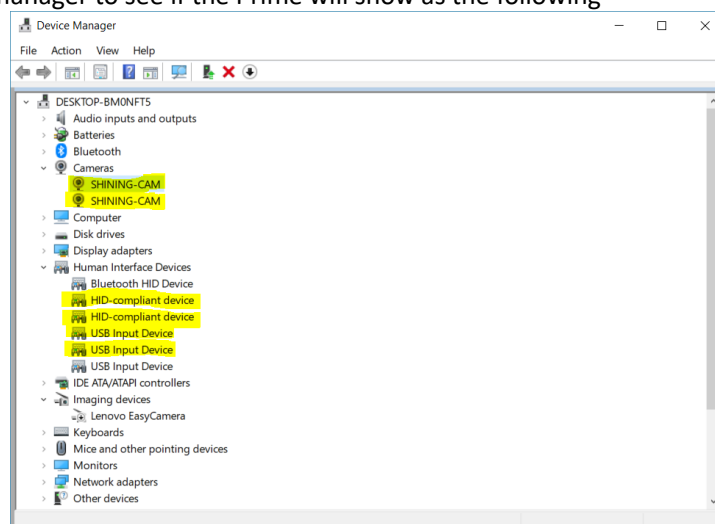


(2)



(3)

- Remove the add-on port cover on the top of the scanner. (1)
- Rotate the hook (rotary lever) to the left side. Plug in the HD Prime Pack. (2)
- Turn the hook (rotary lever) to the right to lock the Prime in position. (3)
- Plug the scanner to the computer then plug in the power cable; the drivers will install automatically.
- To remove HD Prime, rotate the hook (rotary lever) clockwise before unplug.
- Check the device manager to see if the Prime will show as the following



When add the Prime pack , device type on the navigation bar will be shown (P).



## Calibration

Calibration should be performed every time you plug in the HD Prime Pack to insure the correct matching with EinScan.

Use the front side (Black) of the calibration board for Prime calibration. In the calibration interface, run the Calibration with the normal method (see “camera calibration”)

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

After calibration, perform the Accuracy test or click Next to go back to the Mode selection menu.

## 2.3.3 Industrial Pack

### Packing List

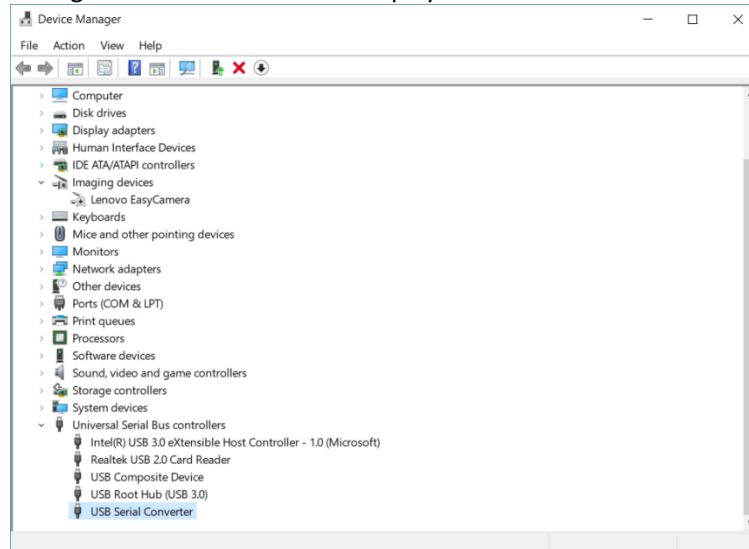
Item	Quantity
Turntable	1
Tripod	1
Scanner tray (Cradle switch stand)	1
USB cable	1
Power adapter	1
Power cable	1

### 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

## 3. Installation to EinScan Pro

### 3.1 PC Requirements

Item	Requirement
Running Environment	Win10 (64 bit) or higher
CPU	Intel Core i7-8700 or higher
Graphics card	2X Series: NVIDIA GTX1060 or higher 2020 Series: NVIDIA GTX1080 or higher
Video memory	≥8G
Memory	2X Series: 32G or more 2020 Series: 64G or more
USB	At least one USB 3.0
Resolution	1920*1080    DPI: 100%; 125% 3840*2106    DPI: 100%; 200%

### 3.2 Download

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

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

**Software Download**

Windows  
EinScan-SE SP & EinScan-Pro Pro+  
**EinScan Software Download**  
EinScan-S  
EinScan\_S\_series software download

**User Manual**

EinScan-SE SP  
Windows  
EinScan-SE User Manual 2.6.pdf  
EinScan-SP User Manual 2.6.pdf  
Mac  
EinScan-SE User Manual Mac-1.3.pdf  
EinScan-SP User Manual Mac-1.3.pdf

**Video Tutorials**

EinScan-S & EinScan-Pro  
EinScan-SE Setup Video Tutorials  
EinScan-SP Setup Video Tutorials  
EinScan-S Setup Video Tutorials  
EinScan-Pro Setup Video Tutorials  
Einstart-C

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

Name \*


Email \*

Country \*

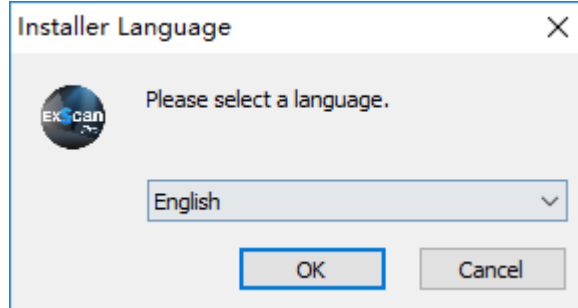
Please choose your scanner model \*

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

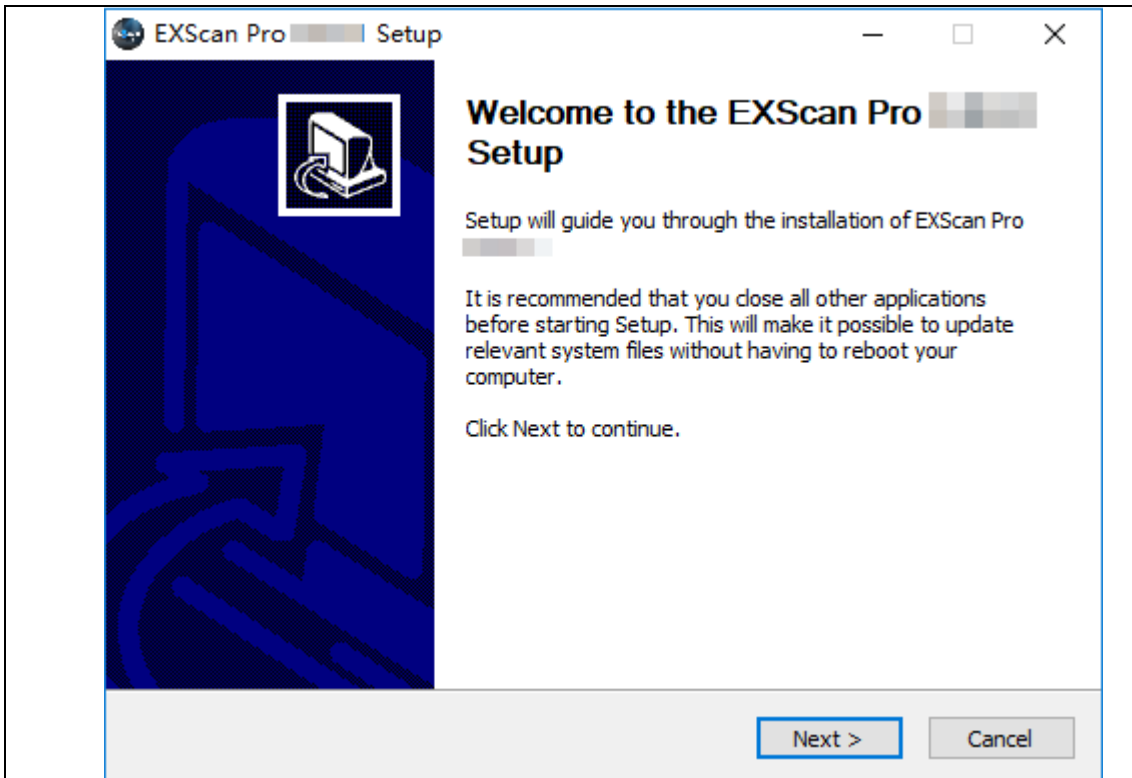
### 3.3 Software installation

 Double-click installation package, accept the modification on your computer

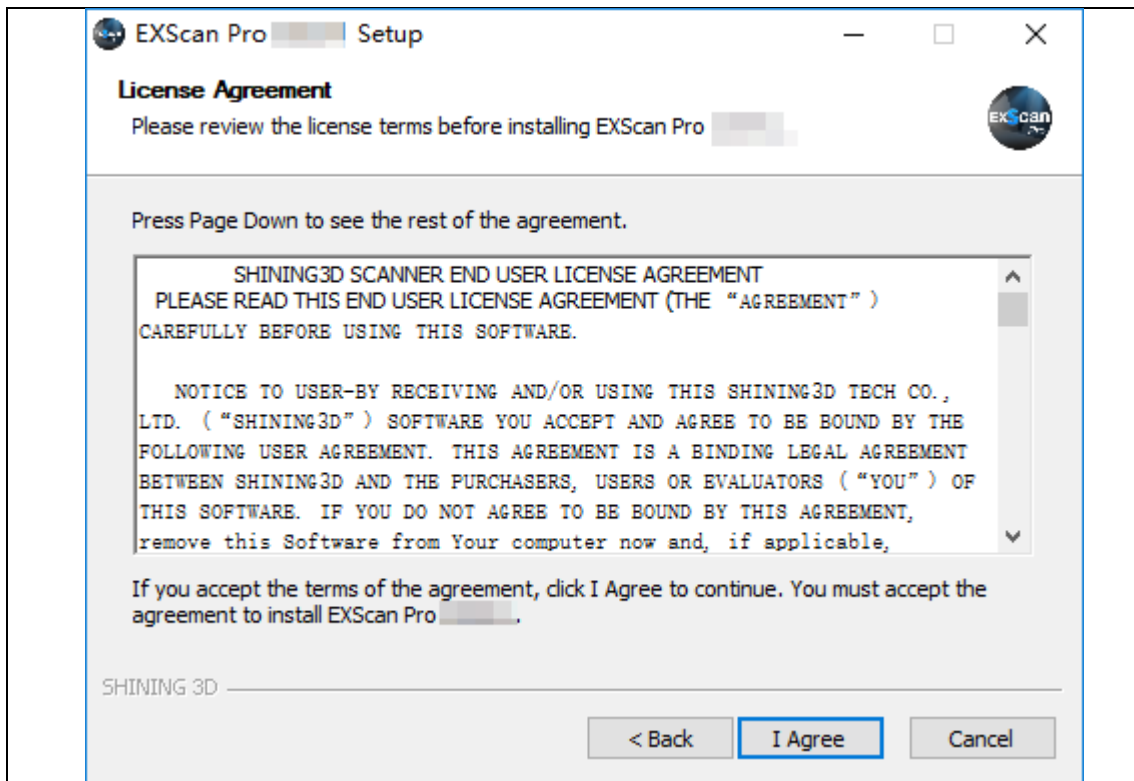
Choose the installation language, then click OK.



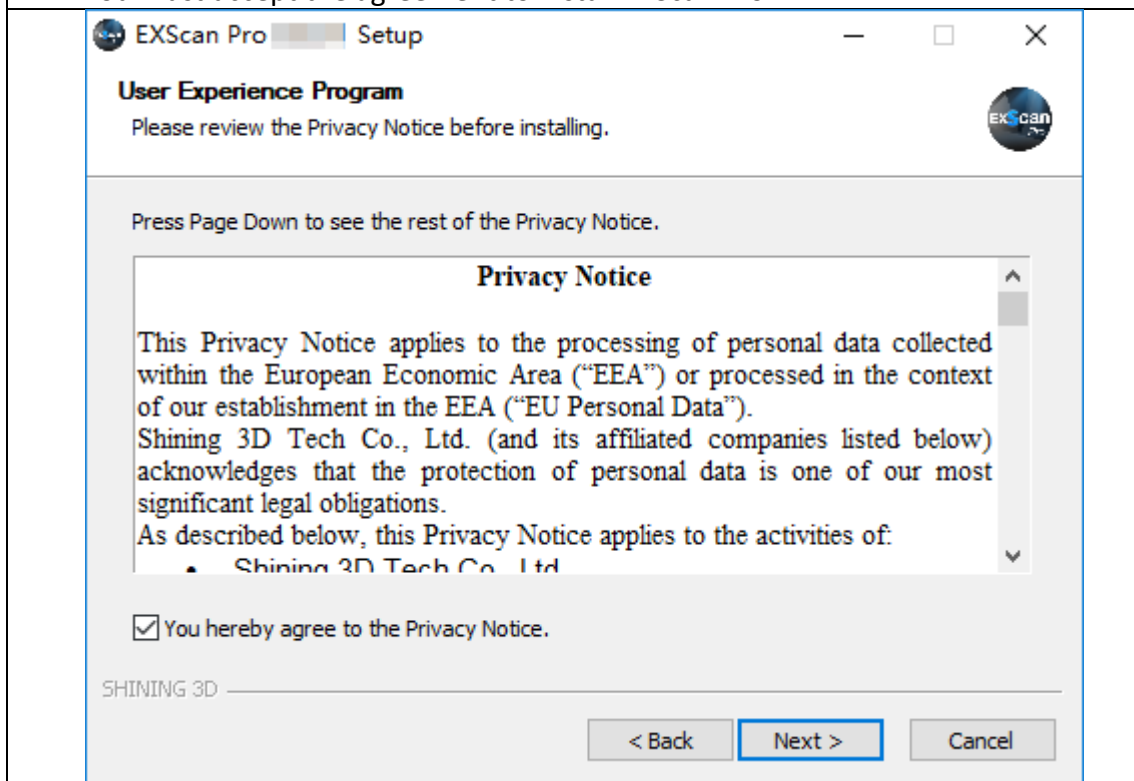
*Select installation language*



Follow the instruction on the pop-up window.

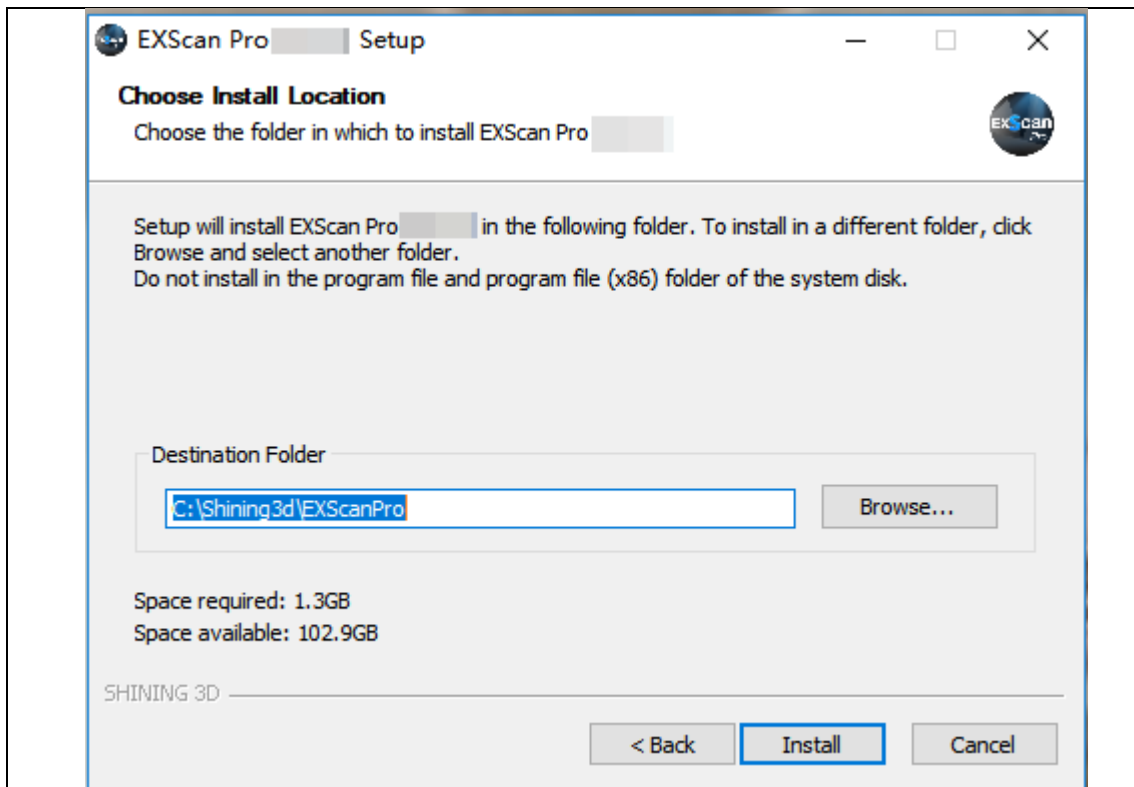


You must accept the agreement to install EXScan Pro.

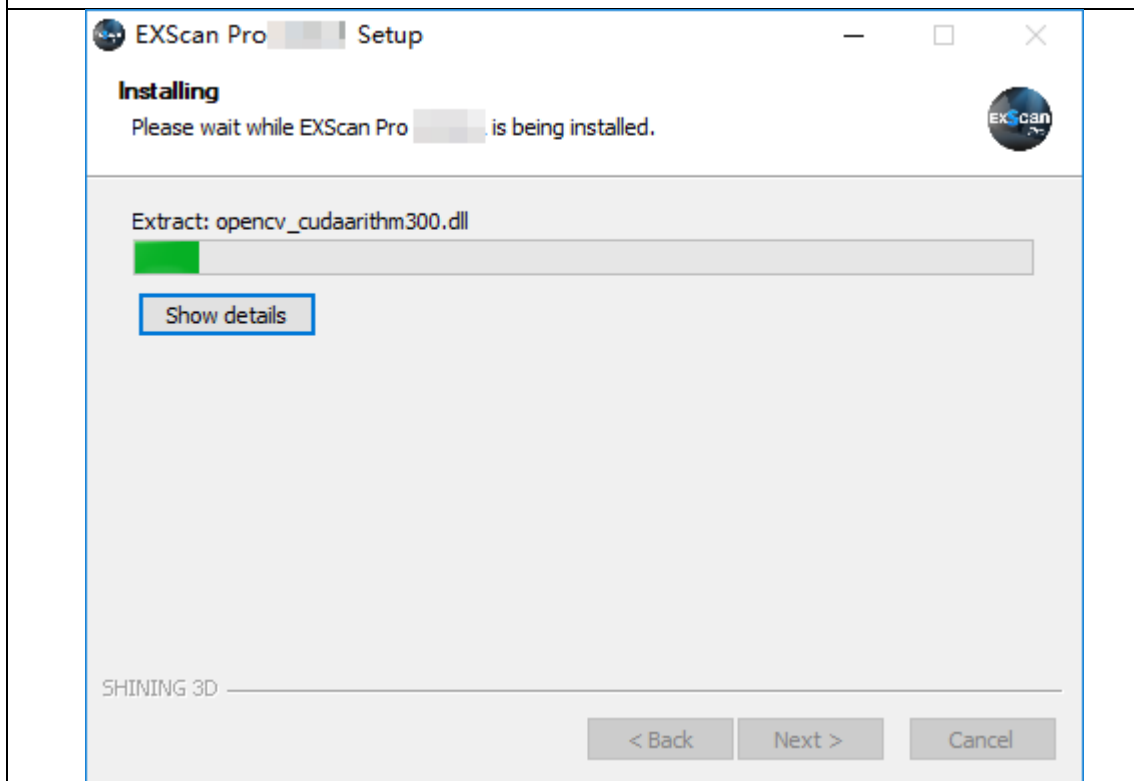


Click the Checkbox and click Next to approve the Privacy Notice.

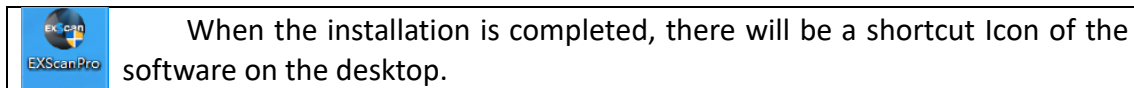
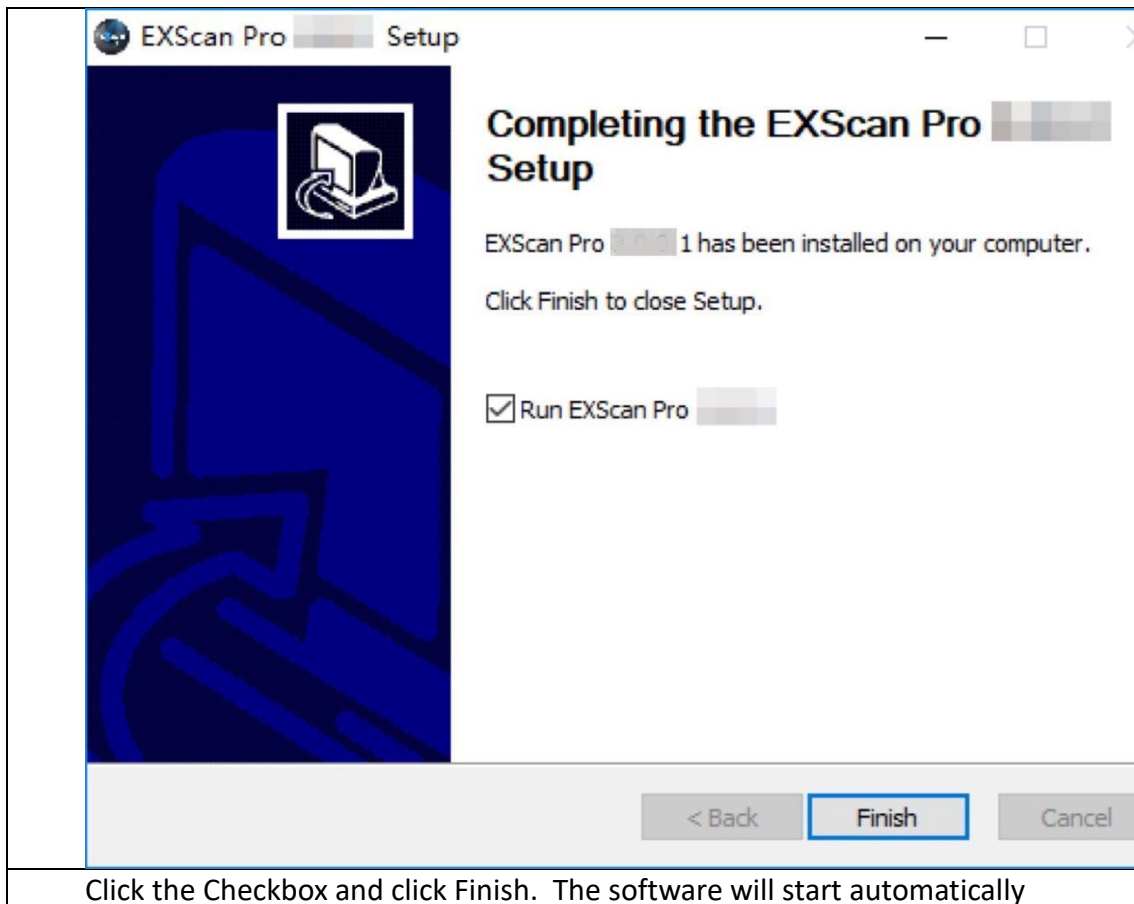




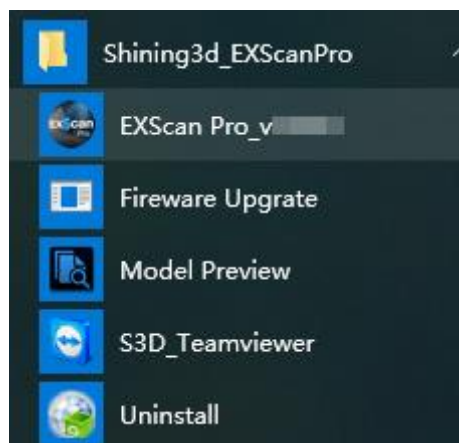
Choose the default installation path or click the Browse button to select the installation path. Default installation path is recommended.



Wait for the installation to be completed.



The shortcut in the Start Menu is shown as below:



### 3.4 Uninstallation

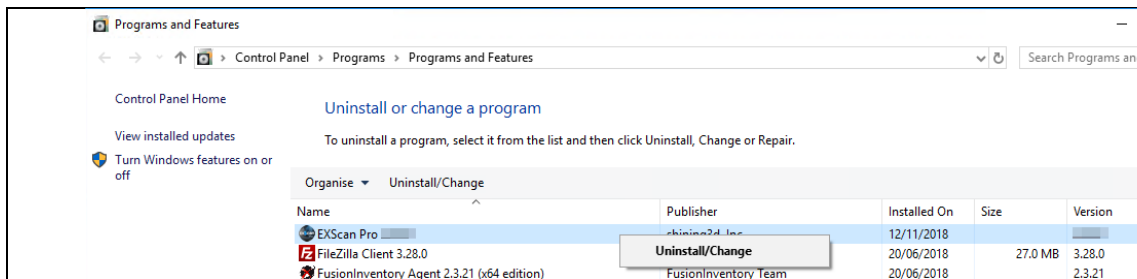
To install upgraded version of EXScan in the future, you may need uninstall previous software first.

To uninstall the software, when the software is closed, in the Start menu click Uninstall.

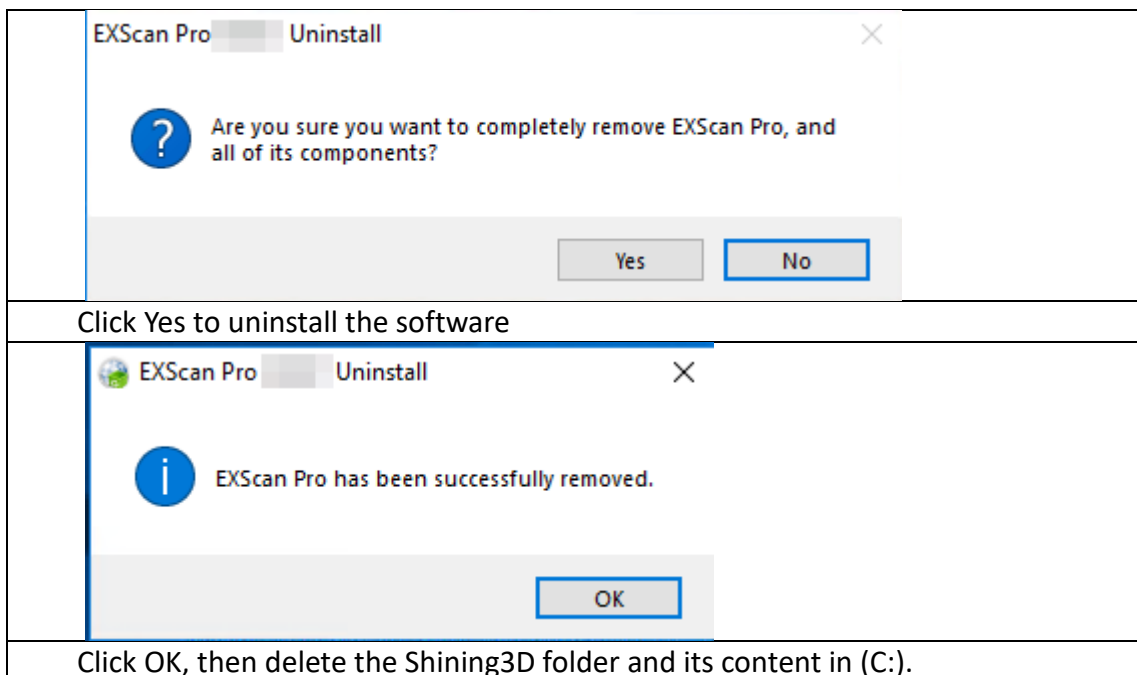


start menu > Shining3d\_EXScanPro > Uninstall

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



Follow the instructions step by step.



### 3.5 Shinning Pass

Shining 3D User Account

Login

by account by verification code

+ 86 中国 China

Input E-mail or phone number.

