SHINING 3D®

# USER MANUAL

## EinScan Pro 2X/2X Plus

## EXScan Pro Software

Nov 2018

SHINING 3D®

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## About SHINING 3D

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

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

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

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

# 1. Hardware

## 1.1. Packing List

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

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

## 1.2. Specifications

### 1.2.1. EinScan Pro 2X Plus

| **Model** | **EinScan Pro 2X Plus** | | | |
|---|---|---|---|---|
| Scan Mode | Handheld HD Scan | Handheld Rapid Scan | Fixed Scan with Turntable (with Add-on: industrial pack) | Fixed Scan without Turntable (with Add-on: industrial pack) |
| Scan Accuracy | Up to 0.05 mm | Up to 0.1 mm | 0.04mm (Single shot accuracy) | 0.04mm (Single shot accuracy) |
| Volumetric Accuracy | 0.3 mm/m (Markers Alignment) | | N/A | N/A |
| Scan Speed | 20 frames /sec<br>1.1 mil points /sec | 30 frames /sec<br>1.5 mil points /sec | Single Scan: <0.5sec | Single Scan: <0.5sec |
| Point Distance | 0.2mm~3.0mm | 0.25mm~3.0mm | 0.24mm | |
| Single Scan Range | 208*136mm——312*204mm | | | |
| Depth of Field | ±100 mm | | | |
| Working Distance | 510mm | | | |
| Light source | LED | | | |
| Align Mode | Markers Alignment | Markers Alignment, Feature Alignment (with rich geometrical features on the surface)<br>Hybrid Alignment (Markers and Feature) | Turntable Coded Targets, Feature, Markers, Manual Alignment | Markers, Feature, Manual Alignment |
| Texture Scan | No | Yes (With Color Pack add-on) | | |
| Outdoor Operation | Set up shelter or cover to avoid direct sunlight | | | |
| Special Scan Object | For transparent, highly reflective or some dark objects, please spray with powder before scanning. | | | |
| Printable Data Output | Able to export watertight 3D model directly to 3D printing | | | |
| Data Format | OBJ, STL, ASC, PLY, 3MF, P3 | | | |
| Scanner Body Weight | 1.13 kg (including the USB3.0 cable) | | | |
| Supported OS | Win7/Win8/Win10<br>64 bit | | | |

## 1.2.2. EinScan Pro 2X

| Model | EinScan Pro 2X | | | |
|---|---|---|---|---|
| Scan Mode | Handheld HD Scan | Handheld Rapid Scan | Fixed Scan with Turntable (with Add-on: industrial pack) | Fixed Scan without Turntable (with Add-on: industrial pack) |
| Scan Accuracy | Up to 0.05mm | Up to 0.1mm | 0.04mm (Single shot accuracy) | 0.04mm (Single shot accuracy) |
| Volumetric Accuracy | 0.3 mm/m (Markers Alignment) | | N/A | N/A |
| Scan Speed | 20 frames /sec<br>0.1 mil points /sec | 30 frames /sec<br>1.5 mil points /sec | Single Scan: <1 sec | Single Scan: <1 sec |
| Point Distance | 0.2 mm-2 mm | 0.2 mm-2 mm | 0.16 mm | |
| Single Scan Range | 135*100 mm——225*170 mm | | | |
| Depth of Field | ±100 mm | | | |
| Working Distance | 400mm | | | |
| Light source | LED | | | |
| Align Mode | Markers Alignment | Markers Alignment, Feature Alignment (with rich geometrical features on the surface)<br>Hybrid Alignment (Markers and Feature) | Turntable Coded Targets, Feature, Markers, Manual Alignment | Markers, Feature, Manual Alignment |
| Texture Scan | No | Yes (Color Pack add-on) | | |
| Outdoor Operation | Set up shelter or cover to avoid direct sunlight | | | |
| Special Scan Object | For the transparent, highly reflective or some dark objects, please spray with powder before scanning. | | | |
| Printable Data Output | Yes | | | |
| Data Format | OBJ, STL, ASC, PLY, 3MF, P3 | | | |
| Scanner Body Weight | 1.13 kg (including the USB3.0 cable) | | | |
| Supported OS | Win7/Win8/Win10<br>64bit | | | |

## 1.3. Hardware introduction

Serial number

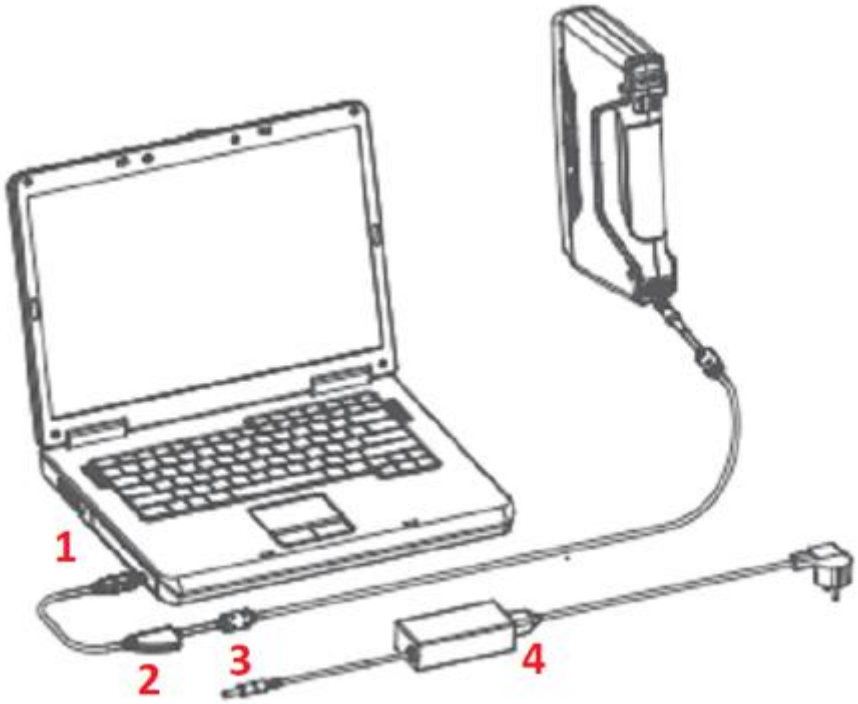
+/- buttons
Play button

USB port for add-ons

## 1.4. PC requirements

| Model | Requirements |
|---|---|
| CPU | I7 or Higher |
| Display card | NVIDIA GTX770 or higher |
| Display memory | >4G |
| Memory Storage | 16G or more |
| USB | At least one USB 3.0 |

## 1.5. Set Up




*Hardware set-up*

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

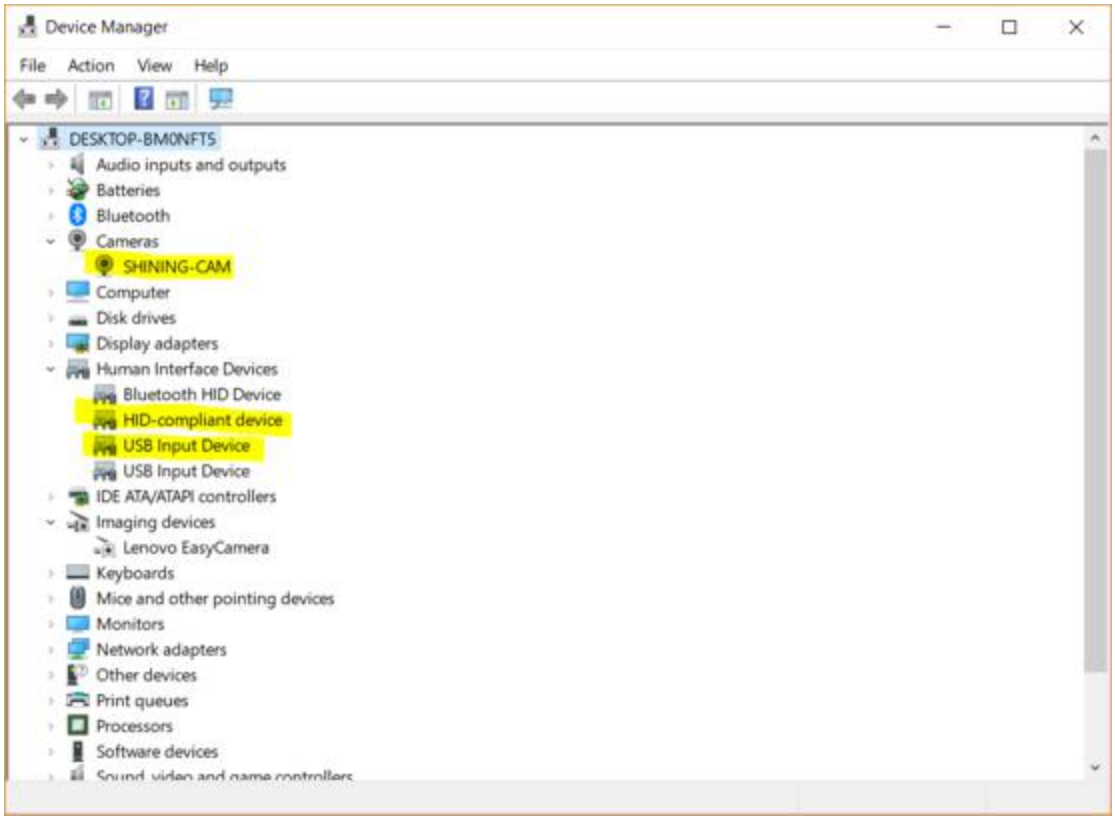
*USB 3.0 should be blue, and/or present the SuperSpeed logo*

Connect the power cable and power adapter. (4)
Plug the power cable into the power port of the cable. (2-3)

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

*Cable with clip*

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




*Device Manager, display of the scanner*

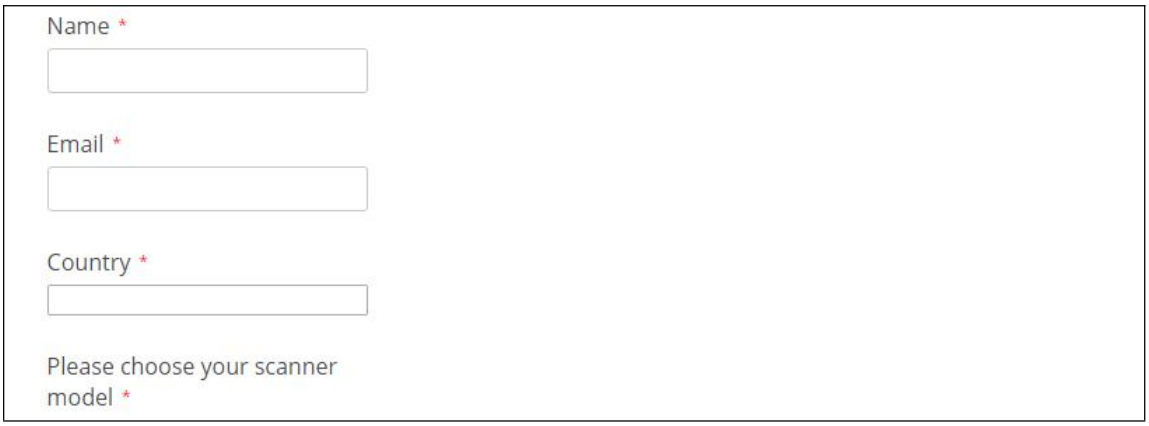
If the drivers are not installed properly, or the Alert “device off-line” keeps coming back. Right click on the SHINING-CAM and uninstall the driver. Unplug and replug the USB, Windows will reinstall the drivers by itself.

# 2. Software

## 2.1. Download

**Step 1:** Go to https://www.einscan.com/software-download.
Click “EinScan Software Download” to download the latest version software for EinScan.

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



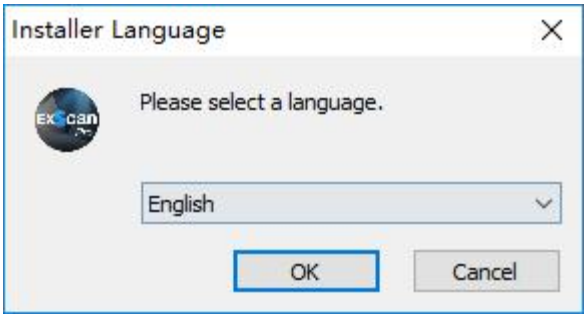

**Step 3:** Download the installer. Save or Save as in the desired location on your computer.

## 2.2. Software installation

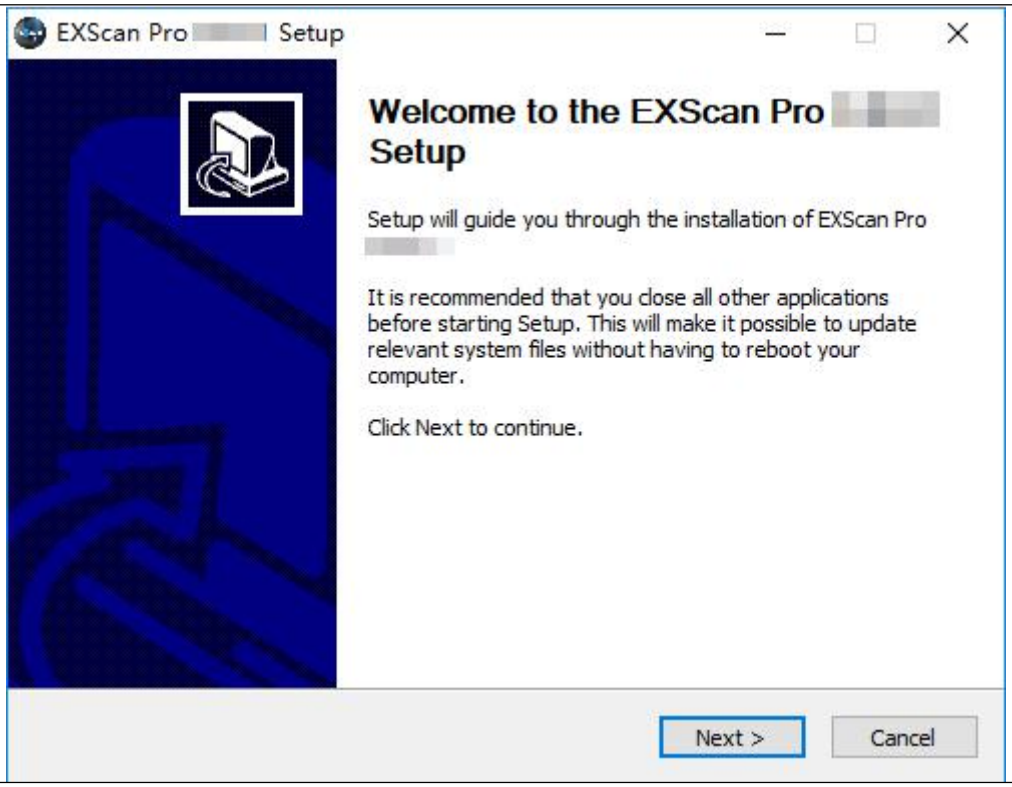
⚠**Note:** Administrator rights are required for the installation of the software only.

Double click installation package, accept the modification on your computer

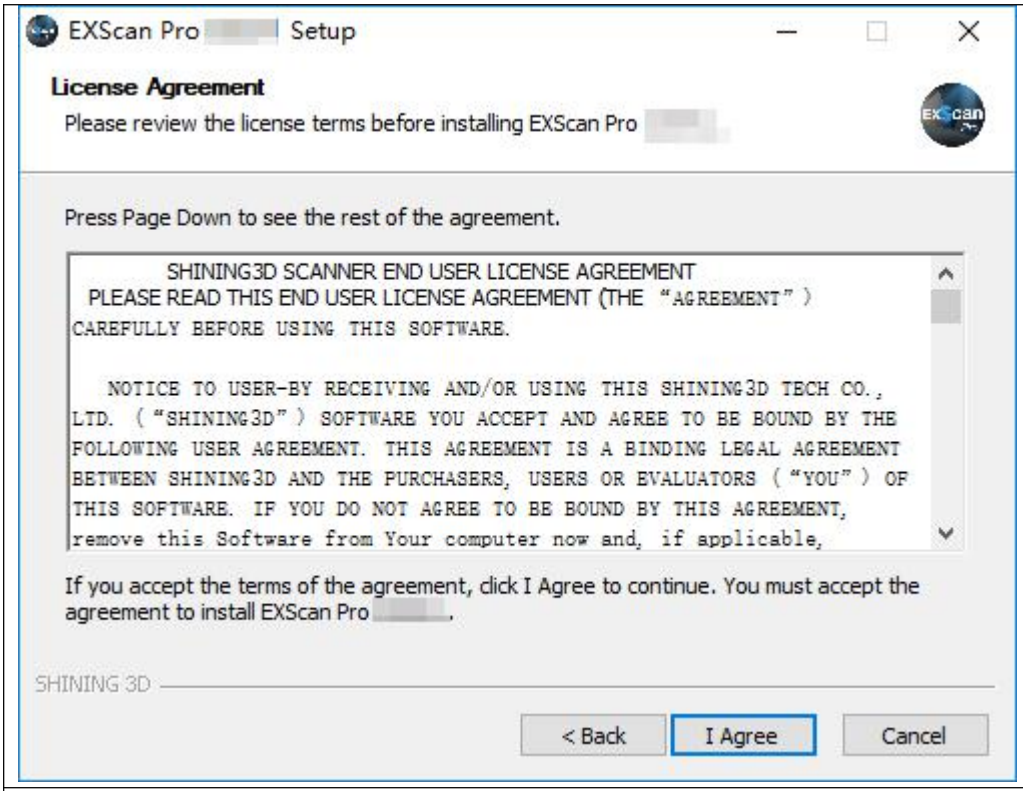
Choose the installation language, then click OK.



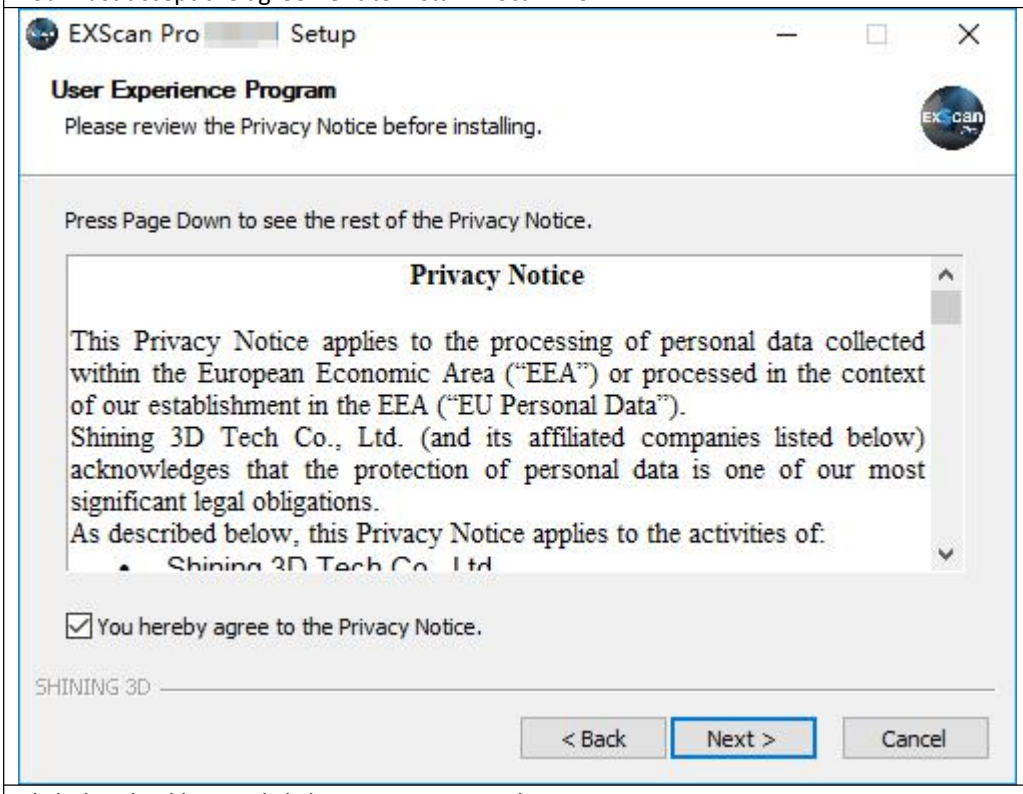

*Select installation language*



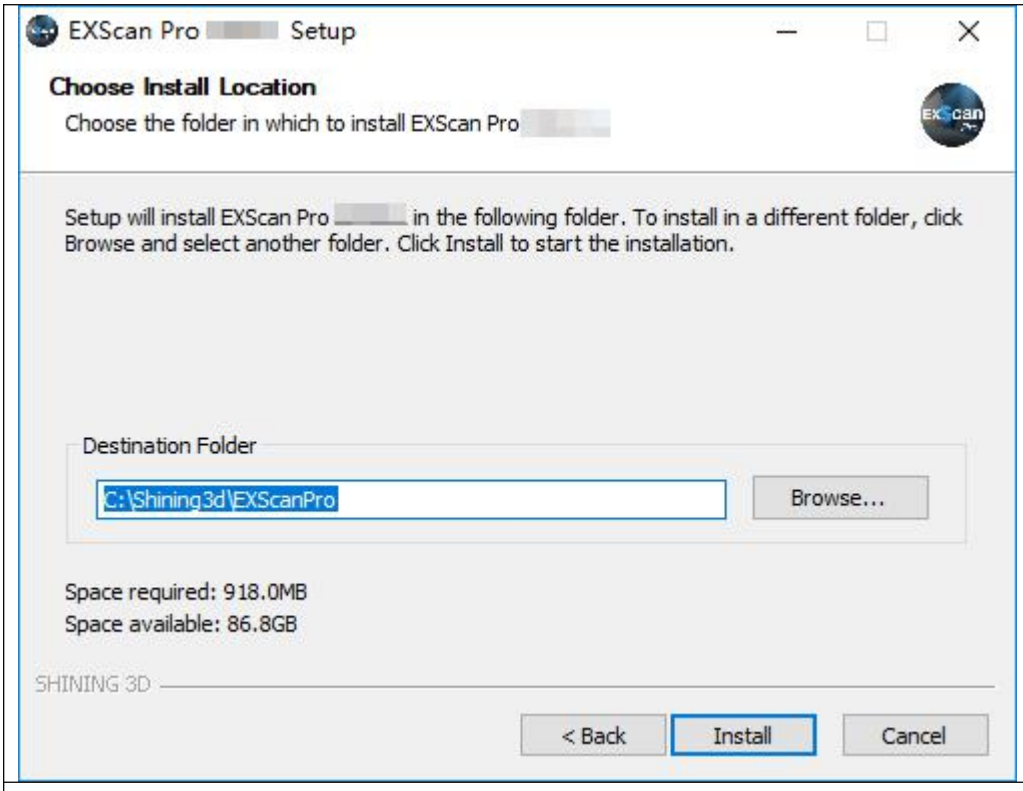

Follow the instruction on the pop-up window



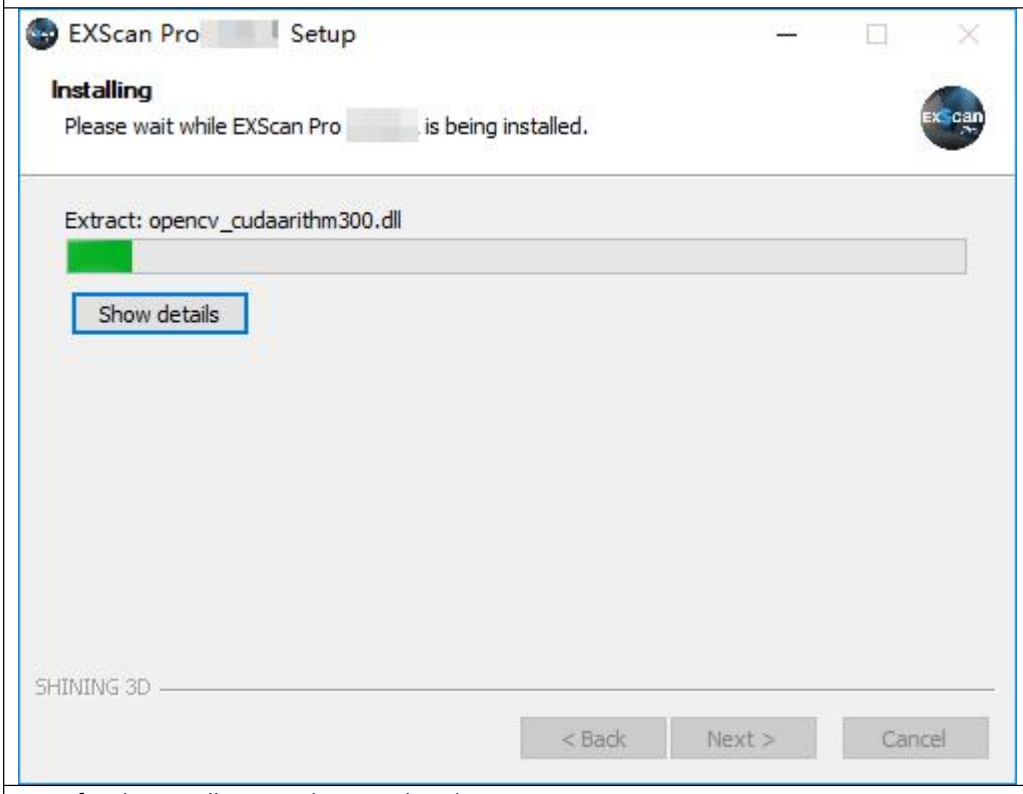

You must accept the agreement to install EXScan Pro.



