SHINING 3D®

Freescan Combo
User Manual

V1.2.4

Symbol Conventions

Symbol	Description
	**NOTE**: This symbol is used to inform you of the additional information of the product.
	**CAUTION**: This symbol is used to inform you of incorrect operations that may damage the device or result in data loss. Any damages resulting from misuse are not covered by the warranty.
	**DANGER**: This symbol is used to inform you of the potential risks that may result in serious personal injury and other safety incidents.

About the document

This document is related to your safety, lawful rights, and responsibilities. Read it carefully before installing and using the product.

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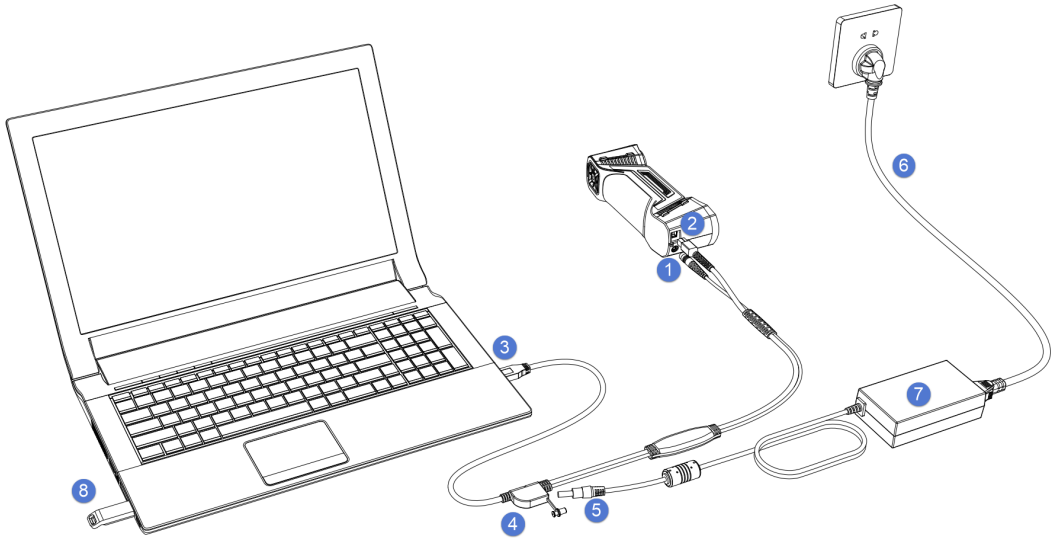
FreeScan Combo is a handheld laser 3D scanner independently developed by SHINING 3D. The scannner supports the laser mode and the IR mode. The laser mode is mainly used in industry scanning; the IR mode is mainly used in portrait scanning and object scanning.

Appearance

Appearance	Button
	

No.	Name	Description
1	Scanning distance indicator/Power indicator	Only after the power indicator lights on, the scanner can be operated. Scanning distance indicator: ●Red: too close ●Yellow: relatively close ●Green: suitable distance ●Greenish-blue: relatively far ●Blue: too far
2	Scanning Button	Click: Preview/Start Scan/Pause Scan. Double-click: call out the menu, and at this time the scanning button becomes the confirmation button. Press and hold: Switch slight source mode.
3	Camera Brightness Button	/
4	Zoom Button	Adjustment of the size of data displayed in the preview window ● Press and hold the up button: turn on/off the **Local Enlarged View** function. ● Press and hold the up button: turn on/off the **View Lock** function.

Connect Cables



⚠ Caution

Make sure you are using the correct power adapter (12V/5A).

Step

1.Connect the aviation cable (4) to the power port (1) and the USB port (2)

2.Connect the power cord (6) to the power adapter (7).

3.Connect the power adapter (5) into the aviation cable (4).

4.Connect the USB port (3) on the aviation cable to the PC USB 3.0 port.

5.Insert the Dongle (8) into the PC USB port.

6.Plug in socket to power up.

Installation

Install FreeScan to use the scanner(hereinafter referred to as the "software").

Operating Environment

Module	Recommendation
CPU	Intel® Core™ i7-8700 or above
RAM	6 gigabyte(GB) or above
Storage	32GB or above
Graphics Card	NVIDIA GTX 3060 or above
Operation System	Win 10，Win11 Pro and Win 11 Home(all 64 bit)

Software Installation

Step

1.Insert the flash drive.
2.Copy the installation file to the PC and run it.
3.Install the software by following the installation wizard.
4.Click **Finish** and run the software.

Note

Administrator rights are required for the software installation.

Graphics Card

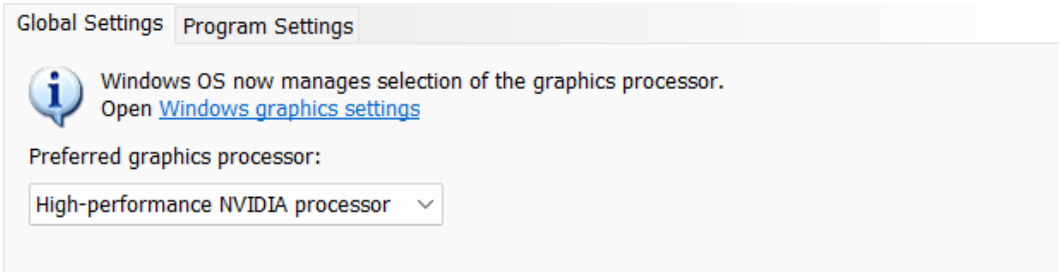
It is recommend to use a discrete graphics card instead of integrated graphics card for better performance.

Desktop

- Connect your display to the port of discrete graphics card on the back of your computer.

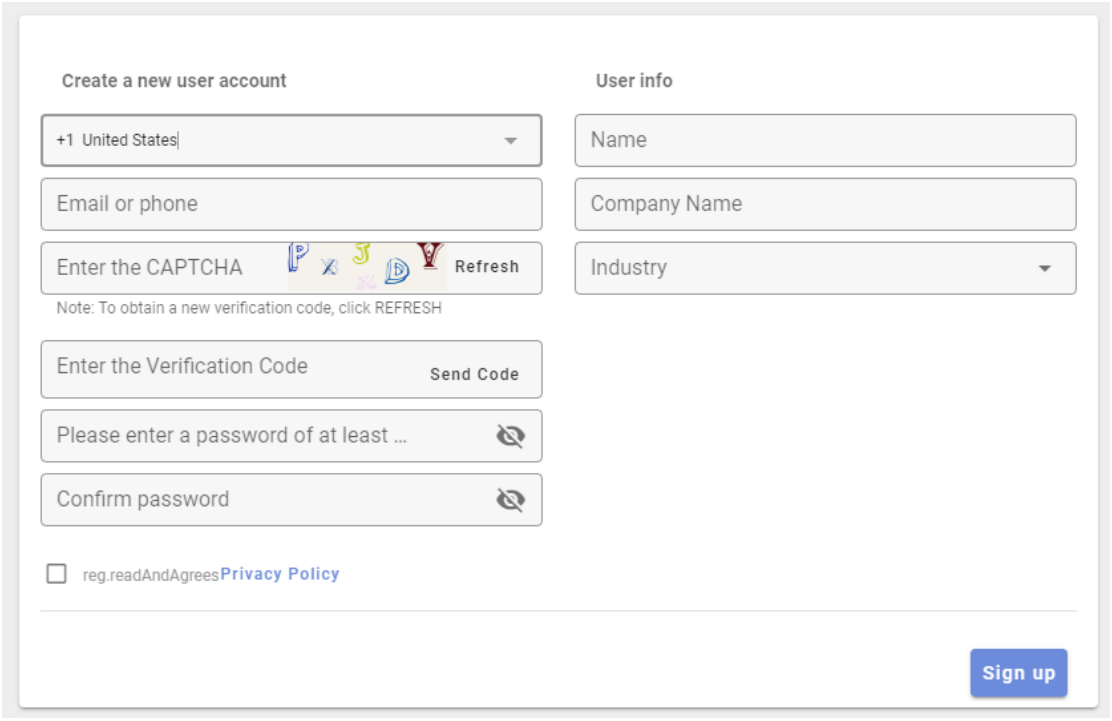
Laptop

- Launch **NVIDIA Settings** on your laptop.
- In **3D Settings** --> **Manage 3D Settings** --> **Global Settings**, select **High-performance NVIDIA processor** and click **Apply**.



Registration

Register an account to log in or directly through a verification code when accessing the software for the first time.
Click **Register** and fill in the account information in the registration pop-up.

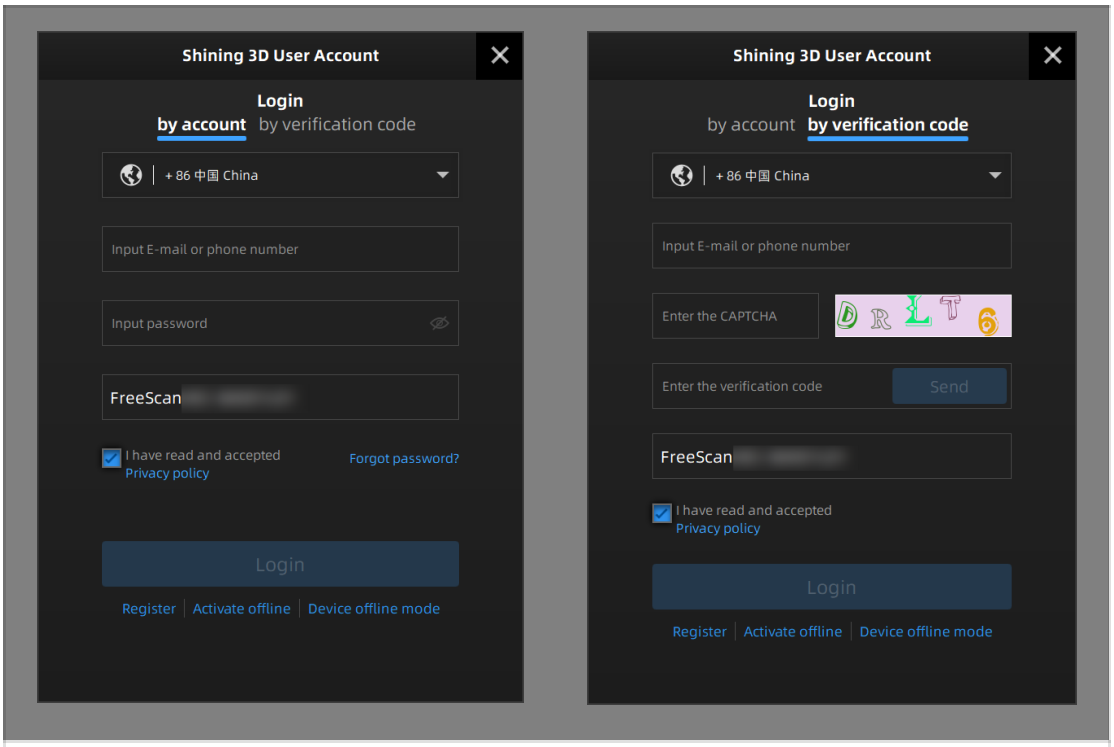


Note

- Enter valid email or phone number to get verify code for registration.
- Fill in correct user information for better service.