Input password


I have read and accepted Privacy policy [Forgot password?](#)

Login

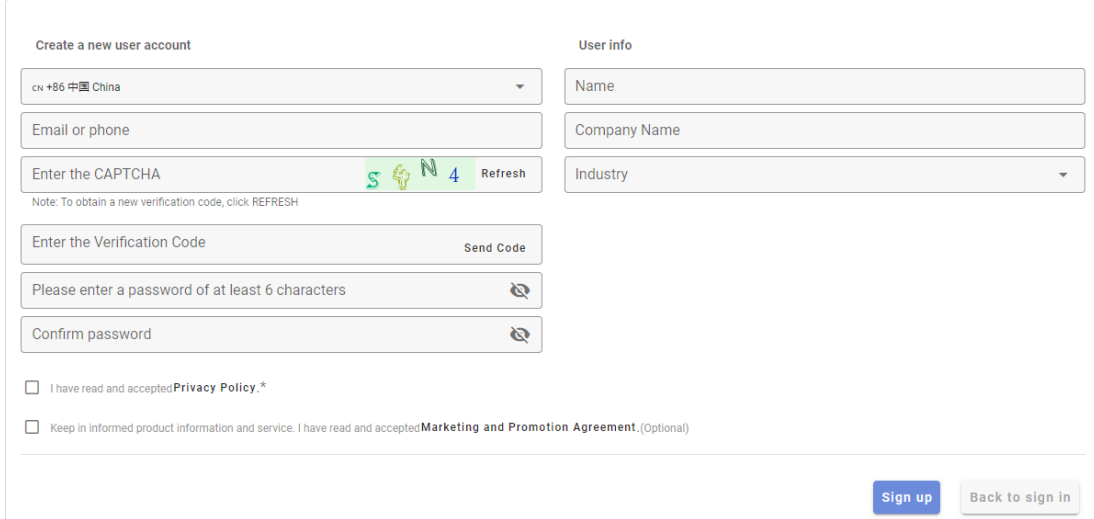
[Register](#) | [Activate offline](#) | [Device offline mode](#)

Before getting shining pass, ensure that the device has been connected properly (refer to [Connect Cables](#)).

### 3.5.1 Registration

Double-click  to enter the software. Register firstly if you do not have a shining pass.

**step 1.** Click  or go to <https://passport.shining3d.com/signup> for register, there will be a pop-up.



The screenshot shows a registration form titled "Create a new user account". It is divided into two main sections: "Create a new user account" and "User info".

- Create a new user account:**
  - Country/Region: A dropdown menu showing "CN +86 中国 China".
  - Email or phone: A text input field.
  - Enter the CAPTCHA: A field with a CAPTCHA image showing "S N 4" and a "Refresh" button. A note below says: "Note: To obtain a new verification code, click REFRESH".
  - Enter the Verification Code: A text input field with a "Send Code" button.
  - Please enter a password of at least 6 characters: A text input field with a strength indicator icon.
  - Confirm password: A text input field with a strength indicator icon.
  - Checkboxes for terms and conditions:
    - I have read and accepted **Privacy Policy**.\*
    - Keep in informed product information and service. I have read and accepted **Marketing and Promotion Agreement** .(Optional)
- User info:**
  - Name: A text input field.
  - Company Name: A text input field.
  - Industry: A dropdown menu.

At the bottom right, there are two buttons: "Sign up" (blue) and "Back to sign in" (grey).


**step 2.** Follow the instructions and fill the blanks.

**step 3.** Click **Privacy Policy**, read the content carefully before checking **I Have Read and Accepted Privacy Policy**.

**step 4.** Click **Marketing and Promotion Agreement**, read the content carefully before choosing whether to check **Keep Informed Product Information and Service. I Have Read and Accepted Marketing and Promotion Agreement** or not.

**step 5.** Click **Sign Up**.



### 3.5.2 Login


Double-click  to enter the shining pass pop-up.

Password and verification code are both available for login. Input E-mail address or phone number and password or received verification code according to the instruction.

Once log in successfully, your account's information will be saved for auto login.

#### Device Offline Mode

Click  or close button  to enter the offline-mode operating interface. Offline mode only supports importing and processing projects with scanned data, while it does not support calibrating and scanning operations.

To connect device under offline mode, click the reconnect button  to re-enter the shining pass interface .



**Note:** After login and entering the operating interface successfully, if the scanner is disconnected, EXScan system would enter the offline mode automatically.

### 3.5.3 Activation

Activate the shining3d pass for full permission.

Both **Online Activation** and **Offline Activation** are available for downloading the permission file.

#### Online Activation

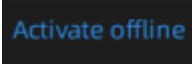
If the computer with installed software has being networked, after registration, the activation will be processed automatically, and the operation interface will appear on the desktop as soon as finishing the online activation.

#### Offline Activation

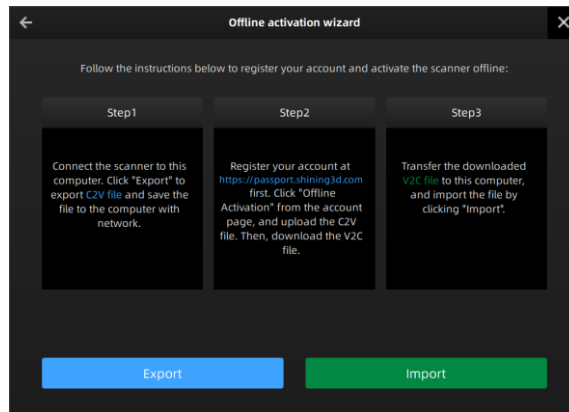
If there is any issue with the network, it is needed to save the permission file (C2V file) under the activation menu manually. Perform the following operations.

Preparation:

**step 1.** Connect a USB disk or a portable hard disk (hereinafter referred to as “the disk”) to the computer installed with EXScan before offline activation.

**step 2.** Click  for entering offline activation interface.

Steps:



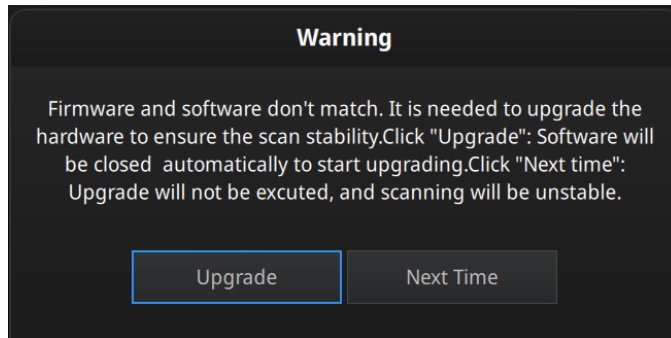
**Figure 2-3 Offline Activation Wizard**

- Export C2V file: Click **Export** on the offline activation pop-up and save C2V file to the disk.
- Upload C2V file:
  - step 1.** Plug the disk into a networked computer.
  - step 2.** Enter <https://passport.shining3d.com/login>, then choose to log in or register a new account.
  - step 3.** Click **Offline Activation** after logging in successfully.
  - step 4.** Upload the downloaded C2V file.
- Export V2C file: Export V2C file corresponding to the account to the disk.
- Import V2C file.
  - step 1.** Plug the disk back into the computer installed with the software.
  - step 2.** Click **Import** on the offline activation pop-up.
  - step 3.** Import V2C file to Shining Pass, then the scanner is fully activated.

If the activation fails, just contact us through the mailbox ([EinScan\\_support@shining3d.com](mailto:EinScan_support@shining3d.com)). Send us the serial number of your device through mail and we will try the best to make the things right for you.

### 3.6 Firmware Upgrade

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

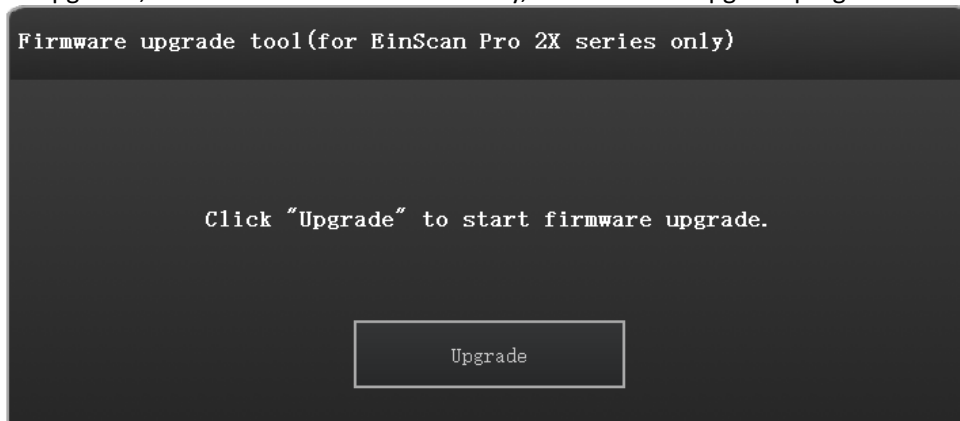


*When firmware doesn't match*



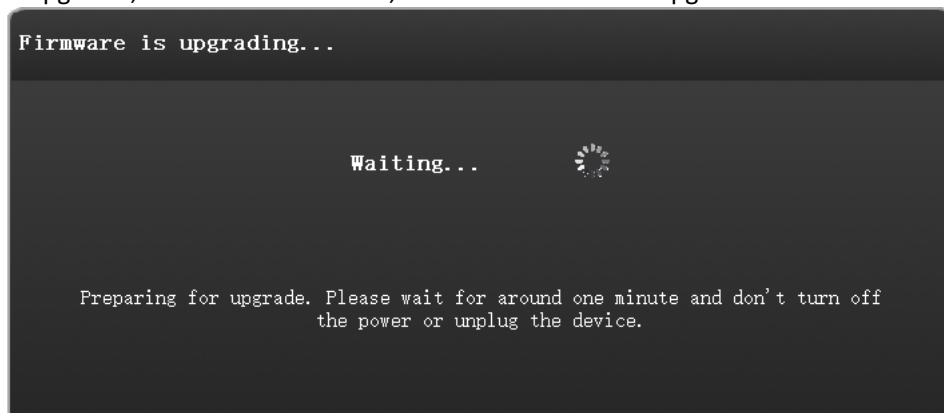
**Caution:** Loosing connection during Firmware upgrade can cause damages on the hardware, make sure a well connection (USB and Power) during the upgrade

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



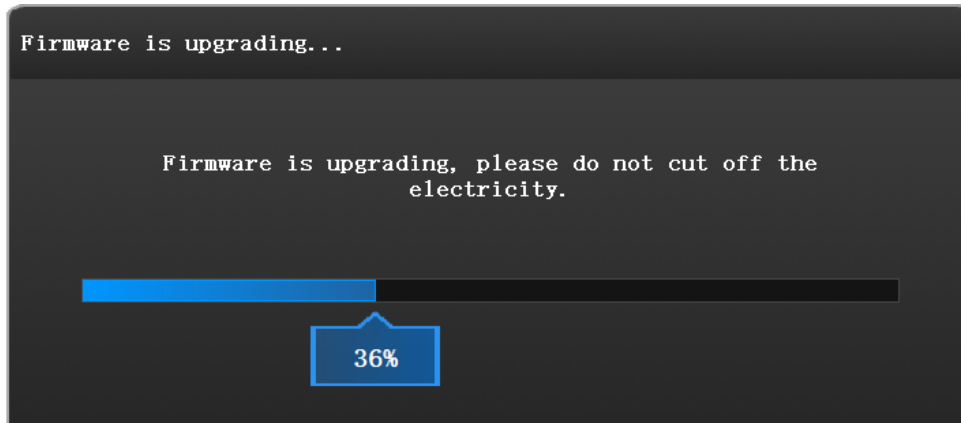
*Firmware upgrade program*

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



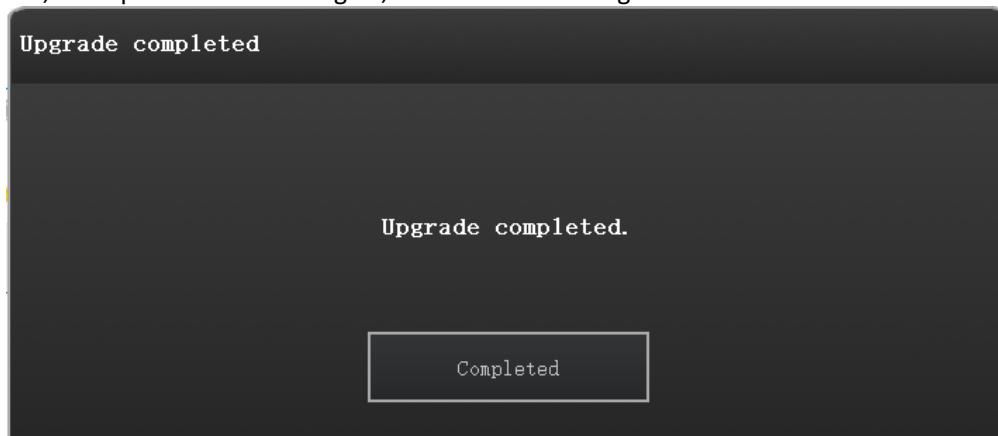
*Waiting to upgrade firmware*

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



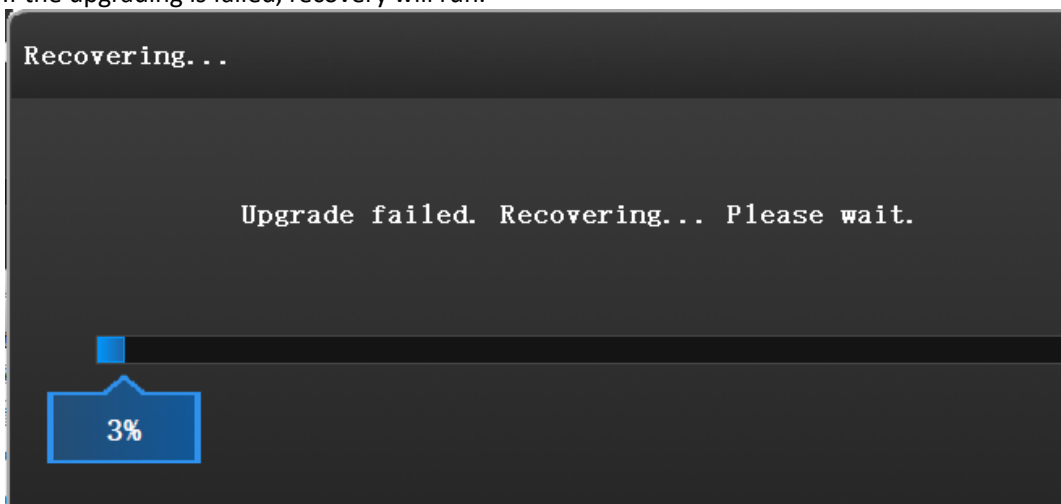
*Firmware Upgrading*

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*

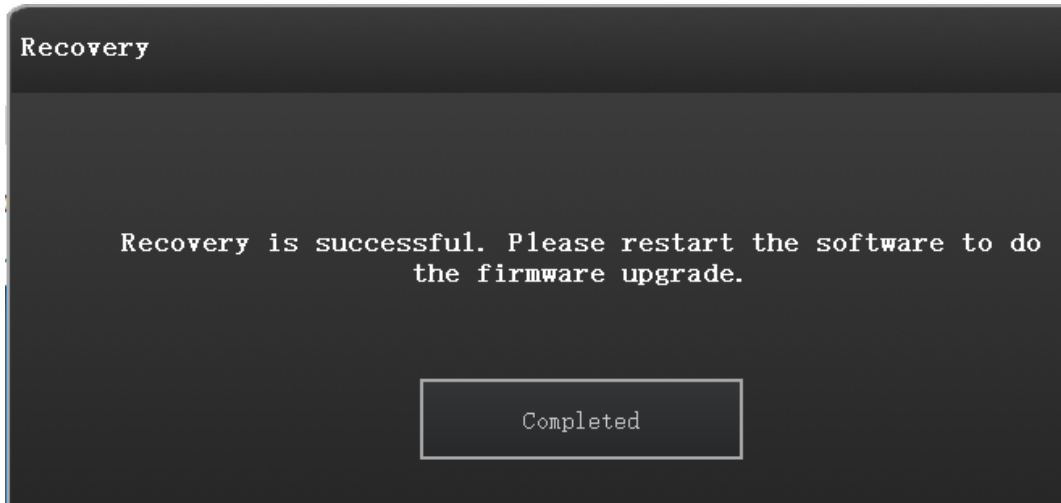
If the upgrading is failed, recovery will run.



*Recovering from a failed upgrade*

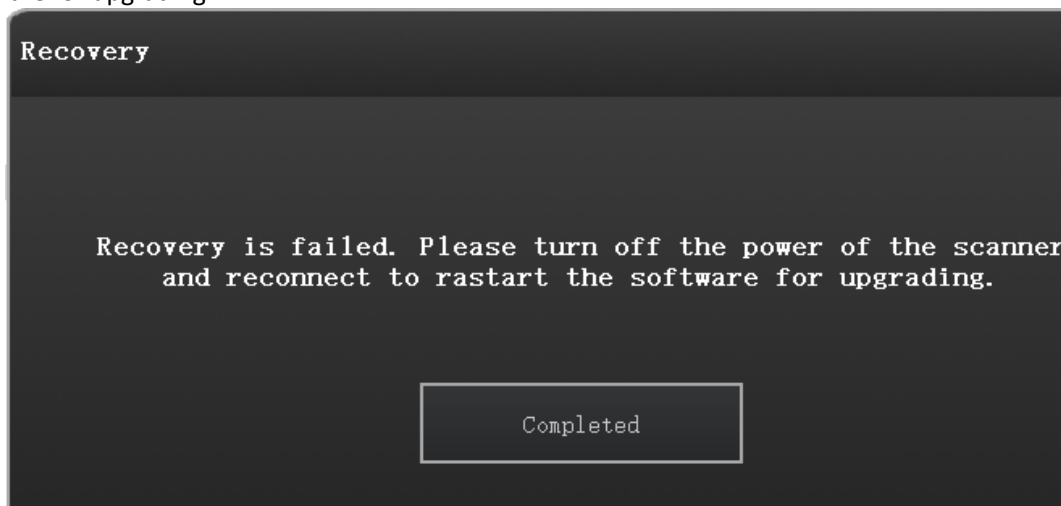
Recovery is successful. Please restart the software to upgrade the firmware.





*A successful recovery*

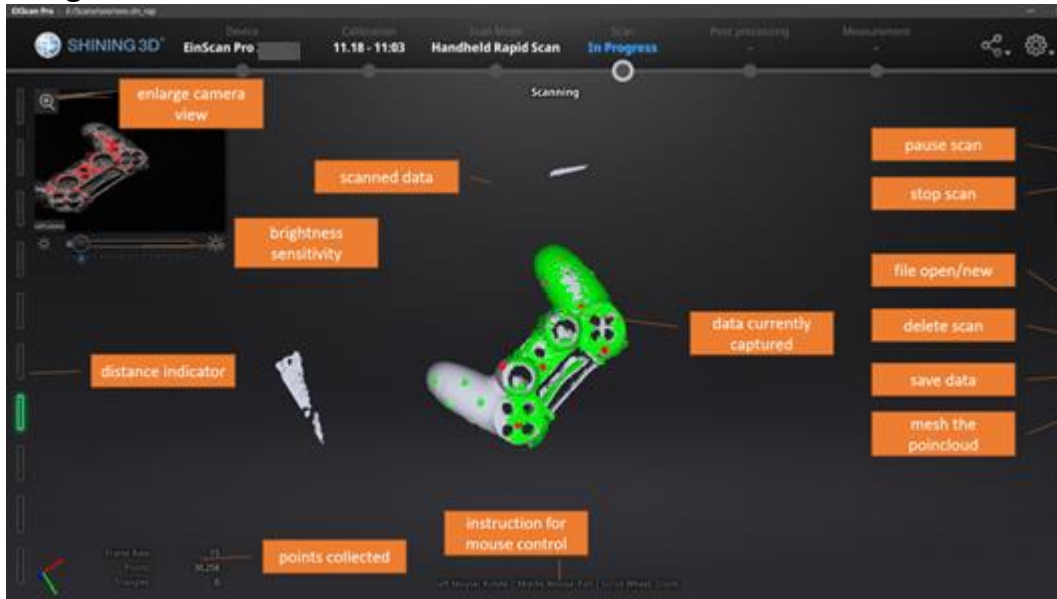
If recovery fails, turn off the power of the scanner and reconnect the scanner to restart the software for upgrading.



*A failed recovery*

### 3.7 Interface and Parameters

#### 3.7.1 Navigate



*Interface navigation*

**Left mouse:** rotate

**Middle mouse:** move the data

**Scroll up and down:** zoom in or out

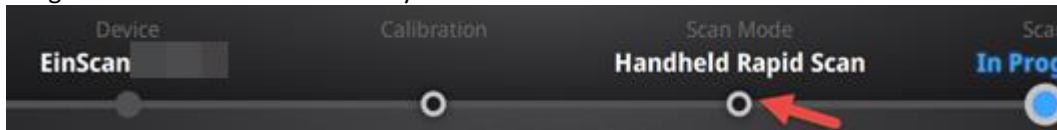
**Keyboard:**

Spacebar to scan again or restart the scan & validate

Delete key to delete selected data

Esc key to exit current pop-up

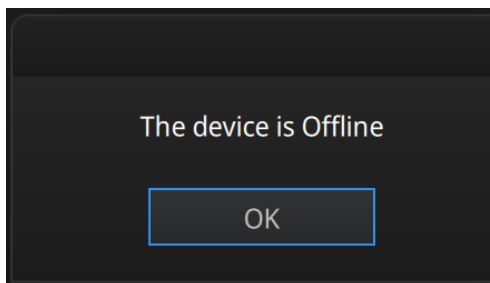
Navigate between different menu by click on the circle.



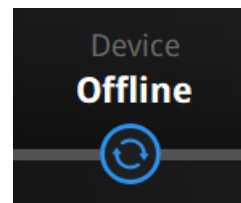
*Navigation bar*

#### 3.7.2 Device Re-connection

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.




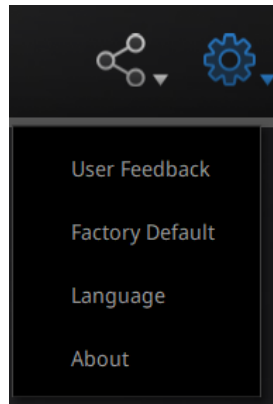
*Device offline or connection loose*



*Refresh the connection on the status bar*

### 3.7.3 Settings

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



*Drop down menu*

### Feedback

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

*Feedback window*

## User Experience Enhancement Program

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

## Factory Default

All settings modifications will go back to the original settings.

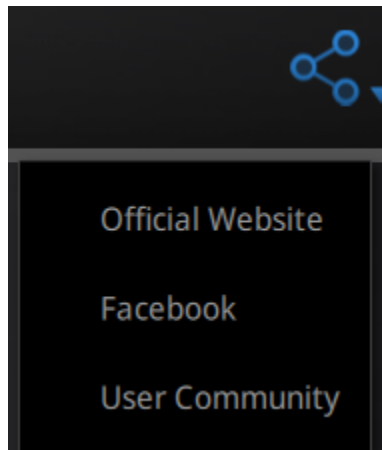
## Language

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

## About

For version information and support, email [einscan\\_support@shining3d.com](mailto:einscan_support@shining3d.com).

### 3.7.4 EinScan community



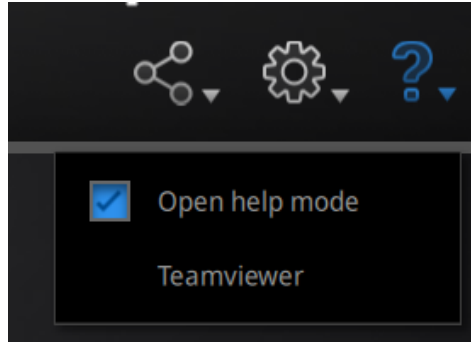
*Community drop down menu*

- **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](http://community.shining3d.com).

### 3. 7. 5 Help Mode

#### Help Mode

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



*Drop-down menu*

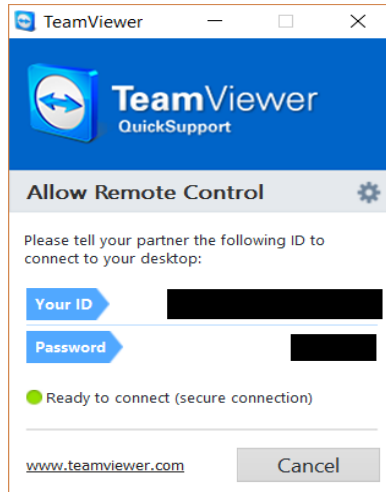
Display the help tool related to the current interface.



*Help window*

#### TeamViewer

It opens S3D\_teamviewer.exe, for online customer support access or display to another 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*

### 3.7.6 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](mailto:einscan_support@shining3d.com).

#### Failure to Activate

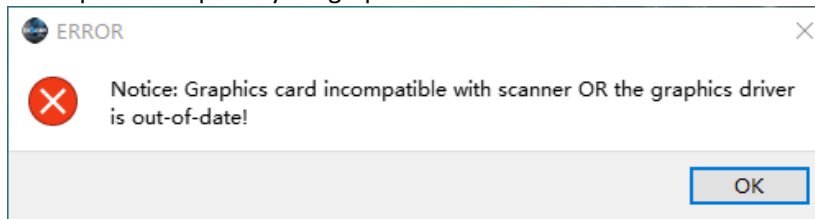
For activation failure, make sure the scanner is well connected. Redo the activation.

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

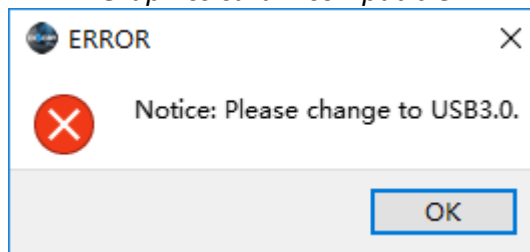
*Device fails to activate*

#### Incorrect configuration

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

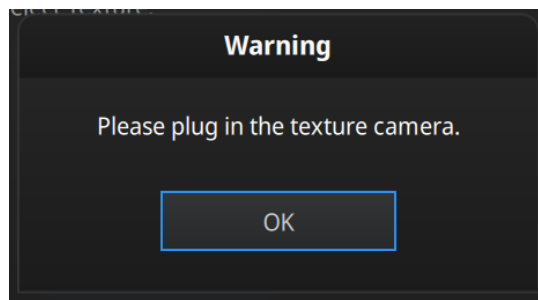


*Graphics card incompatible*



*USB not 3.0*

## Unavailable Scan Mode



*Add-on is required for this function*

### 3.8 Workflow



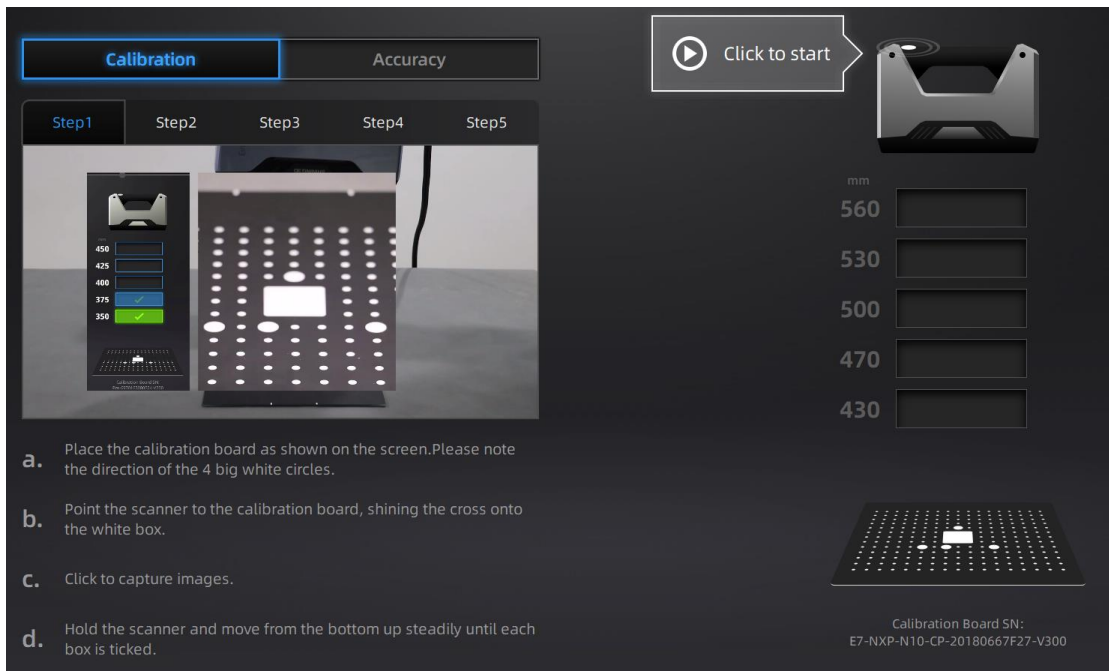


## 4. Calibration

### 4.1 Requirements

Calibration helps the device scan with the optimal accuracy and quality. The parameters of the scanner will be recalculated during the calibration.