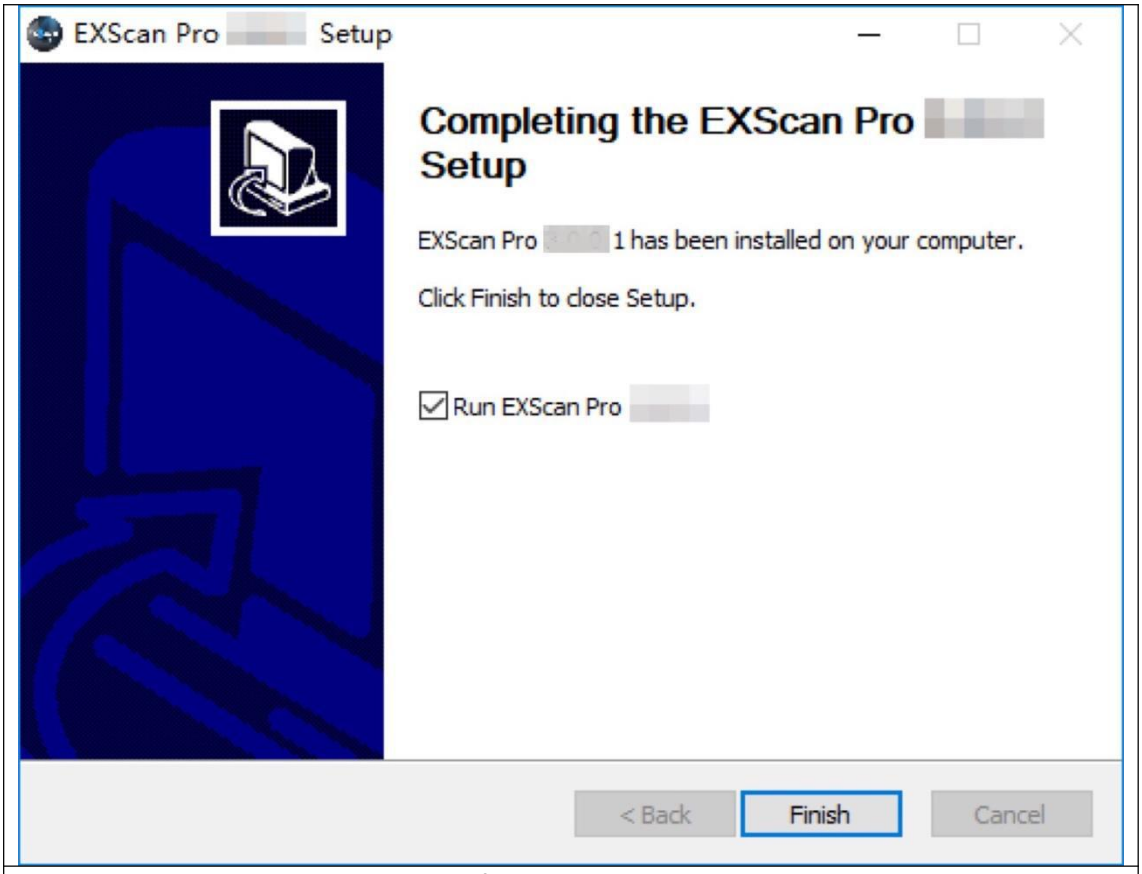

Click the Checkbox and click Next to approve the Privacy Notice




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




Wait for the installation to be completed




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

When the installation is completed, there will be a shortcut Icon of the software on the desktop.

The shortcut in the Start Menu is shown as below:

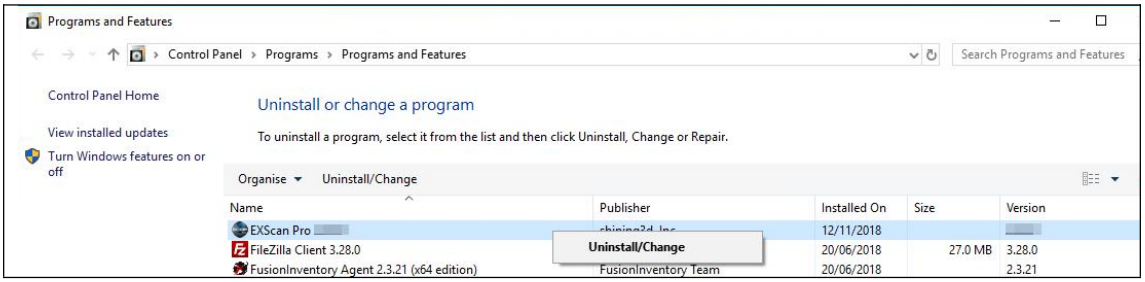
*EXScan Pro on the start menu*

## 2.3. Uninstall Software

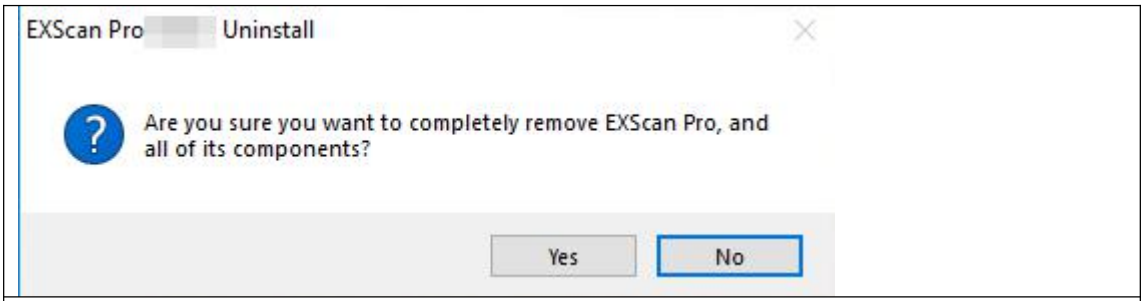
To install upgraded version of EXScan in the future, you may need uninstall previous software first. To uninstall the software, when the software is closed, in the start menu Click Uninstall.

*start menu > Shining3d_EXScanPro > Uninstall*

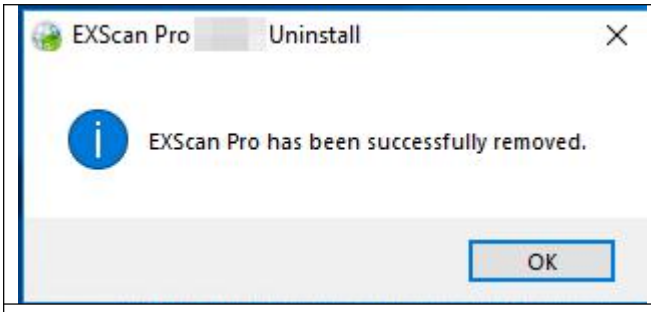
Or go to Control Panel > Programs > Program and Features, choose EXScan Pro and right click to uninstall.




Follow the instructions step by step.




Click Yes to uninstall the software

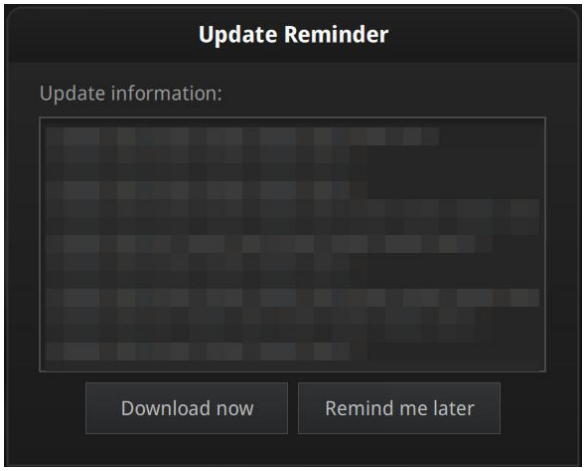



Click OK

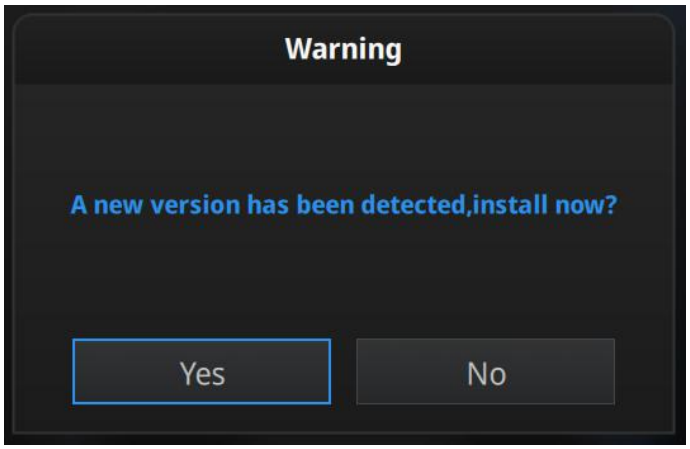
Then delete the Shining3D folder and its content in (C:).

## 2.4. Update

Make sure to run the latest version of EXScan Pro.
If a new version is available, a pop-up will show when you start the software.



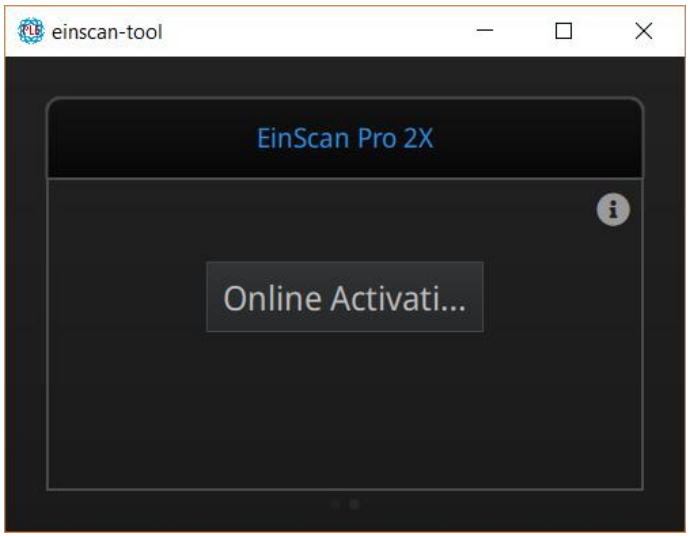

Update Reminder




*Click Yes to update the software version*

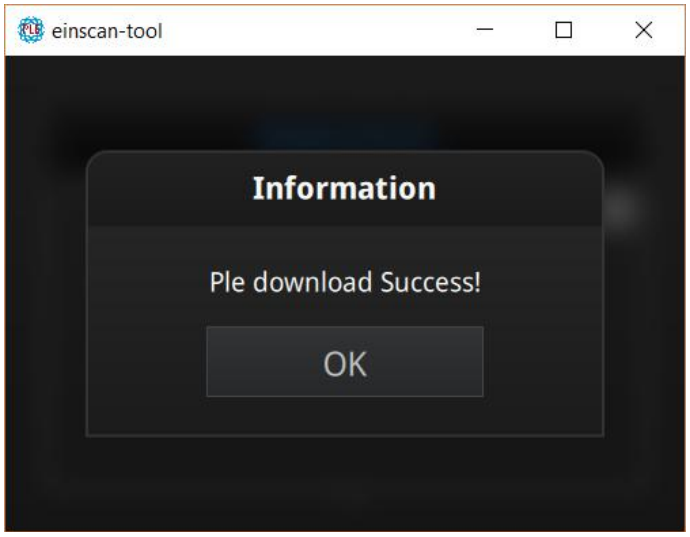
## 2.5. Device activation

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




*Activation tool*

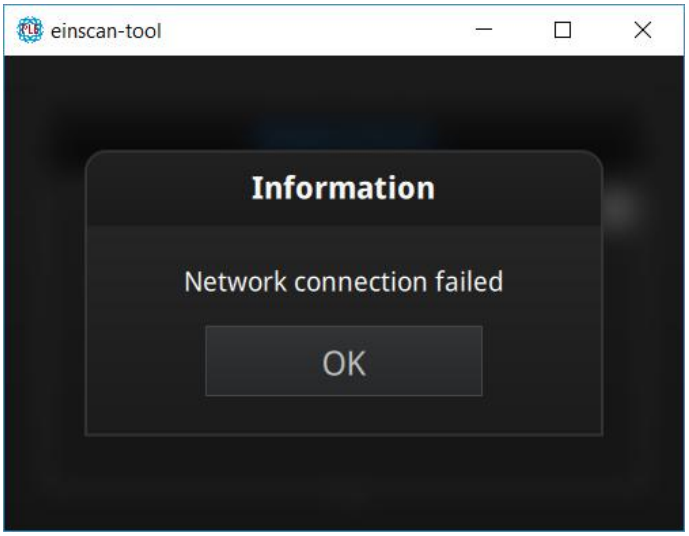
If your computer is connected to the internet, click “online activation”.




*Click OK to continue*

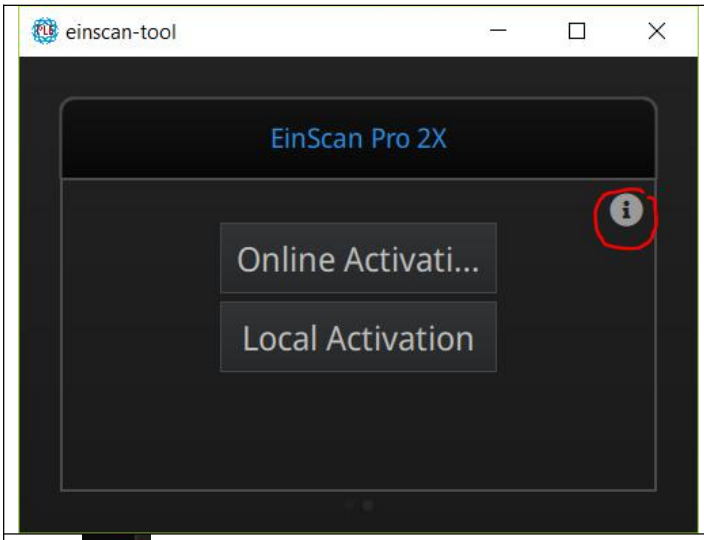
If the computer is not connected to the internet, you can also find the Ple file from the USB drive.

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

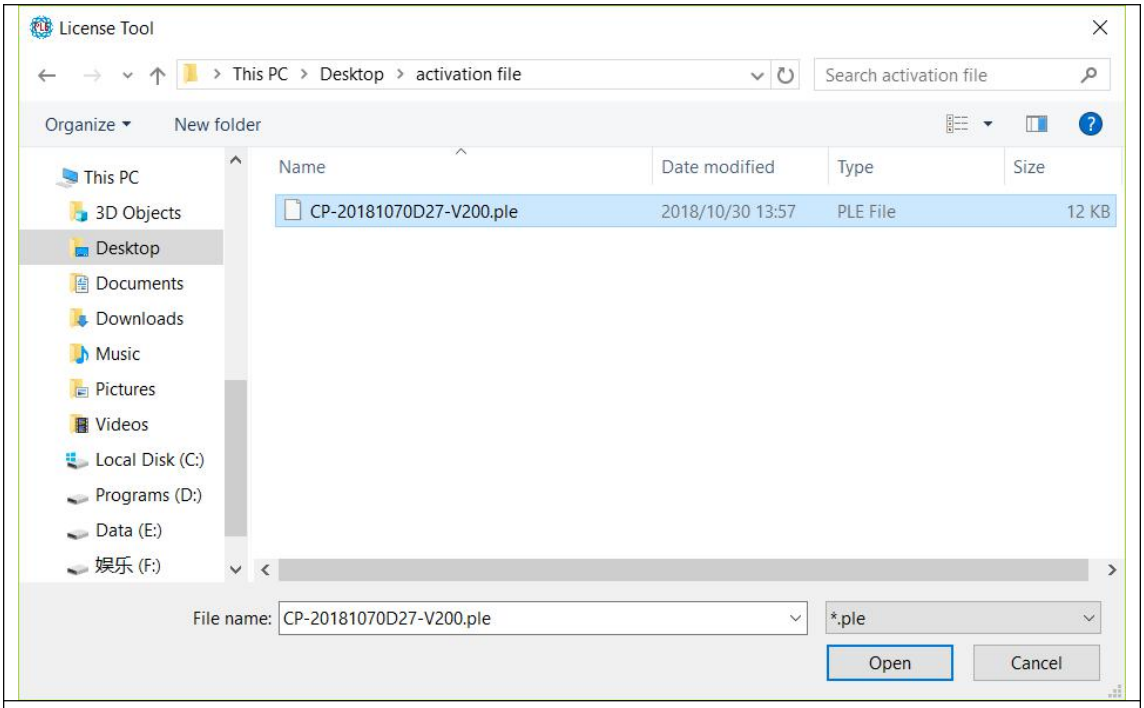



*Connection failed, check your internet connection or do local activation*

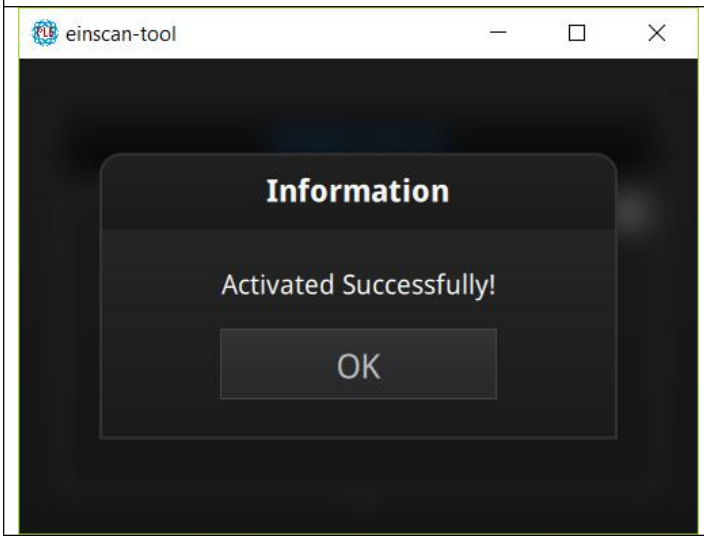
Save the .PLE file on your PC, then on the activation menu.




click “ ” to reveal the “Local activation” button

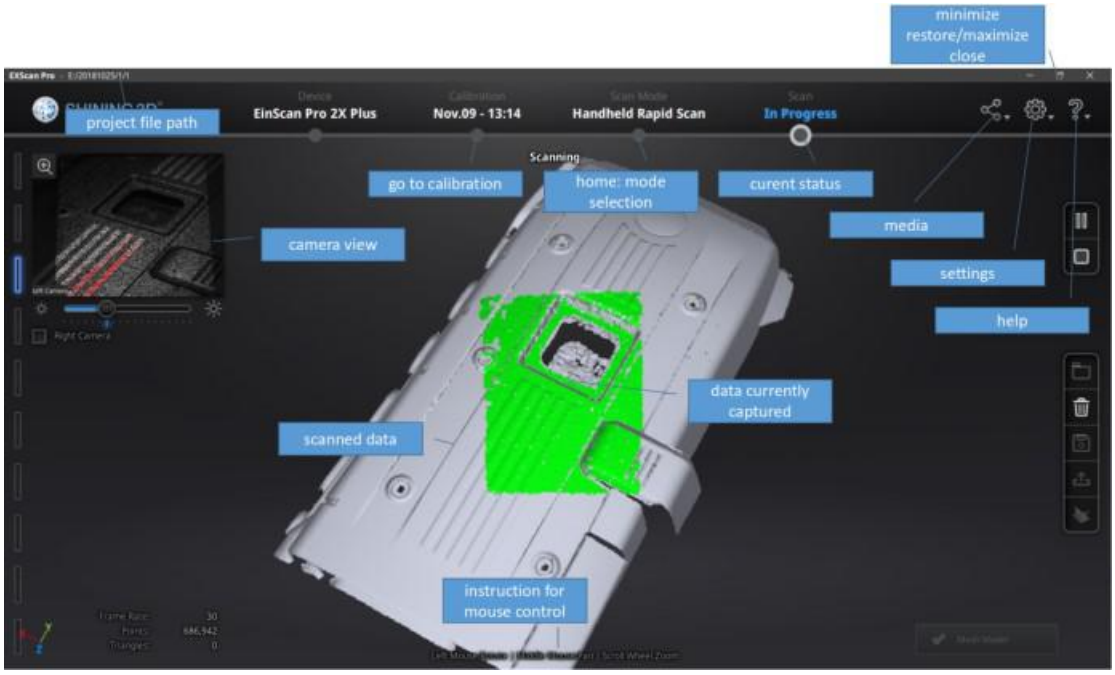



Browse and import the .PLE file.



# 2.6. Interface and Parameters

## 2.6.1. Navigate

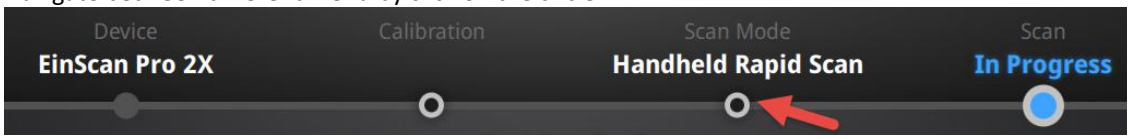



*Interface navigation*

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

Spacebar to scan again or restart the scan & validate
Delete key to delete selected data
Esc key to exit current pop-up

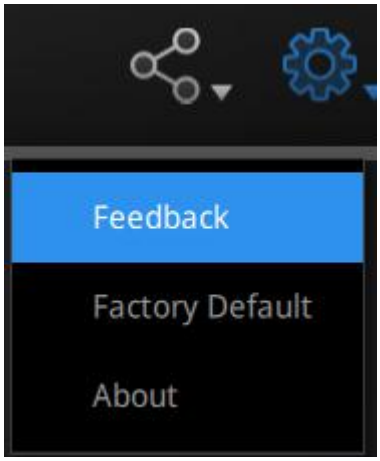
Navigate between different menu by click on the circle.