Login

Log in with your account or verification code.



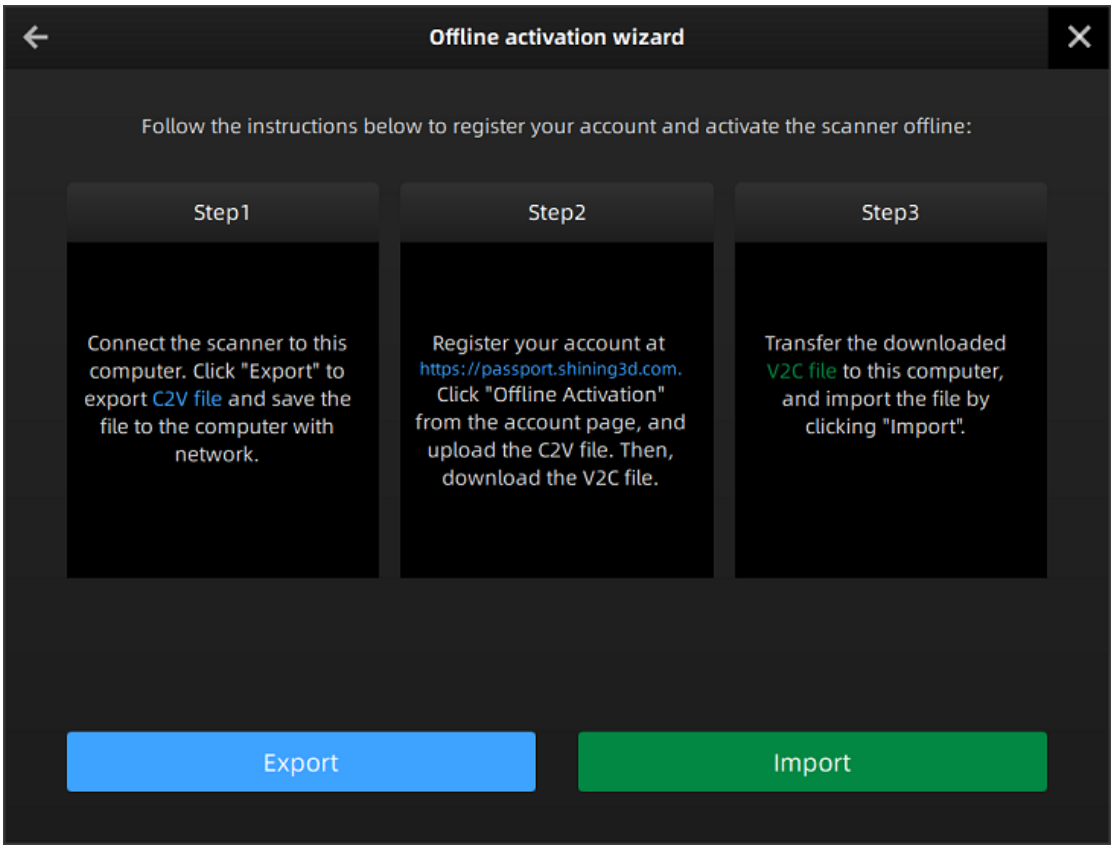
Activation

Online Activation

The activation will be completed automatically after logging in successfully on the networked computer.

Offline Activation

If the PC cannot be networked, activate the scanner offline.

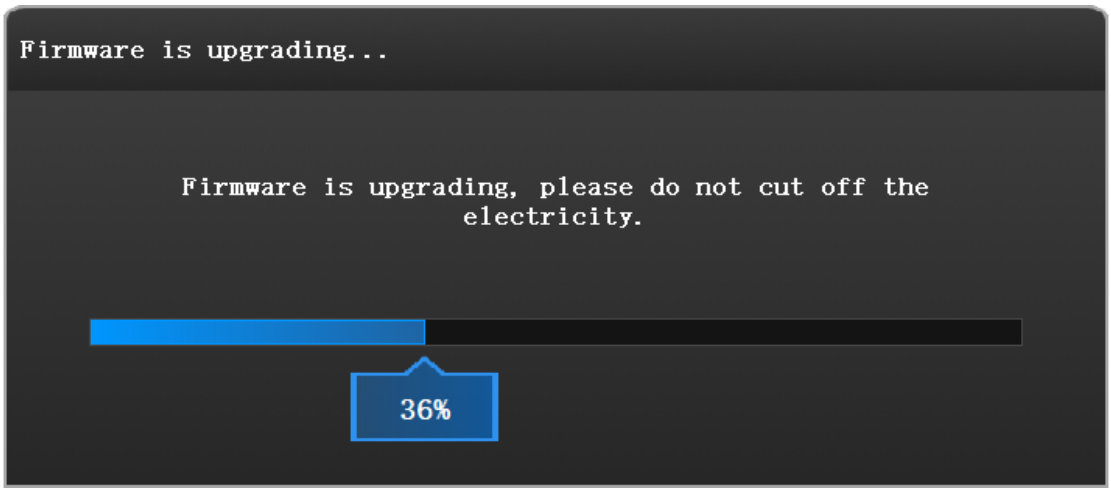


1. Export C2SN3D file.
   (1)Prepare a USB flash drive or portable hard disk.
   (2))Insert the dongle to your PC.
   (3)Enter the device serial number.
   (4)Click Export. And save the C2SN3D file to a USB flash drive.
2. Upload C2SN3D file.
   (1)Enter https://passport.shining3d.com/login on the networked computer. Then log in or register a new account.
   (2)Click OFFLINE ACTIVATION.
   (3)Upload the C2SN3D file.
3. Export the SN3D2C file corresponding to your scanner account to your USB flash drive.
4. Import the SN3D2C file to your Shining Pass (in your PC with the software). Then insert the dongle to the PC to enter the software main interface.

When a new version of the software is released or a higher firmware version is available, you will be prompted when launching the software.

Firmware Upgrade

Update the firmware for better performance, stability or bug fixing. Click **Upgrade** to start the firmware upgrade, as shown below.



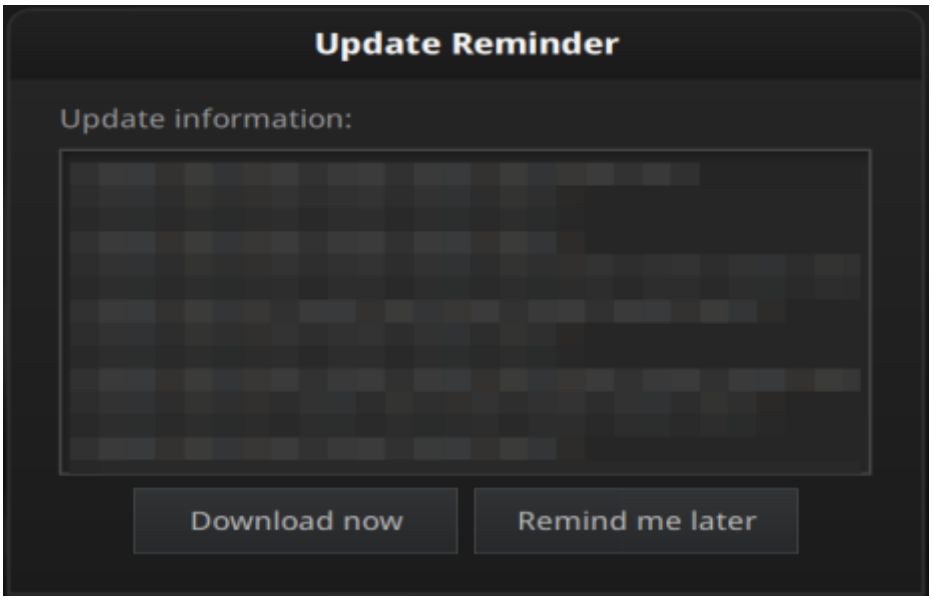
⚠ **Warning**

● Make sure that the device is powered on during the upgrade; avoid interruption of the upgrade due to power cuts.

● Do not use mismatched software, firmware and scanners, because this may affect the scanning effect. If in doubt, please contact your supplier or technical support

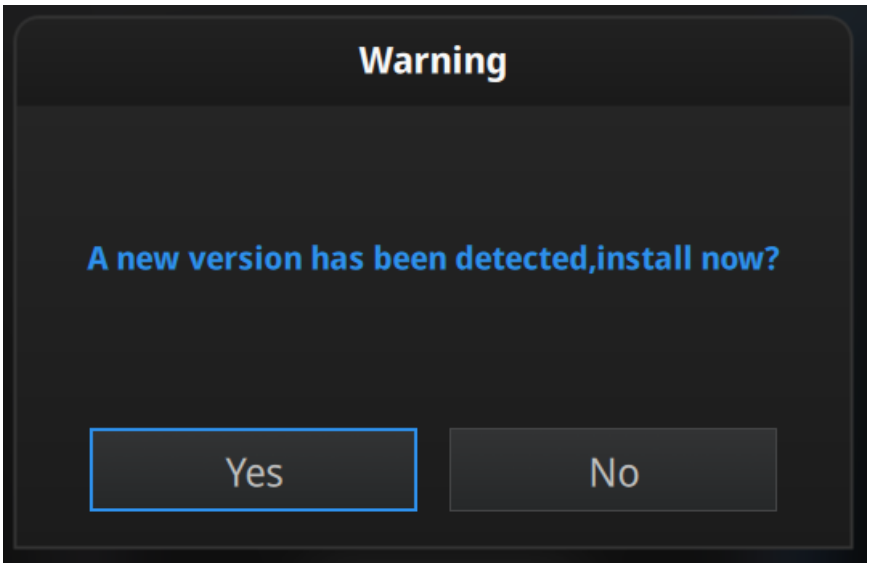
Software Upgrade

Update the software for better performance, new functions or bug fixing.
It is recommended to use the latest software. Otherwise, the following prompt box will pop up when launching the software.