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

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.

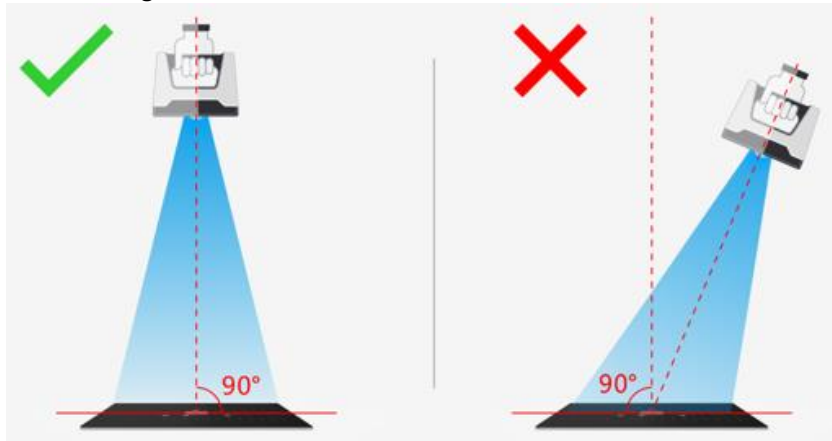
### 4.2 Calibration

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, and 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  on the interface or press  on the scanner to capture.

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

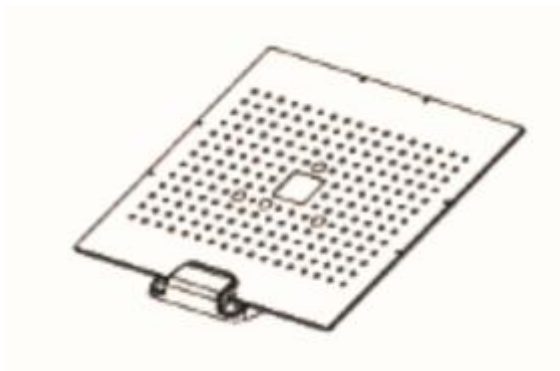
530

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**

**Calibration Success**

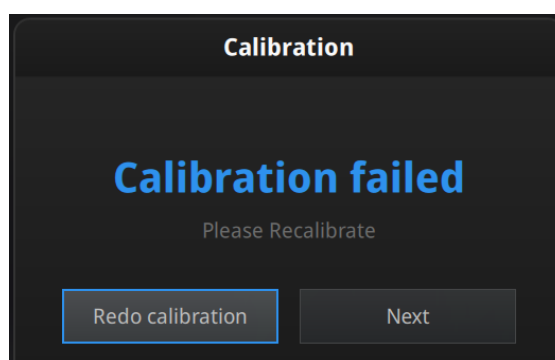
Calibration error:0.030577 Pixel

Next

*Camera calibration result*

If calibration fails, click **Redo calibration** to start the same calibration again from the

beginning.

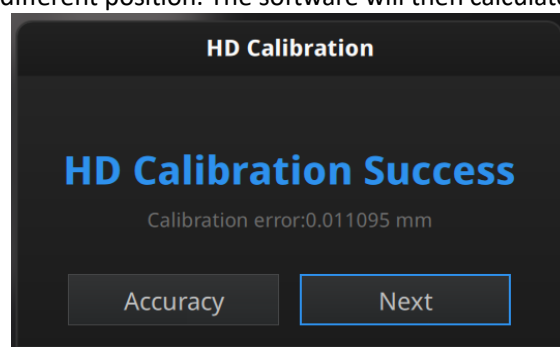


*Calibration failed*

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.

### 4. 3 HD Calibration (Only for EinScan Pro 2X)

On the back side (white) of the calibration board follow the instructions on the video and on the screen to capture the different position. The software will then calculate.



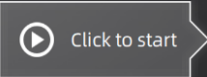

*HD calibration succeeded*

Click **Next** to enter the **Scan Mode** interface.

### 4. 4 Accuracy Test

While scanning, if markers cannot be recognized, tracking is easily lost or misalignment happens, we suggest testing the accuracy.

This process is similar to scanner calibration. Scan on the front side of the calibration board (black) to do an accuracy test.

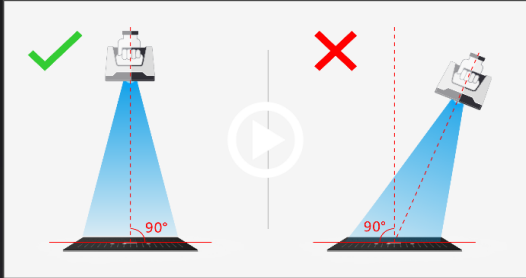
Click  on the interface or press  on the scanner to capture.

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 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

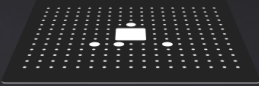
560

530

500

470

430



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

**Accuracy**

**Error:0.020527 mm**

Accuracy
Next

*Accuracy error result*

*How it works: The software calculates point position and compares it to the known value. The deviation is displayed as result.*

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

Click **Next** to enter the **Scan Mode** interface.

## 5. Scanned Objects

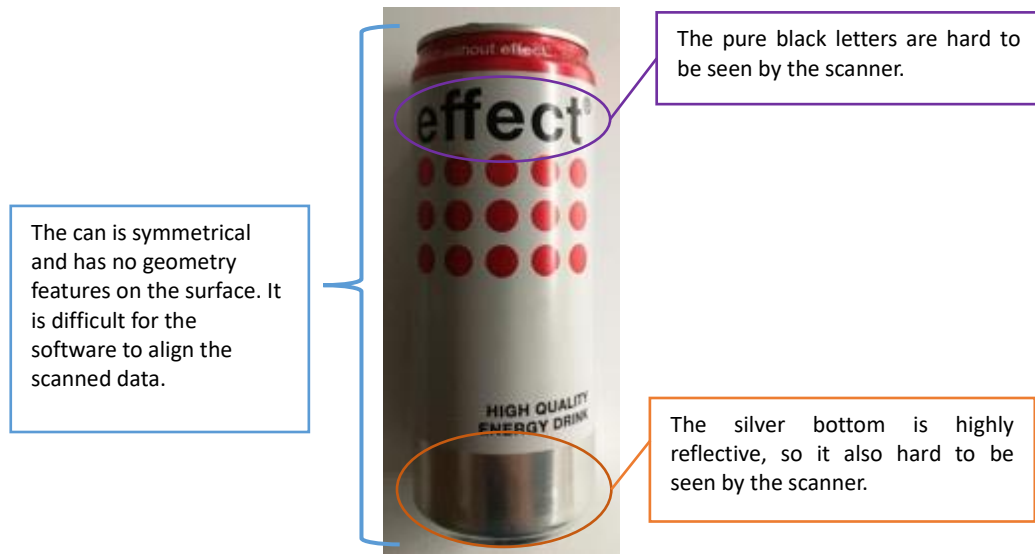
### 5.1 Requirements

EinScan Pro 2X 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 (People must keep still while doing human body scan, for example).



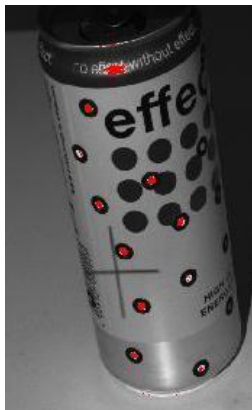
*Example of object that is difficult to scan*

### 5.2 Sticking Markers

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 sticking markers on the scanned object surface:

- (1) Stick 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 image 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.



*Stick 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 image above).

### 5.3 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
Fixed Scan (with turntable from industrial pack)	★★★★	★★	★★★★
Fixed Scan (without turntable)	★★★★	★	★★★★
Handheld HD Scan	★★★	★★★	★★★
Handheld Rapid Scan	★	★★★★	★★

Scan Mode		Support Align Mode
Fix Scan		Feature/Marker/Turntable Coded Targets(With Industrial pack)
Handheld HD Scan	2X/2X Plus	Feature(2X Plus with Prime Pack)/Marker
	2X 2020/Pro HD	Feature/Marker/Hybrid/Texture(With Color Pack)
Handheld Rapid Scan		Feature/Marker/Hybrid/Texture(With Color Pack)

## 6. Scan

### 6.1 Fixed Scan Mode (Use for industrial pack)

Fixed scan mode is for high resolution and high accuracy scanning for small size (from 30\*30\*30 mm<sup>3</sup>) to medium size objects.

Under the 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.

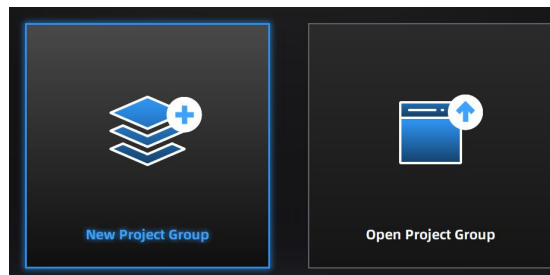
#### Notes:

- The tripod is not included in the standard delivery package. It is included in Industrial Pack together with a turntable.
- The texture camera (color pack) can be used under the mode.
- 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. Instead, you can use geometry features or markers on the object's surface for automatic alignment or use manual alignment mode to get the whole scanned data.

#### 6.1.1 Create a Project

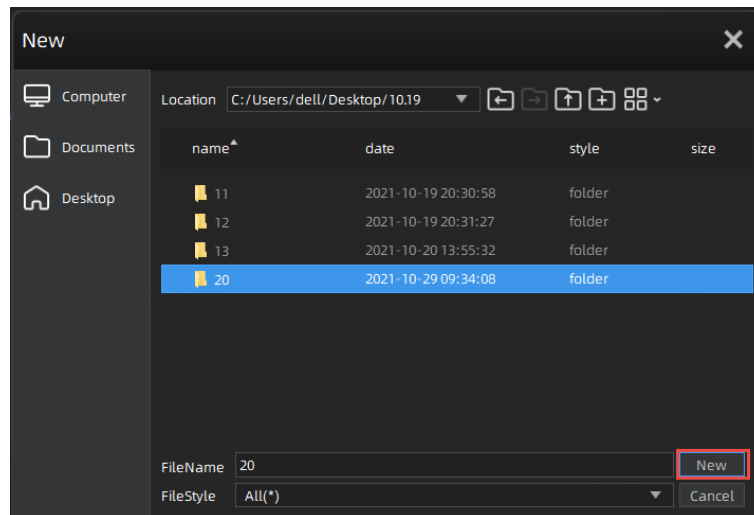
Step1 Create a project.

Enter the interface of **New Project** or **Open Project**. Click **New Project**, select a storage location from **Computer**, **Documents** or **Desktop** (desktop by default). Create a folder, click to select it and click **New**. Then select from **Texture Scan** and **Non-texture Scan**. Texture scan is available only when color pack is attached to the scanner.

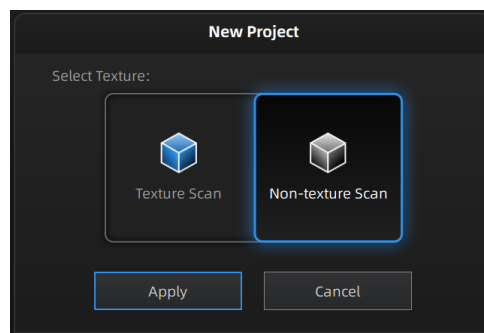


Create or open a project

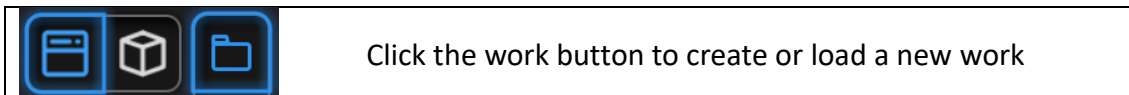




Select project storage location



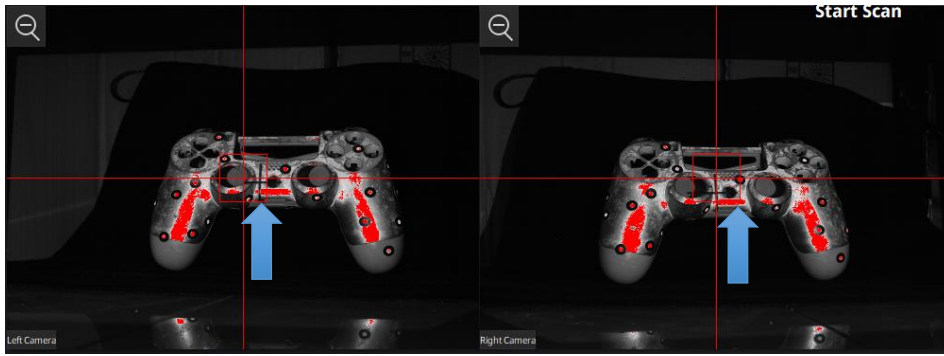
Select texture



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

Step 2 Adjust working distance.

- 1) Adjust the Scanner distance from the scanned object. The optimal distance is 510 mm, the closest distance 410 mm and the furthest 610 mm. Do not move the Scanner when under scanning.
  - 2) Check the projected cross on the on the camera 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.
- In the camera window, if the cross is to the left of the red rectangle, it means that the distance is too close. Otherwise, the distance is too far.
  - With proper distance, the cross is in the red box.



Scanning diagram

### Step 3 Scanning interface introduction.



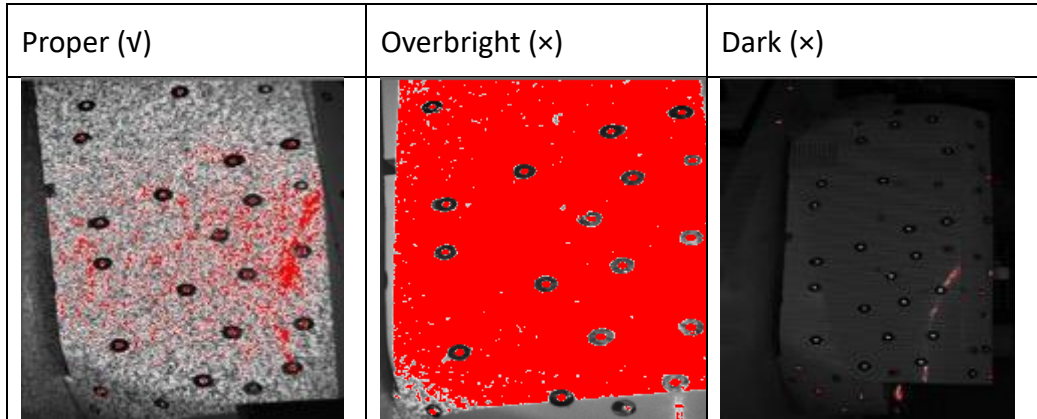
Scanning interface

Right-click on the camera window to display the right camera 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.

**Step 4 Adjust brightness.**

On the camera preview window, red means overexposed, black means underexposed, and white or light grey means proper. 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.




1) When under scanning or under preview mode, to adjust the image brightness:

- Double-click  and press + or - on the Scanner.
- Drag the brightness bar under the camera preview window to the left (-) or right (+).



Brightness bar under the camera preview window

- 2) Double-click  on the Scanner to exit the brightness adjustment.
- 3) 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 on HDR

### 6. 1. 2 Scan



Prescan feature is not available for fixed scan mode.

	Click or press the Space key to start scanning.
	Click to pause the scanning and click again to resume.

When the scan is completed, the data is automatically saved in the project file. Ensure the relative position

does not change during the scan.

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

## 6.2 Handheld HD Mode (For EinScan Pro 2X, EinScan Pro 2X Plus and EinScan Pro EP)

The feature allows a faster scanning speed and higher scanning accuracy. And you can use markers to align scanned data. Applicable to objects of 30mm–4m height.



- HD prime pack add-on is available for EinScan Pro 2X Plus or EinScan Pro EP (not for EinScan Pro 2X).
- The texture feature can't be captured when scanning in Handheld HD mode or Handheld HD (Prime) mode.

### 6.2.1 Create a Project

**Step 1** On **Scan Mode** interface, select Handheld Rapid Scan to enter the interface of **New Project Group** or **Open Project Group**. Click **New Project Group**, select a storage location from **Computer**, **Documents** or **Desktop** (desktop by default). Create a folder, click to select it and click **New**.

**Step 2** Select a resolution for the project. The higher the resolution, the better the details. But this might lead to larger file size and longer processing time. Select from **High Detail** (0.2mm), **Medium Detail** (0.5mm) and **Low Detail** (1.0mm); or drag the cursor to customize a point-distance from 0.2mm to 3.0mm (0.2mm to 2.0mm for EinScan Pro 2X).



Feature alignment is available only when the HD Prime pack is attached and the scanned object has enough geometric features. It is available for EinScan Pro 2X Plus or EinScan Pro EP (not for EinScan Pro 2X).

**Step 3** Adjust the Scanner distance from the scanned object.

1) Distance requirements.

- For EinScan Pro 2X, 400 mm is proper. 300 mm is the closest distance and 500 mm is the farthest distance.
- For EinScan Pro 2X plus and EinScan Pro EP, 510 mm is proper. 410 mm is the closest distance and 610 mm is the farthest distance.

2) Adjust until the distance bar on the scanning interface (or LED indicator on the Scanner) is green.

To evaluate whether the Scanner is in proper distance from the scanned object, see distance bar on the scanning interface or see LED indicator on the Scanner.

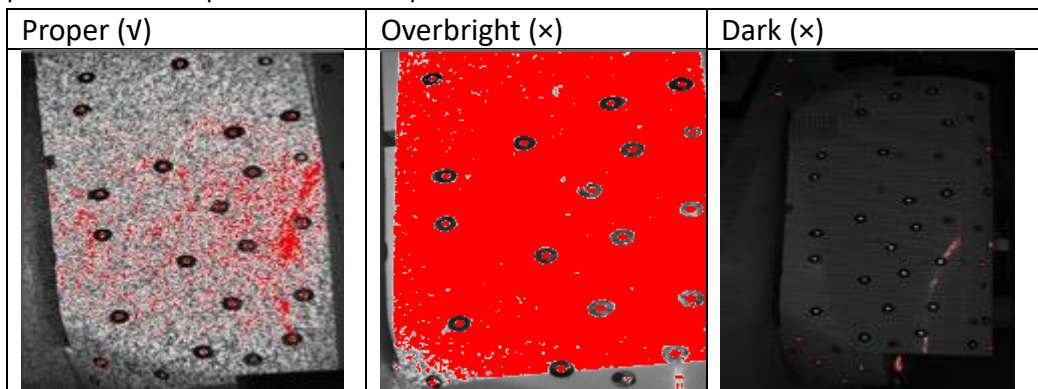
For distance bar or for LED indicators:

- Green: Optimal.
- Red: Too close.
- Blue: Too far.

Good	Too Close	Too Far
------	-----------	---------

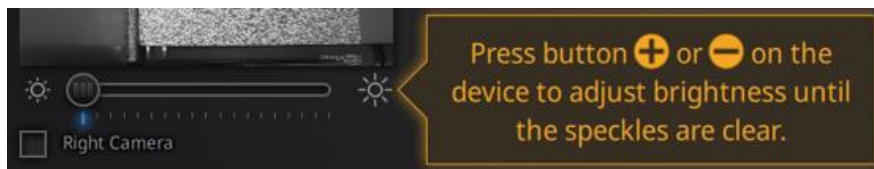


Step 4 On the camera preview window, red means overexposed, black means underexposed, and white or light grey means proper. The lines and the markers should be seen clearly, the lowest brightness where this is possible is optimal. An overexposed scan will capture more noise.



1) When under scanning or under preview mode, to adjust the image brightness:

- Double-click and press + or - on the scanner.
- Drag the brightness bar under the camera preview window to the left (-) or right (+).



Brightness bar under the camera preview window

2) Double-click on the Scanner to exit the brightness adjustment.

Step 5 Prescan an object.



- 1) Face the Scanner to the object, press on the interface or on the Scanner to start prescanning. It shows data for preview, but not record the data.



Preview objects

Under the mode, you can:

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

2) Click  on the interface or  on the Scanner to exit the preview mode and start scanning.

## 6.2.2 Scan

See 6.1.2 Scan.

## 6.3 Handheld HD Scan Mode (For EinScan Pro 2X 2020/EinScan Pro HD)

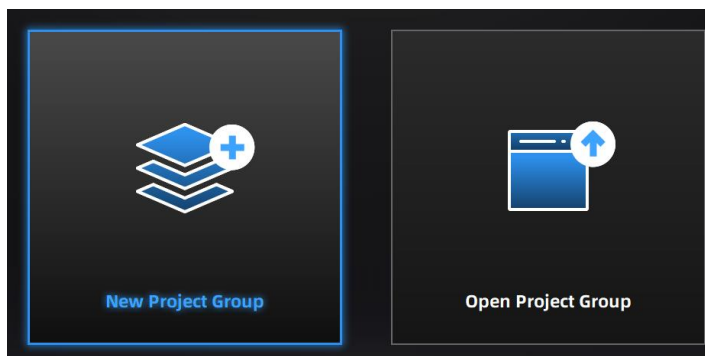
HD mode means the hand-held scan mode with high resolution and high accuracy. When the operator holds the scanner in hand and moves around the object, the data is instantaneously captured and matched with previously captured data.



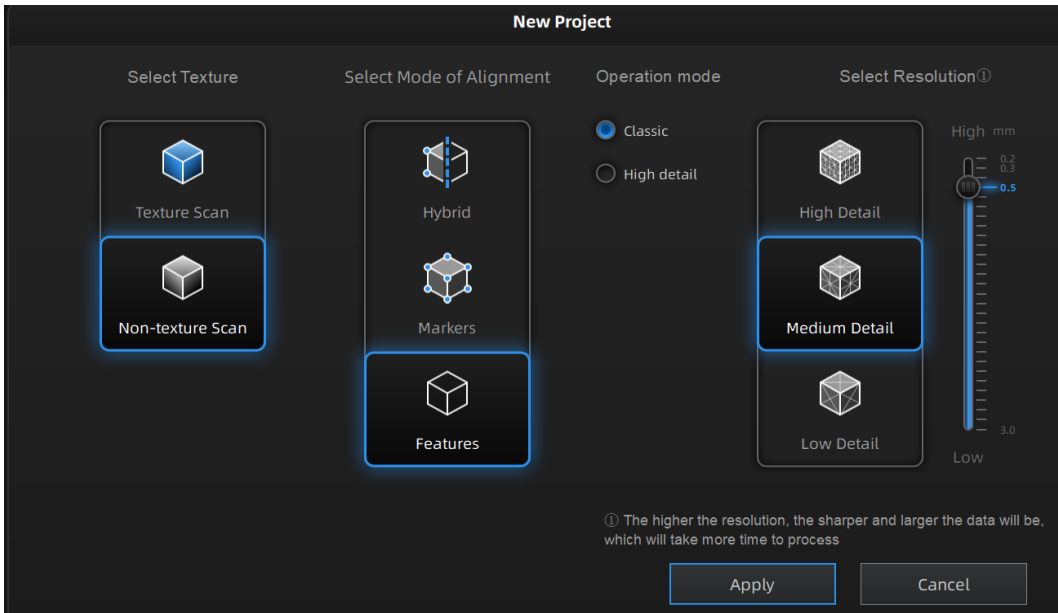
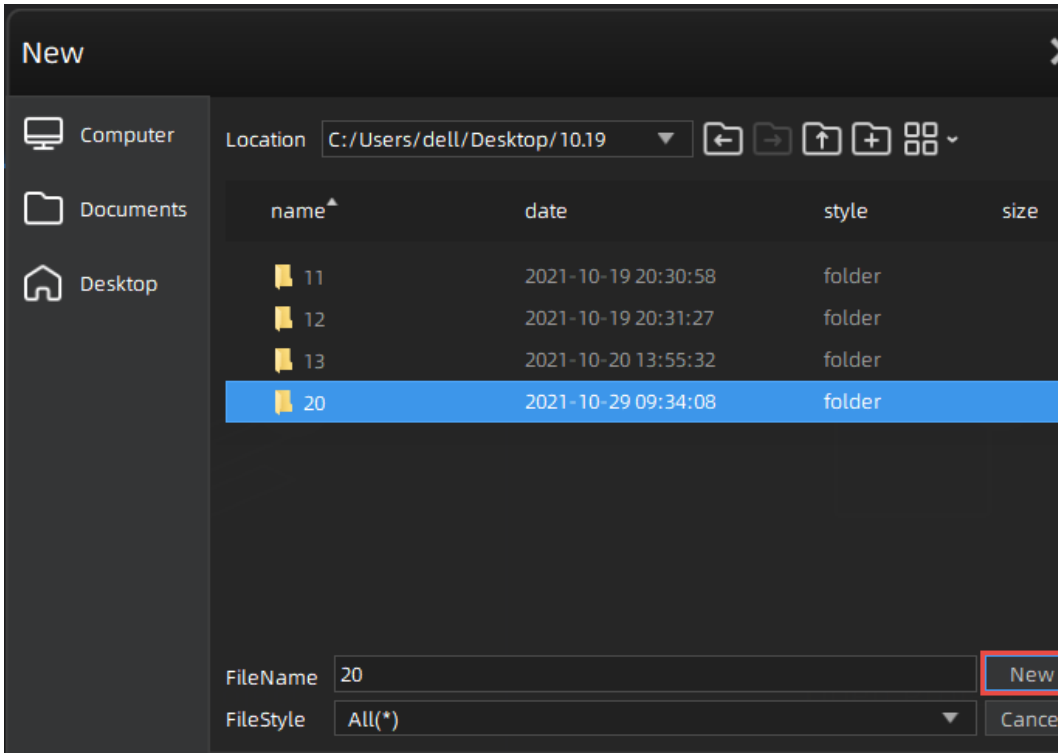
- HD mode uses markers to align the data when under scanning.
- The texture camera (color pack add-on) can be used under this mode to scan 3D data in color texture.

### 6.3.1 Create a Project

Enter the interface of **New Project** or **Open Project**. Click **New Project**, select a storage location from **Computer**, **Documents** or **Desktop** (desktop by default). Create a folder, click to select it and click **New**. Then select from **Texture Scan** and **Non-texture Scan**.



Create or open a project group



*HD mode scan parameters window*

### 6. 3. 2 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.

## **6. 3. 3 Choose operation mode**

- **Classic**

The scan speed is 10 fps.