*Navigation bar*

## 2.6.2. Settings

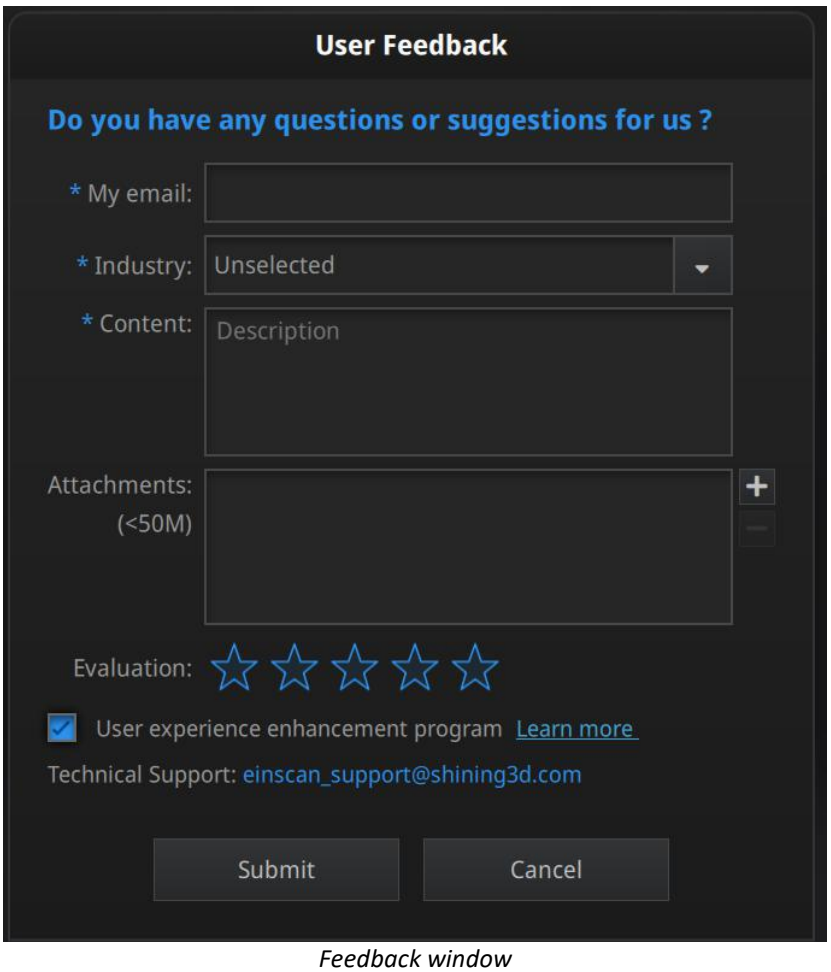
| | |
|---|---|
| | Click the settings logo from the upper right to open the drop down menu. |




*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.

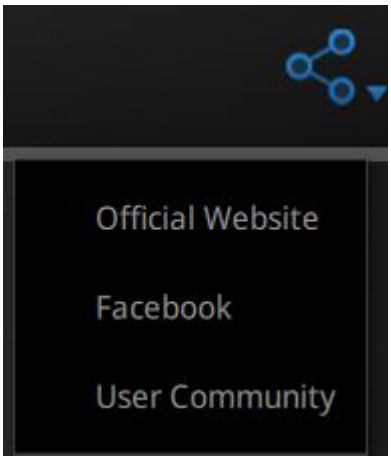
**Factory Default**

All settings modifications will go back to the original settings.

**About**

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

## 2.6.3. EinScan community



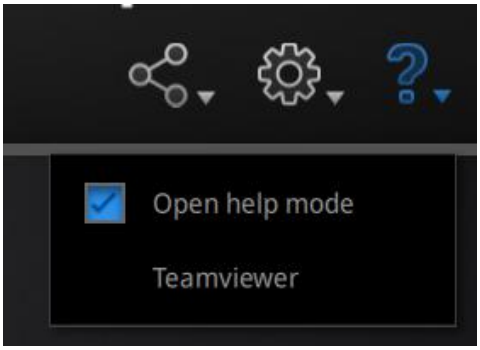

*Community drop down menu*

**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 the platform for EinScan users to activate the warranty and submit service ticket when necessary.

## 2.6.4. Help Mode

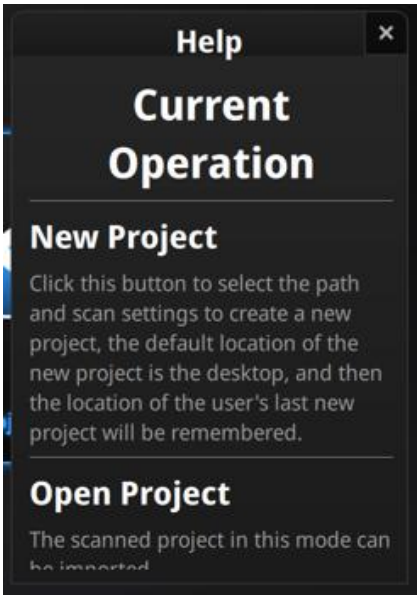
**Open Help Mode**

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




*Drop down menu*

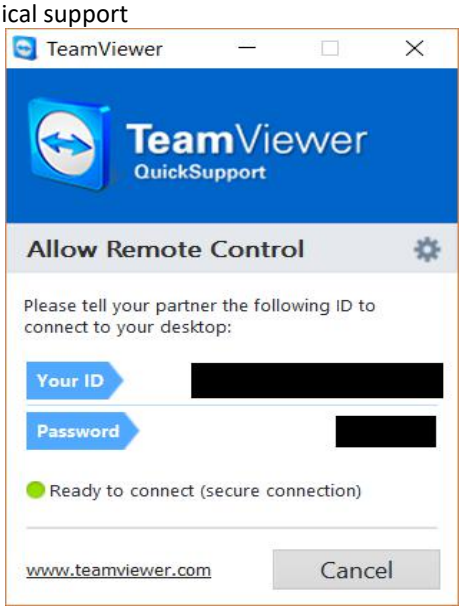
Display the help tool related to the current interface.




*Help window*

**Teamviewer**

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




*Share the Your ID and password to allow* access

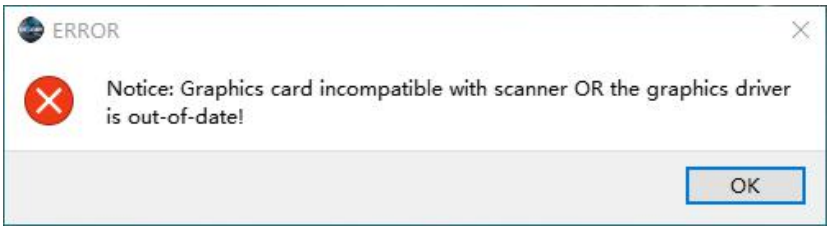
## 2.6.5. Alerts

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.

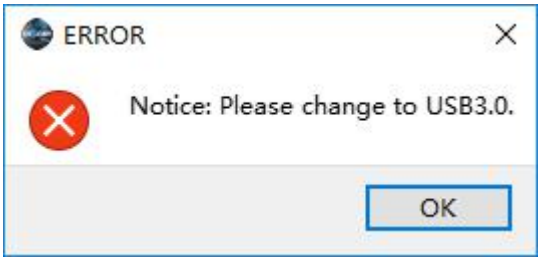
For activation failure, make sure the scanner is well connected. Redo the activation.

*Device fails to activate*

For incorrect configuration: try another USB port and update your graphics card drivers and restart the software.

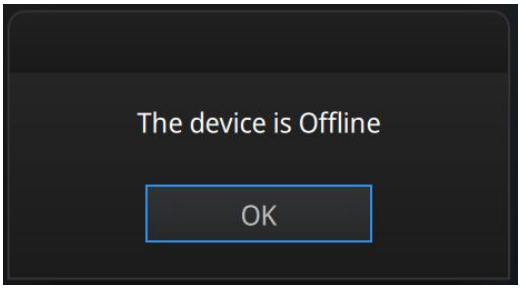



*Graphics card incompatible*

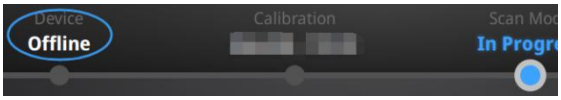



*USB not 3.0*

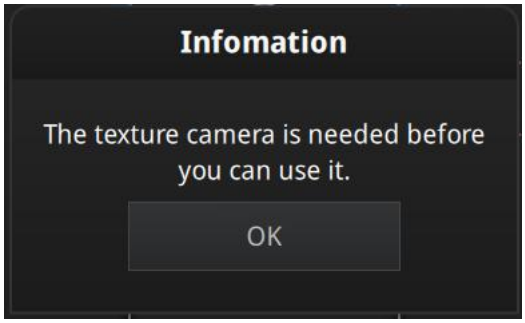
When the device is offline, meaning the scanner is not connected to PC, please check the connection and restart the software.




*Device offline or connection loose*




*Offline status in navigation bar*




*Add-on is required for this function*

# 3. Calibration

## 3.1. Precautions and Use

Calibration is the process to ensure the device will scan with the optimal accuracy and scan quality. The parameters of the scanner will be recalculated during the calibration.
Under the following situations, you should calibrate the device:

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

**⚠Notes:**

Make sure to protect the calibration board and keep it clean, no scratches or stains on the black surface with white circles.

The Calibration board is matched to the Device with same Serial Number. Doing the calibration with an incorrect calibration board will fail to generate good scan data or optimum accuracy.

Clean with clear water only, do not use alcohol or chemical liquid to clean the calibration board

## 3.2. Operation

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

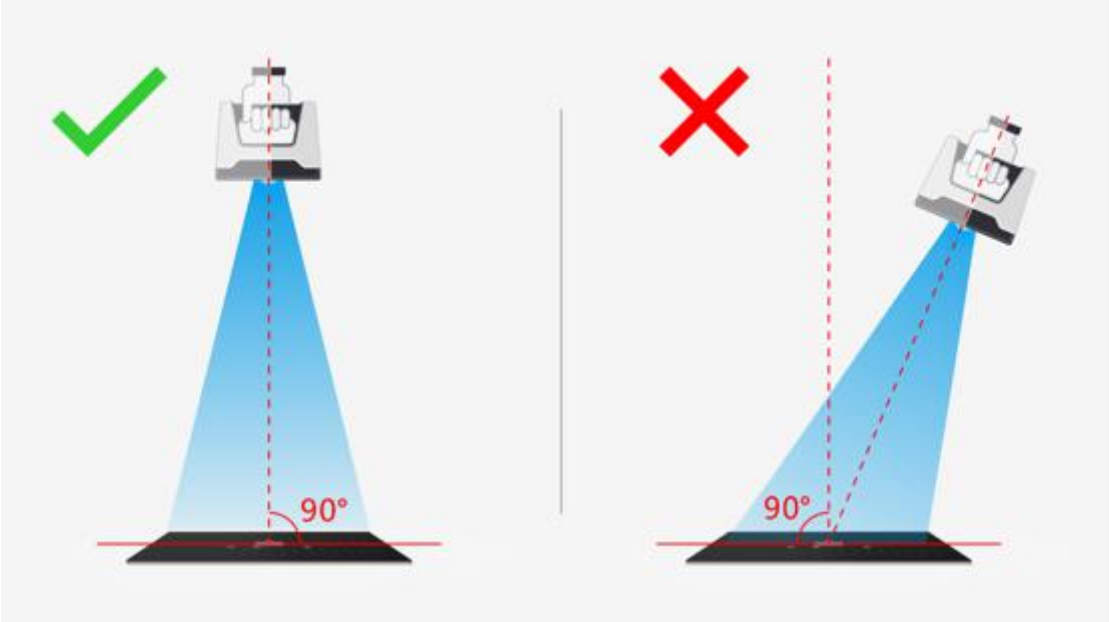
*Calibration interface*

## 3.2.1. Camera Calibration

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

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

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




*On-screen instruction during calibration step 1*

or play button

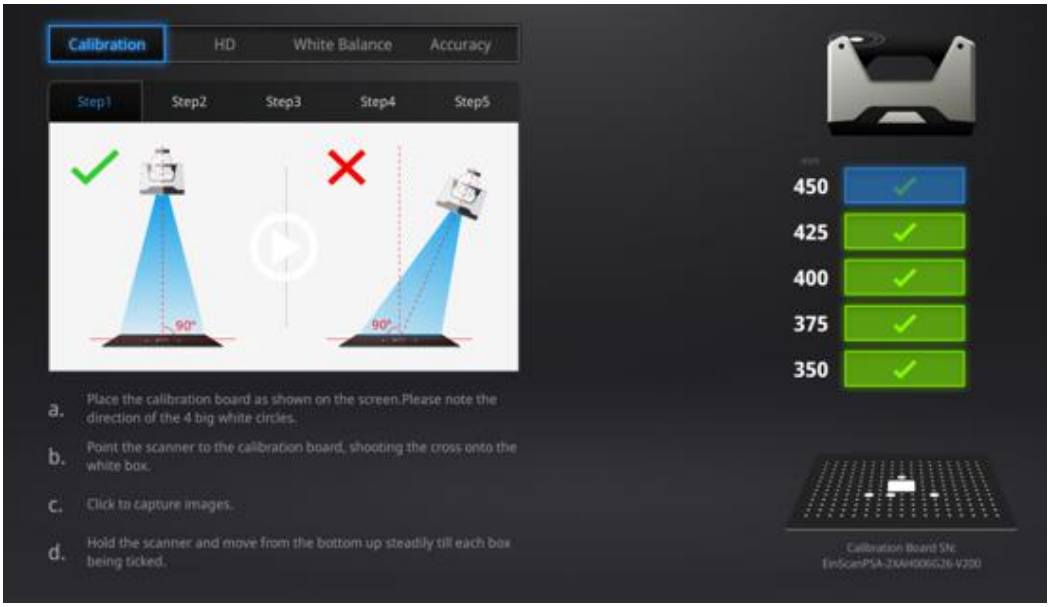
Click Start in the software or press Play button on the scanner to capture automatically

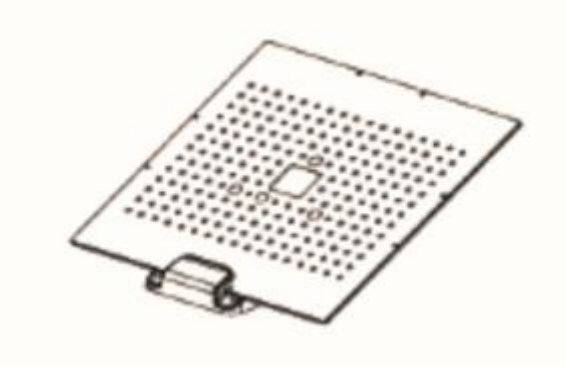
During the capture process, LED rings blink and a cross is projected. Move the scanner from top to bottom or from bottom to top slowly and steadily, until every step in the rangefinder is green, which means the first capture is complete. The software will play a beep sign. During capture, lift the scanner 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 board on its support for step 2*

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

*Camera calibration result*

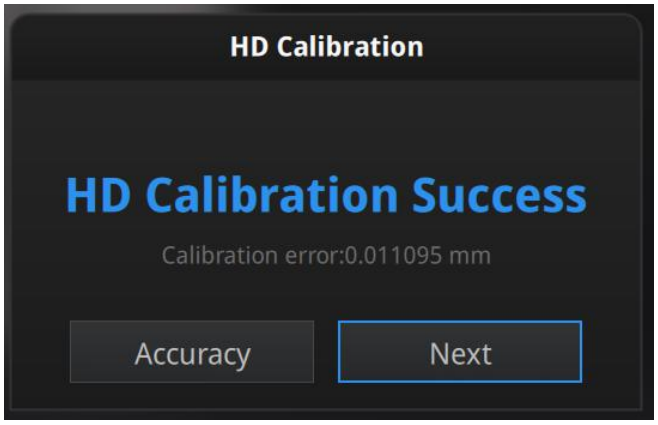
If calibration fails, click “Redo calibration” to start the same calibration again from the beginning.

*Calibration failed*

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

## 3.2.2. HD Calibration (Only required for EinScan Pro 2x)

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




*HD calibration result*

Go back to the scan mode selection page by clicking “Next” at the bottom left.

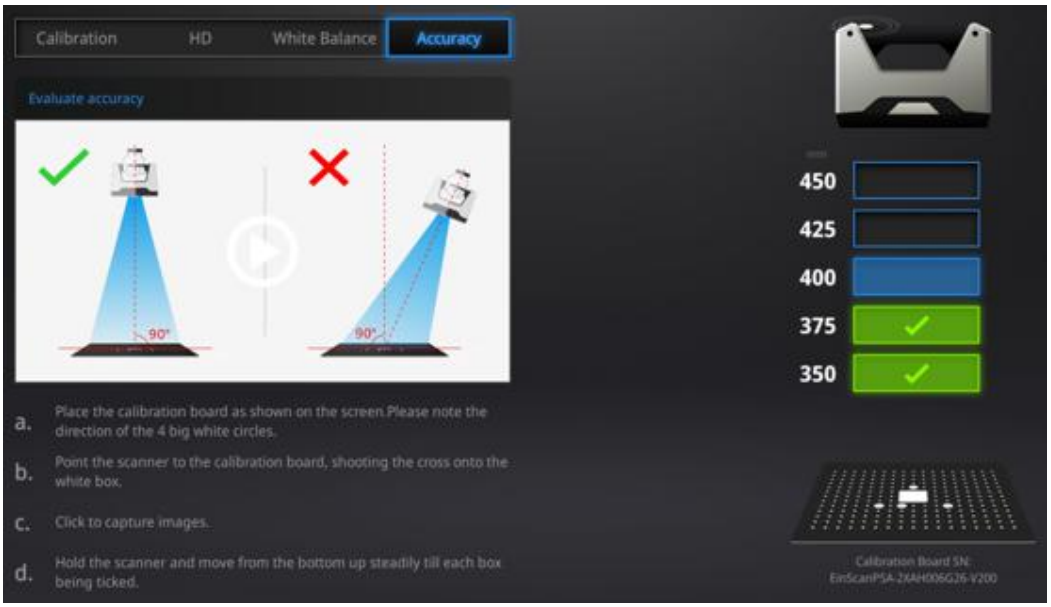
## 3.2.3. Accuracy test

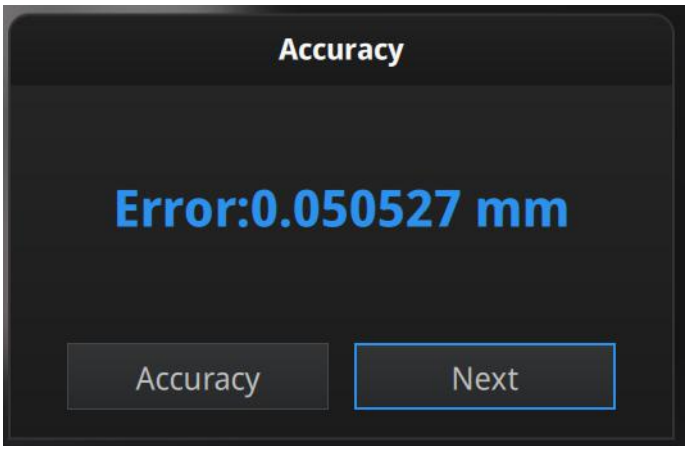
While scanning, if markers cannot be recognized, tracking is easily lost or misalignment happens often, we suggest doing the Accuracy Diagnostic.
This will feel similar to the calibration process. Scan on the front side of the calibration board (black) to do an accuracy test.

or press

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

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




*Accuracy error result*

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

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

# 4. Before Scan

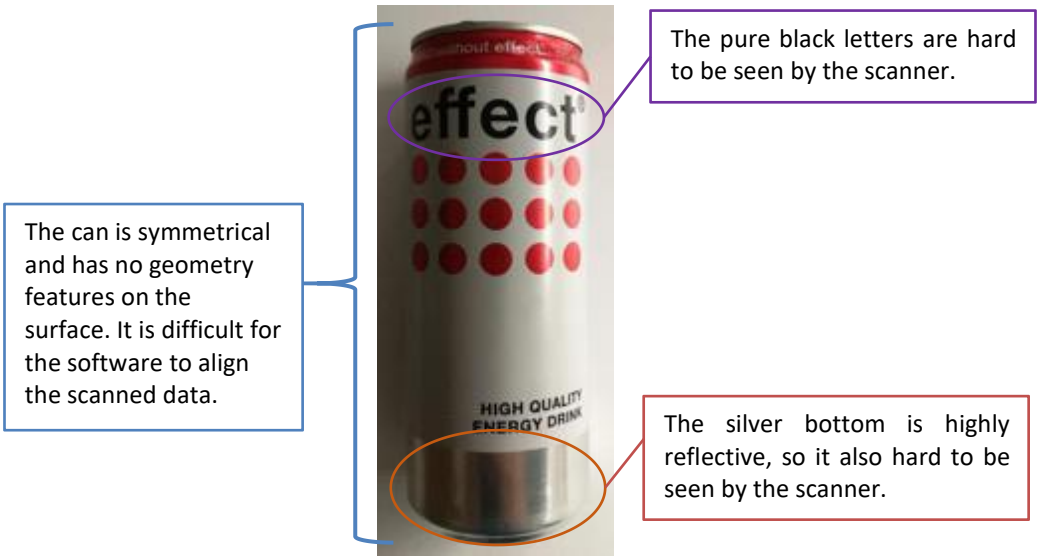
## 4.1. Object

EinScan Pro series can scan objects from 30*30*30mm ^3 to 4m length.
We do not recommend scanning:

moving or vibrating objects, which cause the shape of object changed during scanning process.

lattice structures with many small deep holes

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

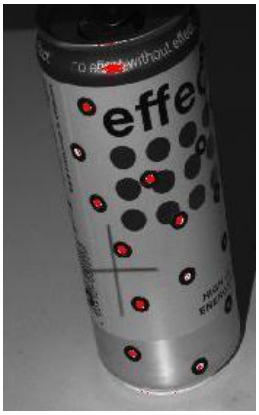



*Example of object that is difficult to scan*

## 4.2. Preparation

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

(1) Make sure sticking at least 4 markers in each frame (one scanning field of view). Control the number of markers seen on the camera view.
(2) Stick markers in a random, non-linear pattern (see example below).
(3) Markers should be stuck on the flat surface area and keep the marker surface flat.
(4) Use the markers provided with the device only. Other markers can result bad accuracy or not to be seen.