Click **Download Now** will download the installation package in the background. Do not close the software during the download process. When the download is completed, a

window automatically pops up for users to decide whether the new version shall be installed immediately.

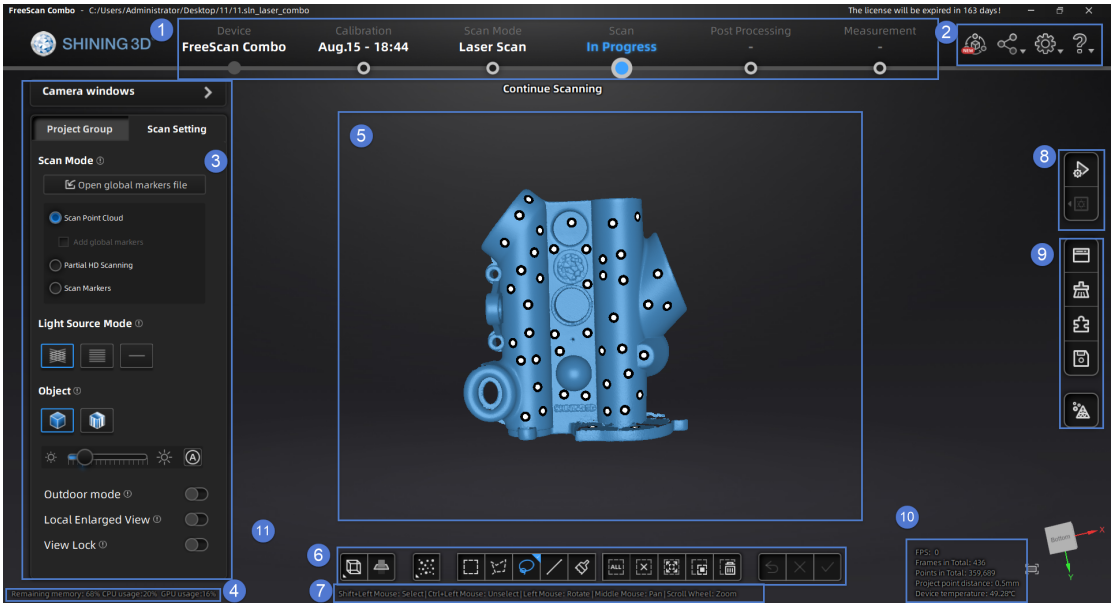


Click **Yes** to start installing.

⚠ Warning

The software will be closed during upgrading. Please save your projects properly before upgrading.

Laser Mode Interface

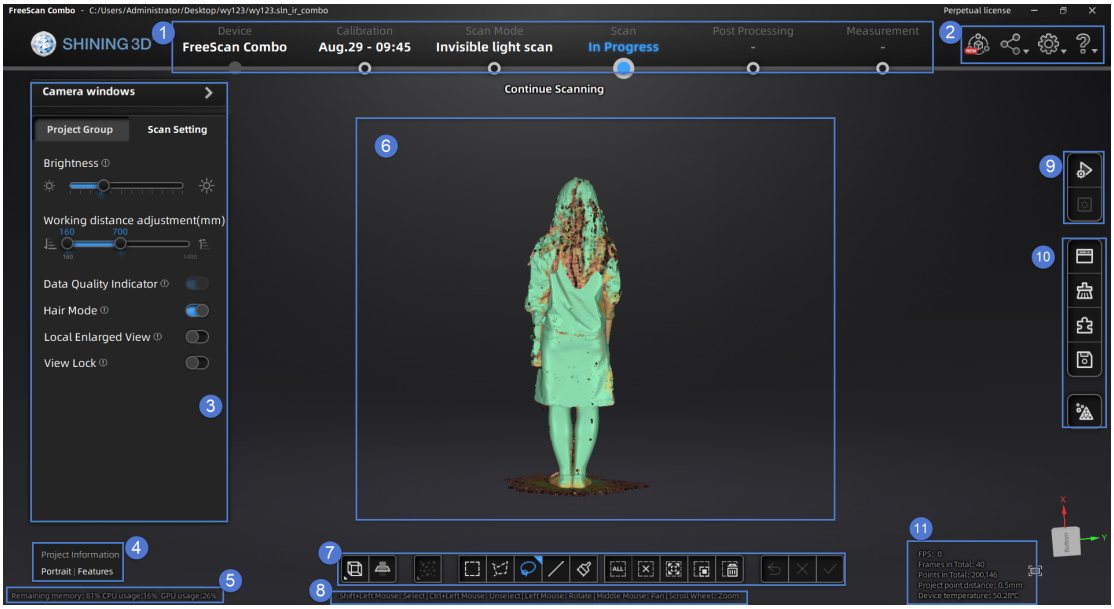


No.	Function	Description
1	Navigation Bar	●Device: Display the device status: online /

		offline. Click  to reconnect when the device is offline。 ●Calibration: Click it to calibrate. ●Scan Mode: Choose the scan mode. ●Scan: Go into scan process. ●Post Processing: Go into post processing after generate point cloud, which includes mesh and mesh editing. ●Measurement: To measure your model.
2	Settings and Feedback	●Reverse Engineering Service  ●Link  - Official Website: Open the official website of Shining 3D to learn about the company's products and information. -Facebook: Enter Shining 3D's Facebook to view product introduction and other operations. - Support Platform: Enter Shining 3D's support platform to view product introduction and other operations. ●Settings  - Advanced Mode: Check the box to select a smaller dot pitch when creating a new project[1]. - User Experience: To help us improve the user experience. We hope to be allowed to collect usage experience information and we will . - Factory Default: All settings can be restored to the initial settings, and the software will restart automatically. - Language: To set the language displayed in the software. - About: View related software release information, contact information, etc. ●Help  - User Manual: Open the user manual.

		- Teamviewer: The quick access to remote assistance. Please send the ID and password in the pop-up window to the technical supporters for remote assistance.
3	Scanning Settings	●Camera Window: To preview the actual scene during scanning. Parameters can be adjusted accurately through the camera window. ●Project Group: To manage projects and the project group. For more, see Project and Project Group. ●Scanning Parameters: To set scanning parameters. For more, see Setting.
4	Memory/CPU/GPU	●Remaining memory. ●CPU usage: If the running program occupies a large proportion, it is recommended to close other software. ●GPU usage.
5	Preview/Scanning Window	Window for viewing the preview and scanning model.
6	Edit Toolbar	For more, see Data Edit。
7	Shortcuts	Quickly move the model or adjust the angle through shortcut keys.
8	Scan & Generate Point Cloud	For more, see Scanning。
9	Side Toolbar	For more, see functions。
10	Other Information	To show information about FPS, Frames in Total, Points in Total, etc.

IR Mode Interface



No.	Function	Description
1	Navigation Bar	●Device: Display the device status: online / offline. Click to reconnect when the device is offline。 ●Calibration: Click it to calibrate. ●Scan Mode: Choose the scan mode. ●Scan: Go into scan process. ●Post Processing: Go into post processing after generate point cloud, which includes mesh and mesh editing. ●Measurement: To measure your model.
2	Settings and Feedback	●Reverse Engineering Service ●Link - Official Website: Open the official website of Shining 3D to learn about the company's products and information. -Facebook: Enter Shining 3D's Facebook to view product introduction and other operations. - Support Platform: Enter Shining 3D's support platform to view product introduction and other operations.

		●Settings  - Advanced Mode: Check the box to select a smaller dot pitch when creating a new project[1]. - User Experience: To help us improve the user experience. We hope to be allowed to collect usage experience information and we will . - Factory Default: All settings can be restored to the initial settings, and the software will restart automatically. - Language: To set the language displayed in the software. - About: View related software release information, contact information, etc. ●Help  - User Manual: Open the user manual. - Teamviewer: The quick access to remote assistance. Please send the ID and password in the pop-up window to the technical supporters for remote assistance.
3	Scanning Settings	●Camera Window: To preview the actual scene during scanning. Parameters can be adjusted accurately through the camera window. ●Project Group: To manage projects and the project group. For more, see Project and Project Group. ●Scanning Parameters: To set scanning parameters. For more, see Setting.
4	Project Information	To show the information about the object size and the alignment mode.
5	Memory/CPU/GPU	●Remaining memory. ●CPU usage: If the running program occupies a large proportion, it is recommended to close other software. ●GPU usage.
6	Preview/Scanning Window	Window for viewing the preview and scanning model.

7	Edit Toolbar	For more, see Data Edit.
8	Shortcuts	Quickly move the model or adjust the angle through shortcut keys.
9	Scan & Generate Point Cloud	For more, see scanning。
10	Side Toolbar	For more, see functions。
11	Other Information	To show information about FPS, Frames in Total, Points in Total, etc.

Quick guide

1. Create a project group and set up project settings.
2. Set scan parameters on the preview page .
3. Scan and generate the point cloud.
4. Mesh.
5. Save the scaned data.

Quick calibration

Through calibration, the device parameters are recalculated, which not only ensures the accuracy of the device, but also improve the scanning quality.

Note

Calibration is required under the following conditions:

- When the scanner is used for the first time, or when it is reused after being laid idle for a long period of time (1-2 weeks).
- The scanner was severely shaken or vibrated, such as shaken during transportation.
- Severe accuracy reduction, such as frequent errors in alignment or unrecognized markers.
- Incomplete data is acquired during the scanning or serious deterioration of the quality of scanned data.