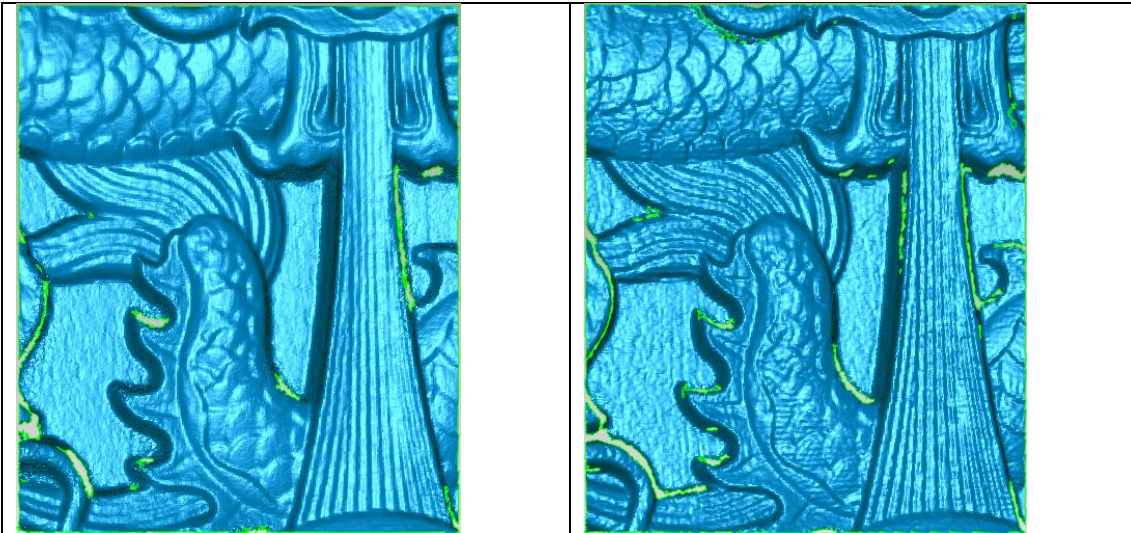
- **High detail**

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:

Classic	High detail
---------	-------------





### 6.3.4 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.

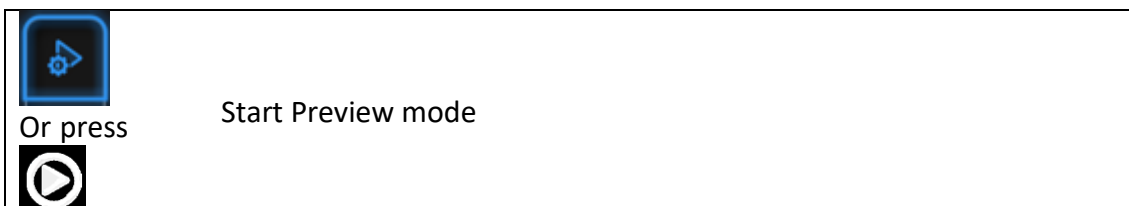
### 6.3.5 Flat Detection

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 prompt “please scan the non-plane area.”

### 6.3.6 Scan

#### Preview



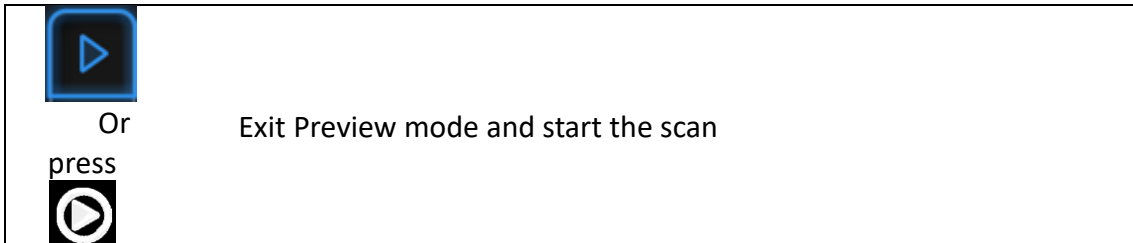
Hold the scanner to face the object (there must be enough markers on the surface), press the Play button or click Preview to run into Preview mode. In this mode, it will start to show data for preview, but not record this data.



*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 created, 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.

#### **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.

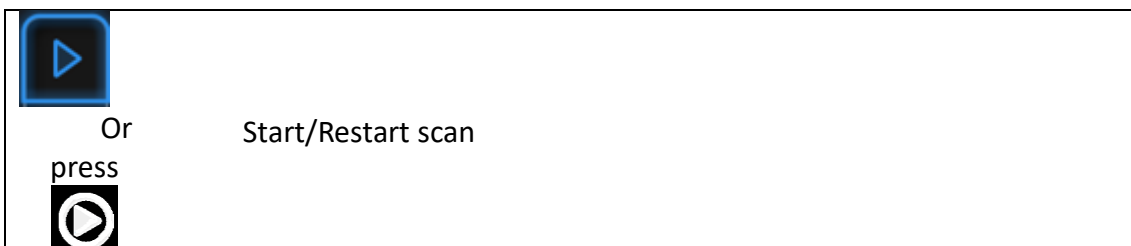
On the scanner, the information is displayed on the colored LED. As with the rangefinder on the screen, if it is too close it will show red and if it is too far it will show blue, and green is perfect.

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

	Pro HD	2X 2020
<b>Closer limit (mm)</b>	410	410
<b>Optimal distance (mm)</b>	510	510
<b>Upper limit (mm)</b>	610	610

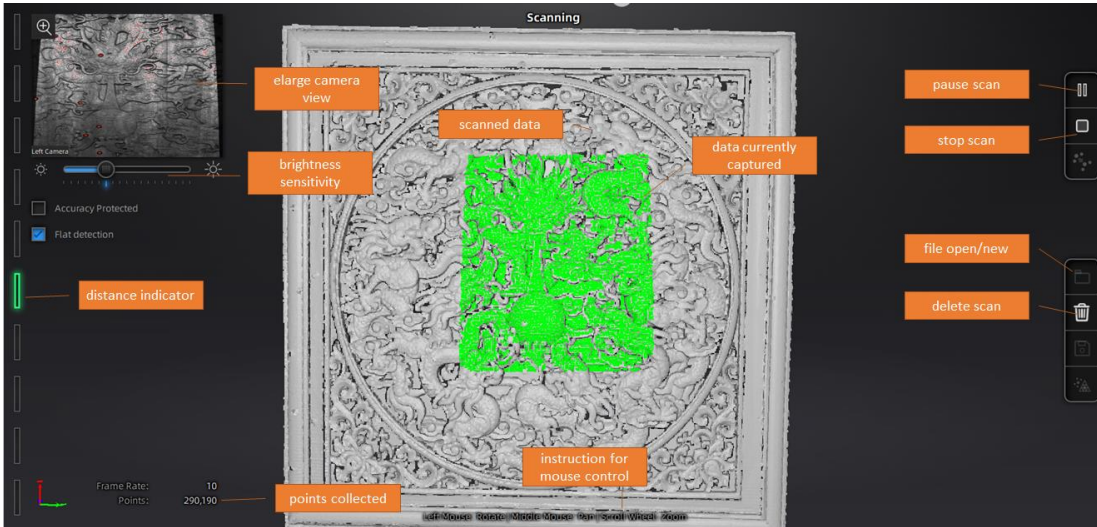


### Start Scan



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.



Scan interface, HD mode



Or  
press



Enter pause menu

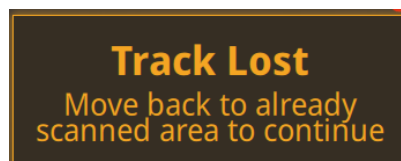
Press the Play button or click Pause in the software to pause the scan.

### 6. 3. 7 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

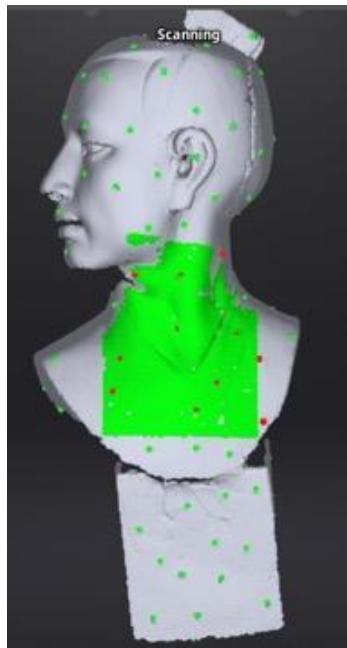
The software will prevent from misalignment when scanning featureless surfaces

**Not enough  
features to align**

*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) must 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.

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**  
Move back to already  
scanned area to continue

*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. 3. 8 Pause Menu

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

### 6. 3. 9 Auto Save

	Or Enter pause menu. press
	

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.

	Or Continue scan. press
	
	Generate point cloud.

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. 3. 10 Optimize Point Clouds



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. 3. 11 Clouds Editing

See 7.5 for data editing

### 6. 3. 12 Projects

Manage projects on the project group when the scanned data is saved.

#### Icons



- Create a new project.
- Import the saved projects.
- Remove the project.
- & Delete the selected project (s).
- Pop up the project tree. Save data in .asc or .p3 format manually.
- Enter Manual Alignment.



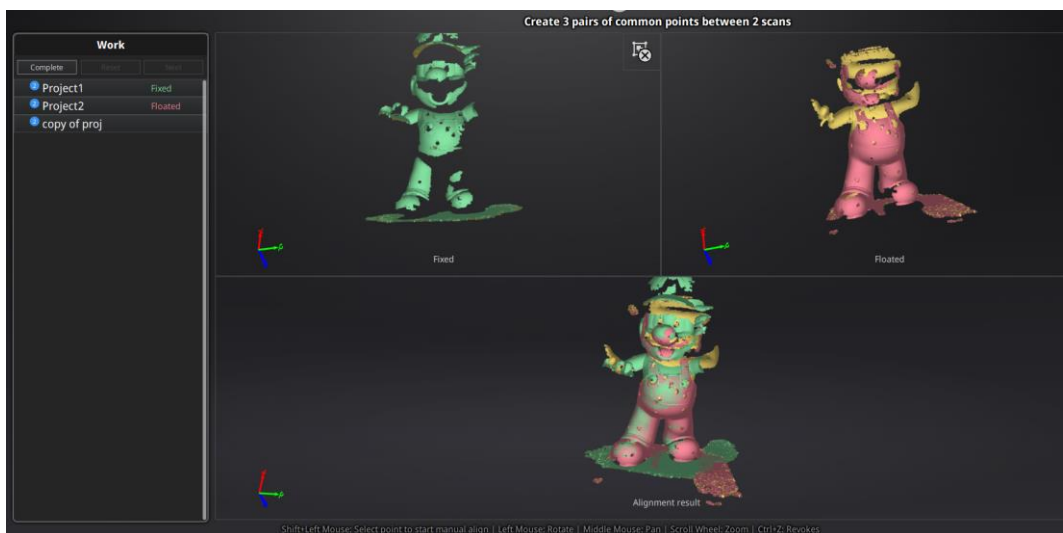
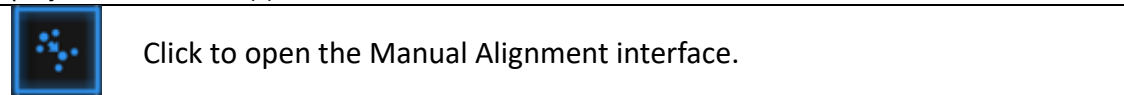
**Note:**

- Click the right mouse button on the project in the project tree for various operations.
- The current project is the last one listed on the project tree and is always the one to be added newly scanned data. Reopening a previous project can turn it the current one .



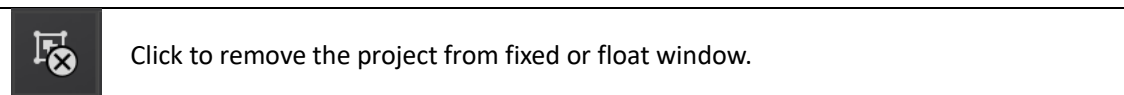
## Alignment

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



*Drag and drop a project to the float and fixed window*

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



### 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.

### Manually 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.*

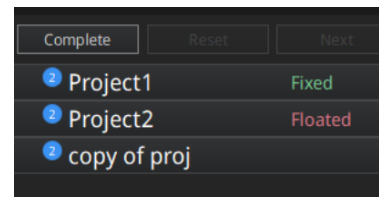
Click **Complete** to validate and leave the Alignment interface

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*

## 6. 4 Handheld Rapid Scan Mode

The mode is the fastest handheld scan mode but has a lower resolution and accuracy than the handheld HD scan 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 alignment, markers alignment, hybrid alignment or texture alignment (use color pack add-on for texture alignment) are available under the mode.

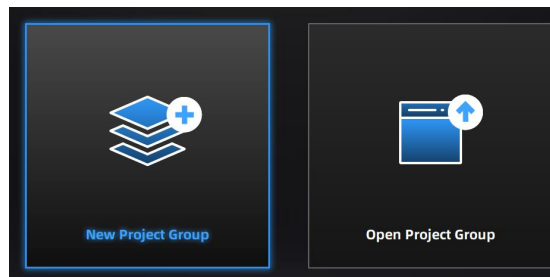
The mode can be used on objects from 30mm to 4m. Under the mode, you can achieve a large size scan efficiently. In this example, the statue is 1m\*1.5m\*1.5m.



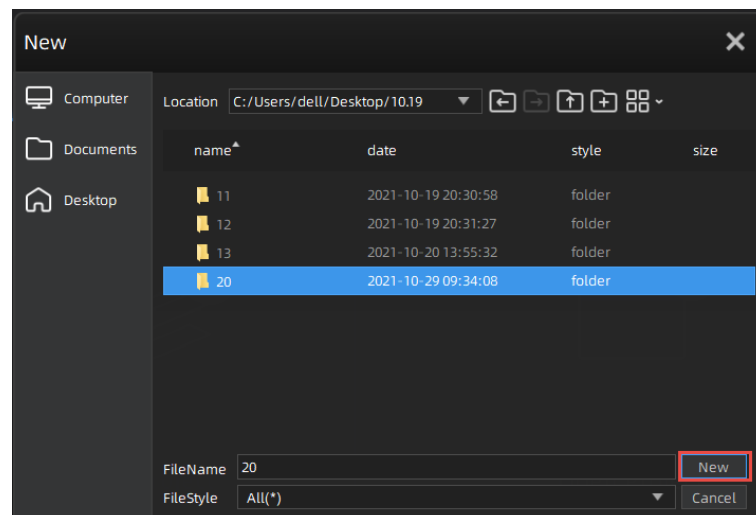
Scanning example

### 6.4.1 Create a Project

Step 1 On **Scan Mode** interface, select **Handheld Rapid Scan** to enter the interface of **New Project Group** or **Open Project Group**. Click **New Project Group**, select a storage location from **Computer**, **Documents** or **Desktop** (desktop by default). Create a folder, click to select it and click **New**.

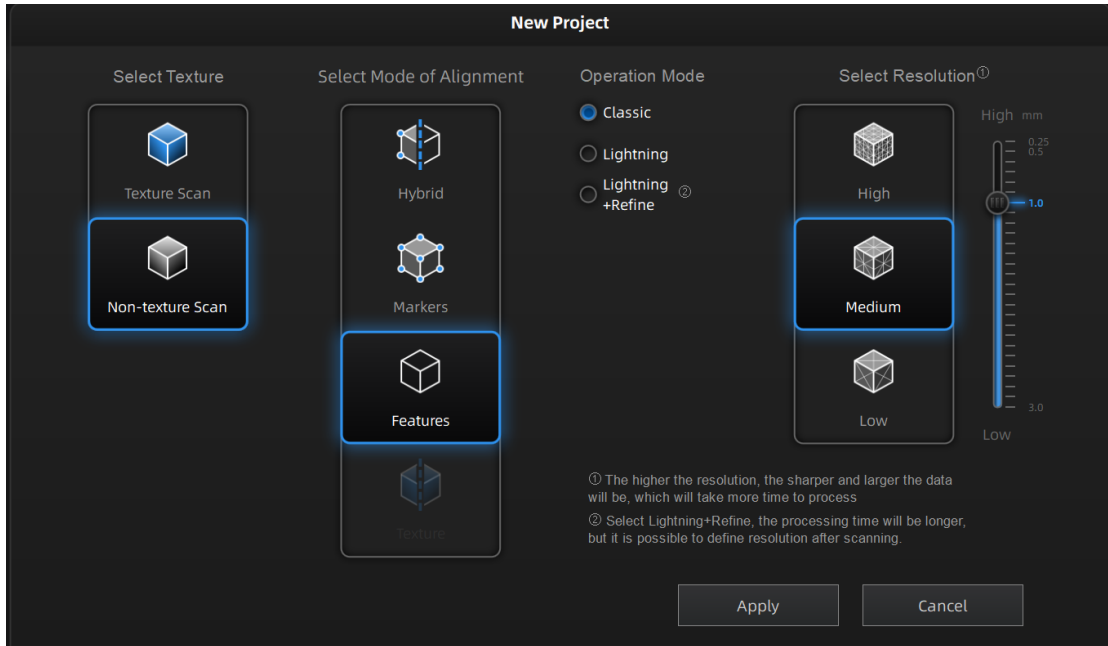


Create or open a project group



Select project group storage location

Step 2 On the **New Project** interface, select from **Texture Scan** and **Non-texture Scan**. To select **Texture Scan**, attach color pack first.



Configure new project settings

Step 3 Select alignment mode.

Mode	Description
Marker Alignment	When scanning a large object, marker alignment mode is the best choice 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 why we recommend the alignment mode for large objects. Follow "5.2 Sticking Markers" to stick markers.
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.



• Feature alignment when scanning surface with enough geometry.

• Markers alignment when scanning surface with less geometry.

Texture Alignment	Uses object surface texture to align the scanned data. Attach texture camera, select <b>Non-texture Scan</b> from <b>Select Texture</b> , then you can select Texture from <b>Select Mode of Alignment</b> .
-------------------	--

Step 4 Select operation mode.

- Scanning speed: Lightning = Lightning + Refine > Classic
- Data resolution: Classic = Lightning + Refine > Lightning
- Data processing time: Lightning + Refine > Lightning > Classic

	Scanning Speed	Resolution	Data Processing
Classic	15 fps	With the selected resolution	Direct data processing according to the selected resolution
Lightning	30 fps	1mm	Interpolation to selected resolution after the scanning ends
Lightning + Refine	30 fps	1mm	Refine to select resolution after the scan ends by retopology

Step 5 Select resolution.

Select a resolution for the project. The higher the resolution, the better the details. But this might lead to larger file size and longer processing time. Select from **High Detail** (0.7 mm), **Medium Detail** (1.0 mm) and **Low Detail** (1.5 mm); or drag the cursor to customize a point-distance from 0.2mm to 3.0mm (2X is 0.2 to 2.0).

- 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.

Step 6 Adjust the Scanner distance from the scanned object.

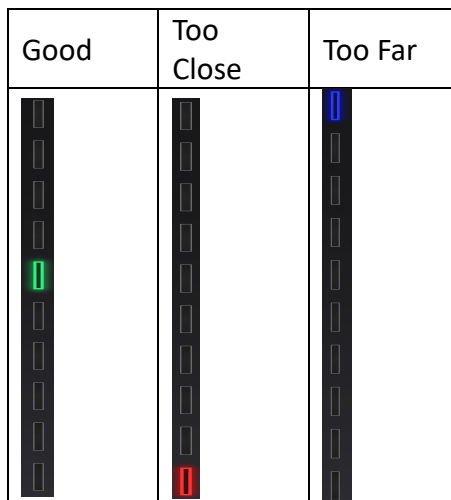
1) Distance requirements.

	EinScan Pro 2X/EinScan Pro 2X 2020	EinScan Pro 2X Plus/EinScan Pro HD/EinScan Pro EP
<b>Proper distance (mm)</b>	400	510
<b>Closest distance (mm)</b>	300	410
<b>Farthest distance (mm)</b>	500	610



2) Adjust until the distance bar on the scanning interface (or LED indicator on the Scanner) is green. To evaluate whether the Scanner is in proper distance from the scanned object, see distance bar on the scanning interface or see LED indicator on the Scanner.

For distance bar or for LED indicators:

- Green: Optimal.
- Red: Too close.
- Blue: Too far.



Step 7 Adjust Scanner brightness. Follow "Step 5" in "6.2.1 Create a Project."  
 Step 8 Prescan an object.



- 1) Face the Scanner to the object, press  on the interface or  on the Scanner to start prescanning. It will show data for preview, but not record the data.



Prescan objects

Under the mode, you can:

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

- 2) Click  on the interface or  on the Scanner to exit the prescan mode and start scanning.

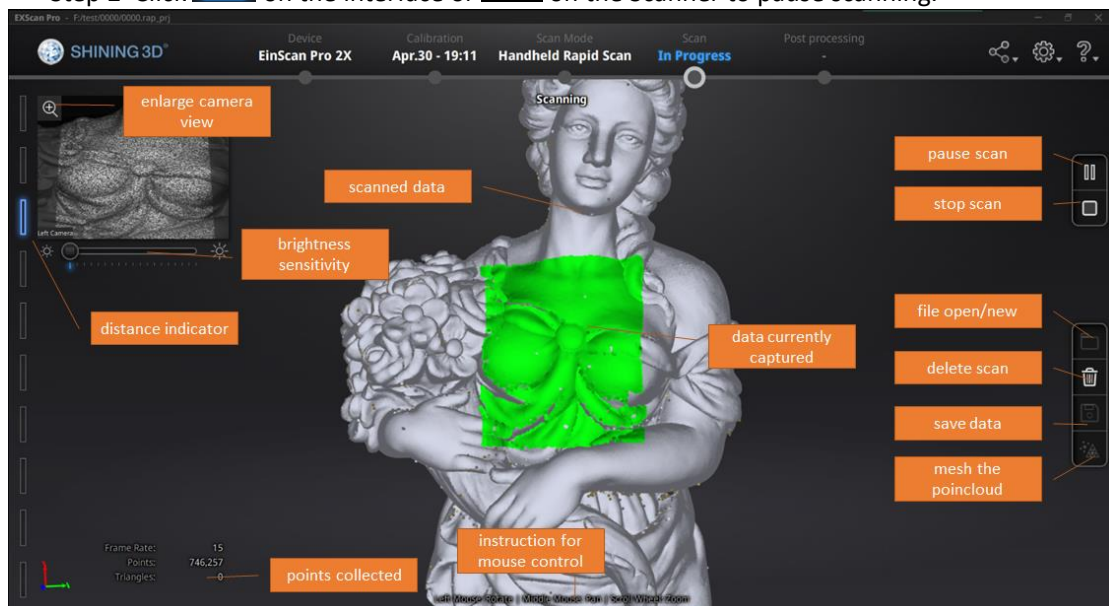
- Preview mode will start every time a new project is created, or an existing project is imported.
- After exiting preview and starting the scan, the preview mode will not show again for this scanning project.
- To access preview mode on a current project, reopen it.

## 6.4.2 Scan

Step 1 Face the Scanner to the object, press  on the interface or  on the Scanner to start scanning. And you will see LED flashing followed by projected stripes.

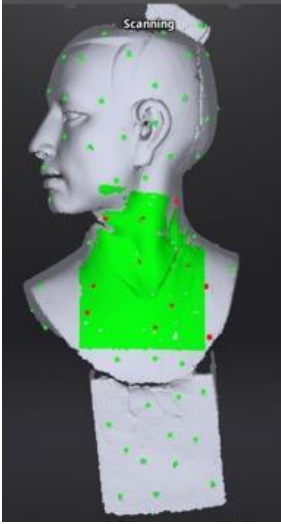

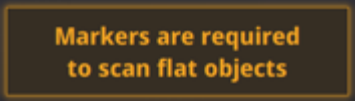
Ensure the relative storage path of scanned data does not change. Data is automatically saved in the set project file.

Step 2 Click  on the interface or  on the Scanner to pause scanning.



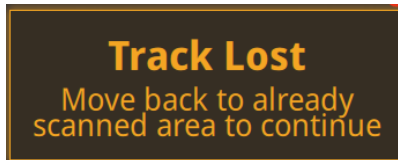
The Scan interface

Step 3 View scanning operation prompt.

Alignment Mode	Operation Prompt
<p>Marker alignment</p>	<p>For a scanned object with markers, EXScan Pro recognizes markers (markers in red), records data and aligns with previously collected markers (markers in green). The green area is the current scanning area.</p>  <p>Scan with marker alignment</p> <p>If you have imported a global marker file, new markers cannot be added during the scanning.</p>
<p>Feature alignment</p>	<p>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. EXScan Pro prevents from misalignment when scanning featureless surfaces.</p>  <p>No enough features</p>
<p>Hybrid alignment</p>	<p>Objects with few geometric features are difficult for feature alignment. An alert will be displayed to prompt you to stick markers on these areas.</p>  <p>Alert of adding markers</p> <p>Here the "flat objects" means areas with few geometric features.</p>

If position tracking fails, "Track Lost" alert is displayed. Return to an area with previously recorded markers to recover the tracking.






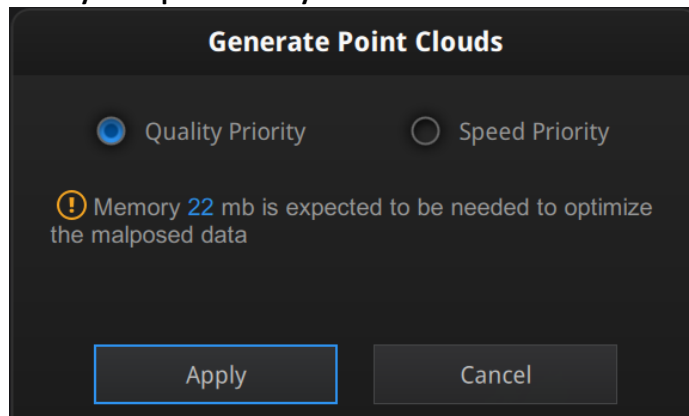
Track lost

Step 4 Edit data.  
See 7.5 for data editing

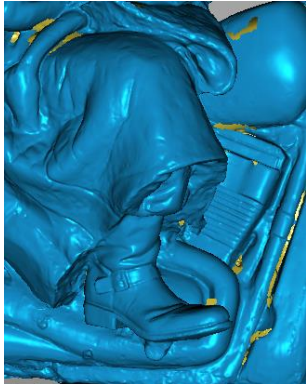


Step 5 Click  to generate point clouds.

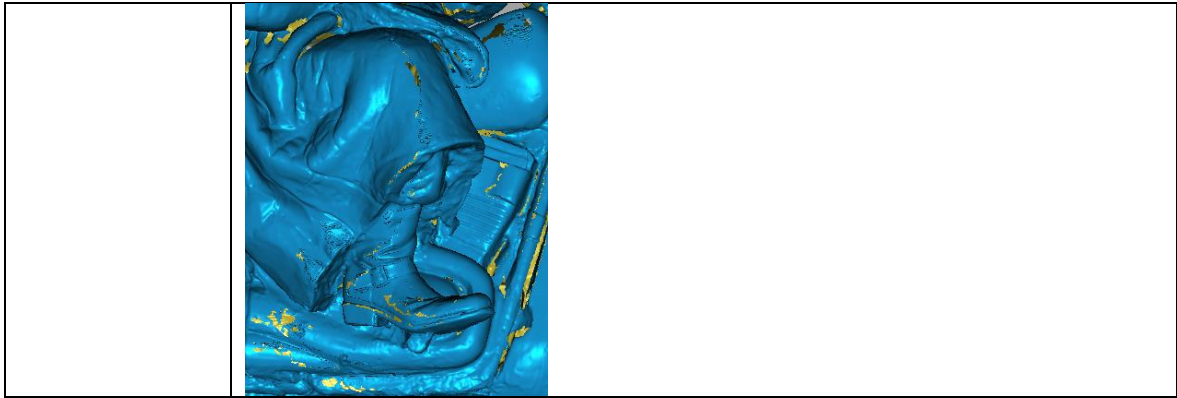
- 1) The optimization includes a realignment of the data by markers position recalculation. In case of thin objects with 2 opposite faces, markers should be registered following a closed loop to allow re-positioning.
- 2) (Optional) If you select feature alignment or hybrid alignment, select priority of generating point clouds from **Quality Priority** and **Speed Priority**.