*Object with markers*

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

*Markers surrounding the object*

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

## 4.3. Select Scan Mode

| Mode | Accuracy ( mm ) | Scan Efficiency | Resolution Point distance ( mm ) | Align Mode |
|---|---|---|---|---|
| Auto Scan | Single Shot Accuracy 0.04 ☆☆☆☆☆ | Single Scan < 0.5s ☆☆☆☆☆ | 0.24 ☆☆☆☆ | Turntable Coded Targets, Feature, Markers, Manual |
| Fixed Scan | Single Shot Accuracy 0.04 ☆☆☆☆☆ | Single Scan < 0.5s ☆☆☆☆ | 0.24 ☆☆☆☆ | Feature, Markers, Manual |
| Handheld HD Scan | Up to 0.05 +0.3 mm/m (markers alignment) ☆☆☆☆ | 20 fps 1,100,000 points/s ☆☆☆☆ | 0.2-3 ☆☆☆☆ | Markers |
| Handheld Rapid Scan | Up to 0.1 +0.3 mm/m (markers alignment) ☆☆☆ | 30 fps 1,500,000 points/s ☆☆☆☆☆ | 0.25-3 ☆☆☆ | Markers, Feature (with rich geometrical features on the surface), Hybrid (Markers and Feature) |

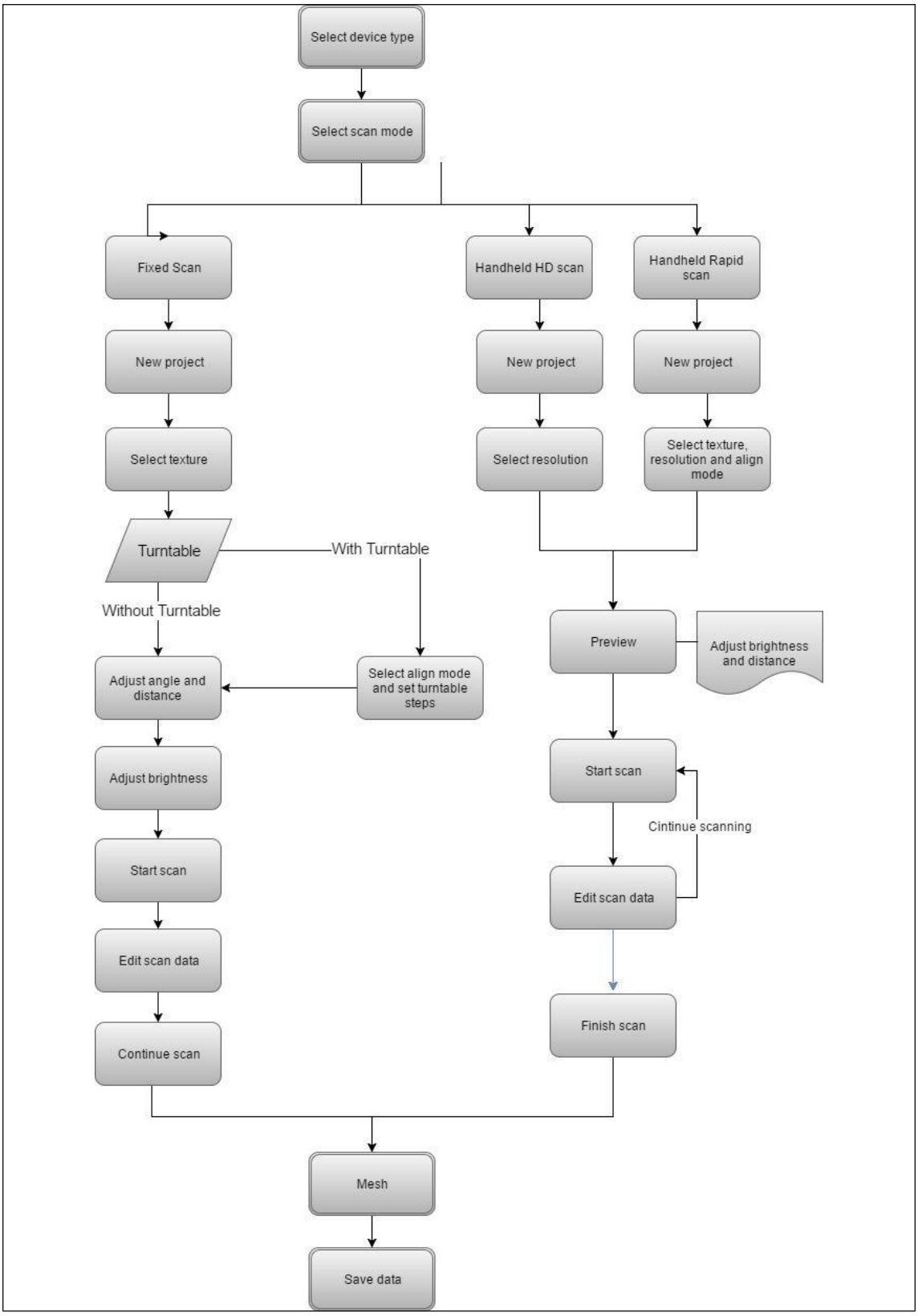
*EinScan Pro 2X Plus*

| Mode | Accuracy ( mm ) | Scan Efficiency | Resolution Point distance ( mm ) | Align Mode |
|---|---|---|---|---|
| Fixed Scan with Turntable | Single Shot Accuracy 0.04 ☆☆☆☆☆ | Single Scan < 1s ☆☆☆☆☆ | 0.16 ☆☆☆☆☆ | Turntable Coded Targets, Feature, Markers, Manual |
| Fixed Scan without Turntable | Single Shot Accuracy 0.04 ☆☆☆☆☆ | Single Scan < 1s ☆☆☆☆ | 0.16 ☆☆☆☆☆ | Feature, Markers, Manual |
| Handheld HD Scan | Up to 0.05 +0.3 mm/m (markers alignment) ☆☆☆☆ | 20 fps 100,000 points/s ☆☆☆ | 0.2-2 ☆☆☆☆ | Markers |
| Handheld Rapid Scan | Up to 0.1 +0.3 mm/m (markers alignment) ☆☆☆ | 30 fps 1,500,000 points/s ☆☆☆☆ | 0.2-2 ☆☆☆ | Markers, Feature (with rich geometrical features on the surface), Hybrid (Markers and Feature) |

*EinScan Pro 2X*

The tables above show the details of each scan mode that can be selected. For limitations of each scan mode refer to the specifications presented previously.

## 4.4. Scan Workflow



# 5. Fixed Mode (Industrial Pack Required)

Fixed Scan Mode is designed for achieving high resolution and high accuracy scanning for small (from 30*30*30 mm^3) to medium size objects, which need fine detail in geometry or high accuracy in size.

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

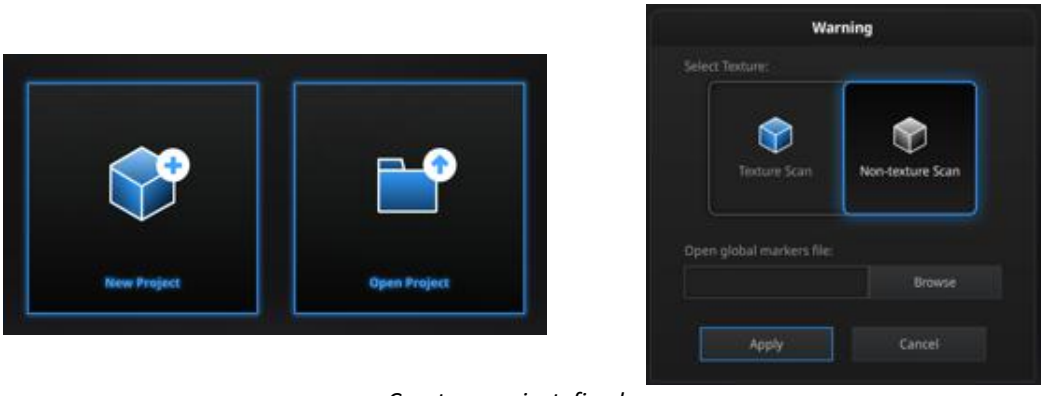
The add-on “Industrial Pack” is dedicated to this mode, with a tripod and a turntable Perfect for object fitting on a Φ 150mm disc.
Tips: The objects’ footprint can be bigger than 150mm in Fixed Scan with Turntable if you do not need to use codes on the turntable for auto alignment. You can instead use geometry features or markers on the object’s surface for automatic alignment, or use manual alignment mode to get the whole scanned data.

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

## 5.1. Set Up

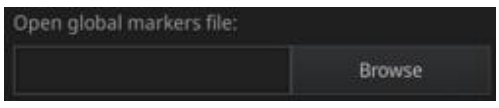
### 5.1.1. Create a Project

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




*Create a project, fixed scan*

In the new project interface, you have the option to click browse to import a Global Marker File (GMF) as .ASC, .TCT or .P3. Global Marker File is normally captured by a Photogrammetry System to achieve a high accuracy Markers Frame for large object, in which you can scan the object in detail and match the global accuracy of Markers Frame.




*Browse to load a GMF*

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

## 5.1.2. Working Distance

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

| | 2X | 2X+ |
|---|---|---|
| **Closer limit (mm)** | 300 | 410 |
| **Optimal distance (mm)** | 400 | 510 |
| **Upper limit (mm)** | 500 | 610 |

At the proper working distance, the cross should be seen clearly with a sharp contour on the surface.

*Set up for fixed mode*

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

## 5.1.3. Adjust Brightness

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

*Drag to adjust the brightness setting*

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

*Turn HDR ON to scan contrasting textures*

# 5.2. Scan with Fixed Mode

## 5.2.1. Capture

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

When the scan is completed the data is automatically saved in the project file.

## 5.2.2. Edit Single Scan

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

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

**Edit buttons:**

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

| | |
|---|---|
| | **Delete selected data**<br>Click the button or the “DELETE” key on the keyboard to delete selected data. |
| | **Undo**<br>You can only undo the most recent deleted data. |
| | **Show/Hide Stripes (for data with color texture only)**<br>Click the button to switch the texture option between display and hide. |

## 5.3. Edit

### 5.3.1. Save and Edit Entire Scan

| | |
|---|---|
| | Press the **space bar** on the keyboard to save data and exit the single-scan editing. The edited data is saved in the project file |
| | Delete the current scan data. |

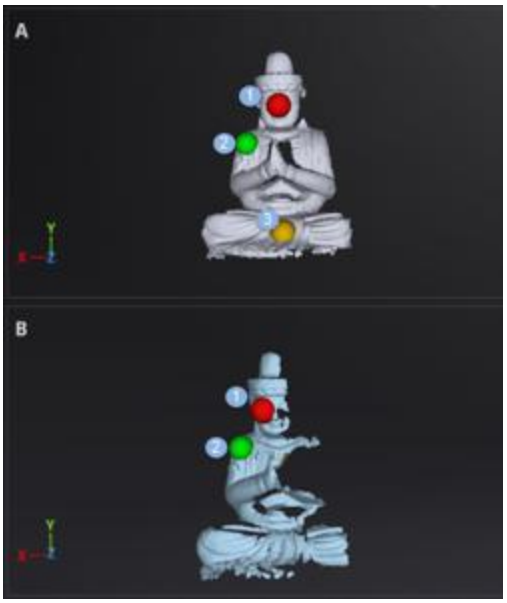
After finishing the single-scan editing, the toolbar will display, and now you can edit the whole scan data. The specific operation is the same as the single-piece edit.  In offline mode, data can be loaded at this step for editing.

## 5.3.2. Alignment

If you use markers, the data will automatically align with the marker positions. If not, an automatic alignment will be calculated with a best-fit of the single scan to the previous scans according to the geometric features of the scanned data. If automatic alignment fails when the scanned object does not have enough geometric features, you can use manual alignment.

| | |
|---|---|
| | Click the button to open Manual Alignment viewport on the left side of the software. Click again to cancel manual alignment. |

**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.




*Select 3 points to align the data*

Press the **Esc button** to cancel points selection one by one in order, until the software exits from the manual alignment.

## 5.3.3. Delete Current Scan

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

| | |
|---|---|
| | click the button to delete current data |

Then change the position of the scanner or the object to scan again.
By clicking “Delete” after scanning, the current scan data will be deleted directly.
By clicking “Delete” after importing a project, it will remove the last single piece of data.

# 6. HD Mode

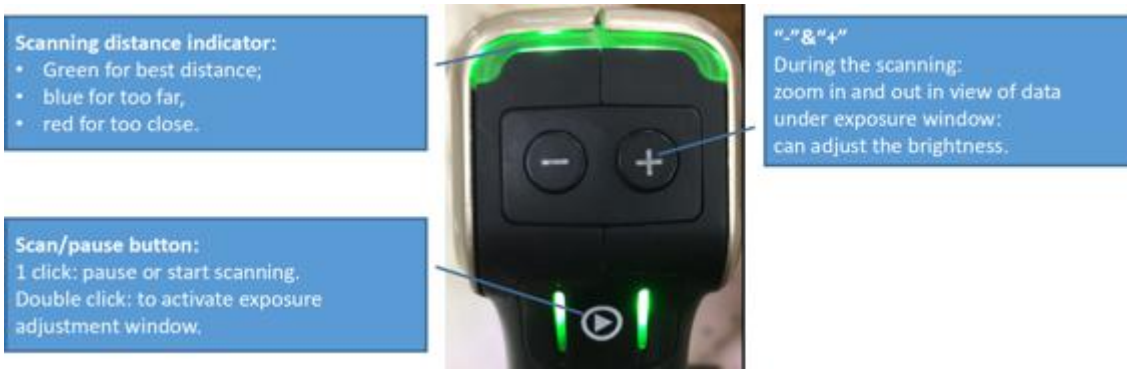
HD mode means the hand-held scan mode with high resolution and high accuracy. When the operator holds the scanner in hand and moves around the object, the data is instantaneously captured and matched with previously captured data.

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

Prime (HD Prime pack add-on) can be used in this mode if your device is EinScan Pro 2X Plus (2X+). It improves a faster scanning speed and enables the feature alignment (Markers-free) for scanning objects with enough geometry.

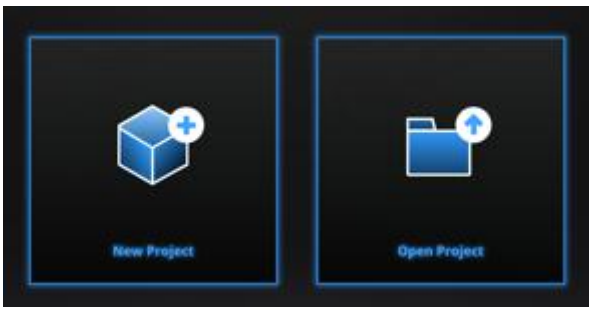
⚠**Note:** The texture can't be captured when scanning in HD mode or HD Prime.

## 6.1. Handheld Scanner Key Function

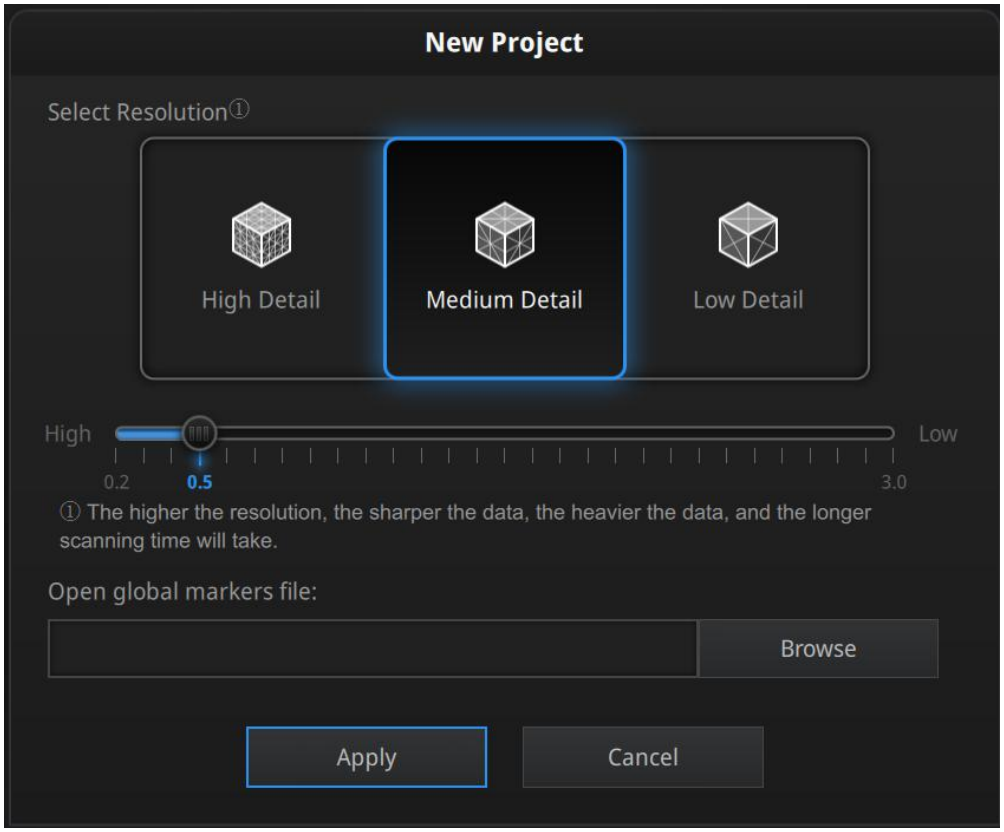



## 6.2. Before Scan

Enter the interface of New Project or Open Project. The default project is saved to the desktop. You can change the saving path, and then the newly created project will be saved to the new location. Click "New Project", input the project name, then click 'Save' to enter the scan parameters window. Feature alignment is only active when the HD Prime pack is attached and the scanned object has enough geometric features. It is only applicable to the EinScan Pro 2X Plus (2X+).




*Project interface*



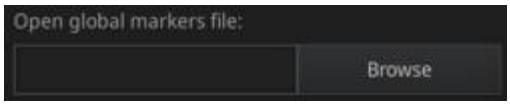

*HD mode scan parameters window*

**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.

**Global Marker File**

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




*Browse to load a GMF*

## 6.3. Scan

### 6.3.1. Preview

OR press

Start Preview mode

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 for 2X+*

In this mode, you can:

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

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

## 6.3.2. Scan Distance

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

| | 2X | 2X+ |
|---|---|---|
| **Closer limit (mm)** | 300 | 410 |
| **Optimal distance (mm)** | 400 | 510 |
| **Upper limit (mm)** | 500 | 610 |

## 6.3.3. Brightness

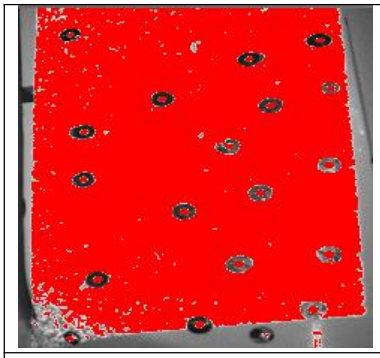
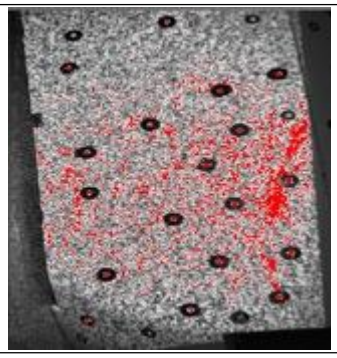
| | |
|---|---|
| Double-click | Enter/Exit the exposure adjustment menu |

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

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

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

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

| | | |
|---|---|---|
|  |  | |
| Too bright (X) | Good (√) | Too dark (X) |

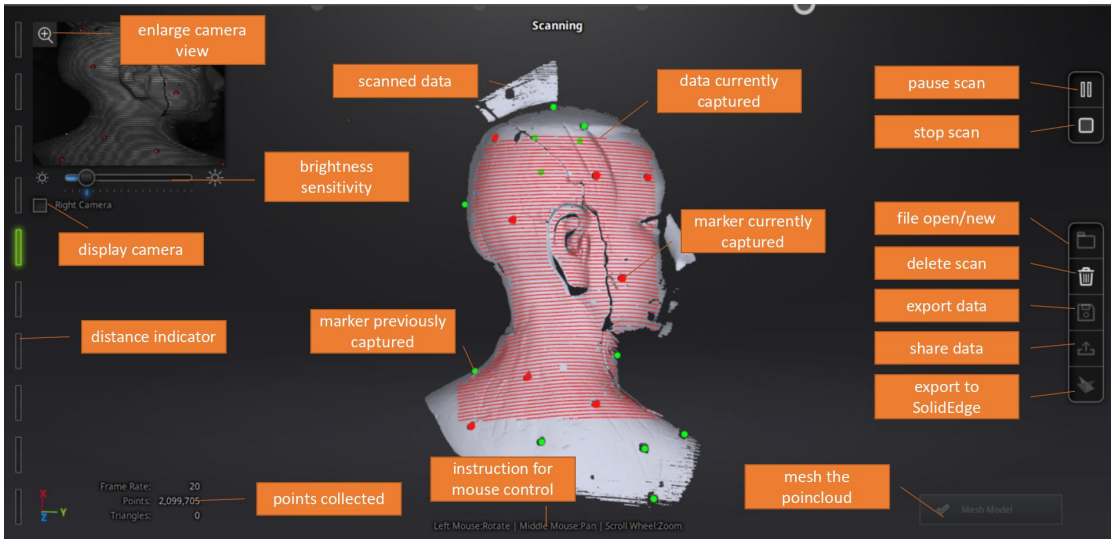
Double-click the Play button to exit the brightness adjustment window.

## 6.3.4. Start Scan

| | |
|---|---|
| OR press | Start/Restart scan |

Press the Play button or click Start in software to start scanning and recording data. 100 lines are projected with 2X Plus, while 7 lines are projected with 2X.

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*

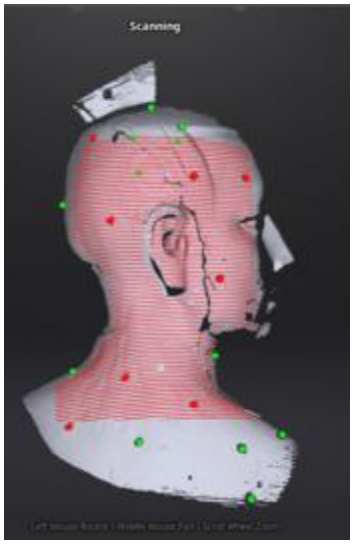
OR press

Enter pause menu

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

## 6.3.5. Alignment

The software will recognize the markers (displayed in red), record data and align with previously collected markers (displayed in green). The data is captured along the lines, as shown below.
To record the data, a minimum of 4 markers (displayed in red) in each frame (every scanning field of view) has to be captured.




*Interface with markers*

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

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

*Track lost alert*

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

## 6.4. Pause Menu

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

### 6.4.1. Auto Save

| | |
|---|---|
| OR press | Enter pause menu |

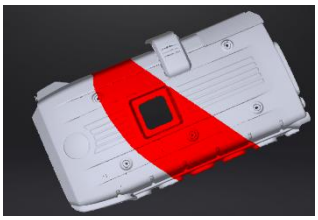
Press the Play button or click Pause in the software to enter the Pause menu. The data will be automatically saved in the project file.

| | |
|---|---|
| OR press | Continue scan |
| | 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.

## 6.4.2. Edit Menu

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

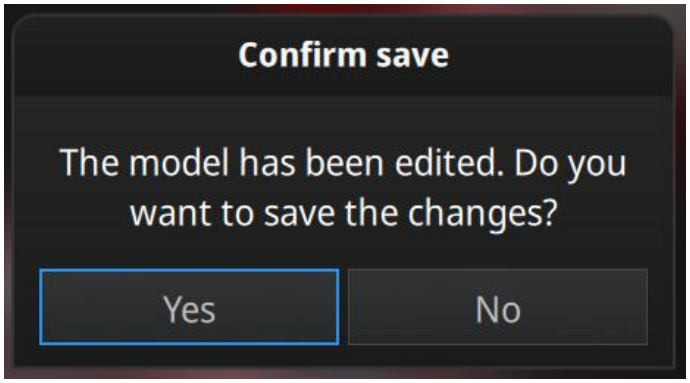
| | | |
|---|---|---|
| | **Edit buttons:**<br><br>**①Deselect**<br>**②Revert**<br>**③Delete**<br>**④Undo**<br>**⑤Show/Hide texture (color pack only)**<br>**⑥Shift + Left mouse: choose data**<br>**⑦Ctrl + Left mouse: deselect selected data** |  |

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

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

| | |
|---|---|
| | End the editing |

Click Check to end the editing portion and Confirm to save the edits in the project file, and then go back to pause menu.




*Save the modification or cancel*

# 7. Rapid Mode

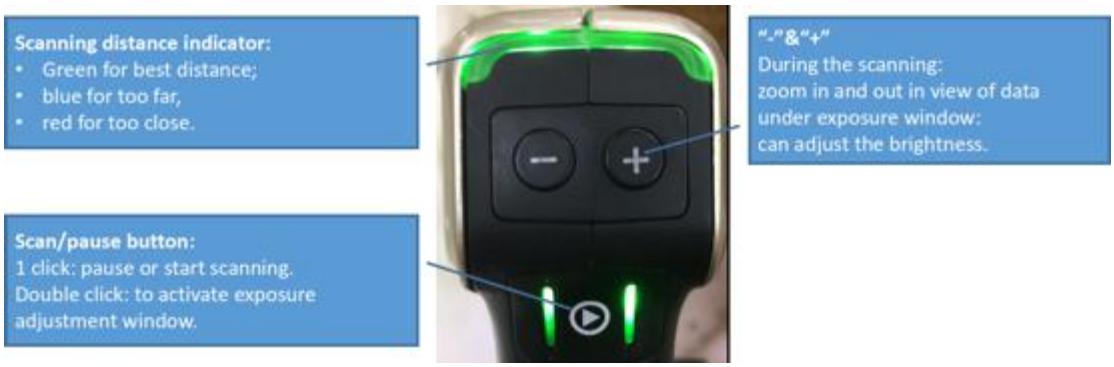
**Rapid mode** means Handheld Rapid Mode which is the fastest handheld scanning mode but has a resolution and accuracy that are lower than the HD mode. This mode is handheld, so the operator moves the scanner around the object, and the data is instantaneously captured and matched with previously captured data.
**Features or markers** can be used for alignment. **Hybrid Alignment** (Markers and Feature) is also valid in this mode.

The texture camera (color pack add-on) can be used in this mode to scan 3D data in color texture. Prime (HD Prime pack) is not compatible with this mode.