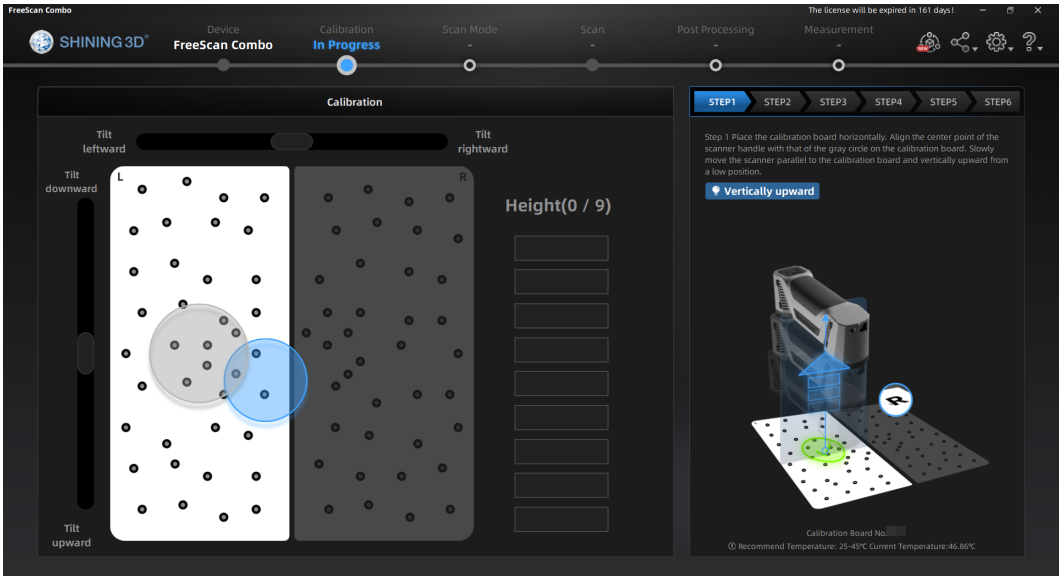
⚠ Caution

- Start to calibrate when the temperature of the device get high enough(35℃).
- The calibration board is matched to the device. Calibrating with an mismatched calibration board will lead to inaccuracy or fail to get good scanned data.
- Always make sure that both sides of the calibration board are clean and free of scratches.
- Do not place heavy objects or sundries on the calibration board.
- Keep the calibration board away from corrosives, metals and sharp objects to avoid corrosion or damage.
- It is not recommended to wipe the calibration board. If needed, gently wipe it with a piece of a clean damp cloth. Do not use a cloth with chemicals or alcohols to wipe the calibration board.
- After using the calibration board, put it in a flannel bag.

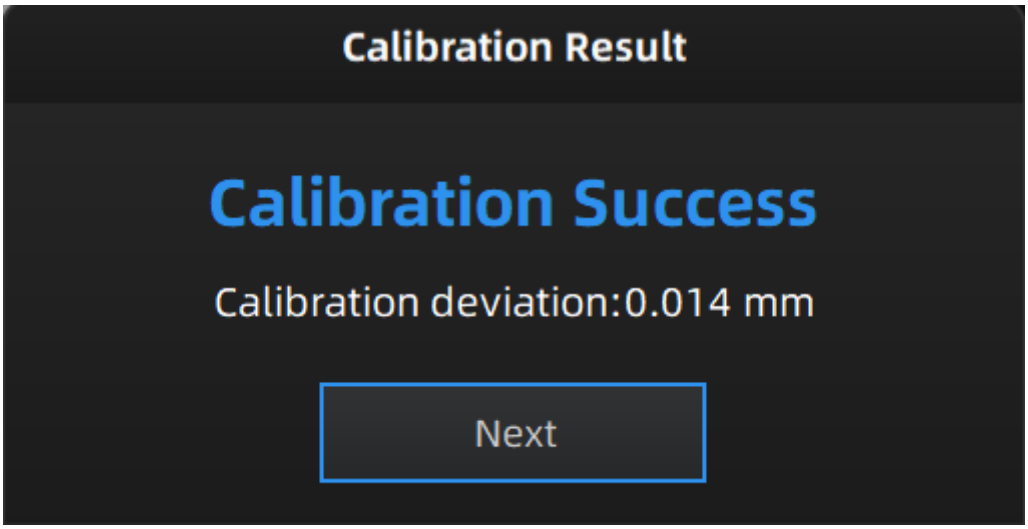
Step

Follow the steps provided by the calibration wizard on the right side of the interface.

1. Place the calibration board horizontally.
2. Place the scanner in the same direction as shown in the figure.
3. Align the center point of the Device’s handle with the center point of the gray circle on the calibration board.
4. Press the scan button on the scanner to start calibration.



5. Move the device slowly and adjust the distance between the scanner and the calibration board according to the height indicating box.
6. Keep moving until all height boxes turn green.
7. Check the calibration result.

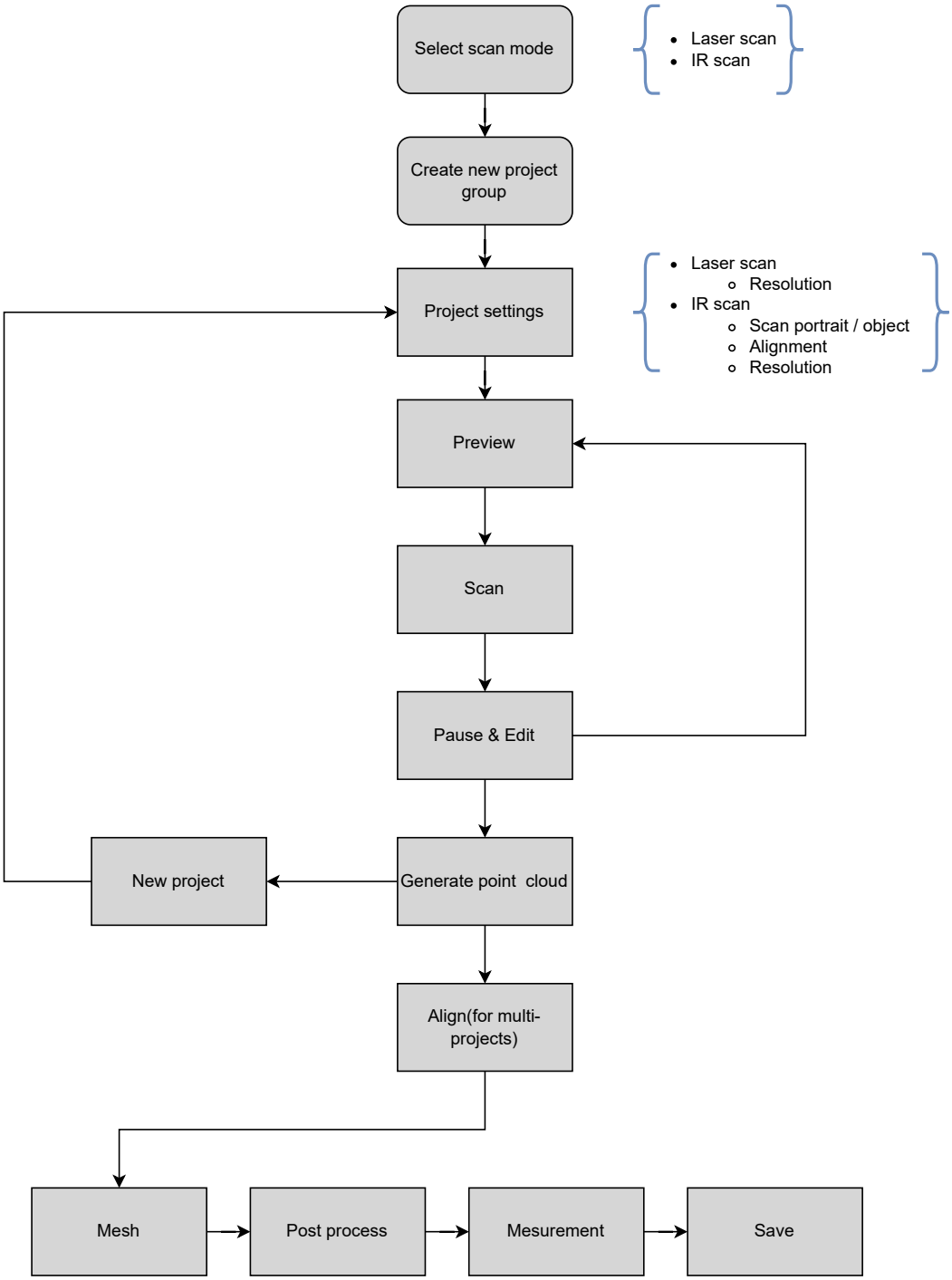


Note

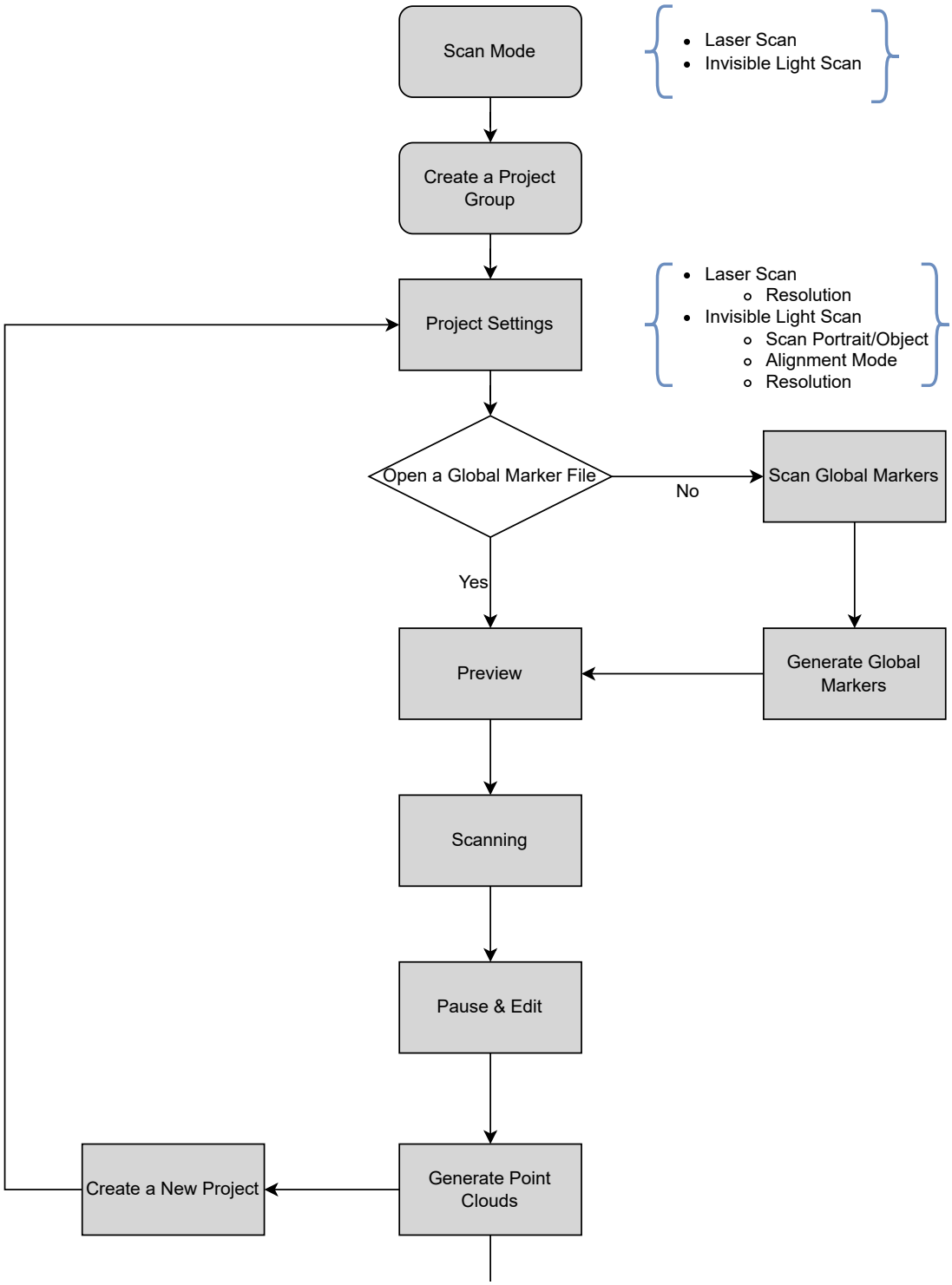
●If the calibration fails, please try it again.
●If the calibration still fails after several attempts, please contact the supplier or technical support.