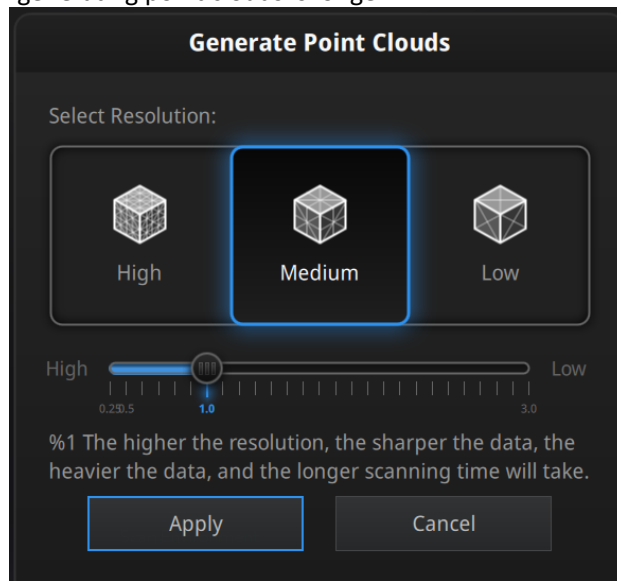
Select priority

Priority	Description
Quality Priority	<p>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 optimization process consumes memory and takes a long time.</p> 
Speed Priority	<p>If the scanned data is not misaligned during the scan, you can select this option for a faster processing of point cloud data.</p>





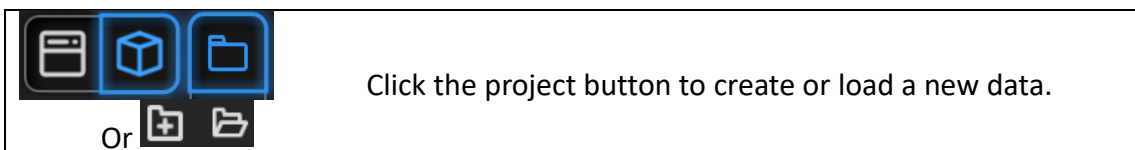
- 3) (Optional) If you select **Lightning + Refine** as the **Operation Mode**, you can select a point distance value. The time when generating point clouds is longer.



Select resolution

## For Single Project

### Create or open a project



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



#### Note:

- Only projects from the same scan mode can be imported.
- Imported data will appear on the project tree and will be copied in the project folder. And if the imported or renamed project name is the same as the current one, then the imported or renamed project name will be added with "\_1".
- 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 a project

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



*Rename projects*

## Remove/Delete

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

Select one or many projects and 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.

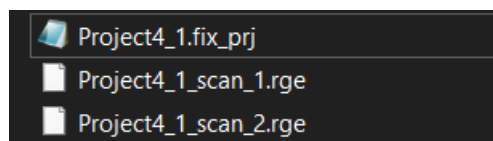
If you remove or delete the current project the last project will reload and become the new current project.



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

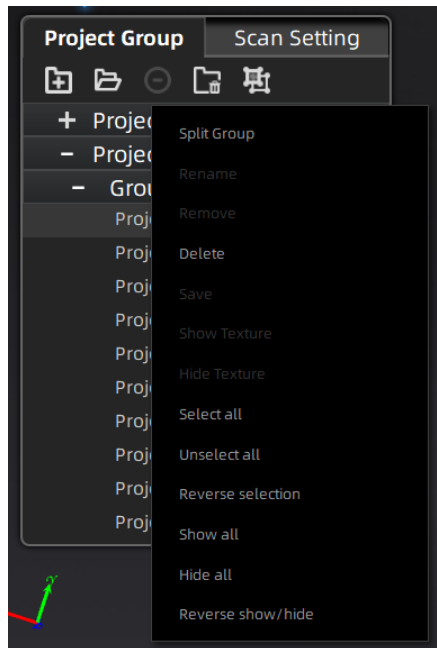
## Duplicate a Project

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*




## Create/Split a Group



*Project tree drop-down 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 to delete the selected scans, group (s) and/or project (s).
	Project or project group 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.




- 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 to select scan by left mouse on the 3D view.

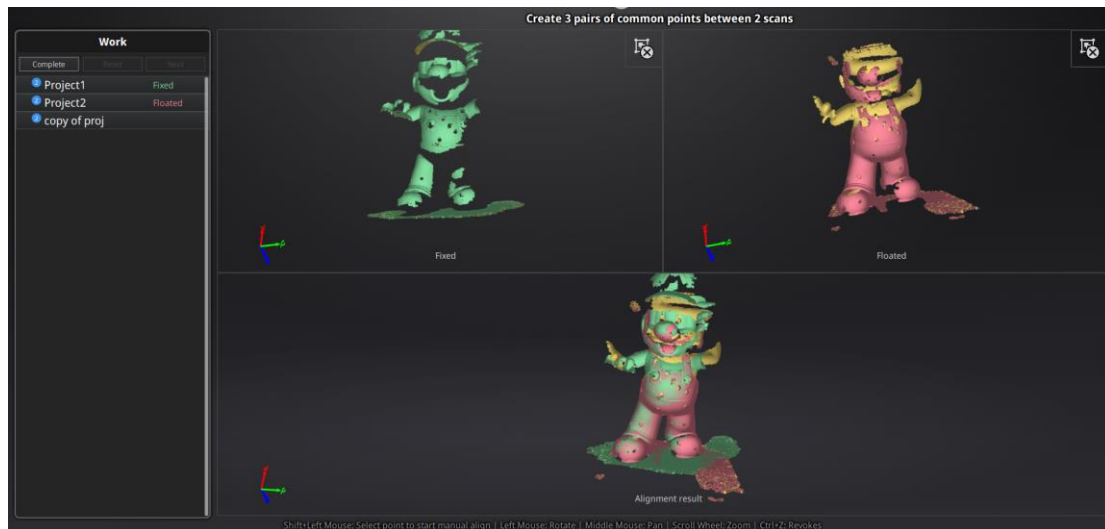
## Align Data

EXScan Pro 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.





Step 1 Click  to enter the alignment interface. Both auto alignment and manual alignment available.

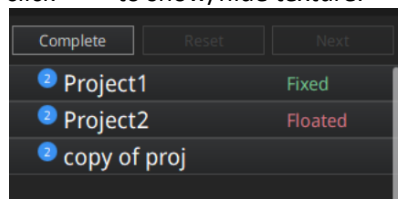
Step 2 Drag and drop single-plate scan, project or project group to the alignment window.



The alignment windows

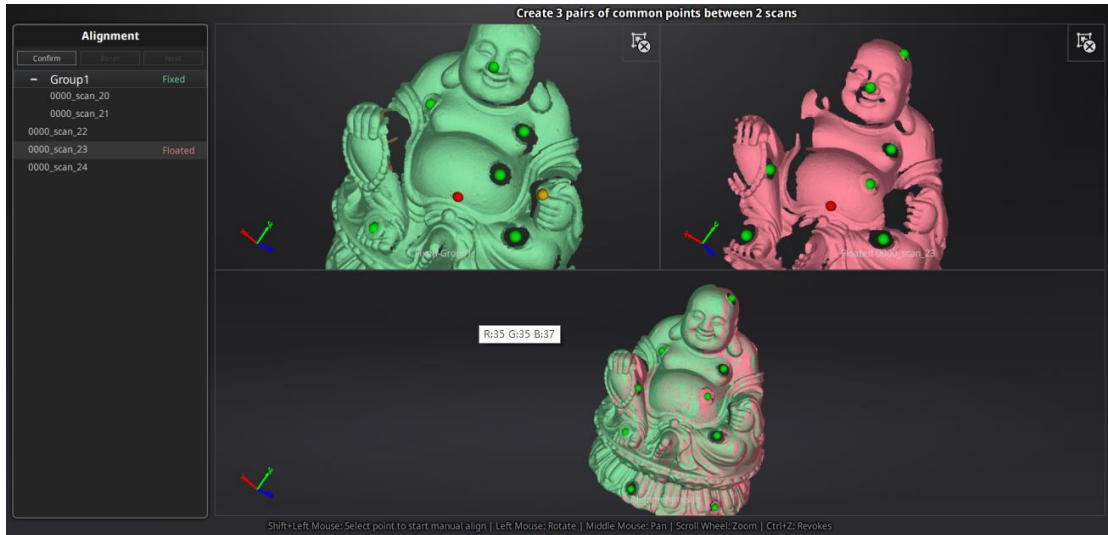


- You cannot drag and drop single-plate data in the project group. Split the group first.
- Align a project only with another project.
- Align single-plate data with a project group only when they are in the same project.
- Align projects, and data numerical symbols will be displayed beside the project name. Floating project numerical symbols is generated referring to fixed project numerical symbols.
- Click  to remove the scan, group or project from fixed or float window
- When you attach a color pack, click  to show/hide texture.



Step 3 Select alignment method.

- **Auto alignment**  
 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 alignment**
- ◆ Press Shift and left-click meanwhile to select at least 3 non-collinear corresponding points in the 3D preview windows.
- ◆ Press Ctrl and Z, or press ESC key: Cancel last selected point.



Select 3 points to align data

Step 4 Operations.

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

Click **Reset** to cancel all completed alignments.

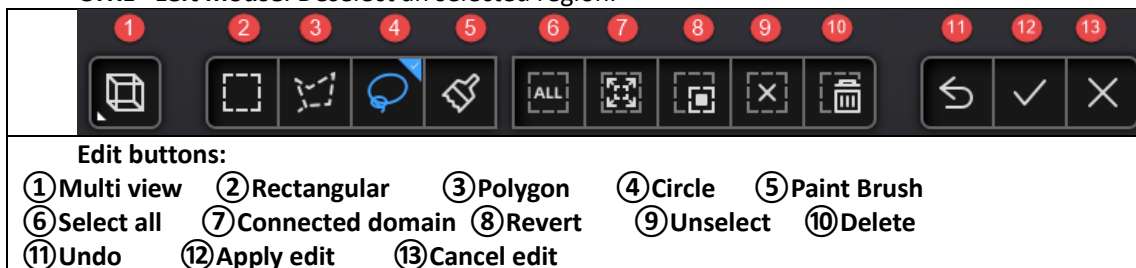
Click **Next** to validate the alignment and continue to align.

## 6.5 Clouds Editing

### CLOUDS SELECT/DELETE

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

**CTRL+ Left mouse:** Deselect an selected region.



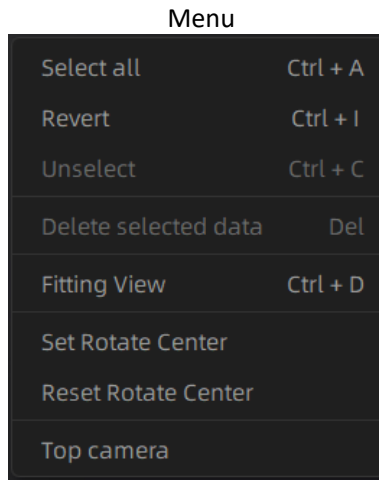
	<b>Paint Brush</b> Mouse scrolling wheel to adjust the paint brush size.
	<b>Connected domain</b> Click the button after select the data, all connected region to the selected data will be picked.
	<b>Delete selected data</b> Click the button or "DELETE" on the keyboard to delete selected data.
	<b>Undo</b> You can only undo the most recently deleted data.
	<b>Apply edit</b> Click the button or space bar to apply the edition, and exit edit mode.
	<b>Cancel edit</b> Undo all editors, and exit edit mode.



**Note:** Don't support markers editing.

## 6.6 Right-click Context Menu

Right click, and there will be the context menu as below.



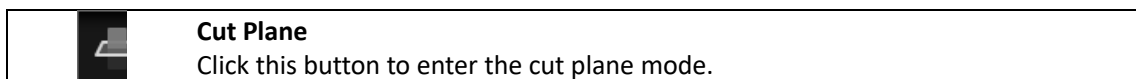
Function	Explanation
Select all, Reverse, Deselect all, Delete	The same function as Edit. Available with shortcut key.
Fitting view	Make the data show in the middle and in a proper size.
Rotation center	Set the rotation center in the data by left click. Quit by ESC key.
Reset rotation center	After reset, the rotation center is in the middle of the data.
Top camera, Texture camera	Click to show the corresponding camera view in the top left.

## 6.7 Cutting Plane

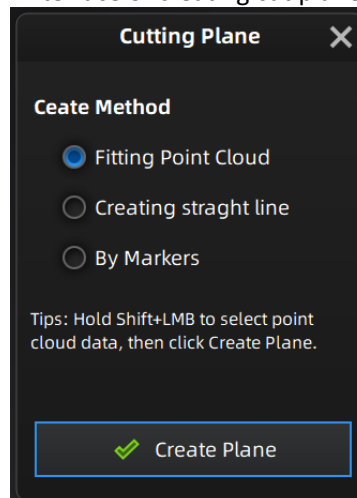
Cutting plane is very useful when a base need to be removed during scanning. You can orient the plane around X,Y, Z axes. The plane can be rotated, zoom, move.

After setting cut plane, there will be no more data scanned below the cut plane during the scanning process, preventing irrelevant data getting scanned.

- **Create Cut Plane**



Interface of creating cut plane



**Fitting Point cloud:** Press Shift + left-click to select data, then click the button “Generate plane”. The cut plane will be created by point cloud fitting. The direction of the plane will be

calculated by the software according to the direction of point cloud.

**Creating straight line:** Press Shift + left-click to draw a line, and generate the cut plane according to the line.

**By Marker:** Press Shift + left-click to select markers. 3 markers or more are required to generate the cut plane.

- **Cut Plane setting**

**Rotation axis:** Cut plane can be rotated around the axis by operating the active bar, editing the text box or placing the cursor on the edge of the cut plane and dragging.

**Translation increment:** Translate the cut plane by operating the active bar, editing the text box or placing the cursor in the center of the cut plane and dragging. After translation, the increment value will be reset to 0.

**Delete:** click this option, data in the reverse direction will be shown in red. Apply this, and the red data will be deleted.

**Reverse:** Reverse the normal direction of the cut plane.

**Delete plane:** Delete the created cut plane.

- **Other operation**

**Mouse operation:** Double click the cut pane to enter the cut plane setting after quitting the cut plane interface.

**Hide/Show cut plane:** After creating the cut plane, hide or show the cut plane by right click.



**Notes:**

Cutting Plane Operations: Create a new cutting plane, remove cutting plane, reverse normal, delete data (Markers can't be deleted).

Cutting plane operation is only workable under the current project.

Scan with Cutting plane: Only one side from the cutting plane can be scanned. Cutting plane is very useful when a base need to be removed during scanning.

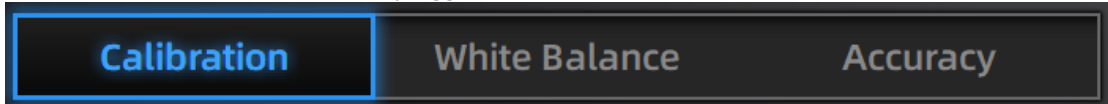
## 7. (Optional) Use Add-on

### 7.1 Color Pack

#### 7.1.1 Calibration

##### 7.1.1.1 Normal Calibration

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.

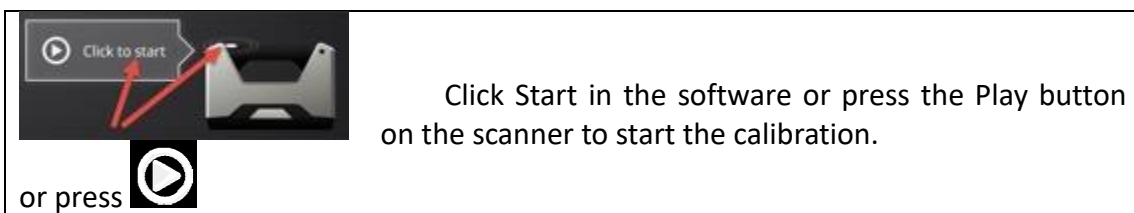
HD calibration can be skipped if the scanner is already calibrated. (full calibration is recommended).

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.

##### 7.1.1.2 White Balance

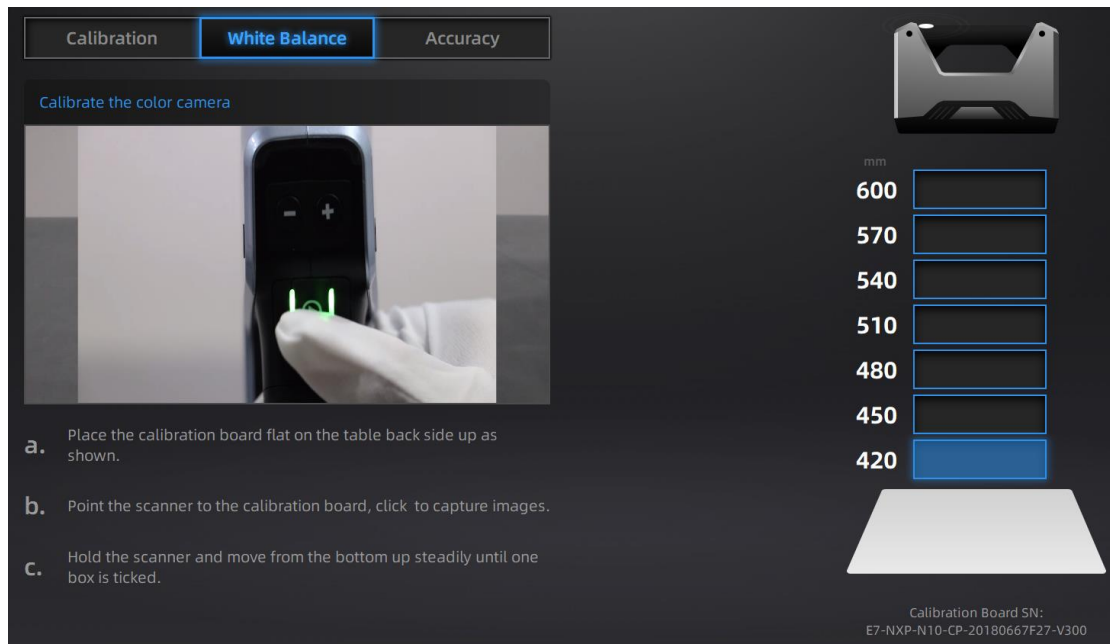
To capture an accurate color texture, White Balance calibration should be done every time when you plug the texture camera, or when the lighting environment is changed. The White balance can be done separately without running the full calibration.



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

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.





The 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.

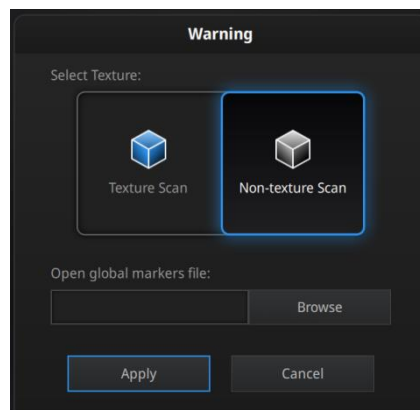
Like taking high-quality picture in the photo studio, the professional lighting environment setting is key to achieve high-quality texture data.

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

## 7. 1. 2 Fixed Scan Mode

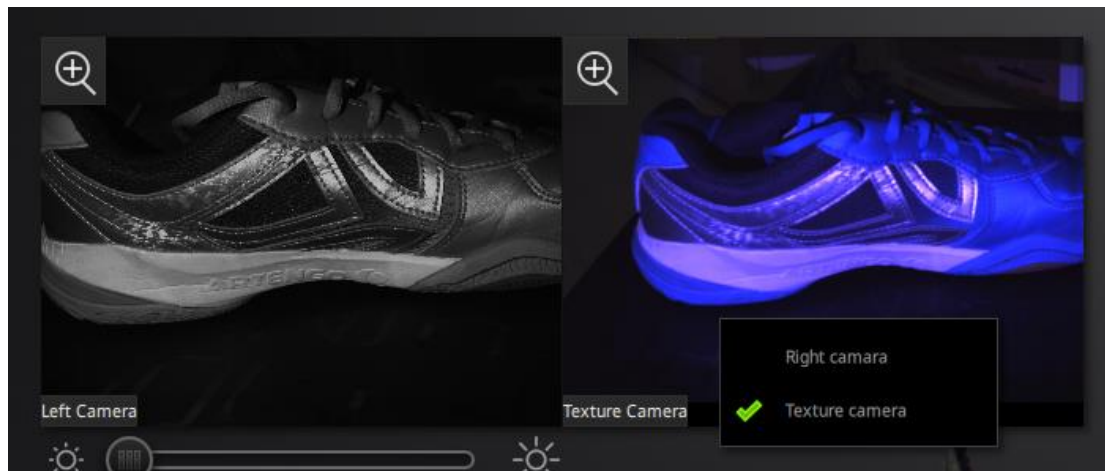
### 7.1.2.1 Scan

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



Texture/Non-texture scan option

Right-click **Texture Camera** to display the texture camera view.



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.

### 7.1.2.2 Align

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

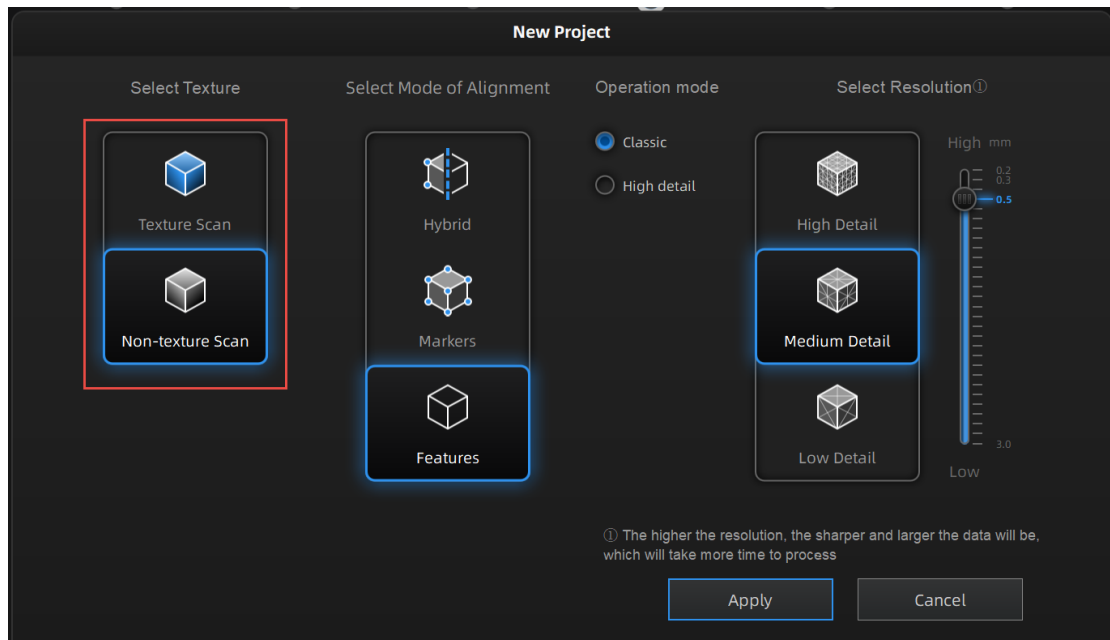
Data and texture are captured from a different angle. In case of sharp edges, texture-data can be misaligned, try to scan from a different angle.

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

## 7.1.3 Handheld HD Scan Mode (For EinScan Pro 2X Plus 2020/EinScan Pro 2X 2020/EinScan Pro HD)

### 7.1.3.1 Scan with Texture

Create a project and select **Texture Scan**. By default, non-texture is selected. Click **Apply** to continue.

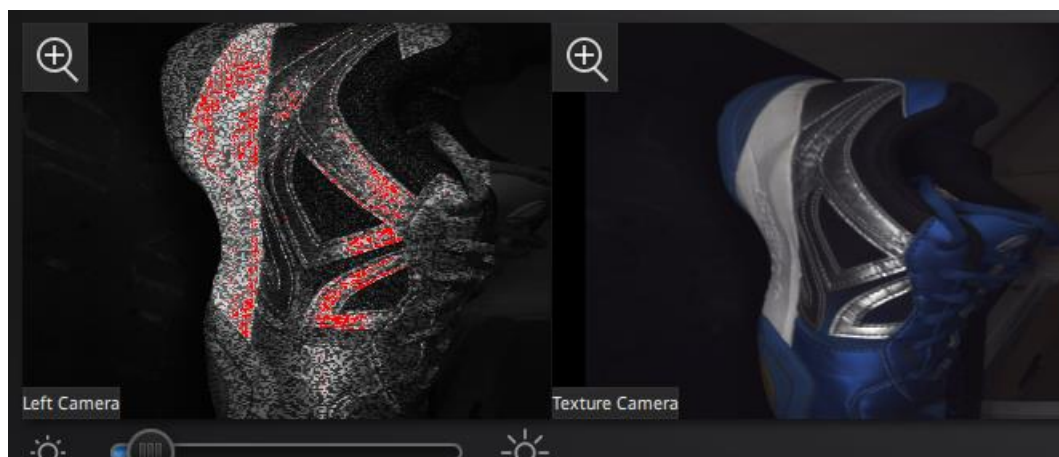


#### Texture/Non-texture scan option

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".