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

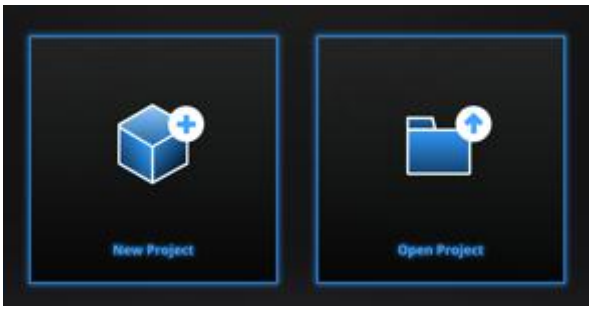
*Scan example with Rapid mode*

## 7.1. Handheld Scanner Key Functions

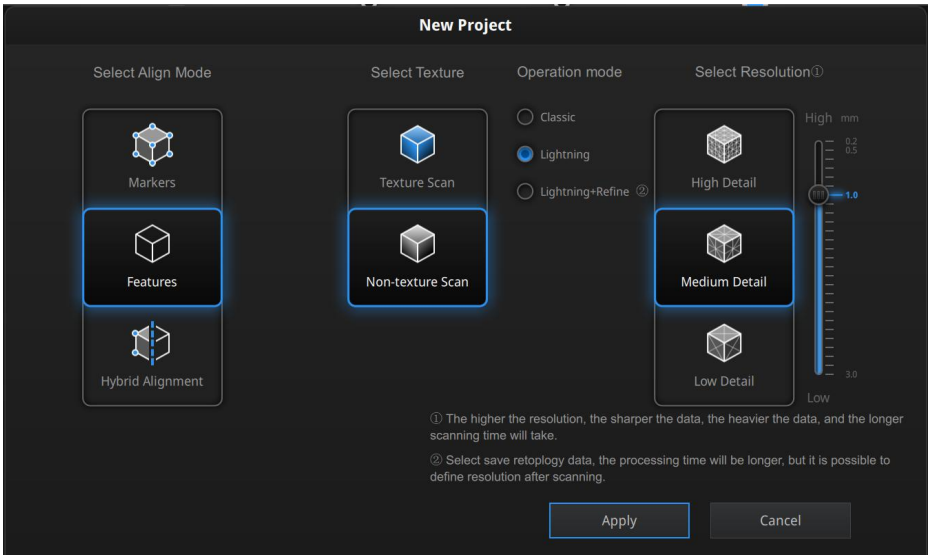


## 7.2. Before Scan

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




*Project interface*



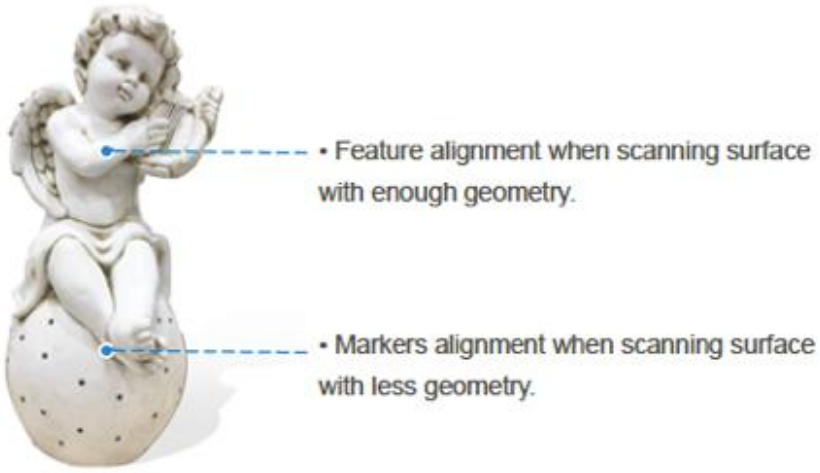

*Rapid mode scan parameters window*

### 7.2.1. Alignment Conditions

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

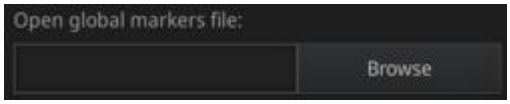
**Feature Alignment:** the data currently captured is “best fit” and aligned to the previously captured data according to the geometric features of the object. “Track lost” will be displayed if there is not enough common area captured in neighboring scans or the scanned area has few geometric features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

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




*Example of use of hybrid alignment*

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




*Browse to load a GMF*

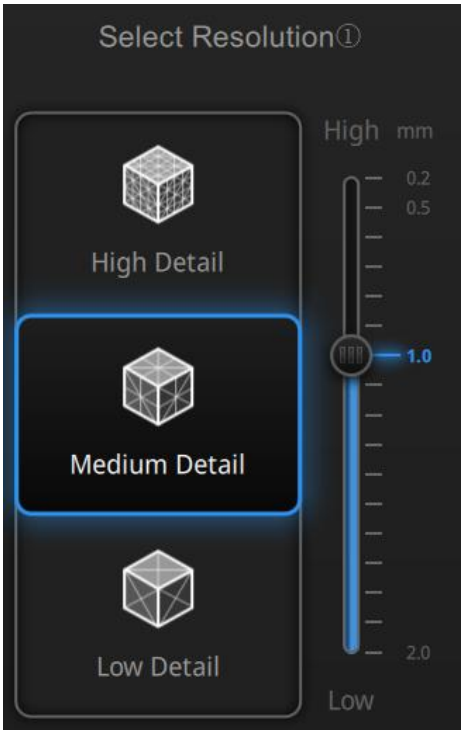
## 7.2.2. Operation Mode

- **Classic：**
  Scanning speed: 15 frames/second
  Scan with the selected resolution
  Direct Data processing according to the selected resolution
- **Lightning：**
  Scanning speed: 30 frames/second
  Scan with a 1mm resolution to ensure fast scanning process
  Interpolation to selected resolution after the scan ends
- **Lightning + Refine：**
  Scanning speed: 30 frames/second
  Scan with 1mm resolution
  Refine to select resolution after the scan ends by retopology

Scanning Speed: Lightning = Lightning +Refine > Classic
Data Resolution: Classic = Lightning + Refine > Lightning
Data Processing time: Lightning +Refine > Lightning > Classic

## 7.2.3. Resolution

Select a resolution for the project. The higher the resolution, the better the details. Choose High (0.25mm 2X+, 0.2 2X), Medium (1.0mm) or Low (1.5mm) or drag the cursor to choose another point distance setting from 0.2mm (2X) or 0.25 (2X+) to 3.0mm




⚠**Notes:**

A higher resolution takes more time to scan and consumes more graphics card memory,

With high resolution, the size of the object to be scanned will be limited. In theory, the maximum size of scan = point distance*8192/mm. In the actual process, the size of the object that can be scanned depends on the computer graphics card.

If high resolution is chosen, the data output is slow, so please be patient.

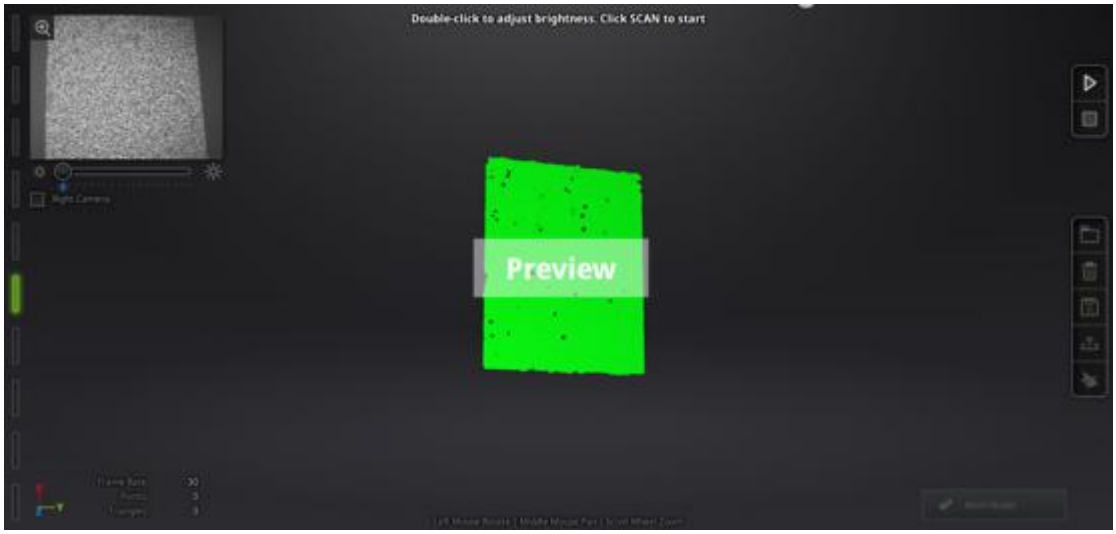
When importing a project, and continuing to scan, the scanning resolution and alignment mode will be the same as the previous setting of the imported project.

# 7.3. Scan

## 7.3.1. Preview

| | |
|---|---|
| OR press | Start Preview mode |

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




*Preview mode on Rapid Mode*

In this mode, you can:

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

| | |
|---|---|
| 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 every time a new project is built or an existing project is imported.

After exiting preview and starting the scan, the preview mode will not show again for this scanning project.

To access preview mode on a current project, reopen it.

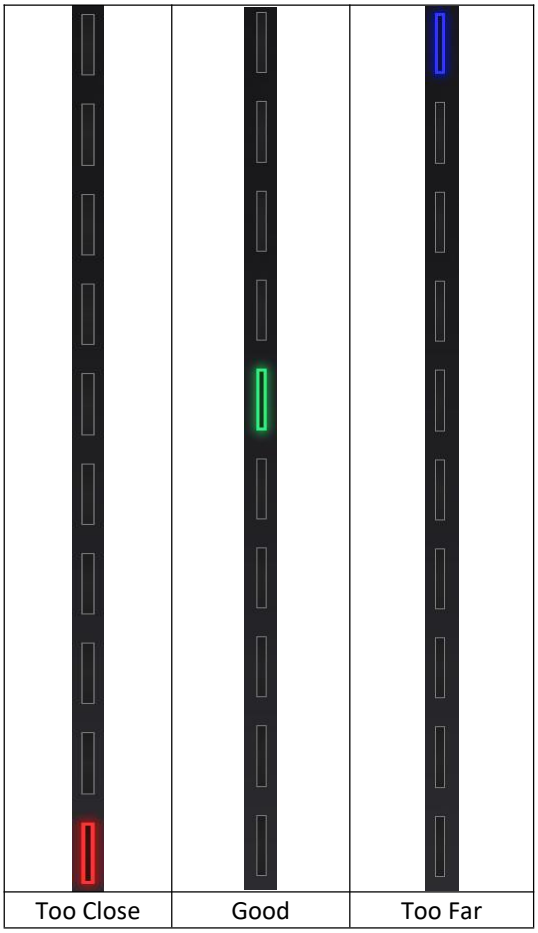
## 7.3.2. Scan Distance

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

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

Adjust the scanner position until the rangefinder color turns green.

| | 2X | 2X+ |
|---|---|---|
| **Closer limit (mm)** | 300 | 410 |
| **Optimal distance (mm)** | 400 | 510 |
| **Upper limit (mm)** | 500 | 610 |



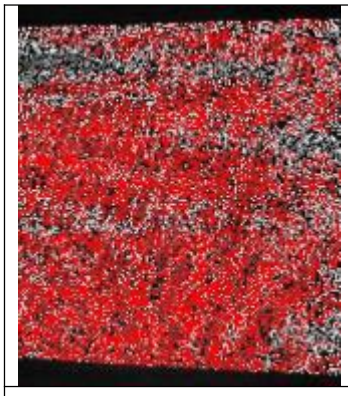
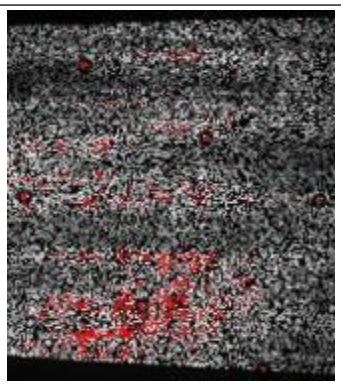
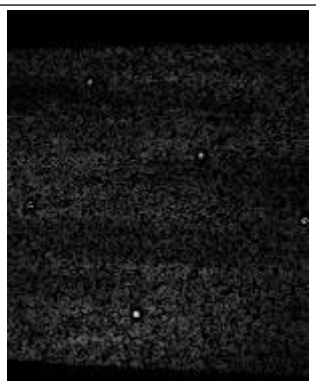

## 7.3.3. Brightness

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

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

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

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

|  |  |  |
|---|---|---|
| Too bright (X) | Good (√) | Too dark (X) |

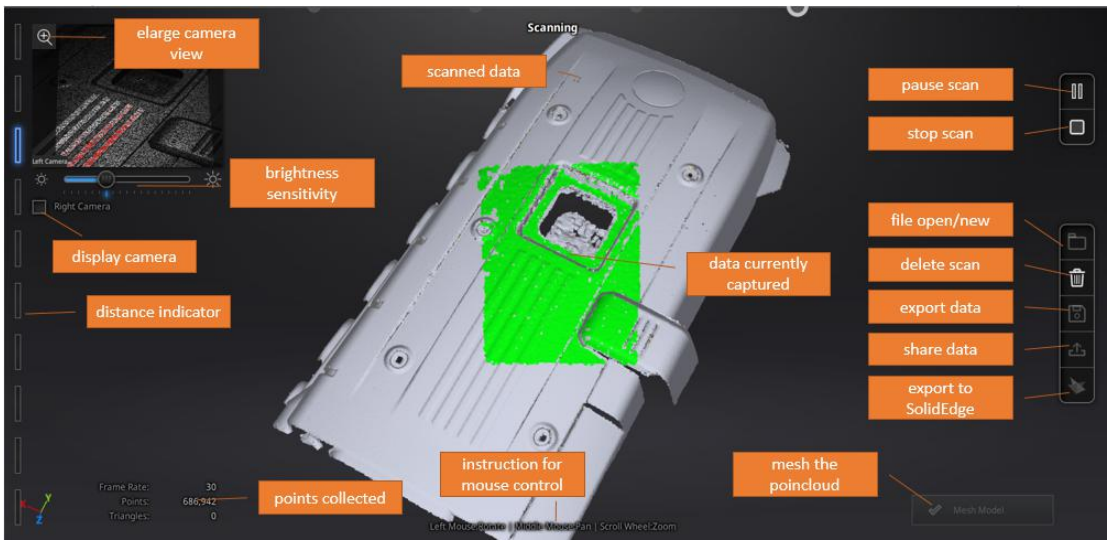
Double click Play button to exit the brightness adjustment window.

## 7.3.4. Start Scan

| | |
|---|---|
| OR press | Start/Restart scan |

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

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




*Scan interface, Rapid Mode*

OR press

Enter Pause menu

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

## 7.3.5. Alignment

**Feature Alignment:**

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

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

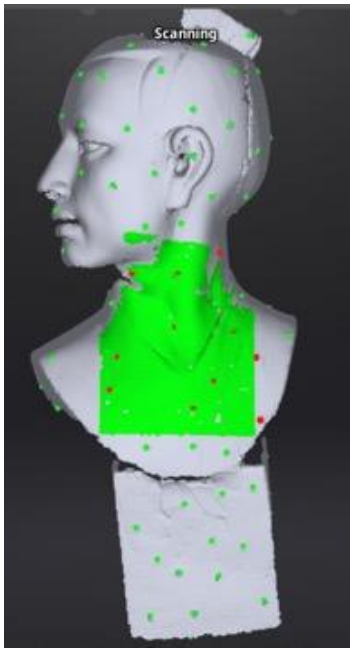
*Track lost alert*

The software will prevent from misalignment when scanning featureless surfaces

*Not enough feature alert*

**Marker Alignment :**

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




*Interface with markers*

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

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

*Track lost alert*

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

**Hybrid Alignment:**

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

*Add-markers alert*

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

## 7.4. Pause Menu

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

## 7.4.1. Auto Save

| | |
|---|---|
| OR press | Enter pause menu |

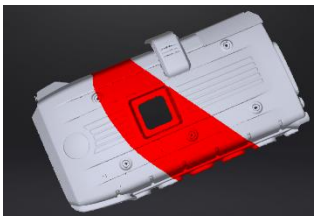
Click Pause in the software or press Play button to enter the Pause menu. The data will be automatically saved in the project file.

| | |
|---|---|
| OR press | Continue scan |
| | Generate point cloud |

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

## 7.4.2. Edit Menu

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

| | | |
|---|---|---|
| | **Edit buttons:**<br><br>**①Deselect**<br>**②Revert**<br>**③Delete**<br>**④Undo**<br>**⑤Show/Hide texture (when installed with a color pack)**<br>**⑥Shift + Left mouse: choose data**<br>**⑦Ctrl + Left mouse: deselect selected data** |  |

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

| | |
|---|---|
| | **Show/Hide texture (when Color Pack is attached)**<br>Click the button to switch between displaying and hiding the texture. |

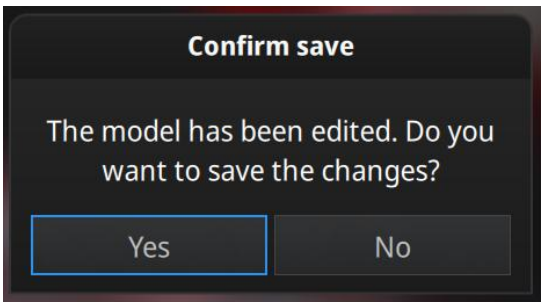
**⚠Notes:**

Handheld scan modes do not support the deletion of markers.

In Rapid Mode using feature alignment, if you use the edit button to delete all the data, the most recently deleted data will be restored when you continue scanning.

| | |
|---|---|
| | End the editing |

Click Check to end the editing portion and Confirm to save the edits in the project file and go back to the Pause menu interface.



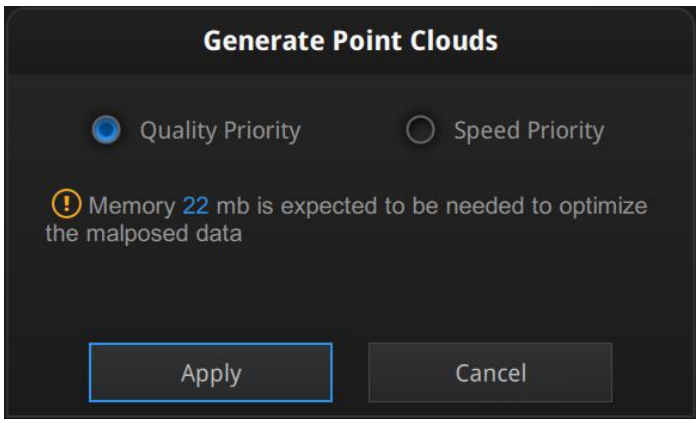

*Save the modification or cancel*

## 7.5. Generate Point-cloud

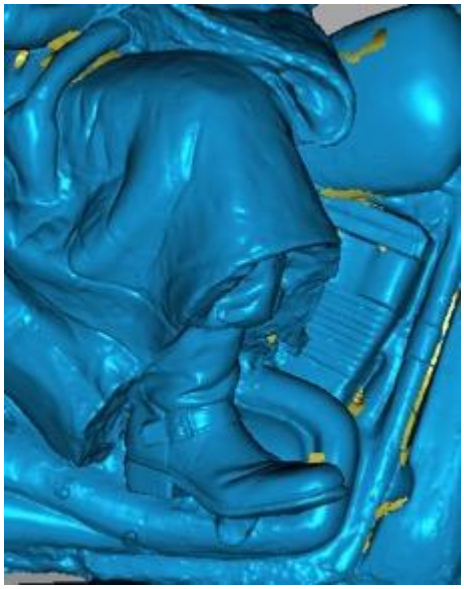
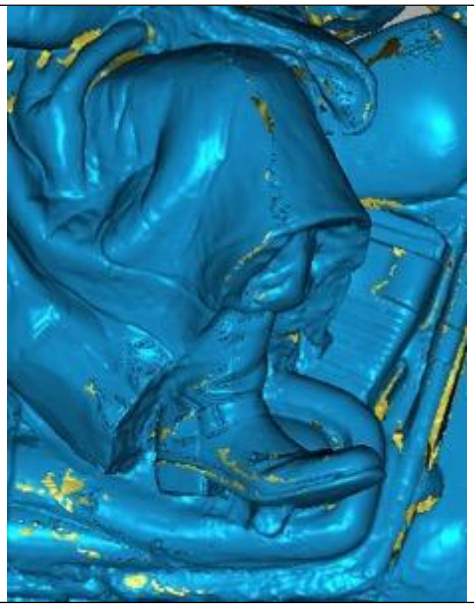
When finished editing, an optimized point-cloud will be generated. This step is accessible in Offline mode.

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

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

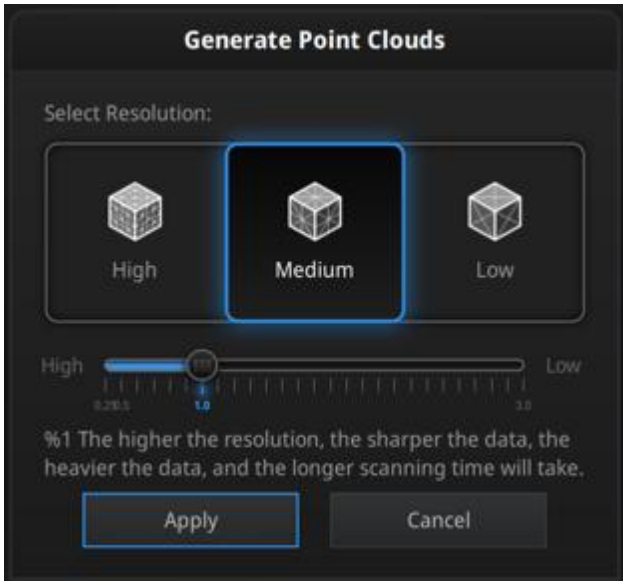



*Generate Point-Cloud options*

| | |
|---|---|
|  |  |
| **Quality Priority**<br>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. | **Speed Priority**<br>If the scanned data is not misaligned during the scan, you can select this option for a faster processing of point cloud data. |

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

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




*Choose resolution*

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

# 8. Post Processing

This step is accessible in Offline mode.

## 8.1. Edit Data

### 8.1.1. Pause Menu

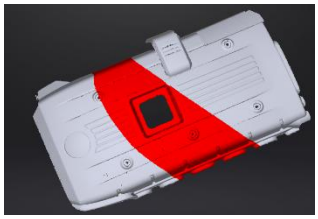
| | |
|---|---|
| OR press | Continue scan |
| | Delete the scan |
| | Save the data |
| | Open/Create project |

Press the Play button or click Pause in software to continue the scan.
Click Delete to delete the whole scan.
At this step, only point-cloud (or separated point-cloud in fixed mode) can be exported Click Save to export the data as *.ASC or the Global Marker File as *.P3.
Open or create a new project in the same scan mode currently used.

Or select data to enter use Edit menu.

### 8.1.2. Edit Menu

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

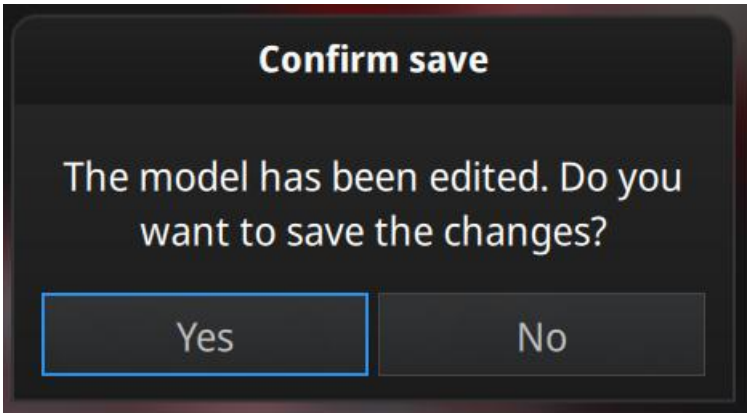
| | | |
|---|---|---|
| | **Edit buttons:**<br><br>**①Deselect**<br>**②Revert**<br>**③Delete**<br>**④Undo**<br>**⑤Show/Hide texture (when installed color pack)**<br>**⑥Shift + Left mouse: choose data**<br>**⑦Ctrl + Left mouse: deselect selected data** |  |

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

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

| | |
|---|---|
| | End the editing |

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




*Save the modification or cancel*

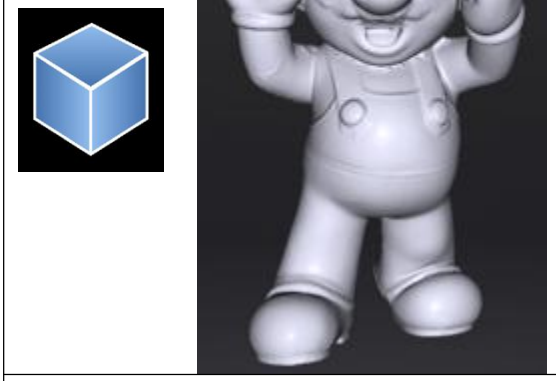
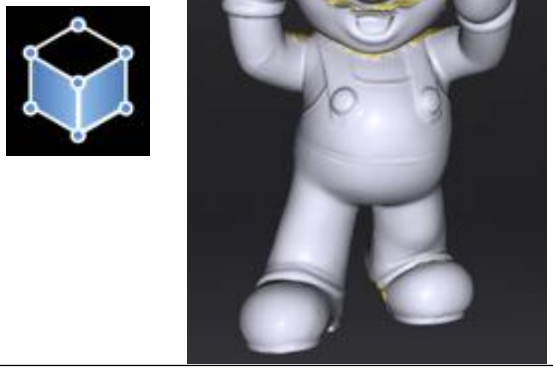
## 8.2. Mesh

| | |
|---|---|
| | Generate the mesh model from the scanned point cloud data |

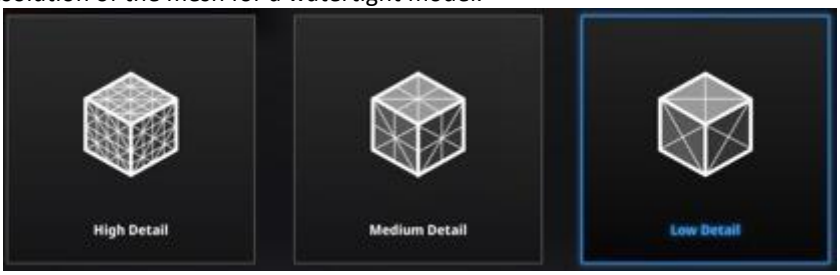
When the scan is completed, click Mesh Model.