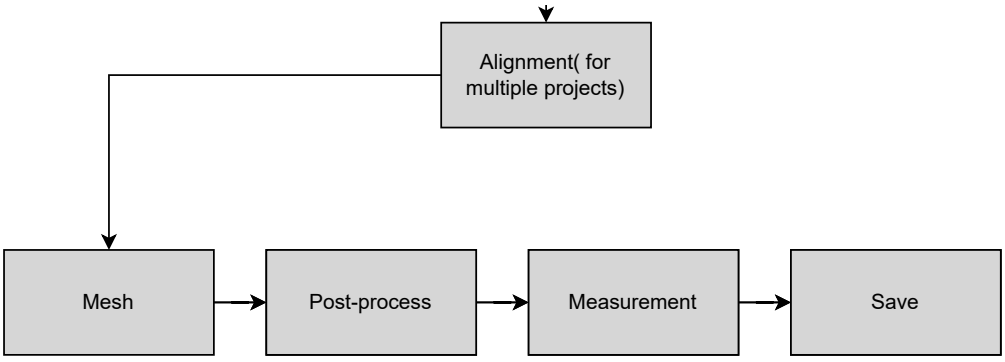
There are two different workflows: Basic workflow, Global marker workflow.
The basic scanning mode can meet most of general scanning needs, and the global markers scanning mode can be used when you need to scan for higher accuracy or scan thin-walled parts.

Basic Scanning Workflow



Global Markers Scanning Workflow





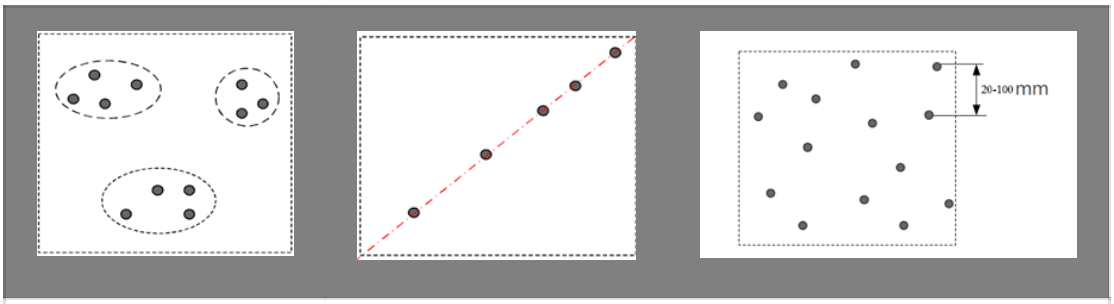
Preparation

Make some preparations when scanning different objects.

Marker

Markers shall be attached to models. If the device fails to catch markers, it will not emit laser lines in the laser scan mode.

- Attach the markers evenly and randomly.
- Four markers are required for the alignment at communal areas.
- Ensure that the device's camera can scan at least 4 markers within the normal scanning range.
- Please attach small markers[1] on the edges or at small facets of the model.
- Do not attach the markers on the surface with high curvature.
- Do not use damaged or incomplete markers.
- Do not use greasy, dusty, or dirty markers.



Error1: Artificial grouping of markers	Error2: Attach markers only on one line	Markers are attached correctly

Hair

Comb the hair before scanning in the IR mode.

Wrong	Correct

Spraying

Spray the washable or specified imaging agent on the transparent, shiny or reflective model before scanning.

Note

Objects are not recommend to scan:

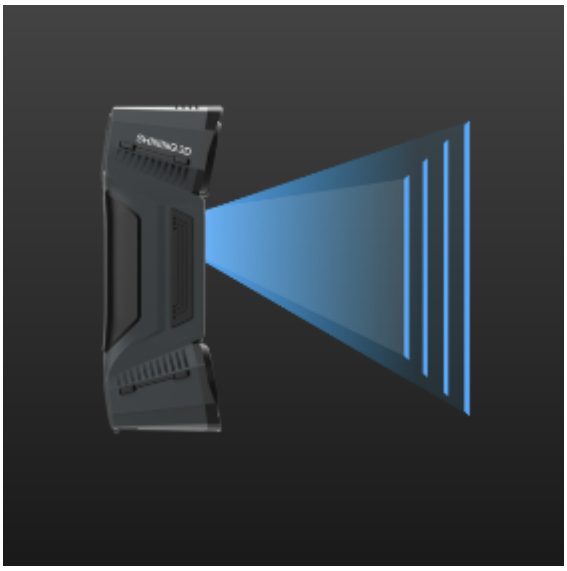
● Moving or vibrating objects. Frequent changes in the coordinates of such objects will result in poor scanning quality.

● Soft material objects.

Two scanning modes are supported: **Laser Mode** and **IR Mode**.

Laser Mode

Laser Mode is a scanning mode that scans objects using laser lines projected by a scanner, which is usually used for high-precision industrial scanning.



IR Mode

IR Mode is a scanning mode that scans with infrared light of a scanner, which is usually used to scan portraits and objects.

Project and project group

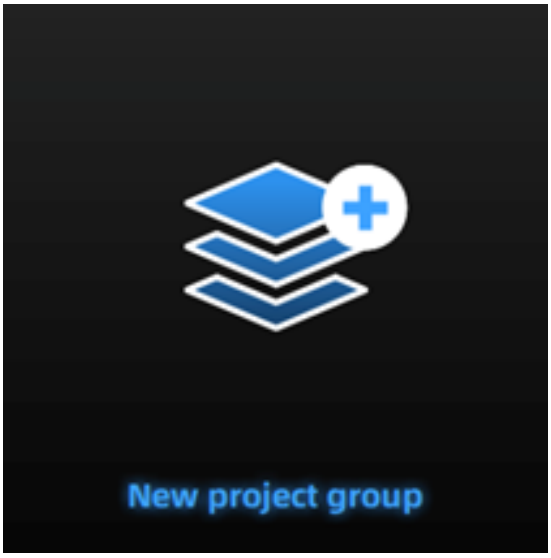
Create or open a project group before scanning.

Project group

Project group is the standard file structure of the software.It contains one project or more. Each project contains the scan data of its own. Project group is mainly used in the following scenarios:

Scenario	Project Group	Description
One object in the scene with only one alignment mode	One project in the group	One project can scan and save all data of the object.
Multiple objects in the scene with only one alignment mode	One project in the group	only need one project to finish the scan
Multiple objects in the scene need different alignment methods	One project for each object.	Objects with different alignment methods need to be separated in different projects.
A big object in the scene	One project for one part of the object.	Scan different part and align together.
One object in the scene need different alignment methods	One project for each part of the object	Scan different parts and align them by using different methods.

Create a project group



Two ways to create a project group:

Method One: Click **New project group** after selecting the scan mode.

Method Two: Click  and select **New project group** on the scanning page.

In the prompt window, select the storage path, name the project group and click **New**. All scaned data will be saved to the folder with the name you just set.

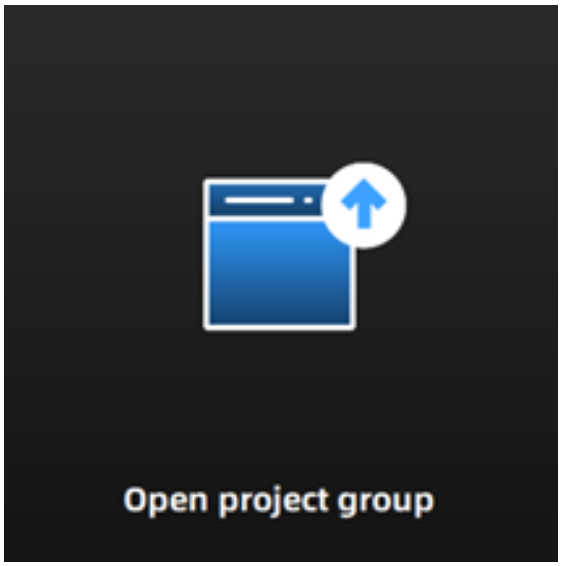
Open a project group

Two ways to open a project group:

Method One: Click **Open project group** after selecting the scan mode.

Method Two: Click  and select **Open project group** on the scanning page.

In the prompt window, select the project group file and then click **open**.



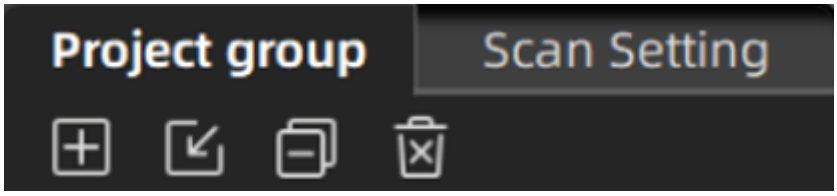
Note

● The current project group will be saved automatically when opening a project group.

● Only the project group scanned in the same scan mode can be opened.

Project

Each **project** is a part of the **project group**. All operations of **project** can be done by the following buttons.