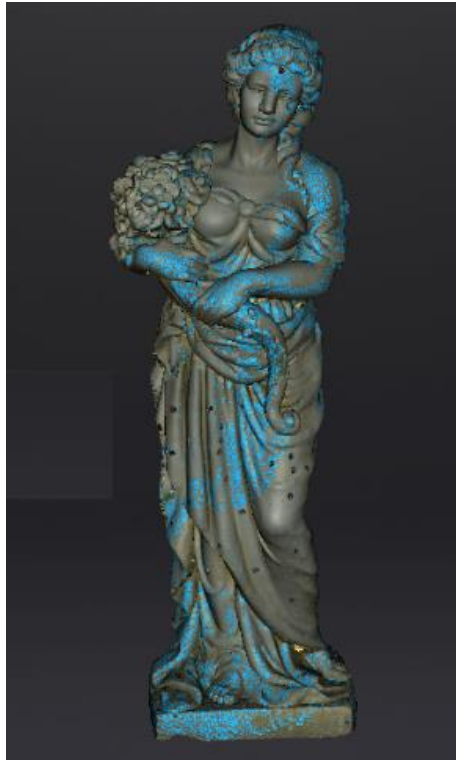
#### Display Cameras



#### 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.

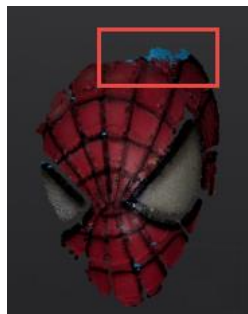
**Notice:** If there are some missing texture areas after the texture project is generated into point clouds, show as the picture below, it could be the reason that the data scan is overlarge and your current PC configuration could not process it. You could change to a computer with higher configuration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



### 7.1.3.2 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.

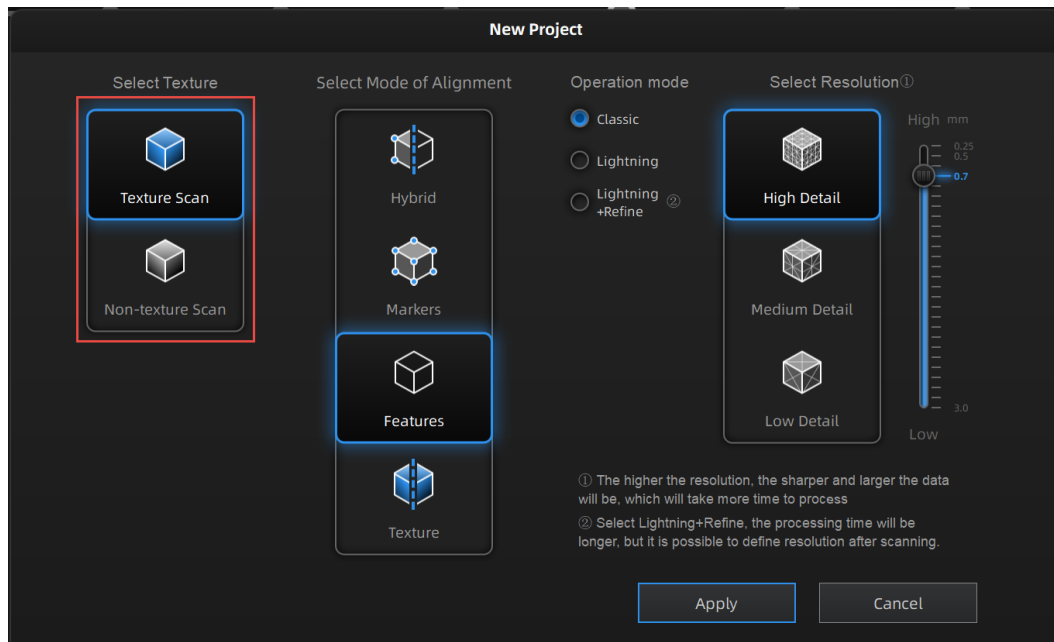


*An area with texture missing*

## 7. 1. 4 Handheld Rapid Scan Mode

### 7.1.4.1 Scan with texture

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

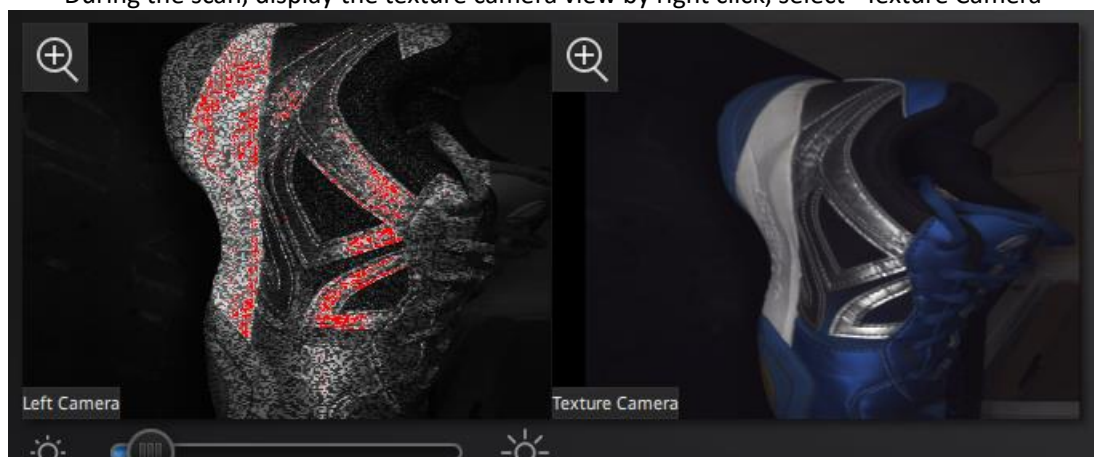


*Texture/Non-texture scan option*

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*

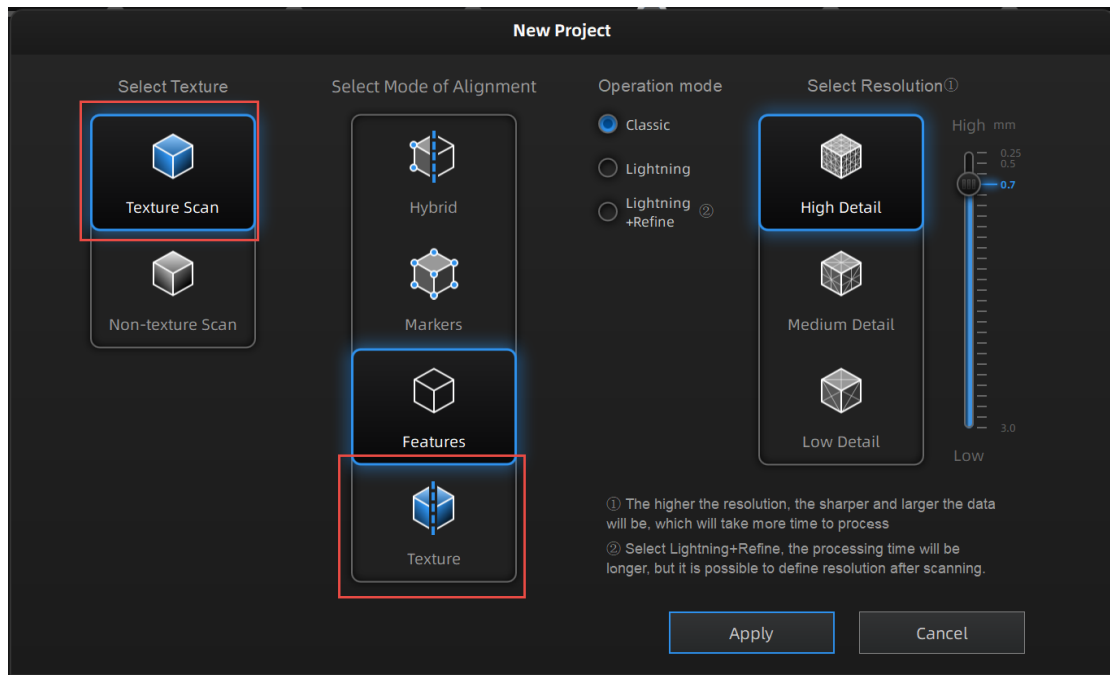


**Notes:**

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.

**7.1.4.2 Texture Alignment**

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

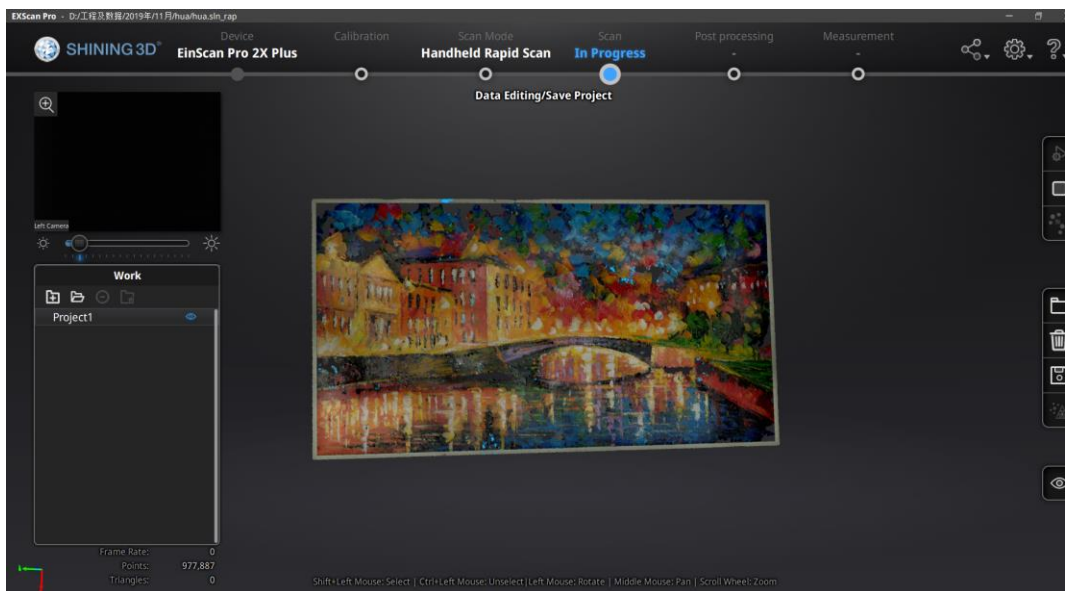


*Texture alignment selection*



When texture alignment is used, all operation modes are reduced 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**  
Move back to already scanned area to continue

*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.



### 7.1.4.3 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*


## 7.1.5 Post Processing

### 7.1.5.1 Point-cloud Editing

	<b>Show/Hide texture</b> Click this button to switch the texture between display and hide.
---	---

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

### 7.1.5.2 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.



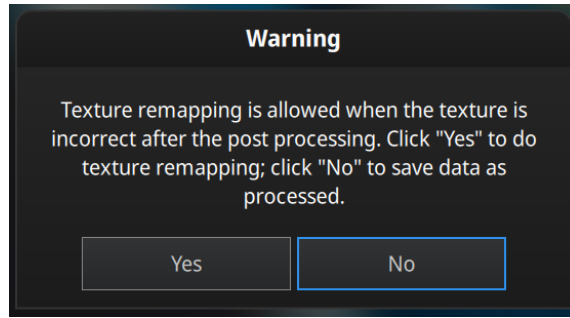
*Example of a watertight model with texture*

### 7.1.5.3 Texture remapping

	Enter the texture remapping menu.
---	-----------------------------------

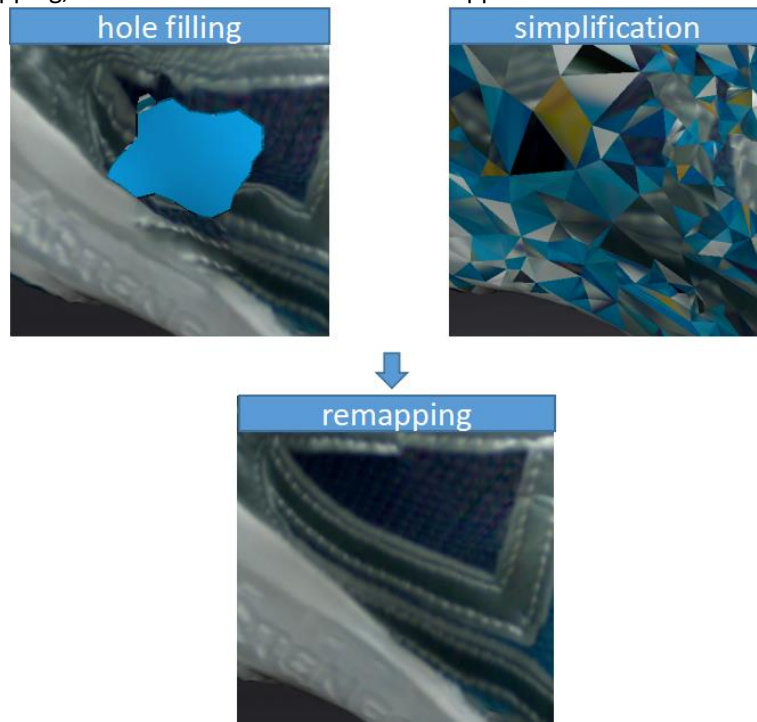
Click the Texture Remapping to display the Texture menu, click again to close the menu. Texture remapping is accessible before saving the data.





*Confirm texture remapping before saving*

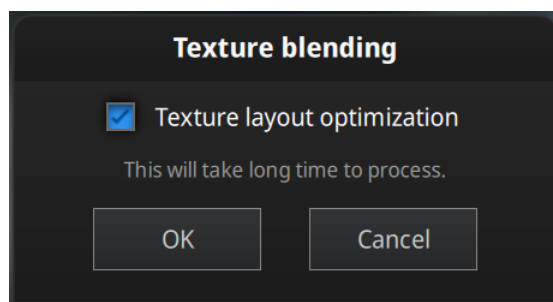
Edition on the mesh (simplification, hole filling) will affect the texture rendering. By doing the texture remapping, the texture information will be reapplied on the mesh.



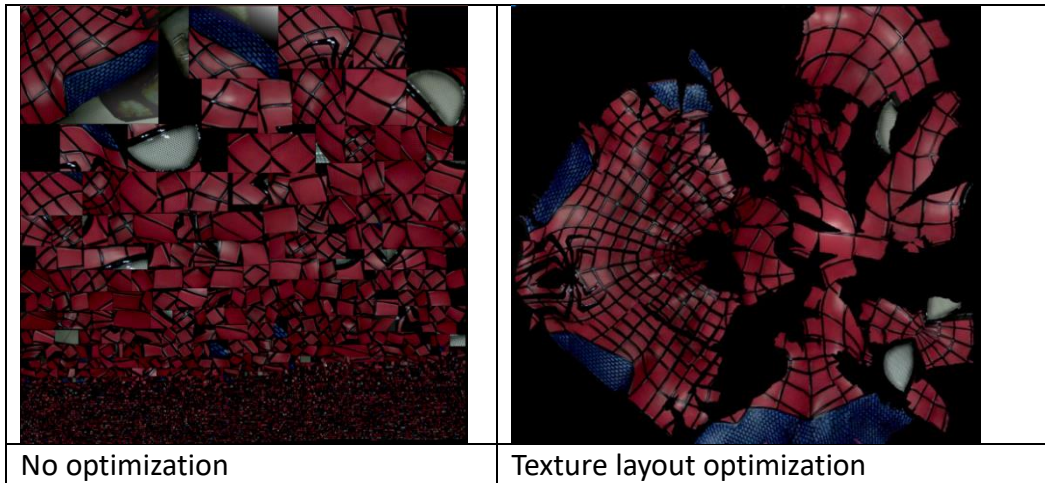
#### 7.1.5.4 Texture Layout Optimization

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 3<sup>rd</sup> party software.

This option has no effect on the texture itself. Click Apply to continue.



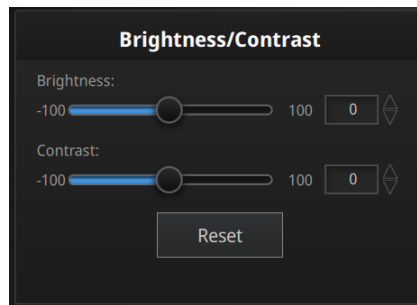
*TLO option in texture blending*



- 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.

### 7.1.5.5 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.

### 7.1.5.6 Export Data

Save the 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
<b>OBJ</b>	Yes (separated )	Mesh, Texture & Matching file	scan.obj scan.jpg scan.mtl	Artistic applications 3D rendering Compatibility with most mesh editing software
<b>PLY</b>	Yes	Mesh	scan.ply	Low storage Easy texture editing

<b>3MF</b>	Yes	Mesh	scan.3mf	Low storage Compatibility with Microsoft paint3d
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### 7.1.6 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 3<sup>rd</sup> 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.



Block the light from the LEDs

## 7.2 HD Prime Pack (For EinScan Pro 2X Plus and EinScan Pro EP)

Prime (HD Prime pack add-on) is an add-on for EinScan Pro 2X Plus and EinScan Pro EP. It allows Feature alignment under HD mode and improve the speed and allow markers-free scanning experience when the scanned objects have enough geometry.

Texture is not available in this mode.



**Caution:** Prime uses Class 1 infrared laser. Class 1 laser is safe under normal use. It means the maximum permissible exposure is not exceeded when viewing with naked eye. But we suggest avoiding direct exposure to the eyes while scanning. HD Prime is not suggested to use for face scanning.

### 7.2.1 Before scan

When prime is plugged, “HD Scan” becomes “HD Scan with Prime”. Other modes are not using Prime (refer to previous sections for Fixed and Rapid mode).



*Mode selection with Prime*

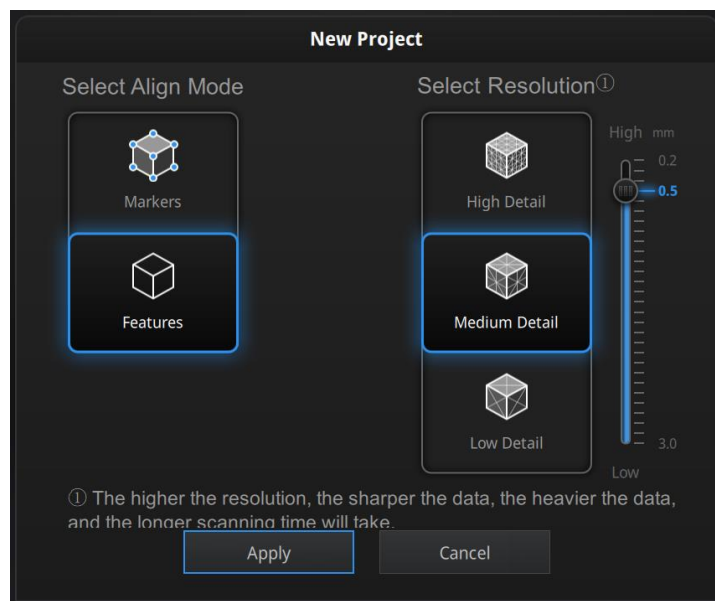
Create a new project, to enter the scan settings window.



*IR ON indication*

When entering the Prime scan mode Prime IR projector will be ON, the side LED will turn orange.

### 7.2.1.1 Align Mode



*Settings for HD Prime mode*

**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.

The project will be saved with the extension .hd\_prj

Prime with markers projects can be open under HD scan mode (without Prime)

**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 neighbouring scans or the scanned area has few geometric features to allow for the alignment. Rich geometric features on the object are required for this mode.

The project will be saved with the extension .pri\_prj.

### 7.2.1.2 Resolution

Select a resolution for the project. The higher the resolution, the better the details. Choose High (0.2mm), Medium (0.5mm) or Low (1mm) or drag the cursor to choose another point-distance setting from 0.2mm to 3.0mm

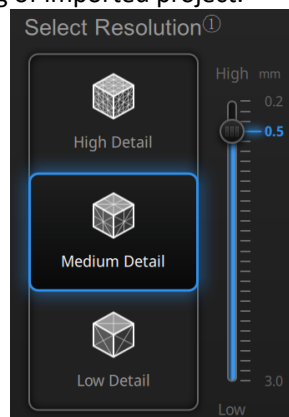


#### Notes:

Higher resolution takes more time to scan and consumes more memory of graphic card.

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 actual process, the size of the object can be scanned depending on computer graphic card.

When import project, and continue the scan, the scanning resolution and align mode will be in accordance with the previous setting of imported project.

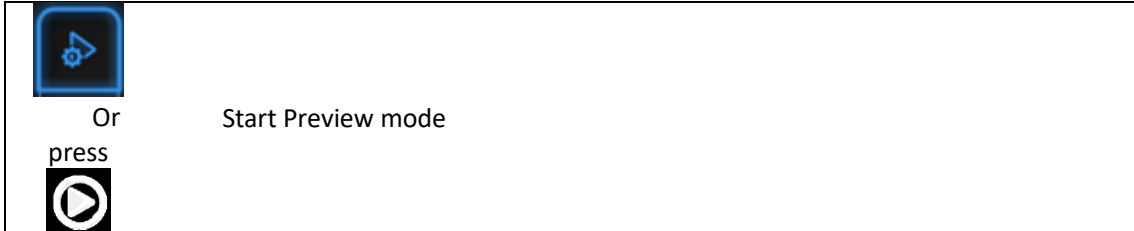


*Resolution for HD Prime mode*

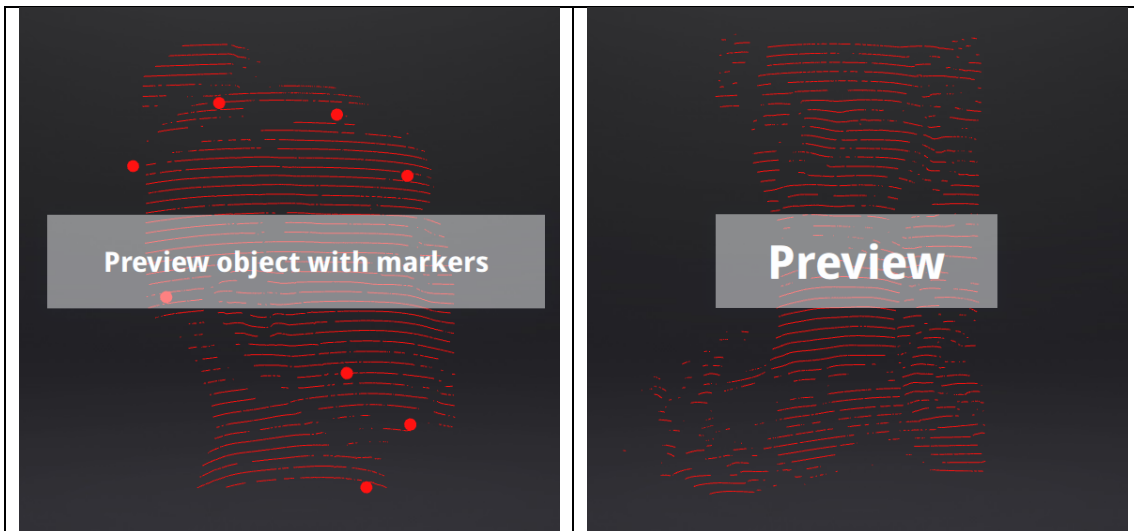
Click Apply to validate and enter the Scanning interface.

## 7.2.2 HD Prime scan

### 7.2.2.1 Preview

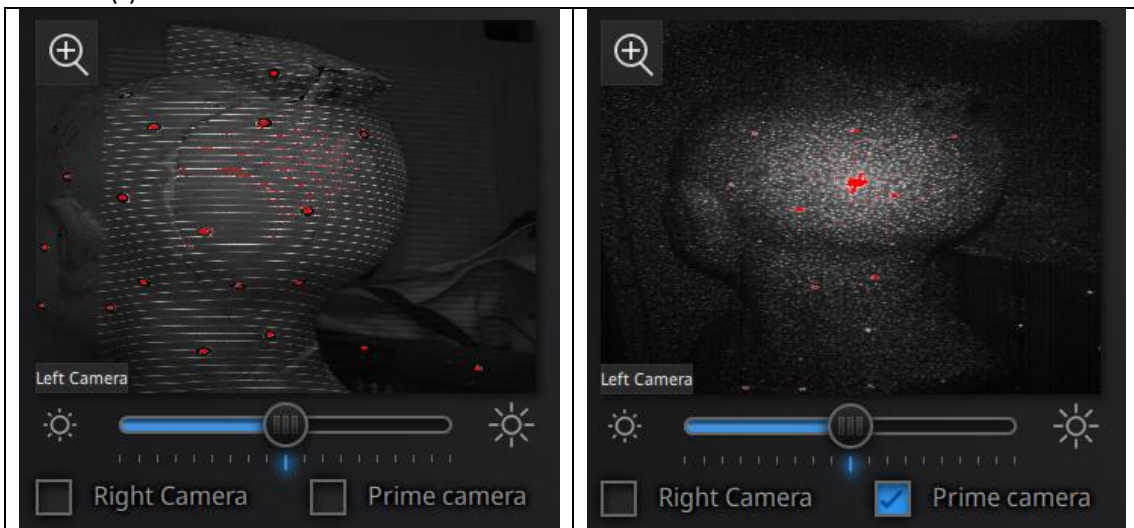


Hold the scanner to face the object (there must be enough markers or enough geometry features on surface), press the Play button or click Preview to run into Preview mode. In this mode, it will start to show data for preview, but not yet record.





*Preview with or without markers*

Check the box “Prime camera” to replace the display of the normal camera(s) with Prime camera (s).




In this mode, you can:


- Check the working distance
- Adjust the brightness sensitivity
- Ensure that the markers are well captured.
- Ensure that the object has enough geometry features if you do not use markers.

 Or  
 press  Exit Preview mode and start the scan

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

 **Notes:**  
 Preview mode will start in every new project or when an existing project is imported  
 After exit preview and start scan, the preview mode is not necessary to show again in this scanning project.  
 To access preview mode on a current project, re-open it.

### 7.2.2.2 Brightness

Double  
 press  Enter/Exit the exposure adjustment menu.

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



Press button  or  on the device to adjust brightness until the speckles are clear.

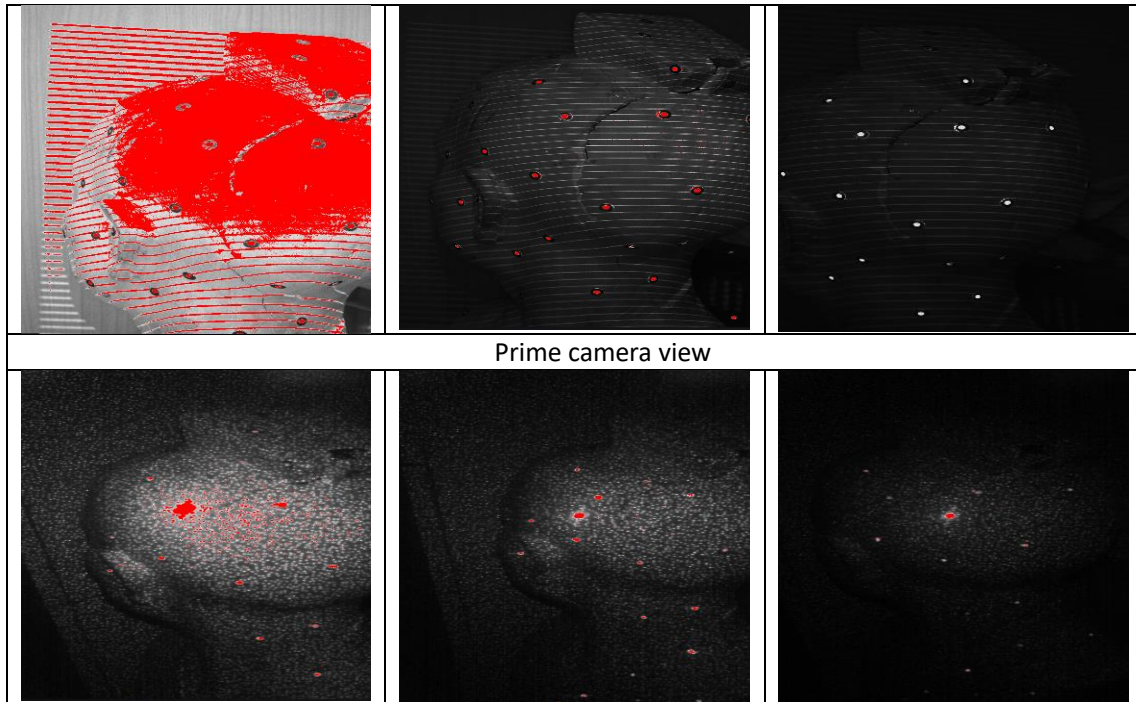
*Exposure adjustment menu, Press +/- or drag the cursor*

To set the proper exposure, first make sure you are in a good working environment. Hold the scanner at the optimal working distance (check the Rangefinder color bar)

Changing the exposure adjustment will automatically change both EinScan and Prime exposure. Check or Uncheck the Prime camera box to insure the good setting for both.

Too bright	Correct	Too dark
EinScan camera view		



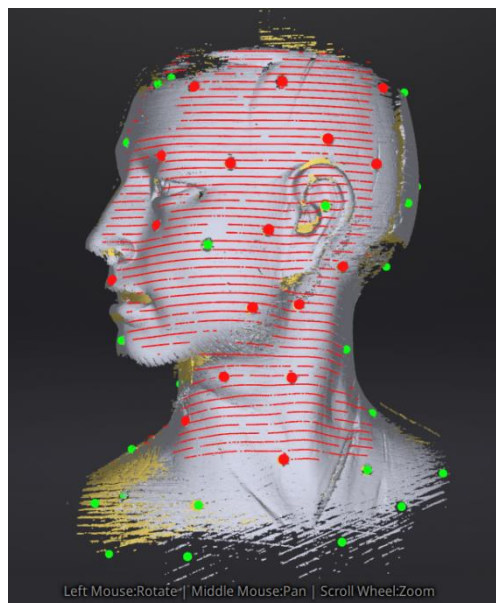


Double press Play button to exit the brightness adjustment window

### 7.2.2.3 Scan with markers

The software will recognize the markers (display in red), record data and align with previously collected markers (display in green). The data is captured along the lines, as shown below

To record the data, minimum 4 markers (display in red) in one frame (each scanning field of view) must be captured.

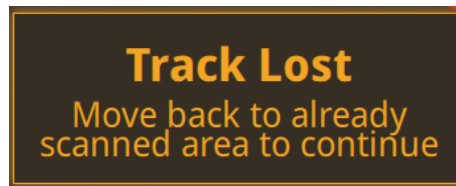


*Interface with markers*

Stick markers on the object in random pattern, avoiding sticking all markers in one line. To check the rules of sticking markers, refer to 4.2 Preparation.



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



*Track lost alert*



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

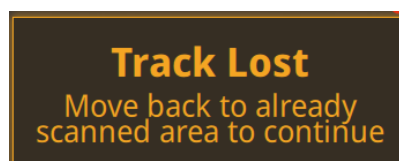
#### 7.2.2.4 Scan without Features

When start scanning, the data is captured along the lines, previously captured data shows grey as below. To improve the scan efficiency, the movement should be continuous and uniform.



*Interface without markers*

If the scan freeze and “Track lost” alert appears, it indicates that the scan cannot match the current data. You need to go back to any previously scanned area to recover the track again and continue scan.



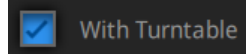
*Track lost alert*

## 7.3 Industrial Pack

### 7.3.1 Scan

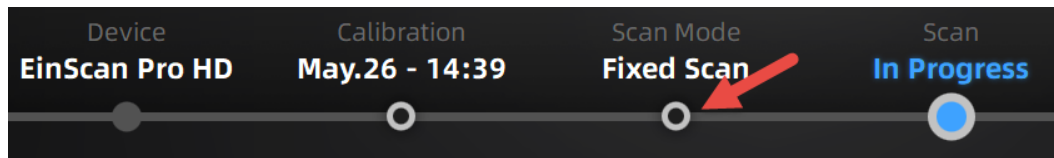
Create or import a fixed scan project.