### 8.2.1. Watertight / Unwatertight

2 types of mesh are available: Watertight and Unwatertight.

| Watertight | Unwatertight |
|---|---|
|  |  |
| Every hole 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. |

Select the resolution of the mesh for a watertight model.




*Choose mesh resolution*

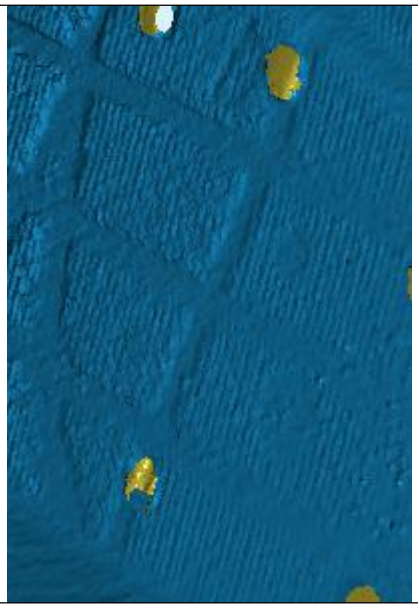
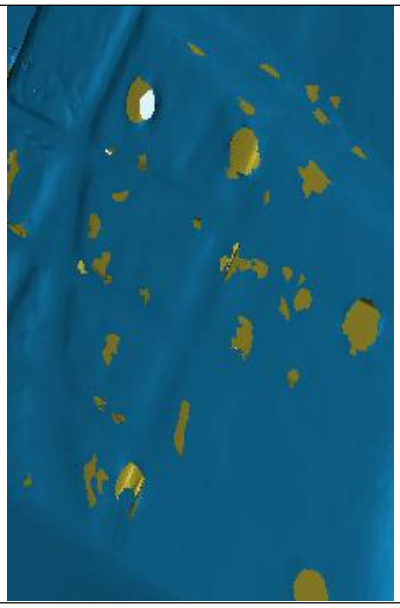
⚠**Note:** If some data are not connected. Watertight will keep only the biggest data.

## 8.2.2. Mesh Editing

EXScan Pro includes the following mesh editing tools

*Simplification window*

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

| | |
|---|---|
|  |  |
| Before simplification | After simplification |

**Hole Filling**

The default setting does not check the Makers Filling or Hole Filling. To check the hole length, you need to set the perimeter and choose the perimeter from 10-100mm to define holes, then all holes with perimeter less than the set value will be filled.

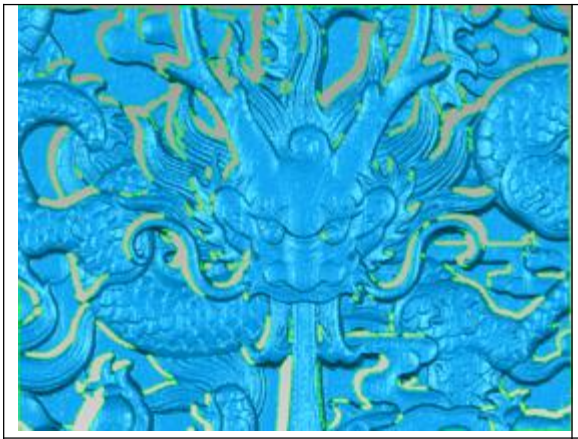
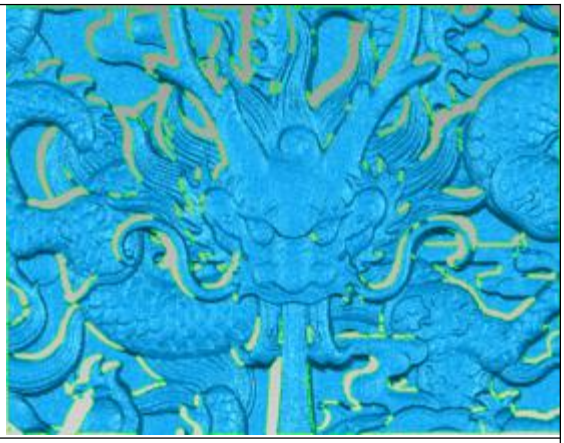
**Markers Filling**

All holes generated by markers will be automatically filled.

| | |
|---|---|
| | |
| No markers fill | With markers fill |

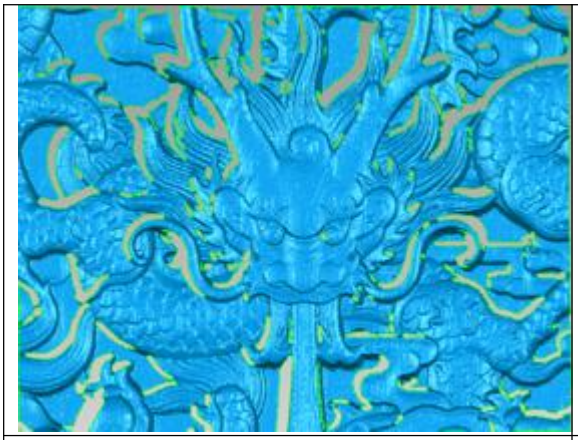
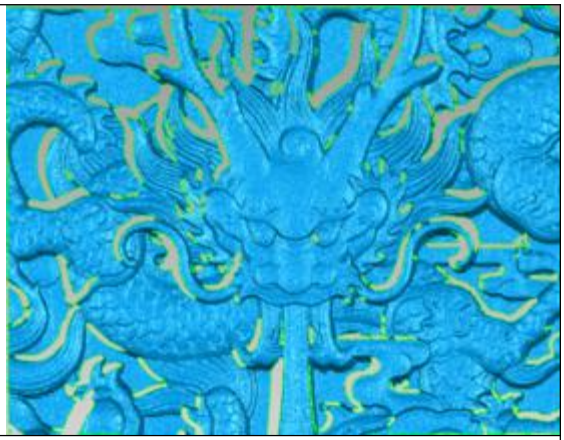
**Smooth**

Smooth the possible noise on the surface of the scan data. It might diminish some small details or smooth some sharp edges at the same time. The example of before and after smoothing is as below.

| | |
|---|---|
|  |  |
| Before smooth | After smooth |

**Sharpen**

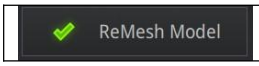
Improve the overall clarity of the data, the figure below before and after sharpening.

| | |
|---|---|
|  |  |
| Before sharpen | After sharpen |

Click Apply to validate the setting.
The mesh data will NOT be saved automatically.

### 8.2.3. Remesh

When the mesh is displayed, click ReMesh Model to recreate the mesh data. The earlier mesh data will be discarded. Save it prior to the Remesh operation if you want to keep the earlier one.

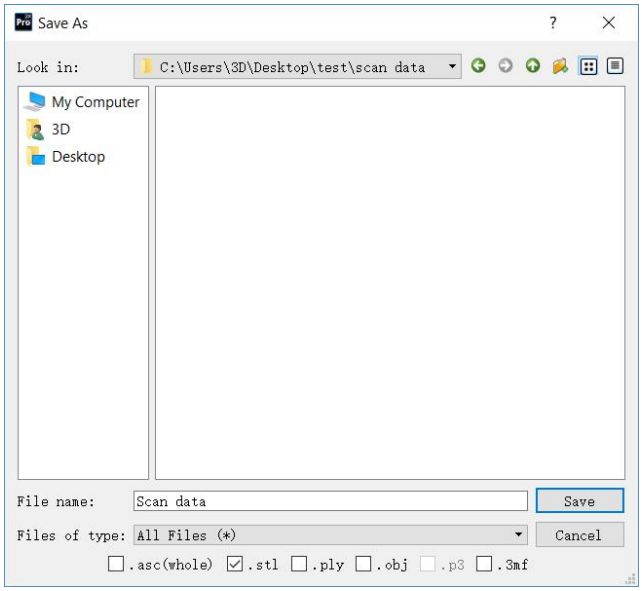
| | |
|---|---|
|   | Mesh the point cloud |

## 8.3. Save

### 8.3.1. Export Data

| | |
|---|---|
| | Save the data |

Click Save to export the data.




*Export data*

Navigate to choose a save folder.
Input the file name.
Choose at least one file format as listed.
By default, the saving path is the project folder, the file name is “Scan data”, and the format is .stl.

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

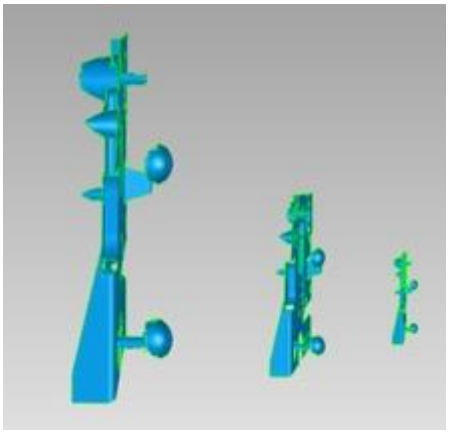
## 8.3.2. Scale Data

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 represent the dimensions of the smallest box containing the data oriented to the reference axis.

*Scale window*

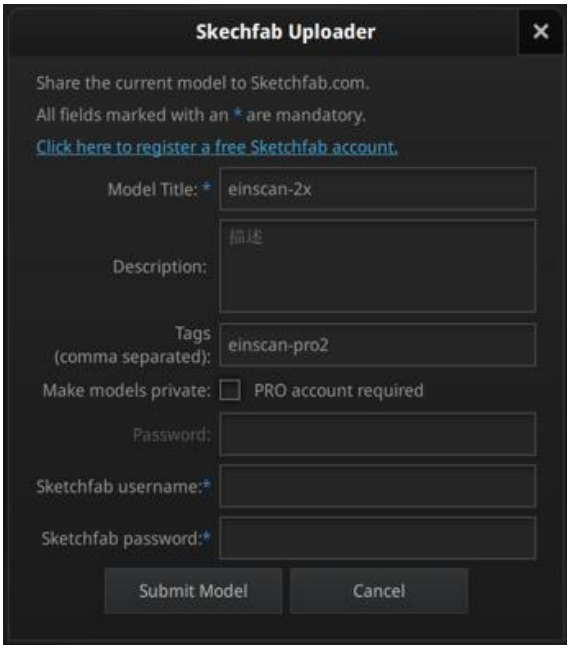


*Scale result*

## 8.3.3. Share Data

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

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




*Sketchfab uploader window*

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

⚠**Notes:**

Sketchfab basic plan accounts can only upload data less than 50M, while Pro plan account can share with a maximum of 200M.

Data is saved as .STL does NOT contain texture.

## 8.3.4. Solid Edge SHINING 3D Edition

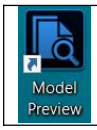
Import the scanned 3D data to Solid Edge SHINING 3D Edition from EXScan Pro software

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

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

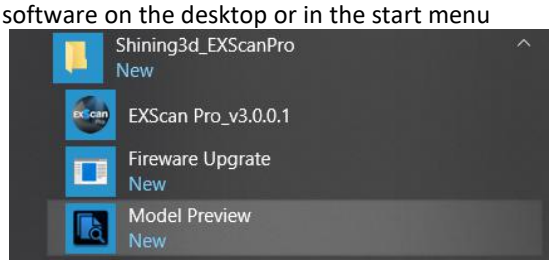
Siemens Solid Edge Global Forum
See What's new in Solid Edge 2019
Find Solid Edge related tutorial video on YouTube channel

## 8.3.5. Model Preview



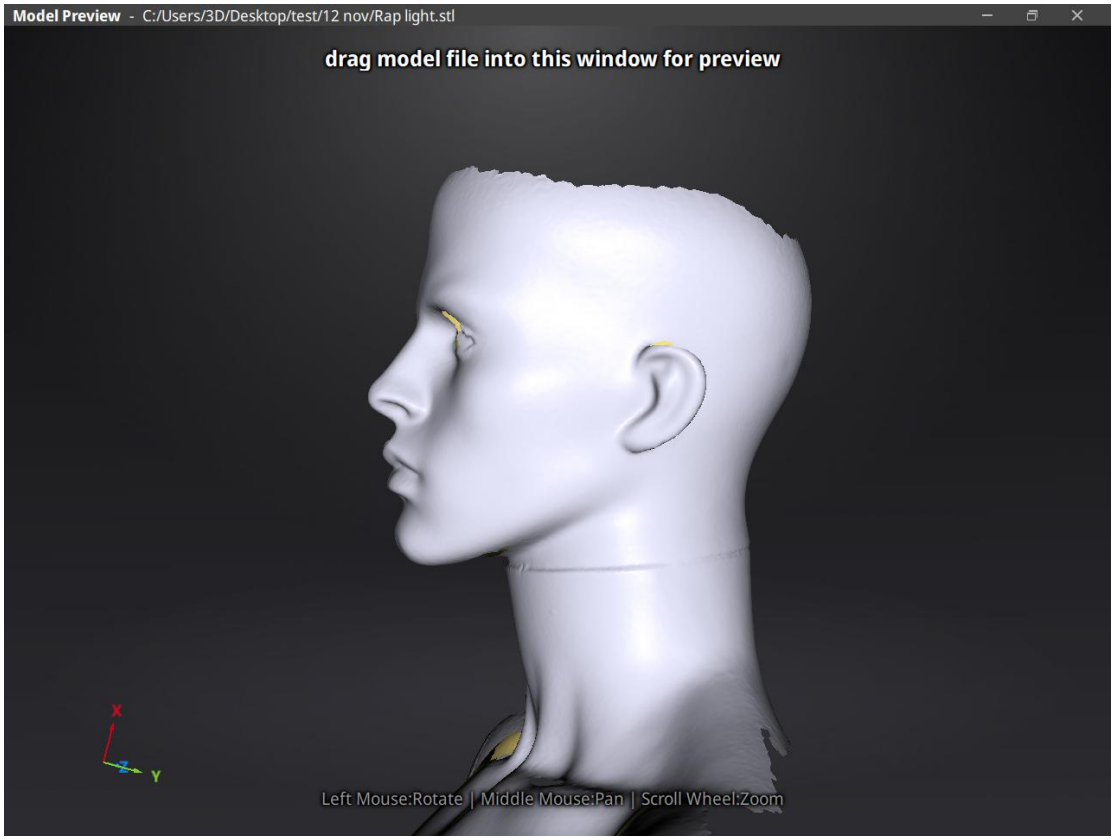

Double click on the Model Preview short-cut on the desktop

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



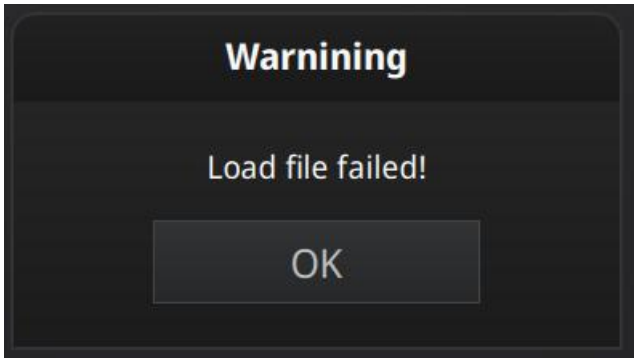

*start menu > Shining3d_EXScanPro > Model Preview*

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




*Model Preview*

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




*Fail to load the mesh data*

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

# 9. Color pack

## 9.1. Hardware

### 9.1.1. Content

| | |
|---|---|
| | |
| Texture camera (2X) | Texture camera (2X Plus) |

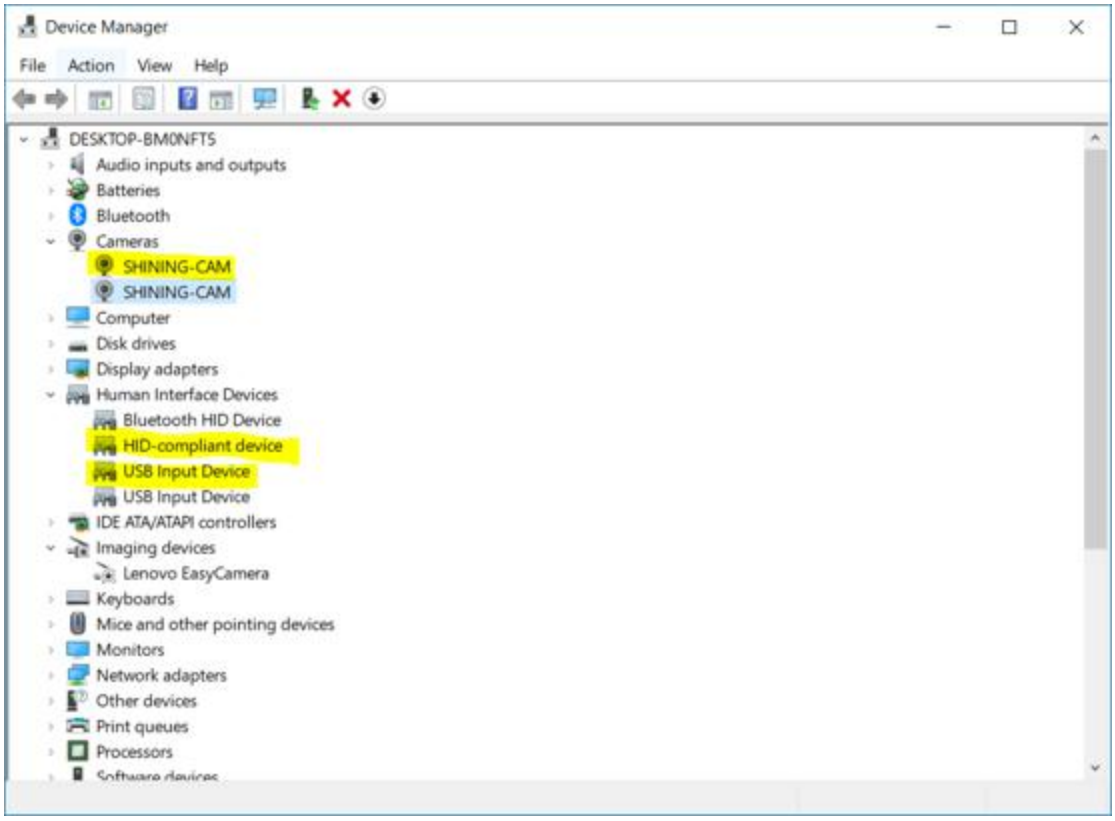
⚠ **Note:** 2X and 2X+ texture cameras are different. Make sure to use the corresponding camera compatible with the scanner.

### 9.1.2. Installation

Before installation, make sure the device is powered off.
Remove the add-on port cover on the top of the scanner. (1)
Rotate the hook (rotary lever) to the left side.
Plug the texture camera (Color Pack). (2)
Turn the hook (rotary lever) to the right to lock the camera in position. (3)
Power on the scanner and the camera driver will start by itself.

| | | |
|---|---|---|
| | | |
| (1) | (2) | (3) |

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

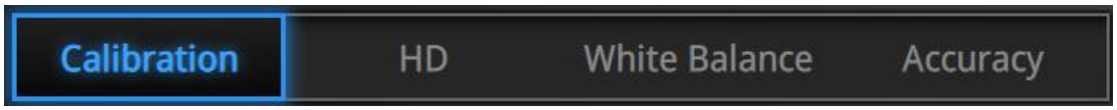



*Device manager with EinScan and texture camera connected*

# 9.2. Calibration

## 9.2.1. Normal Calibration

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




*Calibration steps with Texture camera plugged.*

Use the front side (black) of the calibration board for texture camera calibration. In the calibration interface, run the Calibration with the normal method (see “camera calibration”). The LED rings of EinScan and the texture camera will blink synchronously.
If the calibration keeps failing, check whether the texture camera is well locked in position.

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

After HD calibration, White Balance is suggested.

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

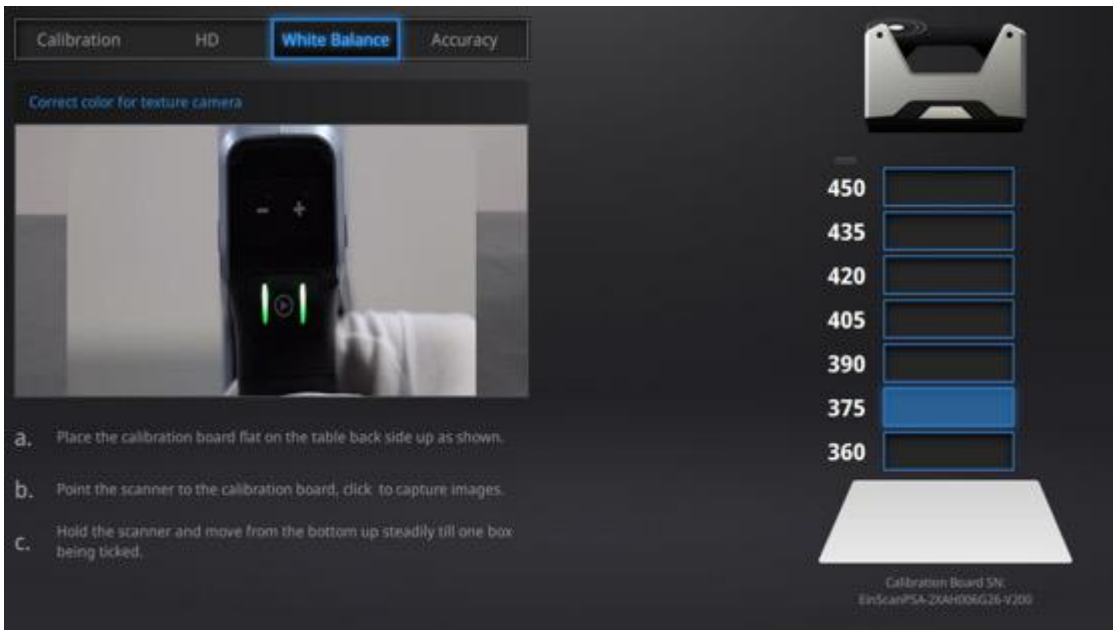
## 9.2.2. White Balance

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

or press

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



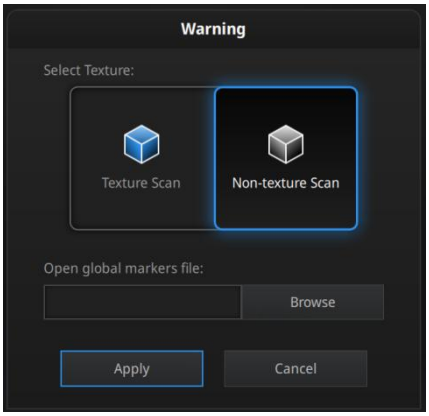

*White Balance calibration interface*

To guarantee a good texture, the calibration board must be kept clean. If needed, wipe with clear water only. Do not use alcohol or chemical liquid to clean the calibration board.
Similar to taking high-quality picture in the photo studio, the professional lighting environment setting is key to achieve high-quality texture data.
If the texture doesn't give you satisfaction, please optimize the lighting environment and redo White balance.