Icon	Function	Description	Note & Warning
	New Project	Two ways to create a project: 1. A project will be created automatically after click **New project group**. 2.Click  to create a new project on the scanning interface.	**Note** ● The project only can be created when the scanner is connected. ●The last project in the project list is the current project. Only the current project can continue to scan, and you can double-click different projects to switch.
	Open Project	Two ways to open	**Note**

		the project: 1. All projects of this group will be loaded to the software after opening the project group. 2. Click  to open the project group.	Cannot open the project group with different resolution or texture setting at the same time.
	Remove Project	Click  to remove selected project from the project tree.	**Note** The project can be opened again when needed.
	Delete Project	Click  to delete the project from the project tree, and delete all the data of this project.	**Warning** The scanned data will be deleted from the computer permanently.
	Visible/Invisible	After clicking, the point cloud or markers can be displayed; click it again to hide the point cloud or markers.	/

Laser Scan

Three kinds of resolution are provided for quick selection, and you can also drag the slider to set it.

Level	Resolution
High Detail	0.2mm
Medium Detail	0.5mm
Low Detail	1.0mm

IR Mode

Two kinds of scanning models are supported in the IR mode: **Portrait** and **Object**.

Alignment

Different alignment methods and resolutions can be chosen in different scanning modes.

Scan Mode	Alignment	Resolution	Note
Portrait Scan	Feature	0.2mm~3.0mm-1.0mm by default	**Feature Alignment**: Align the data automatically during scanning by object geometric features. Rich features on the object are required for this mode.
Object Scan	●Feature ●Hybrid ●Global Markers	Normal: 0.2mm~3.0mm-0.5mm by default For small objects: 0.1mm~0.5mm-0.2mm by default	**Hybrid Alignment**: Align the data by object geometric features and markers of the file. To use this method when scanning the object of which geometric features are different from part to part. **Global Markers Alignment**: Align the data by the markers of the imported marker file or the scanned marker file. **Note** ●Import a marker file or scan makrers first in the global markers alignmrnt mode. ●**Hybrid alignment** here means feature alignment plus global markers alignment. ●Markers alignment is not supported in the small object scanning mode.

Note

●The smaller the resolution is, the more data details can be obtained, but the engineering data will be larger and the processing time will be longer.

●The new created project under the project group will automatically use the same resolution of the project group and the resolution cannot be modified.

Laser Scan

Scan Mode

Choose the proper scanning mode to scan.

Scan Mode	Description
Scan Point Cloud	Acquire the data as point cloud. It could be switched to scan point cloud mode after scanning markers. It is also feasible to import the generated global marker file and then scan the point cloud.
Partial HD Scanning	Partial HD Scanning means selecting the area to be rescanned when the requirement of resolution is high. Targeted scanning can save scanning time and make the data obtained completer.
Scan Markers	Only scan markers. Acquire marker data fast. There is no laser line in the scanning process. Markers can be scanned to supplement in the global marker file generated before. ⚠ When switching to **Scan Markers**, the current scanned data will be cleaned up and the data can not be recovered.

Light Source Mode

Select the different mode of laser lines to scan.

Light Source Mode	Description
26 Lines	26 cross laser lines to scan large objects quickly
7 Lines	7 parallel laser lines to scan fine details
1 Line	A single laser line for deep holes and pocket area scanning

Object

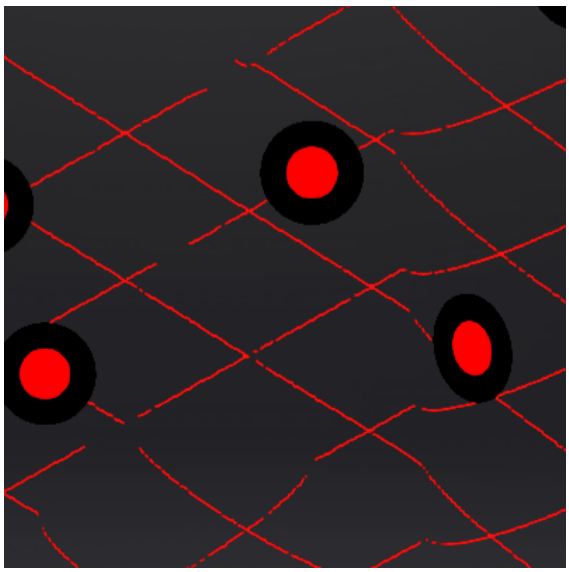
When scanning reflective objects, select **Reflective** to improve the scanning effect.

Outdoor Mode

To scan normally in the glare environment such as outdoors.

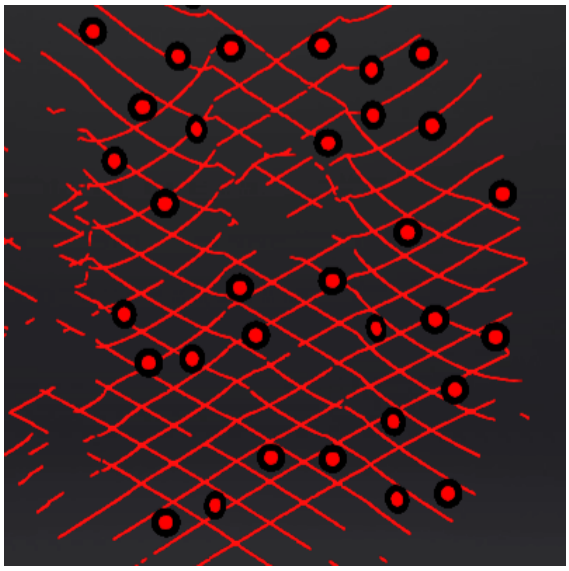
Local Enlarged View

When the function is enabled, the scanning interface only displays the local perspective of the scanned object, which can be used for supplementary scanning of small holes. It is recommended to enable under 0.2mm point distance.



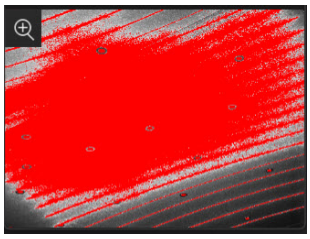
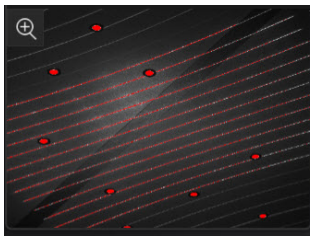
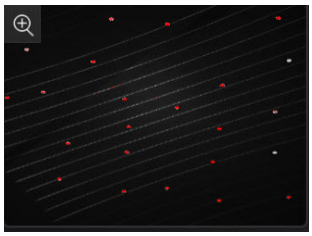
View Lock

The object view will be locked during scanning and not follow the scanning path, when the function is enabled.



Brightness

For objects of different materials and colors, adjust the brightness of the scanner to scan better.

Too Bright	Proper	Too Dark
		

IR mode

Working Distance Adjustment

The effective area of the scanned data. It can be adjusted according to the size of the object and the alignment mode. The larger the value, the easier it is to scan data with far distance, but some data details will be lost.

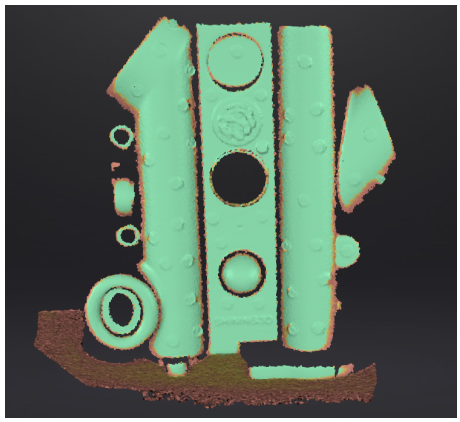
Scan Mode	Minimum Scanning Distance	Maximum Scanning Distance	Scanning Distance Range
Portrait	160mm	1400mm	>=200mm
Object	160mm	600mm 250mm(small objects)	>=200mm >=40mm(small objects)

Data Quality Indicator

To indicate the data quality of your scan.

Note

Only available before generate point cloud.

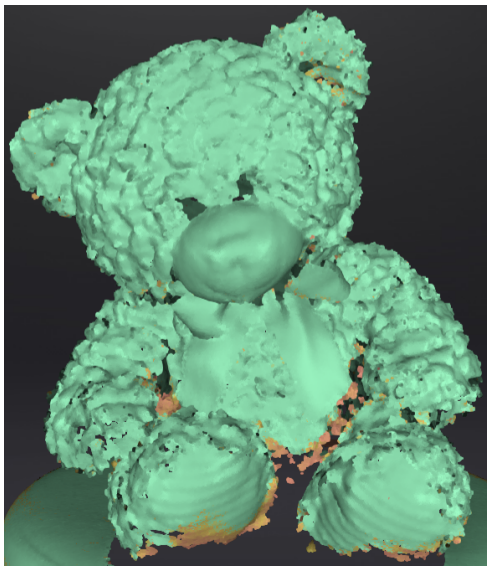
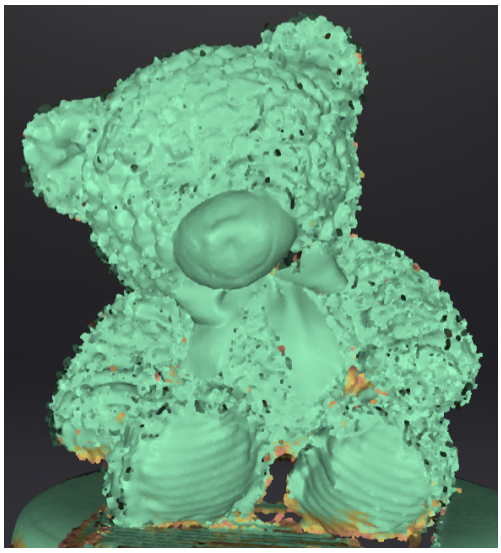


Hair Mode

When the function is enabled, it is easier to capture hair but the data noise will increase.

Note

Only available in portrait scan mode.

Turn off	Turn on
	

Local Enlarged View

When the function is enabled, the scanning interface only displays the local perspective of the scanned object, which can be used for supplementary scanning of small holes. It is recommended to enable under 0.2mm point distance.

View Lock

The object view will be locked during scanning and will not follow the scanning path, when the function is enabled.

