



# FreeScan Trak Pro2 V2.1.0.5

## **User Manual**

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## Overview

## Welcome

## Symbol Conventions

Symbol	Description
Ê	<b>Note</b> : This symbol is used to inform you of the additional information of the product.
	<b>Caution</b> : 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.
	<b>Warning</b> : This symbol is used to inform you of the potential risks that may result in serious personal injury and other safety incidents.

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## **Getting Started**

The following is an overview guide to the hardware and software of the device, making it easy for you to quickly locate the corresponding content.

## About Hardware

Here you can learn about the hardware-related information of the device, including device introduction, device appearance and other content.

- $\rightarrow$  Introduction to the parts
- $\rightarrow$  How to connect the device?
- $\rightarrow$  Introduction to the device appearance and indicators

#### About Software

Here you can learn about software-related information of the device, including software installation, device activation, and other content.

- $\rightarrow$  How to install software?
- $\rightarrow$  How to activate the device?
- $\rightarrow$  How to upgrade the firmware / software?
- $\rightarrow$  How to run the software and do basic settings?

After successfully installing the software and activating the device, you can follow the steps below to operate the device.



- $\rightarrow$  Introduction to the right-click menu
- $\rightarrow$  Introduction to the cutting plane tool

 $\rightarrow$  How to share data?

 $\rightarrow$  To which third-party software can I import the data?

#### **[7]** Post-processing and Measurement

You can process or measure the scanned data.

 $\rightarrow$  What operations can I perform in postprocessing?

 $\rightarrow$  How to use the FreeProbe?

 $\rightarrow$  How to create features in the measurement interface?

 $\rightarrow$  How to align scanned data in the measurement interface?

 $\rightarrow$  How to measure scanned data in the measurement interface?

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## Hardware

## Introduction

Based on the dynamic referencing technology, FreeScan Trak Pro2 is capable of capturing the spatial position of the scanner tip in real time to acquire an accurate and complete 3D data of large or middle-sized objects. The scanner does not require marker placement, thereby simplifying the procedures and reducing the influences on the scanned object to a minimum. The innovative scanning method offers a portable, efficient and reliable solution to scanning large and complex objects. It is mainly applied in aerospace or manufacturing industries, and other scenarios unsuitable for markers attachment.

For more product features and specifications, please refer to Optical 3D Measuring and Dynamic Tracking System - FreeScan Trak Pro2<sup>12</sup>.

## Appearance

This product consists of FreeScan TE25 (a laser 3D scanner), FreeTrak I - G1 (an optical tracker) and FreeProbe<sup>1</sup>.

FreeScan TE25

The scanner is easy for consumers to use and offers high scanning efficiency.

#### **Indicator Status**

The indicator turns bluish after the device is powered on and goes out when the device is on standby.

During scanning, different light colors indicate different scanning distances.

- Blue: The device is too far from the scanned object.
- Light blue: The device is far from the scanned object.
- Green: The distance between the scanner and the scanned object is proper.
- Yellow: The device is close to the scanned object.
- Red: The device is too close to the scanned object.

#### **Buttons**

- Press and hold the up button: To turn on / off the Local Enlarged View function.
- Press and hold the down button: To turn on / off the View Lock function.
- Press and hold the left button: To switch the scan mode between Scan Global Markers
   / Photogrammetry and Scan Mesh.
- Press and hold the right button: To switch the scan object between normal and reflective.



FreeTrak I - G1

With FreeTrak I - G1, you can scan large and complex objects without markers, thereby saving much time and enhancing scanning efficiency greatly.

#### **Indicator Status**

- Cyan: The device is power on.
- Red: The device is unconnected to the network.
- Blue: The device is unconnected to the software.
- Green: The device is connected to the network and the software.



FreeTrak I - G1

#### FreeProbe

This instrument can obtain the 3D coordinate of points by touching the surface of an object to achieve different detection targets.

#### **Indicator Status**

- Cyan: The device is power on.
- Blue: The device has successfully connected to the computer hotspot.
- Green (steady): The device is successfully connected to third-party software or tools.
- Green (flashing): Each successful point marking will cause the green indicator light to flash once.
- Green (flashing continuously): Low battery alert.
- Red (steady): The device has disconnected from the third-party software or tool.
- Red (flashing): Each failed point marking will cause the red indicator light to flash once.



#### Note

When the indicator light is blue and the probe is not successfully connected to the software, you can long press the right rhombic button to switch the color of the indicator light to cyan.

#### **Buttons**

- Left rhombic button: Short press for power on; press and hold for 5 seconds for power off.
- In the state of steady green indicator light:

① The left and right rhombic buttons as well as the middle and down keys on the directional pad serve as the point marking keys.