# 9.3. Fixed Mode

## 9.3.1. Scan

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




*Texture/Non-texture scan option*

During scanning, display the texture camera view by checking the “Texture Camera” box.

*Display Cameras*

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

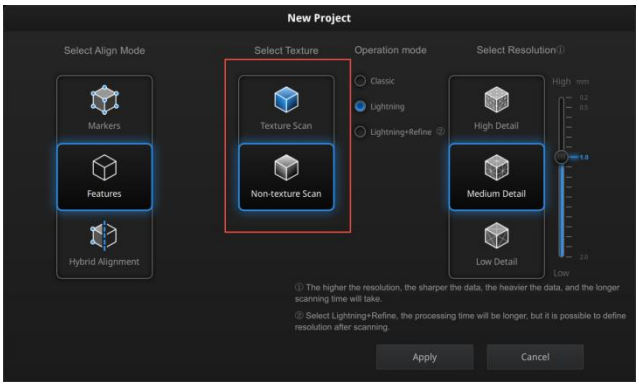
## 9.3.2. Alignment

The texture is not used during automatic alignment. However, it can be helpful to select corresponding points in manual alignment.
Data and texture are captured from a different angle. In case of sharp edges, texture-data can be misaligned, try to scan from a different angle.
If the texture is misaligned to the data, check that the camera is well placed and locked. And redo the calibration.

# 9.4. Rapid Mode

## 9.4.1. Scan

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 checking the “Texture Camera” box

*Display Cameras*

**⚠Notes:**

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

## 9.4.2. Alignment

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

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

*An area with texture missing*

# 9.5. Post Processing

## 9.5.1. Point-cloud Editing

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

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

## 9.5.2. Create Mesh

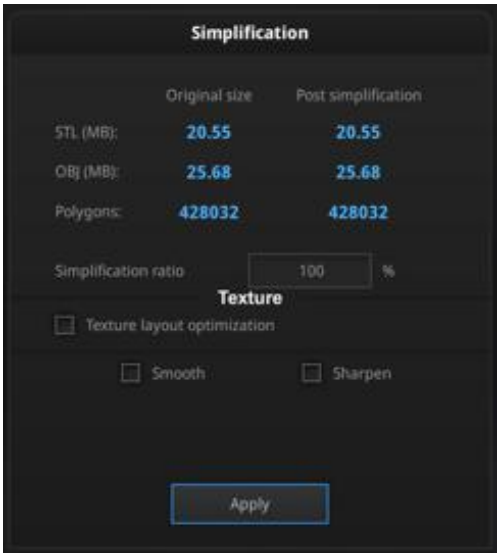
| | |
|---|---|
| | Generate a mesh model from the scanned point cloud data. |

Click Mesh Model to generate the Mesh (watertight or unwatertight). The texture capture is separate from the 3d data capture. If the texture has been captured, it will still be displayed on areas where holes are filled in the mesh processing. If the texture is missing, the corresponding mesh data will be in black.

*Example of a watertight model with texture*

## 9.5.3. 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. Making the texture editing easier with a 3rd party software. This option has no effect on the texture itself. Click Apply to continue.




*Simplification step with texture*

| | |
|---|---|
| | |
| No optimization | Texture layout optimization |

**⚠Notes:**

TLO requires a longer time to compute

In Fixed Mode for one single scan, TLO is the same as normal texture file.

TLO is used only with OBJ output

## 9.5.4. Brightness & Contrast

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

*Modify texture*

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

## 9.5.5. 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.

**⚠Note**: By default, the output format is STL, it does NOT contain texture information

| Format | Texture | Data type | Saves as | Recommended for |
|---|---|---|---|---|
| **OBJ** | Yes (separated) | Mesh, Texture & Matching file | scan.obj<br>scan.jpg<br>scan.mtl | ◆ Artistic applications<br>◆ 3D rendering<br>◆ Compatibility with most mesh editing software |
| **PLY** | Yes | Mesh | scan.ply | ◆ Low storage<br>◆ Easy texture editing |
| **3MF** | Yes | Mesh | scan.3mf | ◆ Low storage<br>◆ Compatibility with Microsoft paint3d |

## 9.6. 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 3rd party software like Photoshop or Gimp, save as OBJ and erase the markers on the matching JPG file.

# 10. Industrial Pack

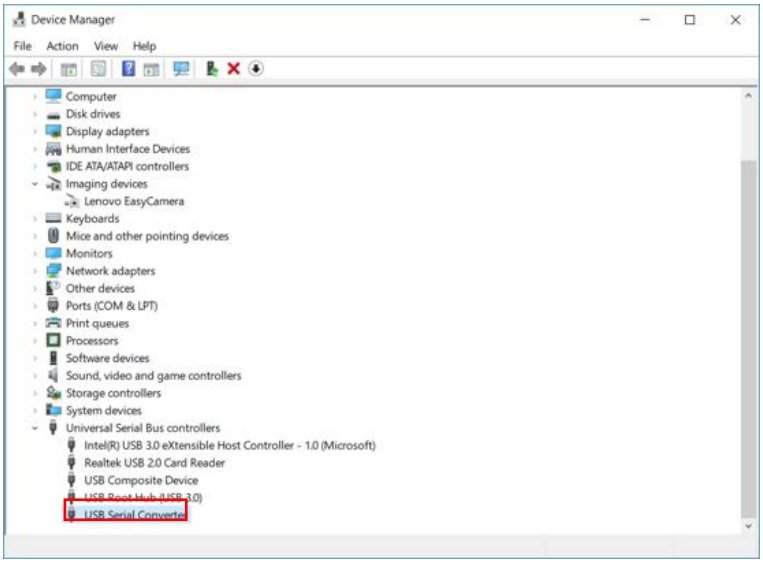
## 10.1. Content

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

## 10.2. Installation

*Industrial pack set up*

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

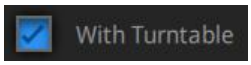



*Device manager with turntable*

## 10.3. Scan

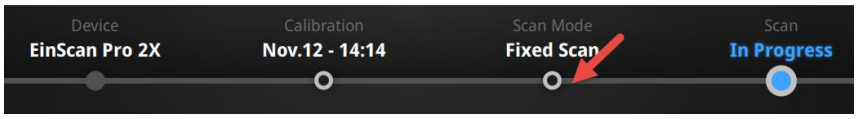
### 10.3.1. With/Without Turntable

Create or Import a fixed scan project.
On the top right, Check the box to use the turntable, or Uncheck to not use the turntable.




*Fixed scan with turntable*

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




*Go back to Scan mode selection menu*

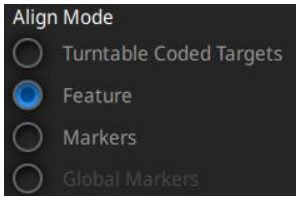
## 10.4. Turntable Steps

*Turntable step input*

Before scanning, set the turntable steps between 2 and 180. The number shows the times of steps that the turntable will stop and data will be captured during the 360° full rotation. The default setting, 8 steps, is recommended. You can change the number of steps according to the features of the objects.

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

## 10.5. Alignment Condition

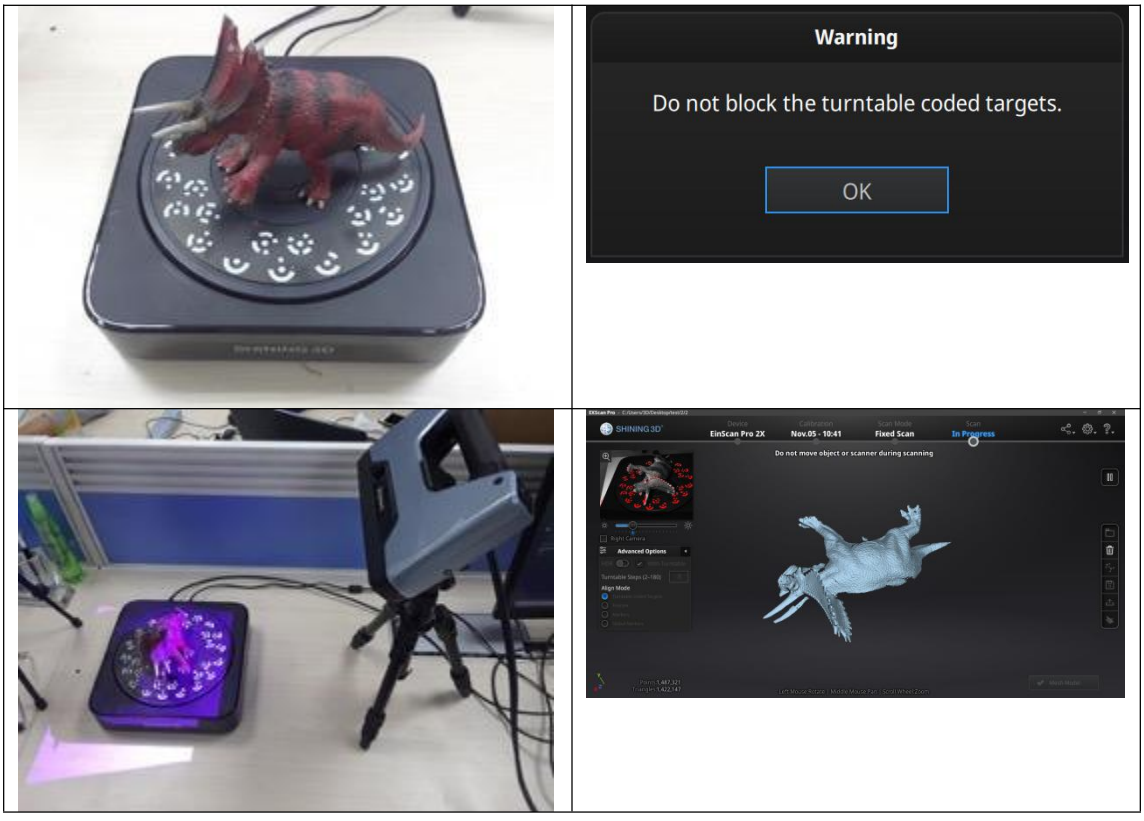



*Alignment mode selection with the turntable*

Select an alignment mode condition for the turntable scan.

### 10.5.1. Turntable Coded Target Alignment

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



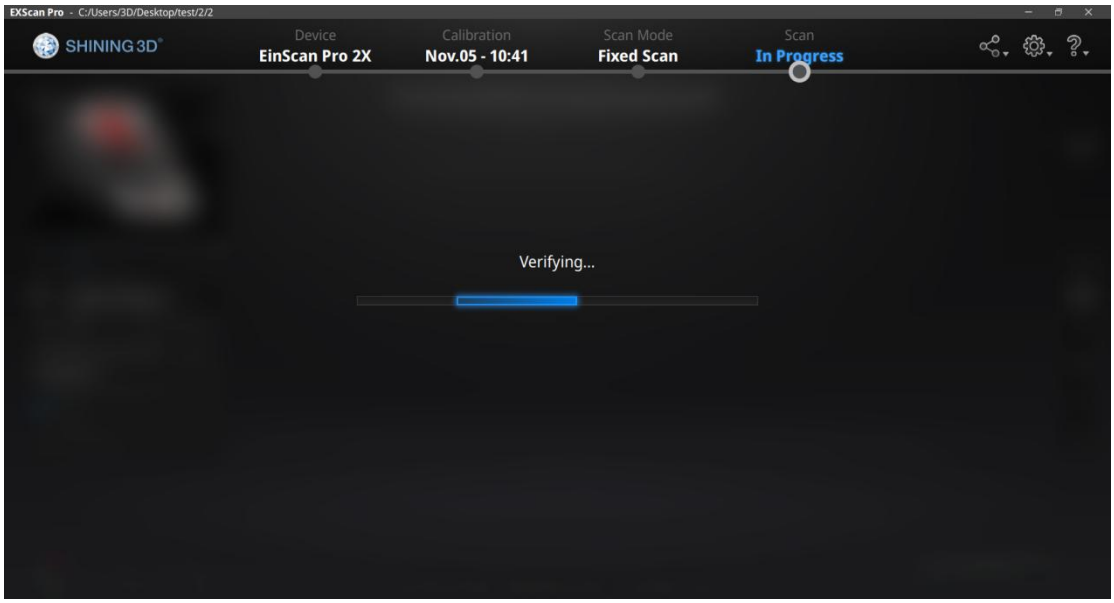
If the object's diameter is smaller than 150mm, it will not cover most coded targets on the turntable surface. Place the object on the middle of the turntable and make sure it will not shake or move during the rotation.

## 10.5.2. Feature Alignment

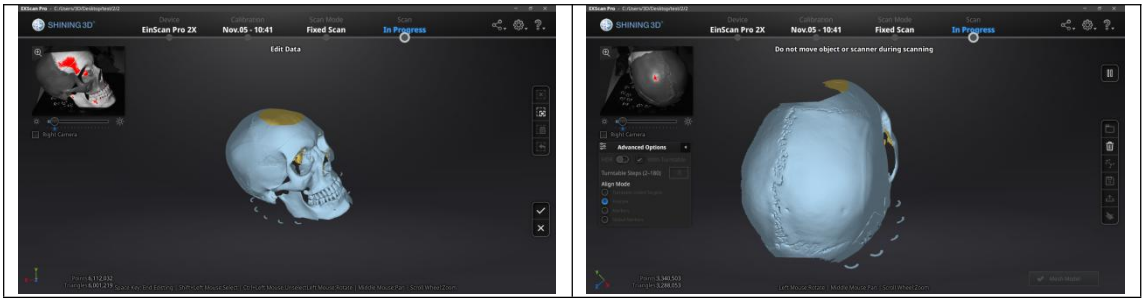
When the object you need to scan is big and will cover most coded targets on the turntable, and you do not want to or cannot stick markers on it, then feature alignment will be helpful. With feature alignment, the software recognizes geometry features on three successive preliminary scans and then calculates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

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

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

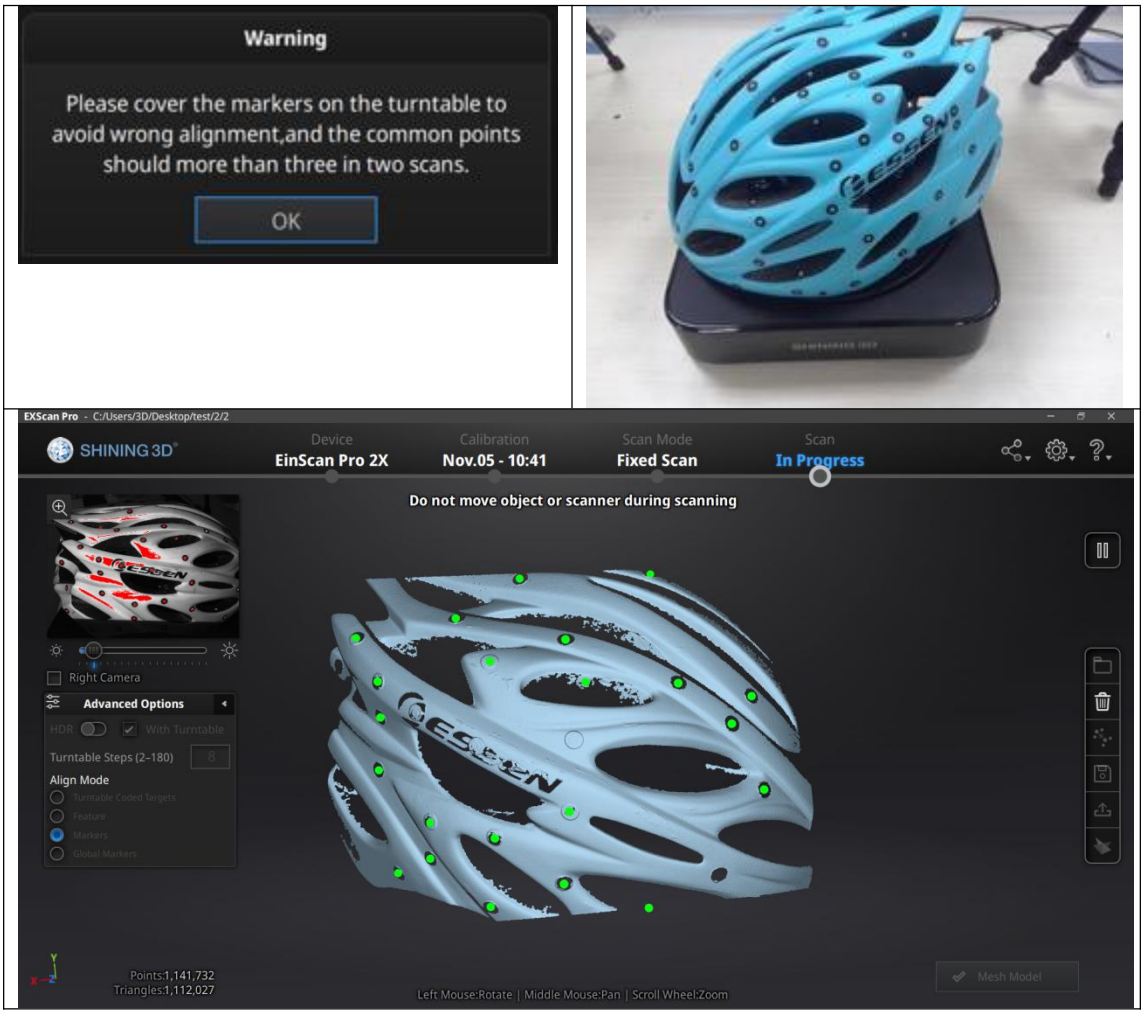



*During the "verifying" steps, the software calculates the position of the turntable*




## 10.5.3. Markers Alignment and Global Markers Alignment

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




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

# 11. HD Prime Pack

Prime (HD Prime pack add-on) is an add-on for EinScan Pro 2X Plus (2X+) only. 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.

⚠**Warning:** 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 to avoid direct exposure to the eyes while scanning. HD Prime is not suggested to use for face scanning.

## 11.1 Hardware

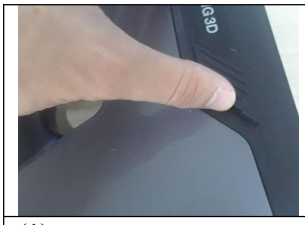
### 11.1.1. Content

HD prime

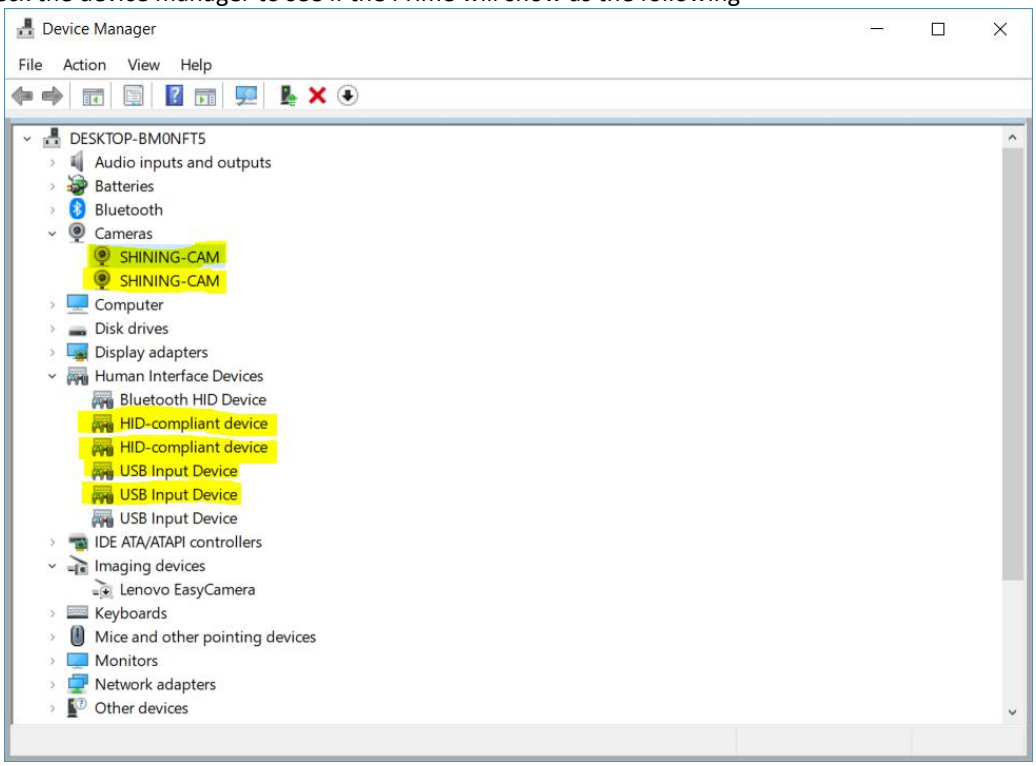
⚠**Note:** HD prime is available only for EinScan 2X Plus

### 11.1.2. Installation

Before installation, make sure the device is powered off.
Remove the add-on port cover on the top of the scanner. (1)
Rotate the hook (rotary lever) to the left side. Plug 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.

| | | |
|---|---|---|
|  | | |
| (1) | (2) | (3) |

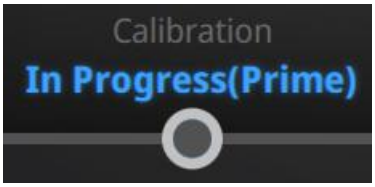
Check the device manager to see if the Prime will show as the following




*Device manager with EinScan and HD Prime connected*

## 11.1.3. Calibration

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




*Calibration with Prime*

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.

## 11.2. 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).

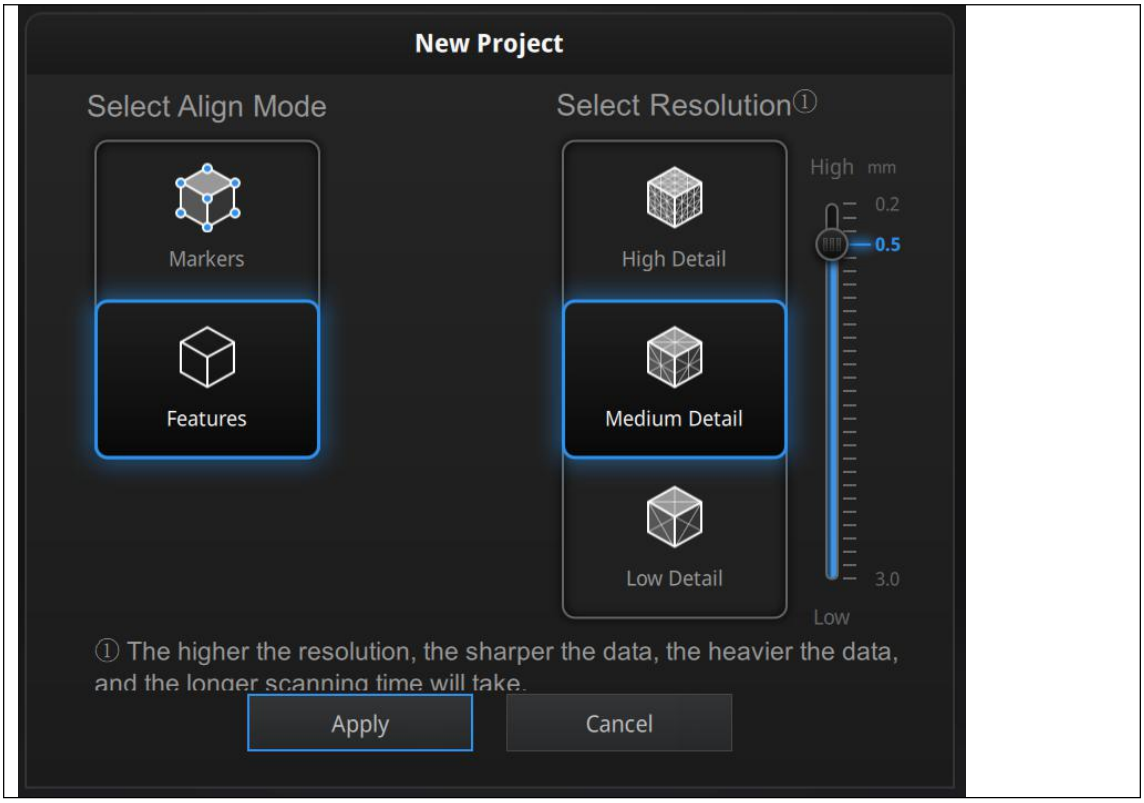
*Mode selection with Prime*

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.