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



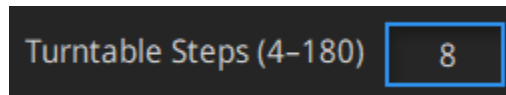
*Fixed scan with turntable*

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*

### 7.3.2 Turntable Steps



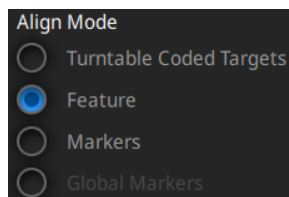
*Turntable step input*

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.

### 7.3.3 Alignment Condition

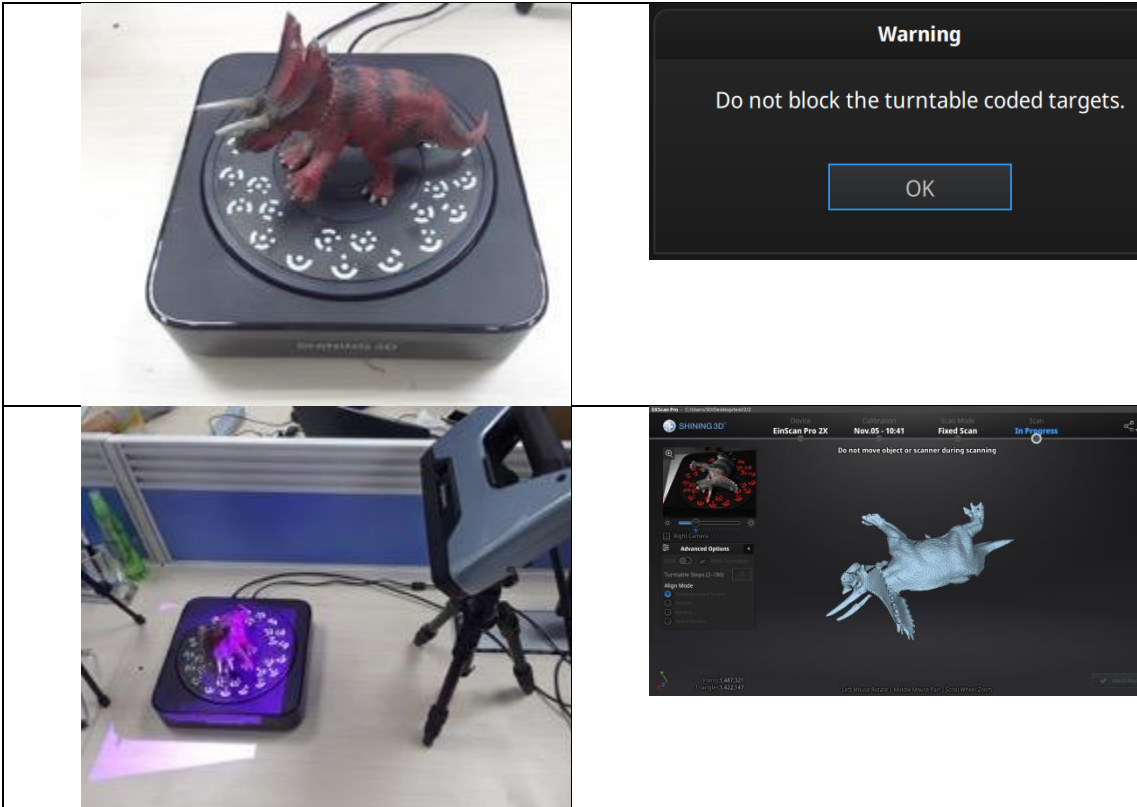


*Alignment mode selection with the turntable*

Select an alignment mode condition for the turntable scan.

#### 7.3.3.1 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.

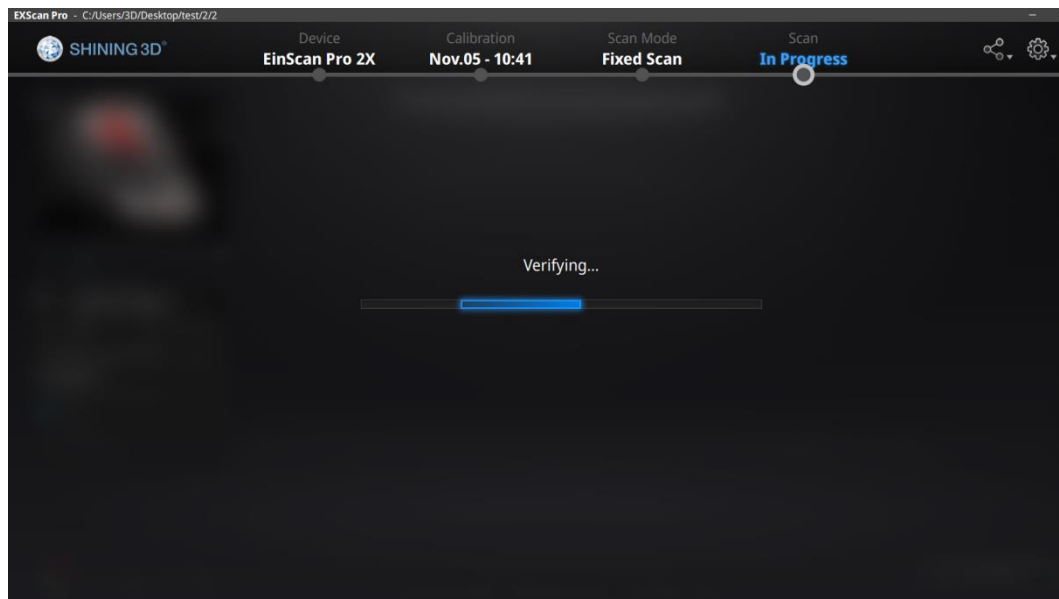
**7.3.3.2 Feature Alignment**

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.

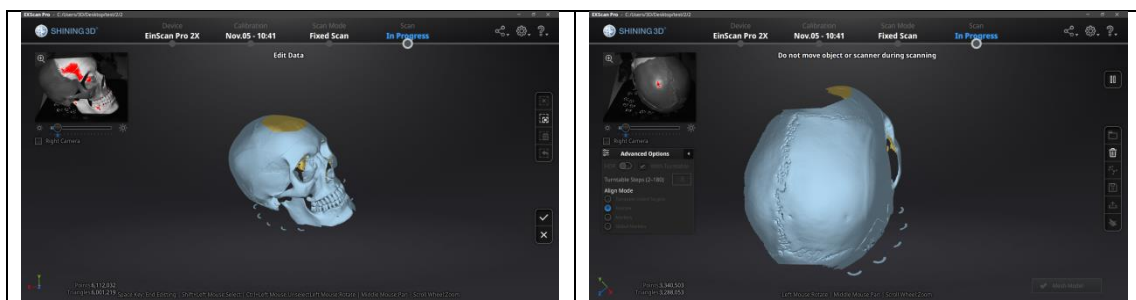
An object with simple features like plain, symmetric surface such as a sphere or cylinder is not recommended for this mode. It is better to use markers to facilitate the alignment for an object with few geometry features.



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.

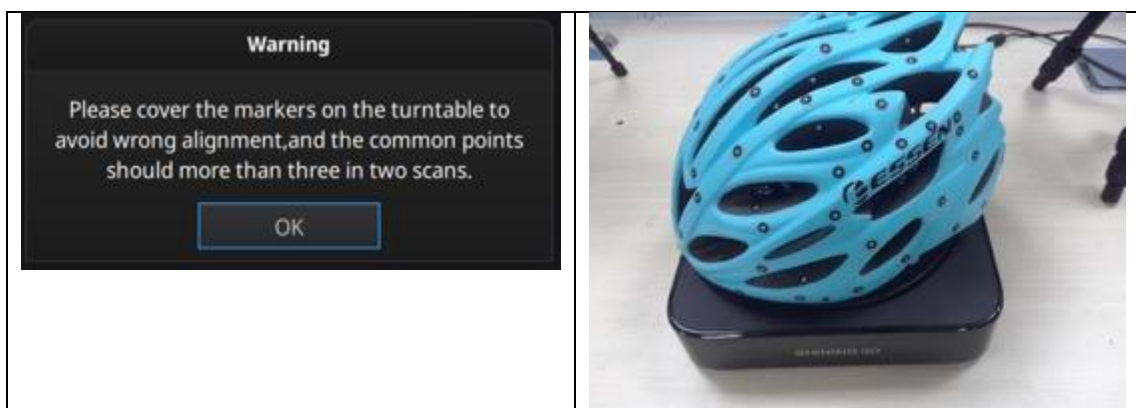


*During the “verifying” steps, the software calculates the position of the turntable*



### 7.3.3.3 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.

## 8. Post Processing

This step is accessible in Offline mode.

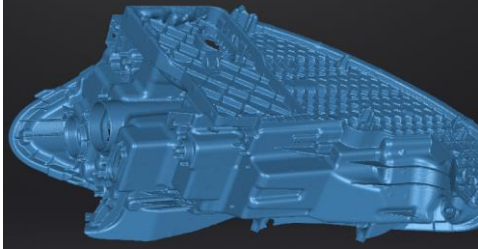
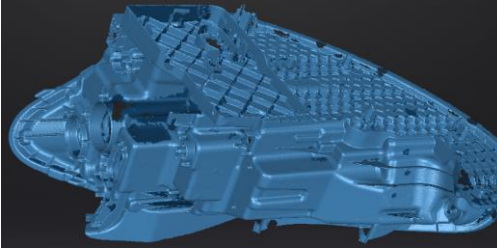
### 8.1 Create Mesh (Watertight/Unwater tight)



When scanning and editing are completed, click  to create mesh.

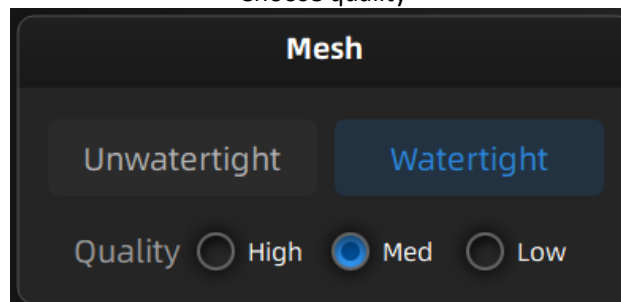
#### 8.1.1 Mesh

There are 2 types of mesh are available: Watertight and Unwater tight.

Watertight	Unwater tight
	
All holes will be filled automatically. The data can directly be 3D printed.	Unclosed model stays the way it is scanned. Processing time is quicker than Watertight.

Watertight quality:

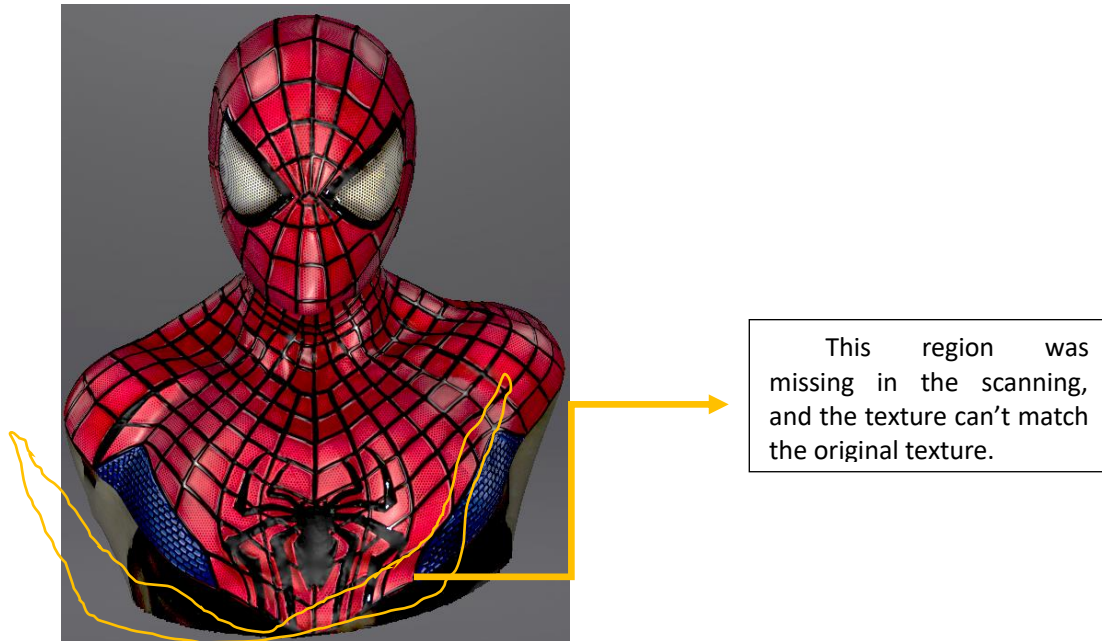
Choose quality



#### TEXTURE WATERTIGHT

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



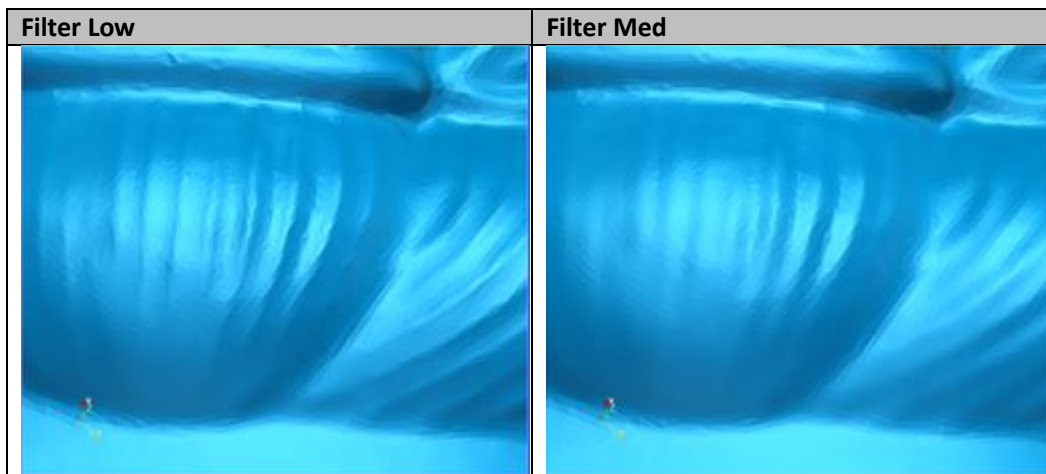


### 8. 1. 2 Mesh Optimization

Through the toolbar on the left, you can simplify, optimize, remove small floating parts, remove spike and marker hole filling.

Use recommended parameters: To get EXScan HX help you optimize a specific model, enable the function. To customize parameters, disable the function.

Filter: Optimize data.

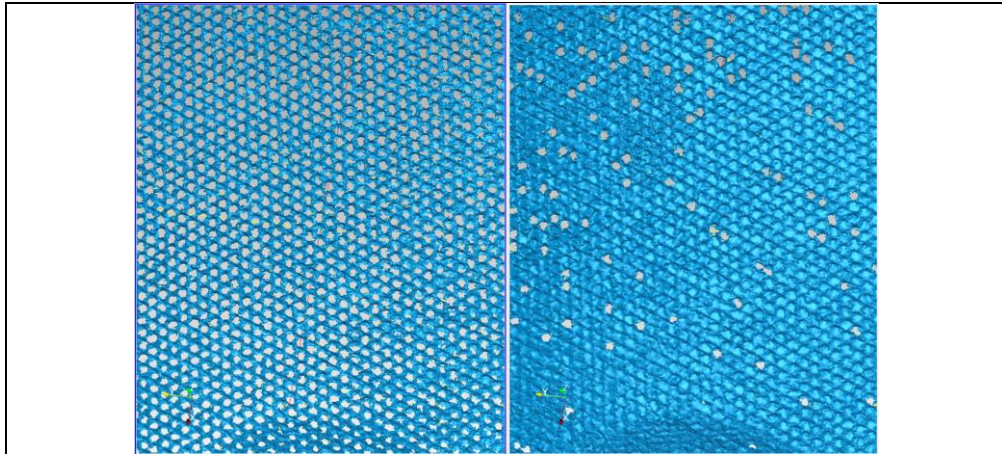


Remove small floating parts: See "8.2 Mesh Editing"—"8.10 Texture Remapping."

Max triangles: Set max. plate number to get mesh model's triangle plate number is within configured plate number.

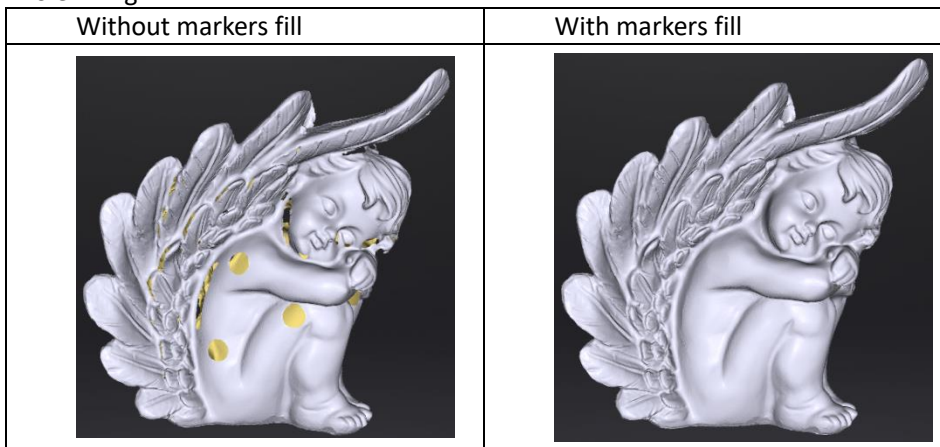
Fill small hole: For objects with tiny holes (larger than 10 mm), use the function to fill tiny hole to make the scanned image look better. For objects with holes (smaller than 10 mm), you are not recommended to use the function or you can set the function parameter value to a smaller one.

<p><b>Situation when You Don't Fill Holes</b></p>	<p><b>Situation when You Fill Holes (for Holes Larger Than 10mm)</b></p>
---	--



Remove spikes: Remove spike-like data on the image edge.

Marker hole filling:



## 8.2 Mesh Editing

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

### MESH SELECT/DELETE

Press **Shift + Left mouse** to select data and enter the selection menu.

**CTRL+ Left mouse**: Deselect a selected region.

### CLOUDS SELECT/DELETE








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

**CTRL+ Left mouse**: Deselect a selected region.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<b>Edit buttons:</b>														
① Multi view	② Select Visible	③ Select Through	④ Rectangular	⑤ Polygon										
⑥ Circle	⑦ Paint Brush	⑧ Select all												
⑨ Connected domain	⑩ Revert	⑪ Unselect		⑫ Delete										
⑬ Undo	⑭ Apply edit	⑮ Cancel edit												

	<b>Select Visible</b> to select data on the front view only
--	--




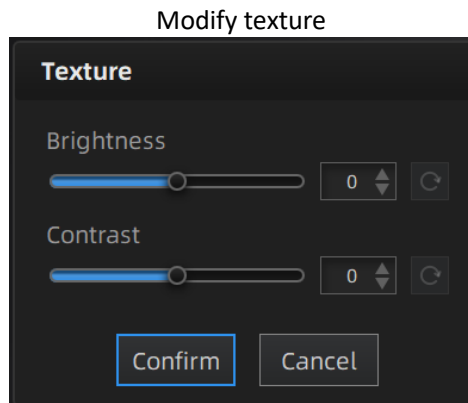
	<b>Select Through</b> to select data all though
	<b>Paint Brush</b> Mouse scrolling wheel to adjust the paint brush size.
	<b>Connected domain</b> Click the button after select the data, all connected region to the selected data will be picked.
	<b>Delete selected data</b> Click the button or "DELETE" on the keyboard to delete selected data.
	<b>Undo</b> You can only undo the most recently deleted data.
	<b>Apply edit</b> Click the button or space bar to apply the edition, and exit edit mode.
	<b>Cancel edit</b> Undo all editors, and exit edit mode.

### 8. 3 Texture Adjustment

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

- Brightness (-100-100): indicates the brightness of the picture. The larger the value is, the higher the brightness is.
- Contrast (-100-100): indicates the degree of contrast between colors. The larger the value is, the more obvious the color difference is.

: Click Reset to return to 0.



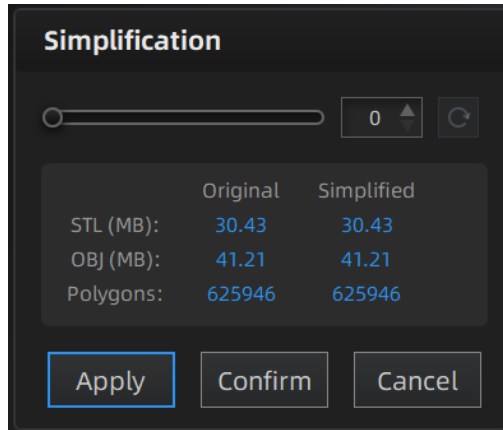
This modification is not saved in the project file. Export the data to save the texture editing.

### 8. 4 Simplification

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 0.

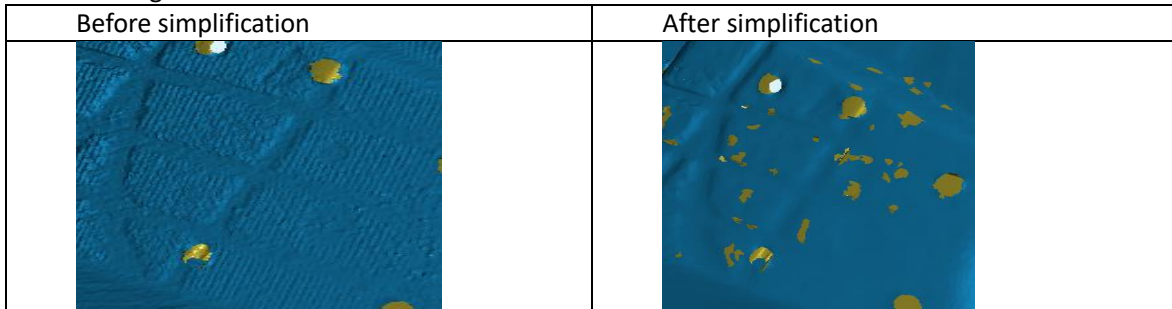
The comparison of detail between before simplification and after simplification (at 70% simplify proportion).

Simplification menu



Click **“Apply”** button to simplify data, preview the result of current setting.  
 Click **“Confirm”** button to apply the **“Simplification”** setting.  
 Click **“Cancel”** button to quit, and go back to the original data.

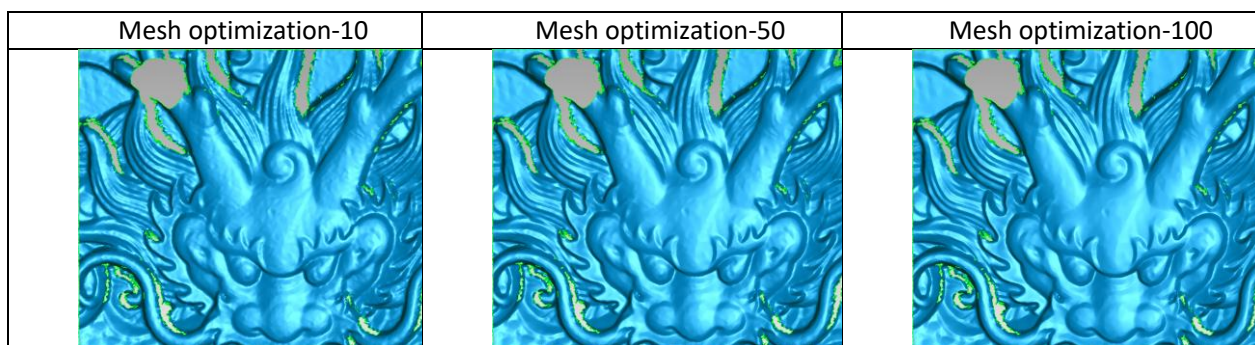
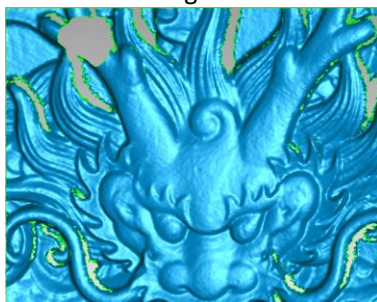
Multiple operations on **“Simplification”**, the result will not be added. It will always operate on the original data.



## 8.5 Mesh Optimization

Mesh optimization can optimize the quality of the data. There are 3 ratio options of mesh optimization. Processing time will be different. Below shows the result of 3 different ratios.

Original



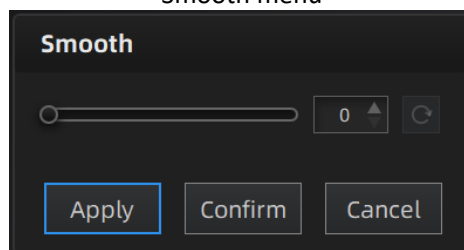
Click **“Apply”** button to optimize data, preview the result of current setting.  
Click **“Confirm”** button to apply the “Mesh Optimization” setting.  
Click **“Cancel”** button to quit, and go back to the original data.

Multiple operations on “Mesh Optimization”, the result will not be added. It will always operate on the original data.

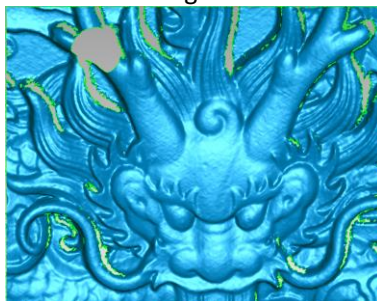
## 8.6 Smooth

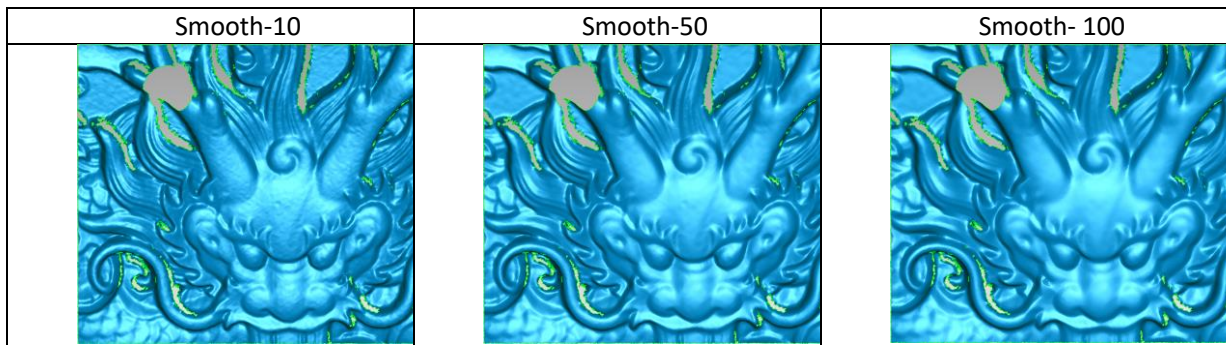
Smooth the possible noise on the surface of the scan data. It might remove some small details or smooth some sharp edges at the same time. The example of before and after smoothing is shown below. Run 2 times, data will be smoothed twice.

Smooth menu



Original





Click **“Apply”** button to smooth data, preview the result of current setting.

Click **“Confirm”** button to apply the “Smooth” setting.

Click **“Cancel”** button to quit, and go back to the original data.

Multiple operations on “Smooth”, the result will not be added. It will always operate on the original data.