Preview / Start Scan / Pause Scan

You can switch in these 3 status with the trigger on the scanner, or click the button in the software. The normal order is: **Preview** -- **Scan** -- **Pause**

Function	Icon	Instruction
Preview		Preview and adjust the scan parameters for better scannning effects.
Start Scan		Click  to scan. During scanning, keep the scanner perpendicular to the surface, keep a proper distance from the object, and adjust the brightness depending on the ambient light or texture of the object.
Pause Scan		edit the scan data or change the view angle after pausing.

Preview

Generate point cloud

When finishing the scan, point at  to choose **Generate Point Cloud**[1] or **Optimize and Generate Point Cloud**[2], and then to edit the data later.

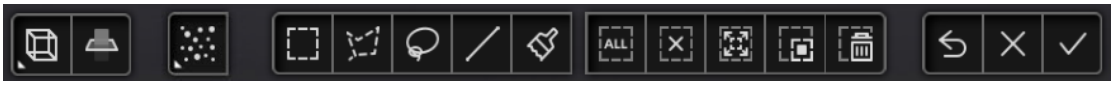
Note

The time it takes to generate point cloud depends on the data size of your project and the hardware configuration of your PC.

Data Edit

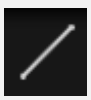
To edit the scanned data when you pause or after you generate the point cloud.

Edit scanned data



Icon	Function	Instruction
	Multi View	6 different view angles to choose.
	Cutting Plane	Create a plane to do quick cut. For more, see Scan Data Edit.

Icon	Function	Instruction
	Point Cloud Edit	Edit the selected data area in the point cloud edit mode.
	Markers Edit	Click Point cloud Edit again to switch to Markers Edit. Select the data area and the mark points in this area will be shown in red. The red mark points can be deleted at this time.

Icon	Function	Instruction
	Rectangular	Select/Deselect a rectangular area. The selected area is displayed in red.
	Polygon	Select/Deselect a polygon area.
	Lasso	Select/Deselect the area bu using the Lasso tool.
	Straight line	Hold down **Shift and left mouse button(LMB)** and move the cursor to draw a straight line to select/deselect the area.
	Brush	Hold down both **Shift and left mouse button(LMB)**

		and a red circle will appear. At this time, roll the mouse wheel will zoom in and out of the circle. Move the red circle to select/deselect the area to be edited.
	Select All	Select all of the data.
	Unselect	Cancel All Selected Areas.
	Connected Domain	Click the button after selecting a patch of data and all connected region to the selected data will be picked.
	Invert	Revert the selection.
	Delete Selected Data	Delete selected data.
	Undo	The last deletion will be undone.
	Cancel Edit	Undo all edits, and exit the edit mode.
	Apply Edit	Click the button or space bar to apply the edit, and exit the edit mode.

⚠**Caution**

Once the edit has been applied, the original state cannot be restored, only by reloading the file.

Shortcut

Shortcut	Function
Press and hold the Left mouse button and move the cursor	Rotate the data
Press and hold the middle mouse button and move the cursor	Translate the data
Hold down **Shift + Left mouse button**	Select the area of data
Hold down**Ctrl + Left mouse button**	Deselect the area of data
Scroll Wheel	Zoom in/Zoom out the data
Spacebar	Apply the edit
Delete	Delete the selected data

Cutting plane

Remove the base data from the whole scanned data by creating a cutting plane.

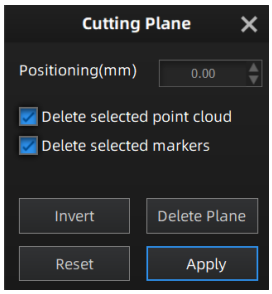
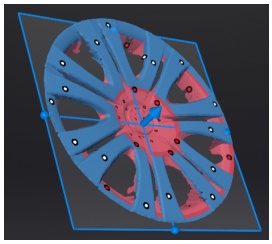
Create cutting plane

1.Click  。
2.Select the creation method and follow the interface prompts to create the cutting plane.

Method	Instruction
Fitting Point Cloud	Press Shift + LMB to select data, and then click **Generate Plane**. The direction of the plane will be calculated by the software according to the direction of point cloud.
Creating Straight Line	Press Shift + LMB to draw a line, and generate the cutting plane according to the line.
By Markers	Press Shift + LMB to select markers. **Note** 3 markers or more are required to generate the cutting plane.

3.Click **Create Plane**.

Set Cutting Plane

Illusration	Instruction
 	●Delete selected point cloud/markers：Data/Makers in the reverse direction will be shown in red afetr checking the box. The red data will be deleted after clicking **Apply**. ●Invert：Inverse the normal direction of the cutting plane. ●Delete Plane：Delete the created cutting plane. ●Reset：Reset all operations after creating the cutting plane. ●Apply：Apply all edits. ●Positioning：After generating the plane, fill in a number in the positioning box or drag the cutting plane normal arrow  to translate the cutting plane. ●Rotate the cutting plane：Cutting plane can be rotated around the axis by dragging the blue ball. 

You can use the functions of the sidebar both before and after scanning.

Icon	Function	Instruction
	Project Group	Create / Open a project group. About project group, please refer to Project Group.
	Delete Your Scan	Delete the current point cloud data to rescan.
	Align	Align the data as you need. For more, see Align.
	Save Your Scan	Save the scanned data.
	Mesh Model	Move to the **Post Processing** to mesh.

Alignment

This is how you align multiple projects in one project group.

Click  on the right side of the interface to enter the project alignment interface.

Mode	Instruction	Note
By Feature	1.Choose **By Feature**. 2.Select the project which needs alignment in the fixed window and the floated window. 3.Click **Apply** to align.	Regular shaped objects (circular objects and square objects included) or small sized objects are not suitable for this mode.
By Manual	1.Choose **By Manual**. 2.Manually choose at least 3 common points on the data in the fixed window and the floated window respectively. 3.Click **Apply** to align.	●The chosen points should not in a line. ●Manual alignment is a supplement to feature alignment, which can solve the problem of feature alignment failures such as some areas with few common areas or extremely similar areas.
By Markers	If the currently selected project is a marker project, the marker alignment can be performed. The software will automatically align according to the mark points.	The two projects have no less than 3 common markers each other.

Note

You should **generate point cloud** before **aligning**.

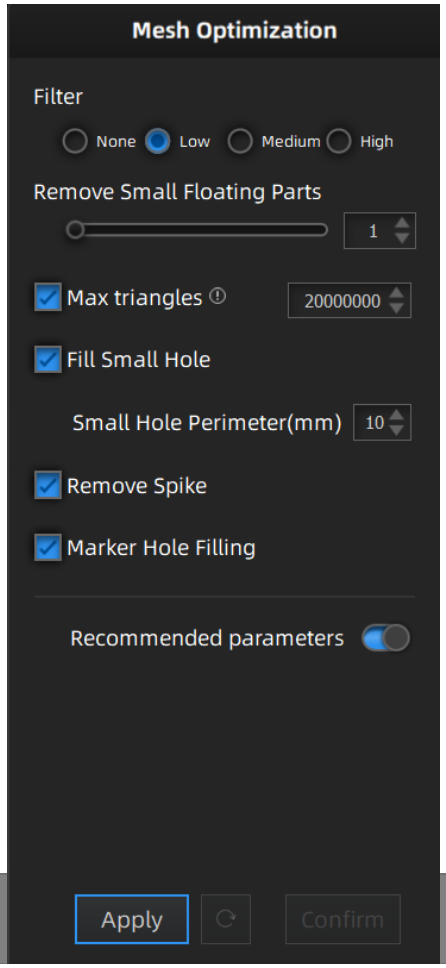
Meshing is to convert the point cloud into a triangular mesh surface. The data after mesh can be directly used for rendering, measurement or printing.

Mesh

Choose different mesh types according to the reality[1] .

Icon	Name	Description
	Unwatertight	For models with unclosed holes, use this mesh type to keep the original state with less meshing time.
	Semi-watertight Model	To fill the holes automatically.
	Watertight	To fill all holes automatically. The data can be 3D printed directly. **Note** Only watertight model can set the mesh quality.

Mesh Optimization

Illustration	Option
	●Filter：Optimize the data and improve the clarity of the data. The higher the level, the less the small details. - None: No optimization. - Low: Optimize data slightly and preserve data features. - Med: Reduce the noise on the surface of the scan data. - High: Reduce the noise on the surface of the scan data and sharpen it powerfully. ●Smooth(IR Mode)：Smooth the possible noise on the surface of the scan data. ●Remove Small Floating Parts：Remove small floating parts on the model. ●Simplifiction(IR Mode)：The polygon numbers and detail of data will be reduced universally. When the simplification degree is greater than the number of max triangles you have set, the simplification will be applied.

Option

	●Max triangles: Set max plate number to get mesh model's triangle plate number is within configured plate number. - Please enter this value reasonably to avoid over-simplification resulting in poor data quality. - Avoid entering extremely small numbers.
	●Fill Small Hole：Automatically fill the small holes with a smaller perimeter than the number input.
	●Remove Spike：Remove spike-like data on the image edge.
	●Marker Hole Filling：Fill in the holes on the surface of objects that are not scanned due to being covered by markers.
	●Recommended Parameters：When turning on, it will automatically use the recommended parameters for meshing.

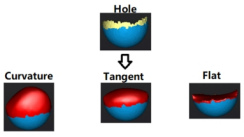
Click **Apply** to confirm the settings and start meshing.
Click **Confirm** to save it after meshing.
Click  to restore.

Mesh Editing

After the model data is meshed, the software automatically switches to the post-processing interface. Alternatively, users can directly click on the navigation bar to enter the post-processing interface and import the data.

Left Panel

Click **+** to check the function.

Function	Instruction	Note
Simplifiction	After simplification, the polygon numbers, file size and detail of data will be reduced universally. Set the ratio from 0 to 99 and the default is 0.	The result will not be added by multiple operations on **Simplification**.
Mesh Optimization	Mesh optimization can optimize the quality of the data by adding more triangles to curvature regions. Set the ratio from 0 to 100 and the default is 0.	/
Smooth	Smooth the possible noise on the surface of the scan data. Set the ratio from 0 to 100 and the default is 0.	It might remove some small details or smooth some sharp edges at the same time.
Remove Small Floating Parts	Remove small floating parts which are not connnected to the main data. The maximum value is the square of the diagonal length of the floating part/10, MAX=(L/10)². Set the ratio from 0 to 100 and the default is 0.	The result will not be added by multiple operations on **Remove Small Floating Parts**.
Auto Hole Filling	Automatically fill all holes with a smaller perimeter than the number input.	Filling type: 
Manual Hole Filling	Choose the filling tyepe and click the holes to be filled. The hole edges are shown in green and the holes get red after filling.	/
Cutting Plane Tool	Define a plane by drawing a straight line. Delete the selection and close the mesh at the intersection. Use the cutting plane to align the mesh to the CSYS.	/

Buttom Panel

Icon	Function	Description
	Select Visible	To select data on the front view only.
	Select Through	To select the front and back sides of the data.