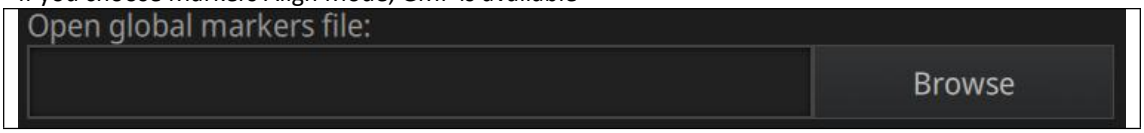
## 11.2.1. Align Mode




**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

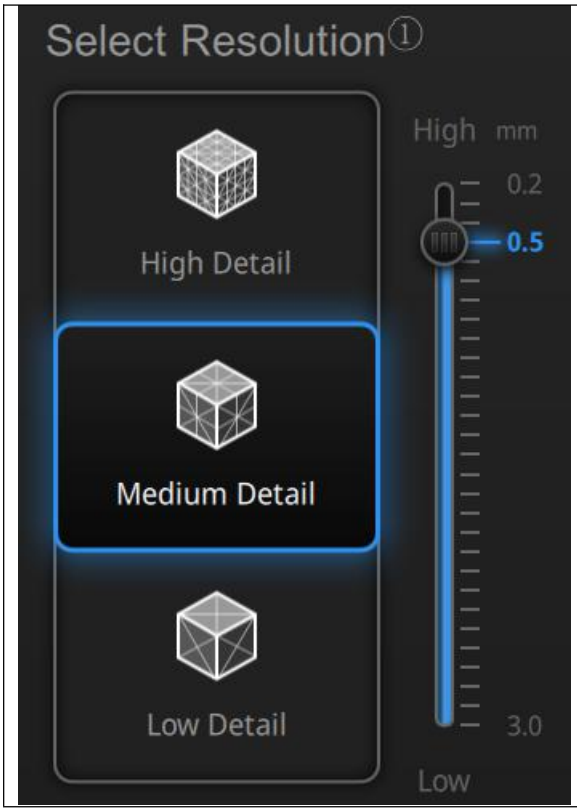
If you choose Markers Align Mode, GMF is available




Click Browse to import the GMF as .P3 .TXT or .ASC

## 11.2.2. 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.
Choose high resolution, the data output is slow.
When import project, and continue the scan, the scanning resolution and align mode will be in accordance with the previous setting of imported project.

Click Apply to validate and enter the Scanning interface

## 11.3. HD Prime scan

### 11.3.1. Preview

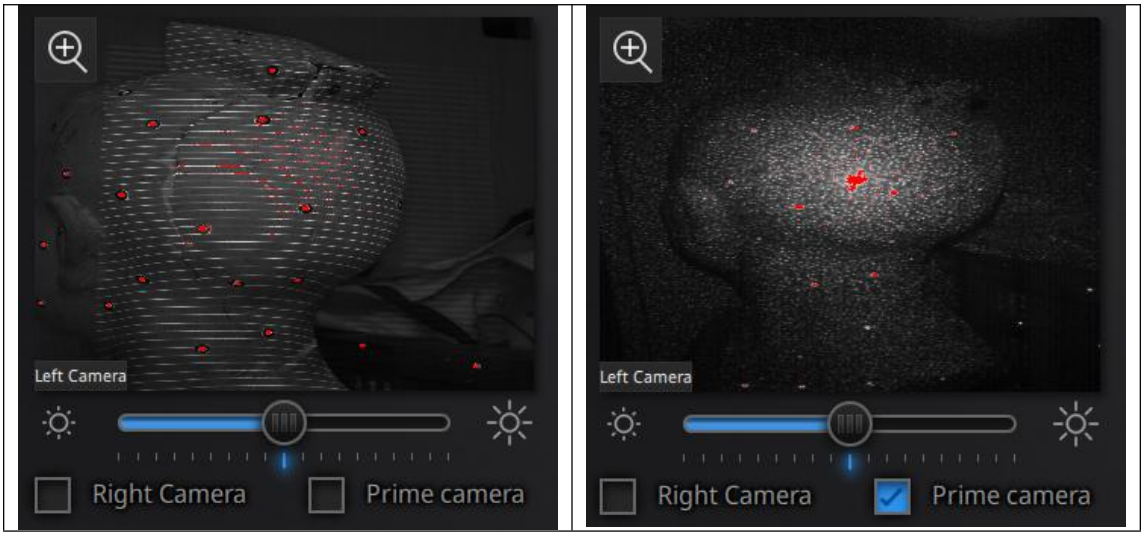
OR press

Start Preview mode

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
Insure that the markers are well captured.
Insure that the object has enough geometry features if you do not use markers.

| | |
|---|---|
| OR press | Exit Preview mode and start the scan |

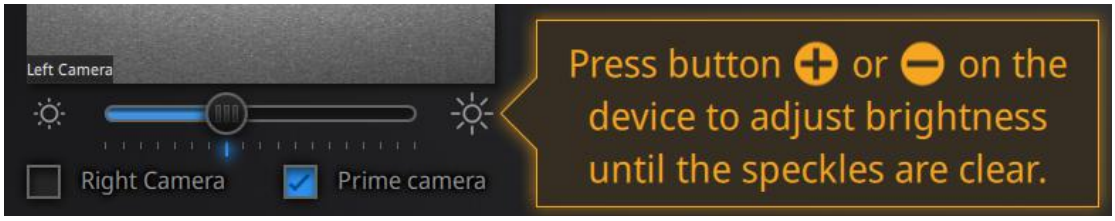
Click Start in software or press the Play button to exit the preview mode and start the scan

**⚠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.

## 11.3.2. Brightness

| | |
|---|---|
| Double press | Enter/Exit the exposure adjustment menu |

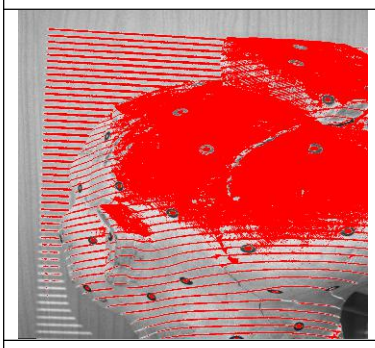
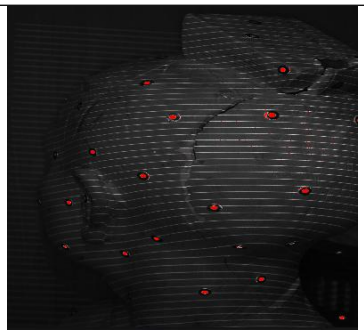
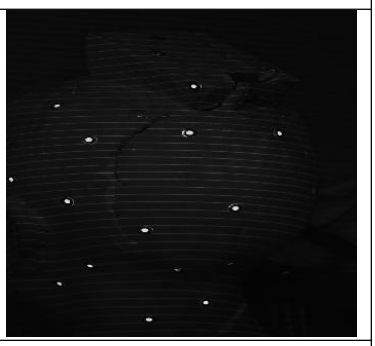
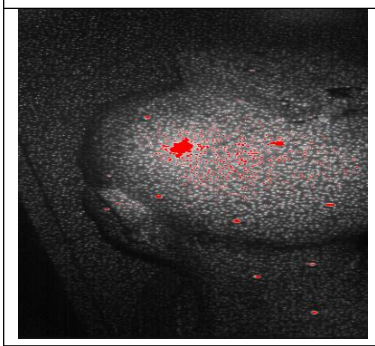
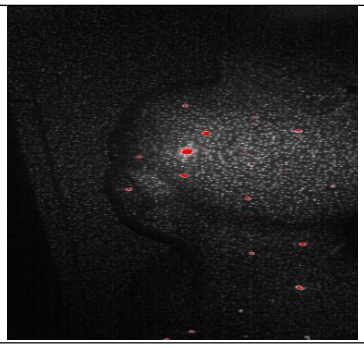
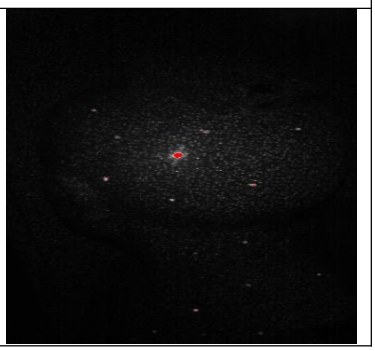
When scanning or in Preview mode double press Play button, adjust the brightness by pressing “+/ -” buttons on the scanner, or drag the cursor under the camera preview to left (-) or the right (+).




*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.

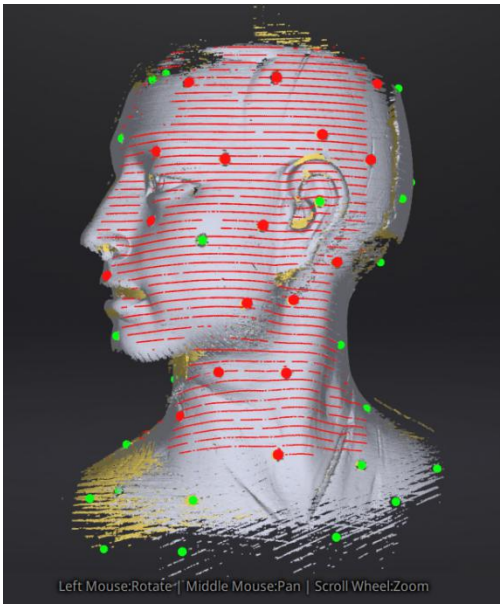
| Too bright | Correct | Too dark |
|---|---|---|
| EinScan | | |
|  |  |  |
| Prime | | |
|  |  |  |

Double press Play button to exit the brightness adjustment window

## 11.3.3. 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) have to 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.

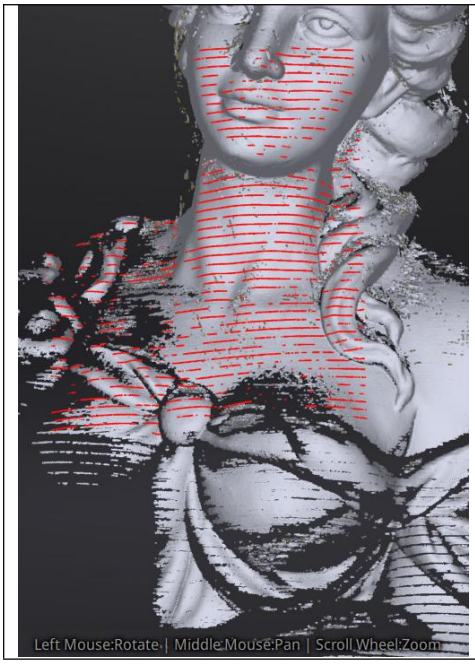
If the position tracking fails, “Track lost” alert will appear, you need to go back to an area with previously recorded markers to recover the track again and continue scan.

*Track lost alert*

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

## 11.3.4. Scan without markers

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.




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*

## 11.4. Pause menu

In Off-line mode the data can be loaded at this step for editing.

### 11.4.1. Auto-save

OR press

Enter pause menu

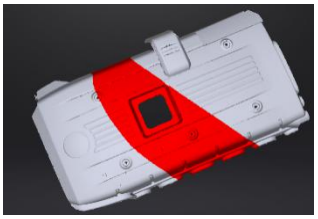
Press play button or click Pause in the software to enter the Pause menu. The data will be Auto-saved in the project file.

| | |
|---|---|
| OR press | Continue scan |
| | Generate point cloud |

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

## 11.5. Edit menu

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

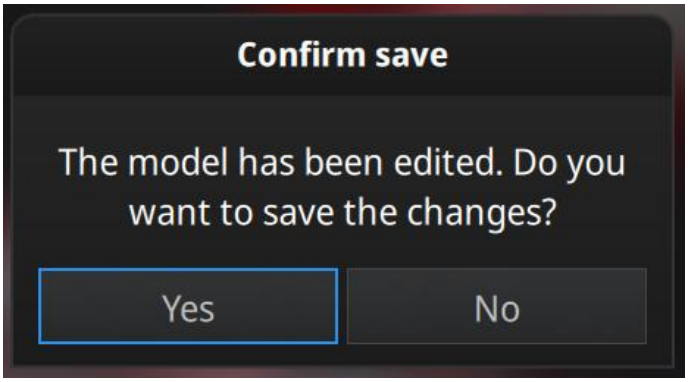
| | | |
|---|---|---|
| | **Edit buttons:**<br><br>**①Deselect**<br>**②Revert**<br>**③Delete**<br>**④Undo**<br>**⑤Show/Hide texture (color pack only)**<br>**⑥Shift + Left mouse: choose data**<br>**⑦Ctrl + Left mouse: deselect selected data** |  |

| | |
|---|---|
| | **Delete selected data**<br>Click the button or “DELETE” in the keyboard to delete selected data. |
| | **Undo**<br>You can only undo the last deleted data. |

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

| | |
|---|---|
| | End the editing |

Click Check to End the editing and confirm to save the editing in the project file and go back to pause menu

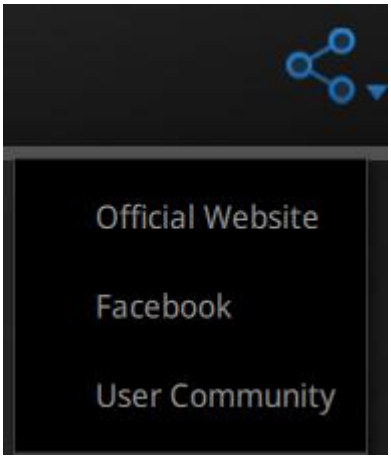


Save the modification or cancel

# 12. Support and Contact

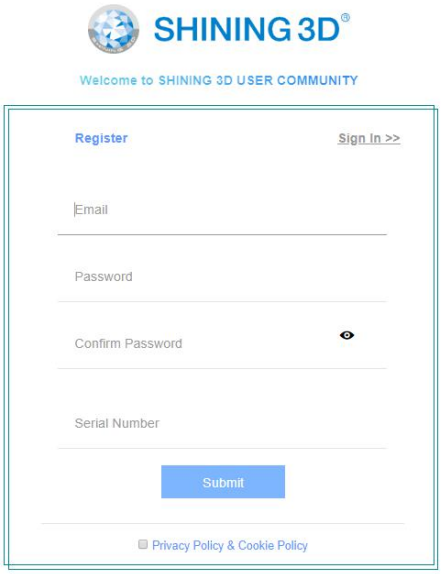
## 12.1. User Community

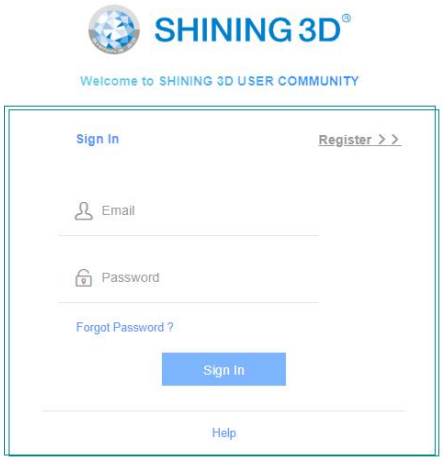
Find the User Community tab in www.einscan.com, or from the Community menu.




### 12.1.1. Log In

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

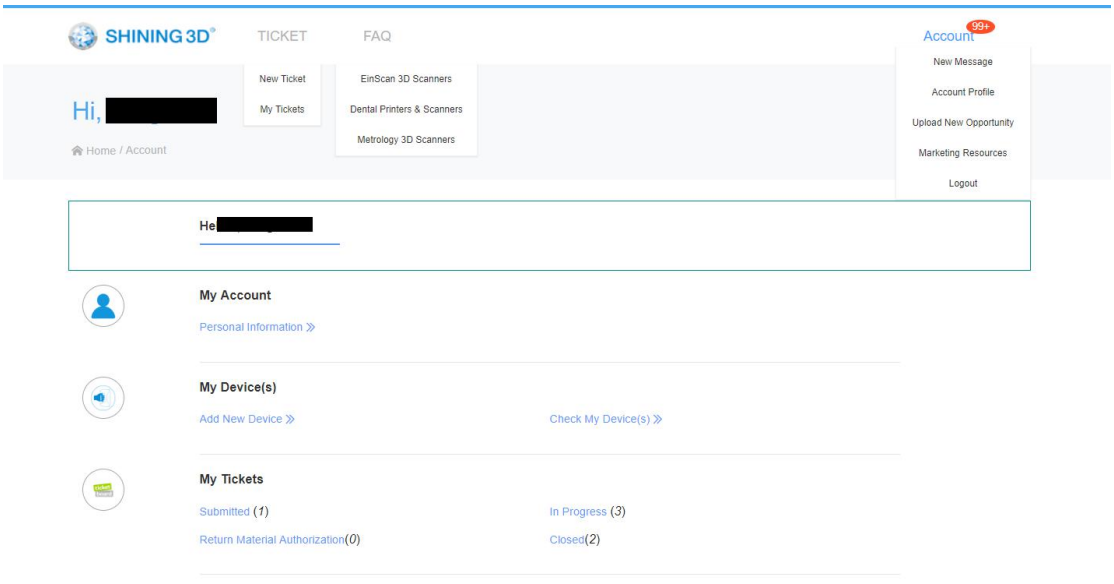



*Register* *Log-in*

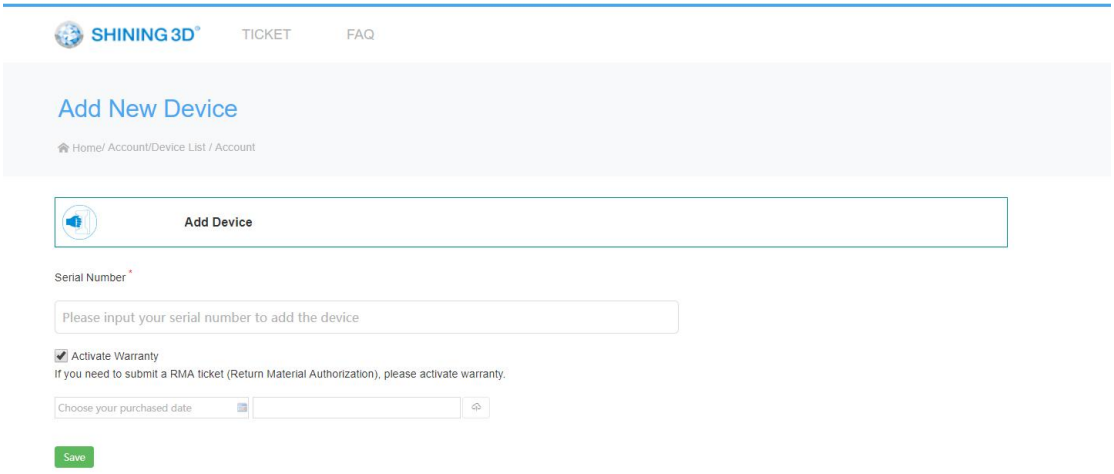
## 12.1.2. Activate Your Warranty

To start the warranty of your device, in My Account, click Add new device.




*Account page*

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

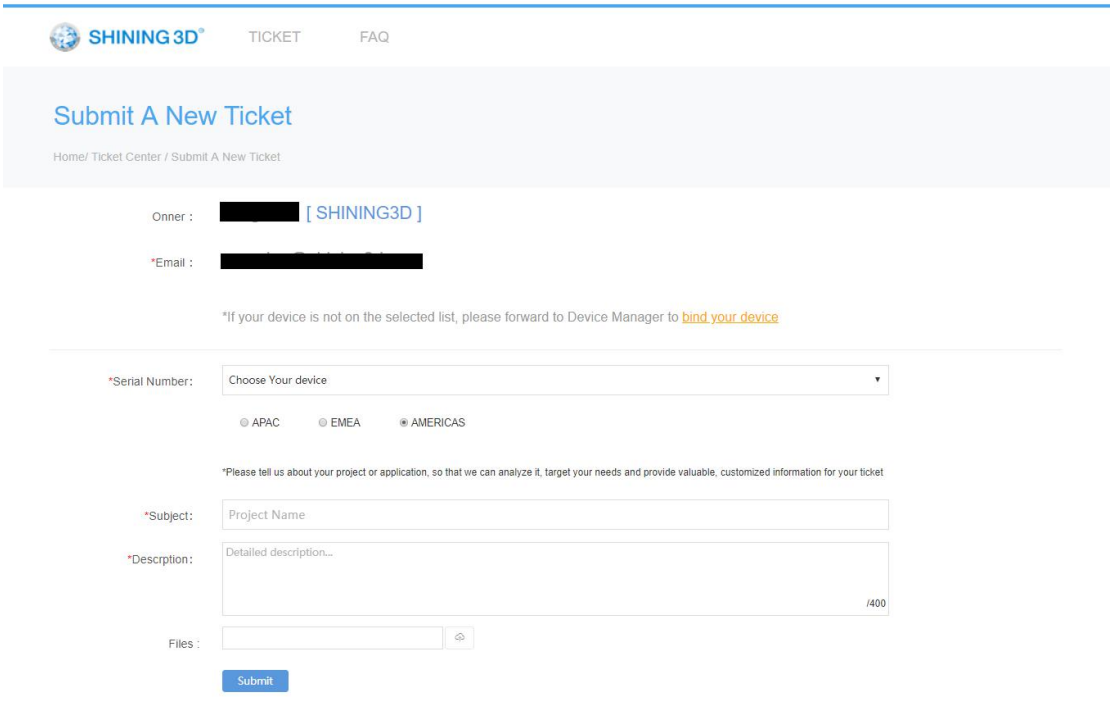



*Add device page*

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

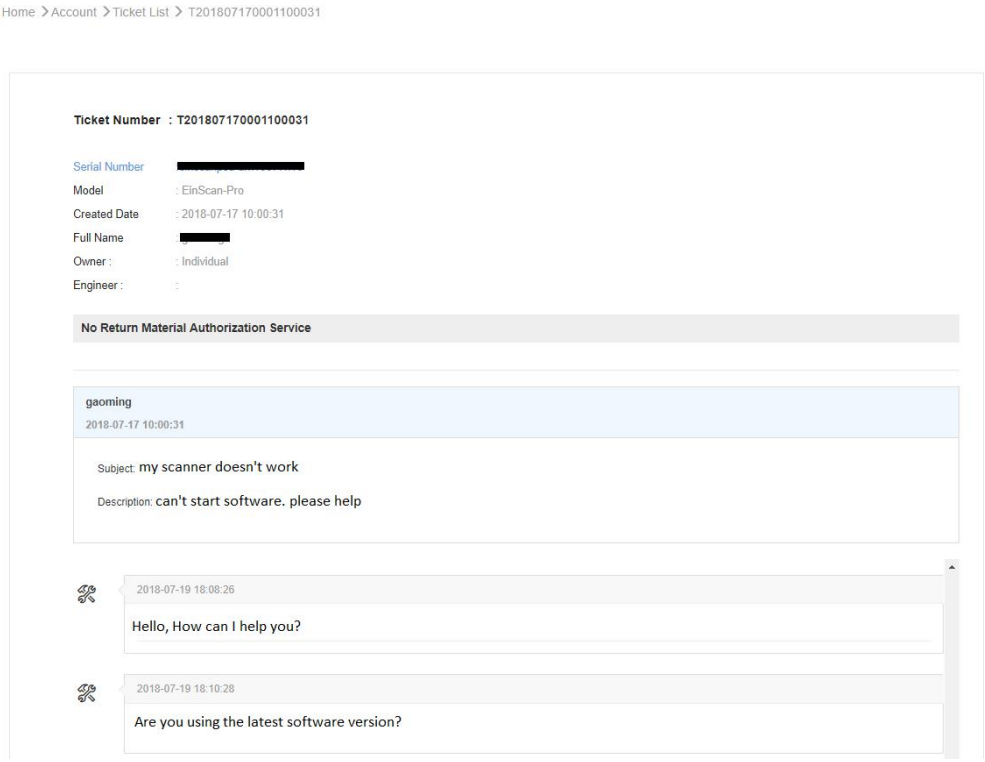
### 12.1.3. Submit a Ticket

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




*Submit a ticket*

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




*Opened ticket*

## 12.2. Contact Us

By email
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sales@shining3d.com

Skype: Einscan_support

Facebook Group: EinScanexpert

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