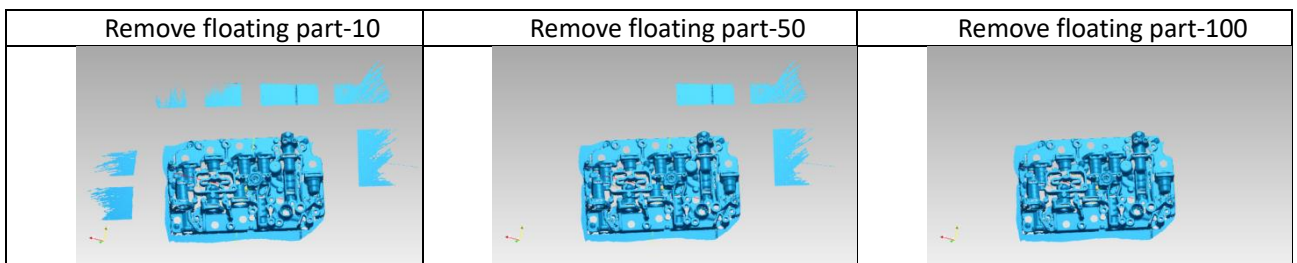
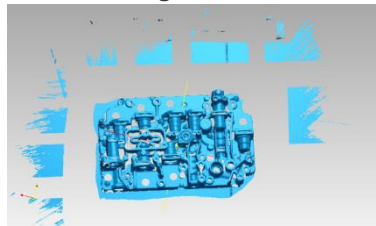
## 8.7 Remove Small Floating Parts

Remove small floating parts in the scan data.

0 means no operation, 100 is the maximum. The maximum value is the square of the diagonal length of the floating part/10,  $MAX=(L/10)^2$ .

Diagram of removing floating parts shows as below:

Original data



Click **“Apply”** button to remove floating part, preview the result of current settings.

Click **“Confirm”** button to apply the “remove floating part” setting.

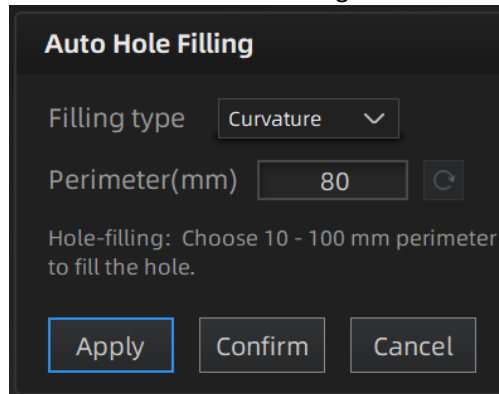
Click **“Cancel”** button to quit, and go back to the original data.

Multiple operations on “Remove floating part”, the result will not be added. It will always operate on the original data.

## 8.8 Auto Hole Filling

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

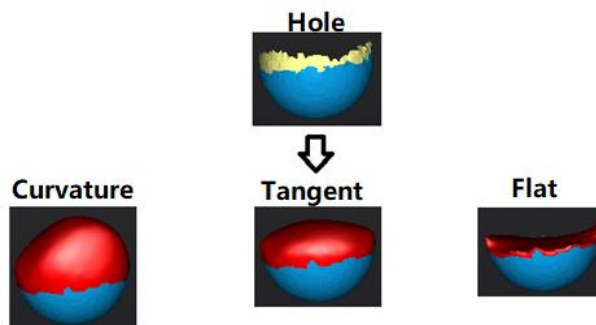
### Auto hole filling



Choose Curvature, Tangent or Flat before filling hole.

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

Effect of Curvature, Tangent or Flat



Click **“Apply”** button to auto fill hole, preview the result of current setting.

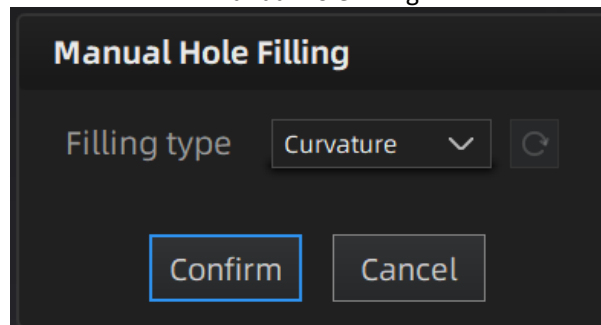
Click **“Confirm”** button to apply the “Auto hole filling” setting.

Click **“Cancel”** button to quit, and go back to the original data.


## 8.9 Manual Hole Filling

The hole edges are displayed green, and get red after picking. The number of the holes and the number of holes filled will be displayed on the interface. Choose Curvature, Tangent or Flat before picking a hole.

### Manual hole filling



Click the edge of the hole to fill it.

Click , according to the order of filling holes, from the last hole to cancel hole filling. Ctrl + Z can also cancel hole filling.


Click **“Confirm”** button to apply current setting and exit the manual hole filling.



Click “Cancel” button to quit, and go back to the original data.

## 8.10 Texture Remapping



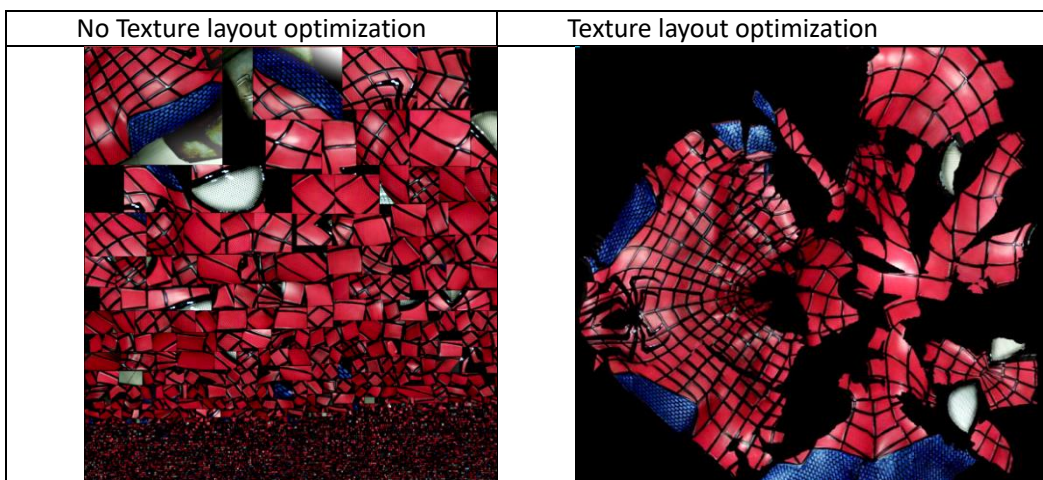
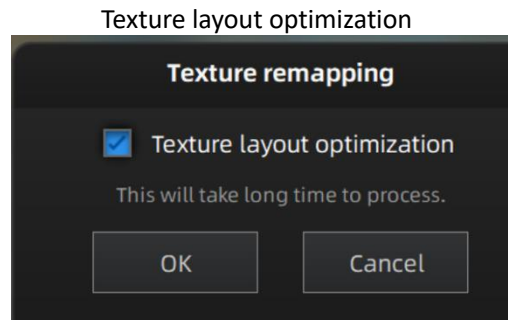
Click  Texture Remapping to display the Texture menu.

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

Texture remapping is accessible before saving the data.

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

This option has no effect on the texture itself.



### Note:

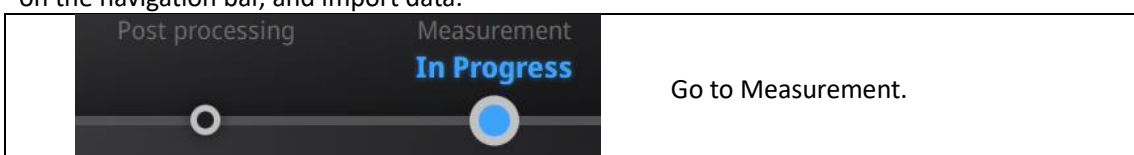
TLO requires a longer time to compute.

TLO is used only with OBJ output.

TLO result is more convenient for texture manual editing.

## 9. Measurement

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





Open file. Or, you can drag stl, obj or ply files onto the post-process interface.  
 Drag texture ply file onto the interface and non-texture data will be shown.

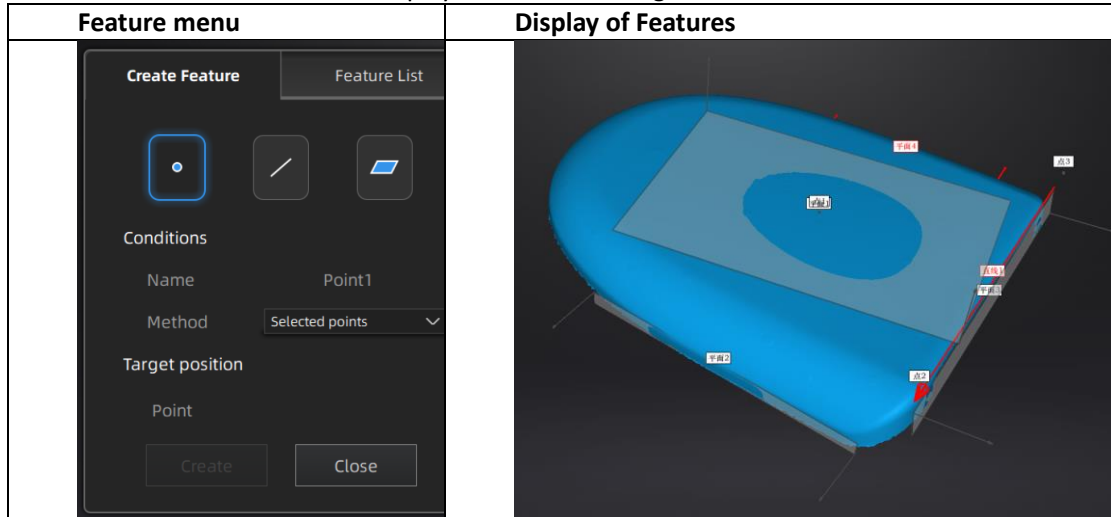
Click **Open file**, a STL or OBJ file can be imported to edit.

## 9.1 Create Feature



Enter/Exit the Feature menu.



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

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

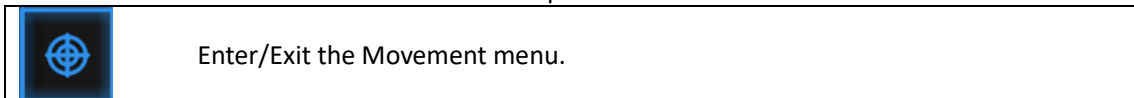
Feature	Creation Method	Requirement	Description
Point 	Selected Points	—	Click on the data to select a point. Click create to create a point.
	Line-Plane Interface	Line and Plane should be created in advanced	Click on the created line, or select it on the dropdown. Click on the created plane, or select it on the dropdown. The point generated is the intersection between the non-parallel line and plane. <b>Feature creation failed! Error code 9:</b> the line is parallel to the plane.
Line 	Point-Point	—	Pick 2 points. Click on the data to select a point or click on a feature point previously created. In the Choice list select one of the point to redo it. The line generated is define as point from to point to point.
	Plane-Plane Intersection	2 Planes should be created in	Click on the plane previously created, or select it on the dropdown, repeat for the second plane.

		advanced	The created line is the intersection between the 2 non-parallel planes. <b>Feature creation failed! Error code 1:</b> the planes are parallel.
Plane 	3 Points Fit	—	The plane is generated by 3 points not co-linear. Click on the data to select one point or click on a previous created feature point. In the Choice list select one of the point to reselect it. <b>Feature creation failed! Error code 6=</b> the points selected are co-linear.
	Point-Line Fit	Line should be created in advanced	The plane generated includes the point and the line (The line should be created in advanced). Click on the line previously created, or select it from the drop-down. Click on the data to select a point or click on a feature point previously created. In the Choice list select one of the element to reselect it. <b>Feature creation failed! Error code 6=</b> the point selected belongs to the line
	Best Fit	—	Press Shift+ LMB to select an area, press ctrl+ LMB to unselect. The plane generated is the position with the smallest deviation from the selected area.

## 9.2 Movement

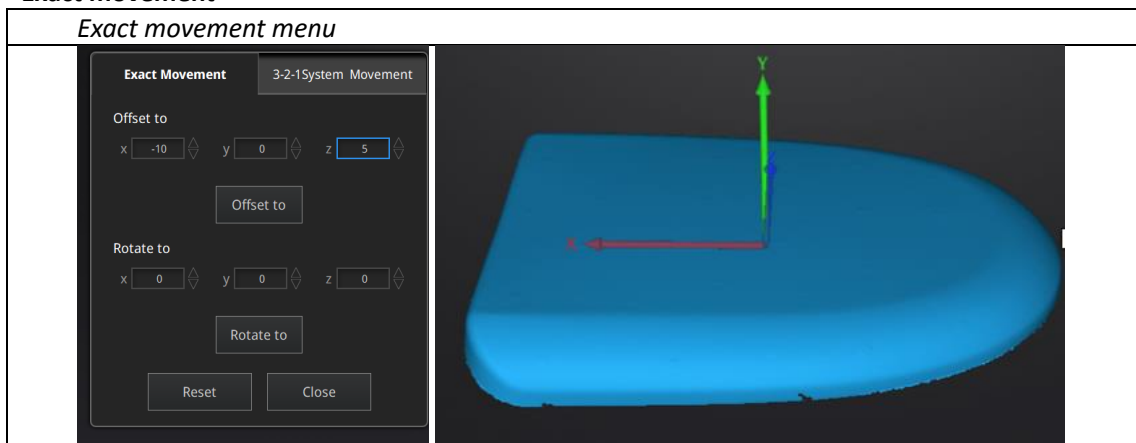
Use this mode to modify the alignment of the data to the global coordinate. This action is useful for post processing or reverse engineering.

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



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+.

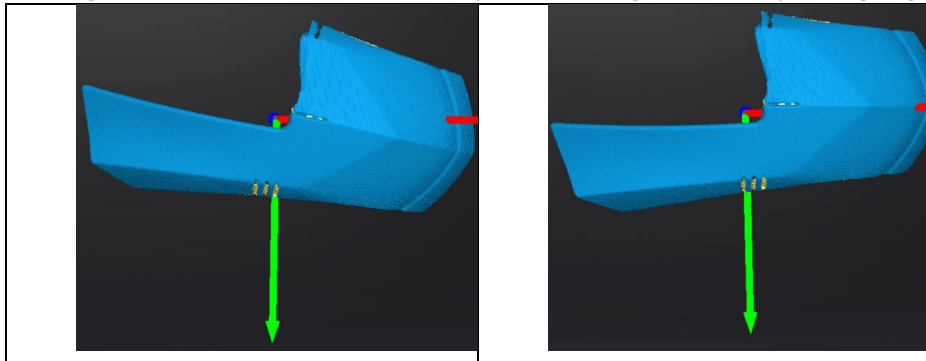
Click **Reset** to cancel the transformation to original position.



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



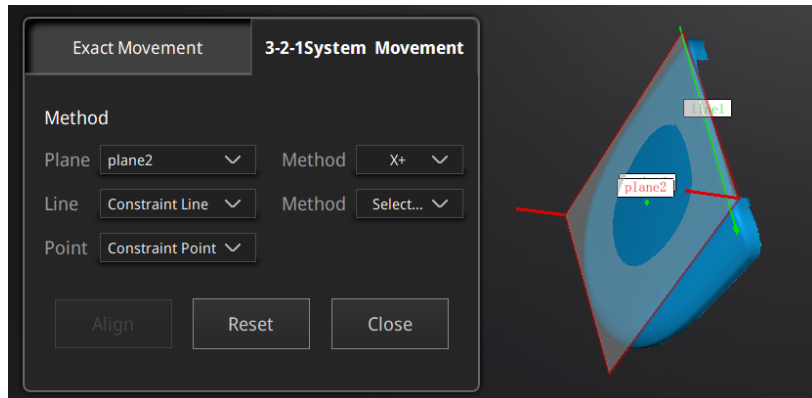
### 9.3 3-2-1 Movement

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.

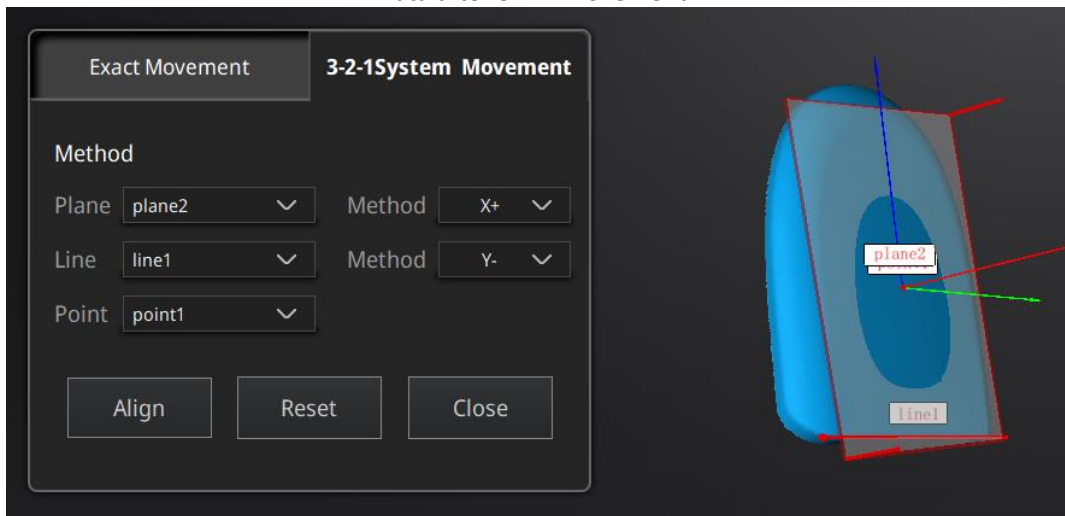
The arrows represent the global coordinate system, Red=X+, Green=Y+, Blue=Z+.

### 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.

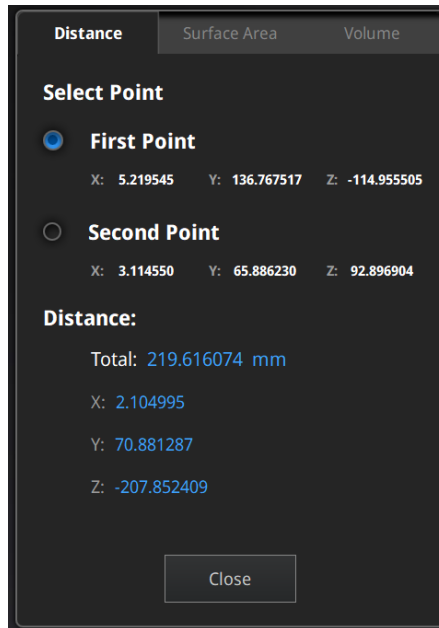
## 9.4 Measuring

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

### DISTANCE

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

### Distance menu



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

### SURFACE AREA

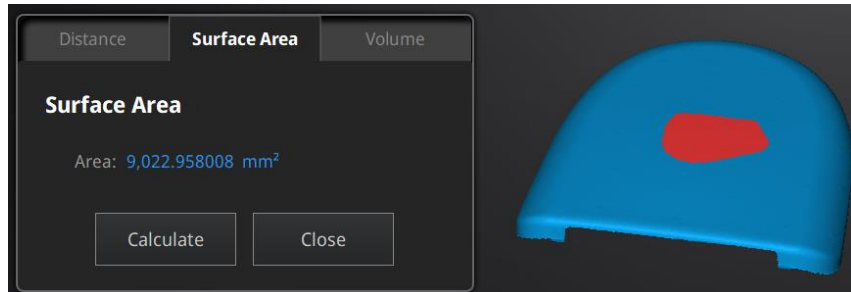
Press **Shift+ LMB** to select an area, press **ctrl + LMB** to unselect.

**Ctrl + A** to select all.

Click **Calculate** to display the Area value of the selected data in mm<sup>2</sup>

Redo the selection and click calculate again to update.

### Surface area menu

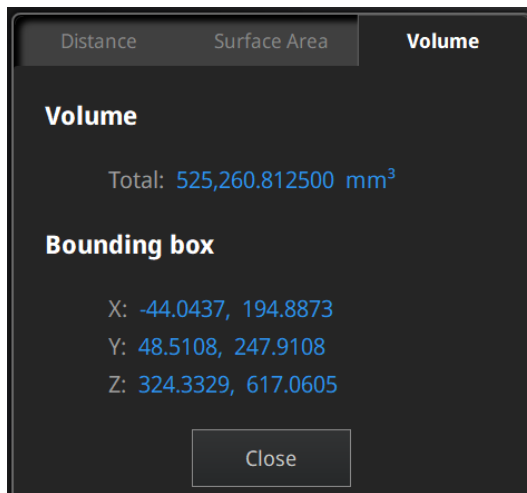


### VOLUME

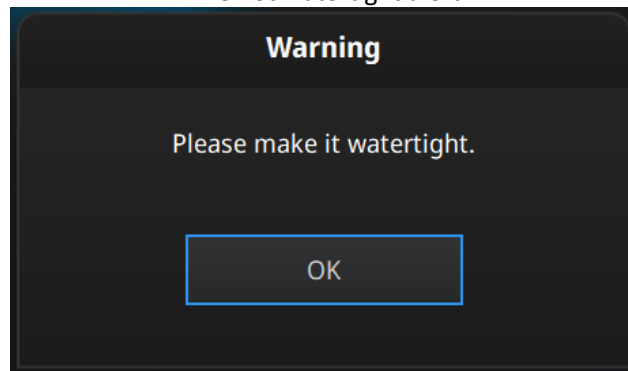
This tool calculates the volume contains in a watertight mesh.

It returns the volume in mm<sup>3</sup> and the coordinates of the smallest box, parallel to the global coordinates, containing all the data.

### Volume menu




Prior to the calculation make sure the file is [watertight](#) (no holes).  
File not watertight alert



# 10. Export Data

## 10.1. Data Formats



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

Save folder

File name:

Files of type:

.asc(whole)  .stl  .ply  .obj  .p3  .3mf

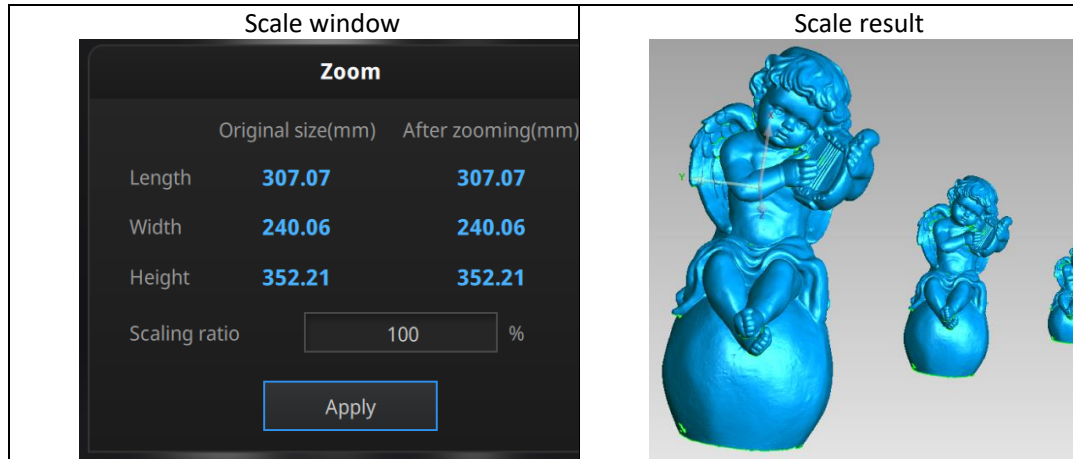
Format	Texture	Data type	Saves as	Recommended For
<b>ASC (separated) (fixed mode only)</b>	No	Separated point-clouds, with calculated alignment	scan_0. asc scan_1. asc scan_2. asc etc...	<ul style="list-style-type: none"> <li>◆ Inspection</li> <li>◆ Fast export (no post-processing needed)</li> <li>◆ Complex data to post process in another software</li> </ul>
<b>ASC (whole)</b>	No	optimized point-cloud	scan.asc	<ul style="list-style-type: none"> <li>◆ Inspection</li> <li>◆ Fast export (no post-processing needed in hand-held mode)</li> <li>◆ Large data to post process in another software</li> <li>◆ Complex data to post process in another software</li> </ul>
<b>STL</b>	No	Mesh	scan.stl	<ul style="list-style-type: none"> <li>◆ 3D printing (watertight mesh data)</li> <li>◆ Reverse Engineering</li> <li>◆ Compatibility with most mesh editing software</li> </ul>
<b>OBJ</b>	Yes (separated)	Mesh, Texture & Matching file	scan.obj scan.jpg scan.mt	<ul style="list-style-type: none"> <li>◆ Artistic applications</li> <li>◆ 3D rendering</li> <li>◆ Compatibility with most mesh editing software</li> </ul>
<b>PLY</b>	Yes	Mesh	scan.ply	<ul style="list-style-type: none"> <li>◆ Low storage</li> <li>◆ Easy texture editing</li> </ul>
<b>3MF</b>	Yes	Mesh	scan.3mf	<ul style="list-style-type: none"> <li>◆ Low storage</li> <li>◆ Compatibility with Microsoft paint3d</li> </ul>
<b>P3</b>	No	Marker position	scan.p3	<ul style="list-style-type: none"> <li>◆ Global Marker File in EinScan software</li> <li>◆ Measurement of the marker position</li> </ul>

## 10.2. Scale Data

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


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

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










## 10.3. Share Data

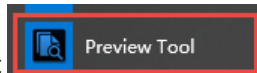


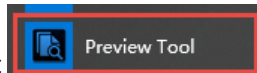
Click  after mesh to share data to Sketchfab, it will show the dialog as below. A model title, username and user password are required. Register and view the shared model at <http://sketchfab.com>.

## 10.4. Third-party Software

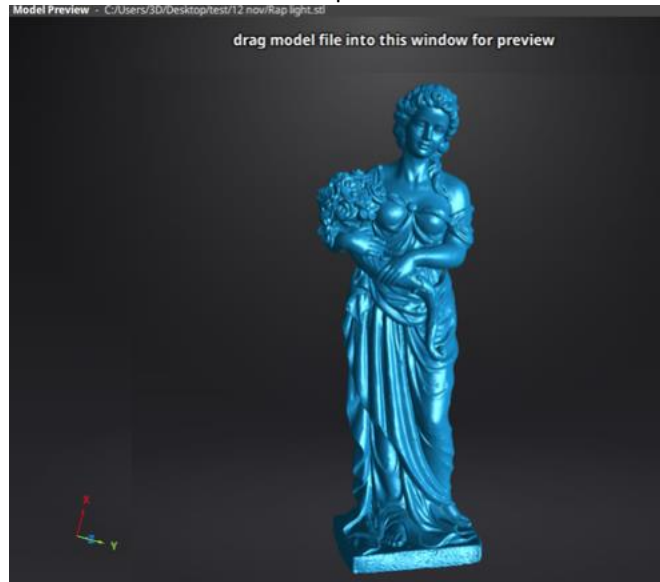
Install a third-party software ( Geomagic ControlX ,  Verisurf ,  Einsense Q ,  Geomagic Design X ,  Geomagic Essentials and  Solid Edge SHINING 3D Edition) first. Then after meshing data, click  to export data to the third-party software.

## 10.5. Model Preview



Double click the short-cut  on the desktop. Drag files into the window for preview. Manipulate the data with the same control as EXScan software.

Model preview



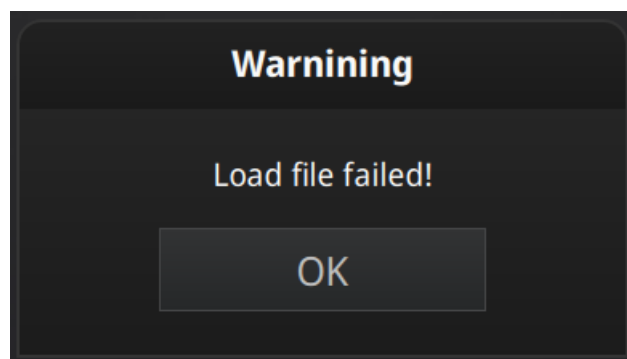
STL, OBJ, PLY, ASC, or 3MF can be loaded, files from 3rd party software might fail to be loaded. In this case we recommend Meshlab, a free mesh software editor, or upload to sketchfab.



**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.

STL, OBJ, PLY, ASC, or 3MF can be loaded, files from 3<sup>rd</sup> 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



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