Note

The other editing functions are the same as point cloud editing.

Right Panel

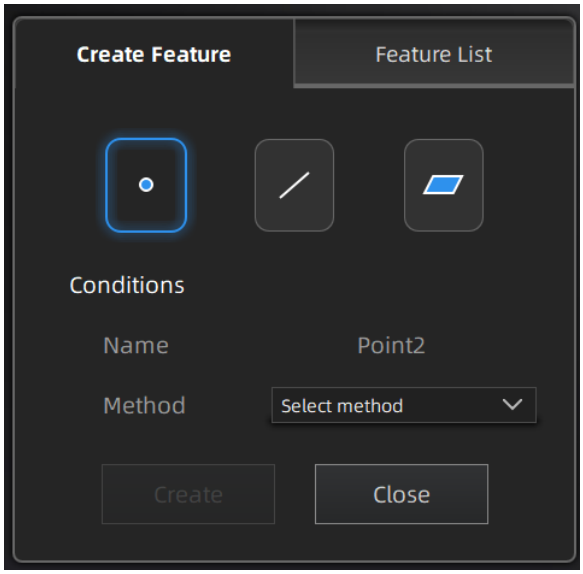
Icon	Function	Description
	Open File	Open a file (STL, OBJ, PLY) for post-processing.
	Save Your Scan	Save the scanned data in the specified format to the specified location.
	Share You Scan	Use your Sketchfab account to share the model.
	Third-party Software	Save the data and open it with third-party software.

You can measure on the model you just scanned, or you can open a model file to do the measurement.

Click to select the file to be measured; or directly drag the file (STL, OBJ, PLY) to the measurement interface.

Create Features

Click  to display the menu of creating features. To close the menu, please click the icon again, or click **Close**.



Point

Creation Method	Description	Note
Selected Points	● Click on the data to select a point. ● Click **Create** to create a point.	-
Line-Plane Intersection	● Click on the created line, or select it on the dropdown. ● Click on the created plane, or select it on the dropdown. ● The point generated is the intersection between the non-parallel line and plane.	Line and Plane should be created in advanced. The line should not be parallel to the plane.

Line

Creation Method	Description	Note
Point-Point	● Pick 2 points. ● Click on the data to select a point or click on a feature point previously created. ● In the Choice list select one of the points to	-

	redo it. ● The line generated is define as point from to point to point.	
Plane-Plane Intersection	● Click on the plane previously created, or select it on the dropdown, repeat for the second plane. ● The created line is the intersection between the 2 non-parallel planes.	2 planes should be created in advanced. The planes should not be parallel to each other.

Plane

Creation Method	Description	Note
3 Points Fit	● The plane is generated by 3 points not co-linear.	The 3 points

	● Click on the data to select one point or click on a previous created feature point. ● In the Choice list select one of the points to reselect it. **Feature creation failed! Error code 6**: the points selected are co-linear.	can't be on the same line.
Point-Line Fit	● The plane generated includes the point and the line (The line should be created in advanced). ● Click on the line previously created or select it from the drop-down. ● Click on the data to select a point or click on a feature point previously created. Feature creation failed! Error code 6: the point selected belongs to the line.	Line should be created in advanced
Best Fit	● The plane generated is the position with the smallest deviation from the selected area. **Note** ●Press **Shift+ LMB** to select an area. Press **Ctrl+ LMB** to deselect. Press **Ctrl + C** to deselect all data.	-

Movement

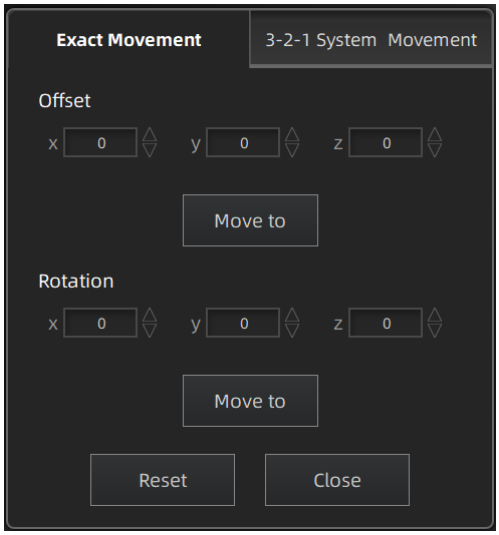
Use this mode to modify the alignment of the data to the global coordinate. This action is useful for post processing or reverse engineering.

Caution

- The shape and accuracy of the model will not be changed by the movement.
- After the movement and exiting, the changes are irreversible so you can only reset the model by reloading the original file.

Click the button to enter the movement interface. Click it again to exit.

Exact Movement



Click "Move to" to align the model center with the input coordinates, and the axis direction is adjusted to match the input rotation angle.

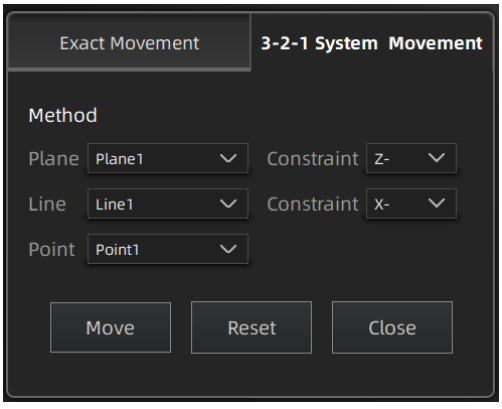
The coordinate system displayed on the interface is the global coordinate system, in which the direction of the red line is the positive direction of X-axis, green is the positive direction of Y-axis and blue is the positive direction of Z-axis.

Click **Reset** to cancel all the transformation in the exact movement interface.

Click **Close** to save the results and exit.

3-2-1 System Movement

3-2-1 system movement aligns data by selecting the point, line and plane. Before movement, create feature points, lines and planes. The feature lines created are not perpendicular to the plane.
The coordinate system on the interface represents the global coordinate system: Red=X+, Green=Y+, Blue=Z+.



- Select a feature surface in the plane drop-down menu, and select an axis in the

Select a feature surface in the plane drop-down menu, and select an axis in the corresponding constraint drop-down menu of the plane. The arrow on the plane corner indicates the positive direction of the plane, and the selected axis direction will be consistent with the plane direction.

- Select a feature line in the drop-down menu of the line, and select an axis in the drop-down menu of the line. The arrow of the line indicates the positive direction of the line, and the direction of the selected axis will be consistent with the direction of the projection of the line on the selected plane.
- Click the drop-down menu to select a point, the position of this point is the origin of the coordinates (0, 0, 0).

Click **Movement** to start the coordinates transformation. When the lines are perpendicular to the plane, the transformation fails, so the movement fails.

Click **Reset** to cancel all the transformation in the 3-2-1 system movement interface.

Click **Close** to save the results and exit.

Measurement

Click  to enter the measurement interface and the menu is displayed. Click it again to exit.

Measurement	Description	Steps
Distance	Calculate the distance between two points on the surface of the model. ● **Total** is the 3D distance. ● **X**, **Y** and **Z** are the projection of the segment to the respective planes.	Click on the surface of the model to pick two points, the calculation will be done automatically.
Surface Area	Calculate the surface area value.	● Press **Shift + left mouse button(LMB)** and move the cursor to select an area ● Press **Ctrl + left mouse button(LMB)** and move the cursor to unselect. ● **Ctrl + A** to select all. ● Press **Ctrl + C** to deselect all the date.
Volume	Calculate the volume of the **watertight data**.	It returns the volume in mm^3 and the coordinates of the bounding box. **Note:** Only available for **watertight mesh**.

Save Data

You can save the scanned data.
Click to select the save path and the file format, enter the file name as well.

Format	Data Type	Saved as	Application
ASC (whole piece)	Optimized cloud points	scan.asc	1. Check the data; 2. Quick export and no need for post-operation. 3. Use other software to post-possess the data.
STL	Mesh Data	scan.stl	1. 3D printing; 2. Reverse designing; 3. Compatible with most post-processing software.
PLY	Mesh Data	scan.ply	1. Small file; 2. Easy for texture editing.
OBJ	Mesh Data	scan.obj scan.jpg scan.mtl	1. Used for artworks 2. 3D rendering 3. Compatible with most post-processing software.
3MF	Mesh Data	scan.3mf	1. Small fire; 2. Compatible with Microsoft 3D printing software

Date Sharing

You can upload the encapsulated data to Sketchfab.

Click  to upload the encapsulated data to Sketchfab, where the title, username and password are required to be provided. You can register an account on the Sketchfab (http://sketchfab.com) to view the shared models.

Caution
The files uploaded are in stl format.

Third-party Software

You can import scanned mesh data into the third-party software with one click. These third-party software include Geomagic Control X, Verisurf, Einsense Q, Geomagic Design X,

Geomagic Essentials and Solid Edge SHINING 3D Edition.

Icon	Name	Description
	Export data to Geomagic Control X	Mainly used for 3D test. If the GeomagicControl X software has been installed, clicking this button will open the GeomagicControl X software and import the mesh data.
	Export data to Verisurf	Mainly used for 3D test. If the Design with Verisurf software has been installed, clicking this button will open the Design with Verisurf and import the encapsulated stl data into Design with Verisurf.
	Export data to Geomagic Design X	Mainly used for reverse design of mesh data. If the GeomagicDesign X has been installed, clicking this button will open the GeomagicDesign X and import the mesh data.
	Export data to Geomagic Essentials	Mainly used for reverse design of mesh data. If the GeomagicEssentials has been installed, clicking this button will open the GeomagicEssentials and import the mesh data.
	Export data to Solid Edge SHINING 3D Edition	Mainly used for reverse design of mesh data. If Solid Edge has been installed, clicking this button will open the Solid Edge and import the encapsulated stl data into Solid Edge.

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1. Only avaliable for projects in the IR mode. ↩ ↩ ↩ ↩ ↩
2. Only avaliable for projects in the IR mode. ↩