(2) The left key is used to undo a single point that has been marked.

③ The right key is used to confirm fitting.

1. An optional device. 🛏

## Connection

Please connect all parts as the following steps.

#### Introduction to the Parts



No.	Name	Description
1	Optical Tracker	To be installed on a tripod.
2	Tracker Cable	<ul><li>One end for the tracker and the other end for the hub.</li><li>At the tracker end: One port for power supply, and the other port for network connection.</li></ul>
3	Laser Scanner	1
4	Scanner Cable	<ul><li>One end for the scanner and the other end for the hub.</li><li>At the scanner end: One port for power supply, and the other port for data transmission.</li></ul>
5	Hub	To connect the tracker, the scanner and the computer.
6	Hub Power Cable	To connect the hub to the power supply.
7	Data Cable	To connect the hub with the computer.
8	Dongle	To authorize the use of the software.

## Introduction to the Hub



#### **Front Ports**



No.	Name	Description
1	USB Port	To connect the tracker, the scanner and the computer to transmit data.
2	Network Port	To connect the computer or the switch to test.
3	Auxillary Power Input	To connect the power adapter (24 V, 3.75 A). It is only available when an extended tracker is used.
4	System Power Input	To connect the power adapter (24 V, 3.75 A). It is a main power input of the system.



No.	Name	Description
1	Power Output	To power on the extended tracker.
2	Power Output	To power on the tracker.
3	Power Output	To power on the scanner.
4	Network Port	To transmit data of the extended tracker .
5	Network Port	To transmit data of the tracker.
6	USB Port	To transmit data of the scanner.

## Wired Connection

1. Install the tracker on the tripod and tighten the bolts.



2. Connect one end of the tracker cable with the tracker.



- 3. Connect the other end of the tracker cable with the hub.
- 4. Connect one end of the scanner cable with the scanner.



5. Connect the other end of the scanner cable with the hub.



- 6. Connect the hub and the power supply with the hub power cable.
- 7. Connect the hub and the computer with the data cable.



8. Power on the device.

## Software

## Installation

Please install the software before using the scanner.

#### Steps

- 1. Insert the dongle.
- 2. Copy the installation file to the PC and double-click to run it.
- 3. Install the software by following the guidance.

## **Environmental Requirements**

Recommendation	
Operating System	Windows 11 Professional 22H2 (64-bit)
Processor	13th Gen Intel® Core™ i7-13700H or above
Graphics Card	NVIDIA GeForce RTX 4060 Laptop GPU or above
VRAM	8 GB or above
RAM	64 GB or above, DDR5 dual-channel
Interface	USB 3.0

#### GPU

Please use a NVIDIA discrete graphics card for better scanning performance.

#### Use a discrete graphics card on desktop

Connect your monitor to the port of discrete graphics card on the back of your computer. OS will use the discrete graphics card automatically.

#### Use a discrete graphics card on laptop

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

#### Global Settings Program Settings

(į)

Windows OS now manages selection of the graphics processor. Open <u>Windows graphics settings</u>

#### Preferred graphics processor:

High-performance NVIDIA processor

#### Caution

- Administrator privileges are required for software installation.
- The initial installation process may take some time, please be patient.
- Do not install the software in C:\Program Files or C:\Program Files (x86) directories to prevent startup issues.
- If driver abnormalities occurs, please open Device Manager, uninstall the current driver, and reinstall it. If reinstalling the driver does not resolve the issue, please contact technical support promptly.

## Activation

If you are using the device for the first time, please start the software after installation and log in with your SHINING 3D user account to activate the device.

#### Note

- Please insert the dongle before running the software.
- Please run the software after the device indicator light is on.

## Register

For a new user, create a SHINING 3D user account first.

- Sign up via the software Click **Register** and fill in the account information in the registration pop-up.
- Sign up via the website
  Click Register a new account in our
  SHINING 3D User Account website:

passport.shining3d.com/login<sup>™</sup>

Create	an	account	
--------	----	---------	--

+86 China 中国	•
State/region do not support modification after submiss please choose cautiously	sion,
Enter phone number or email	
Click the button to start verificatio	n
Please enter the verification code Get Cod	de
Please enter your name	
Enter at least 6 characters password	
Please enter the password again	
Read and agree our <b>《Privacy policy》 《Terms of use</b>	2 »

Sign U

## Log-in

Shining 3D User Account	×
Use Password Use VerifyCode	
🚯   + 86 中国 China 🔻	
Input phone number or E-mail	
FreeScan	
FreeScan	
FreeScan	
I have read and accept Forgot password? Privacy policy	
Register   Guest Mode   Contact Us	

Log in with your account or verification code.

**Device 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.

#### Steps

1. Connect scanner to the computer with no Internet, then export C2SN3D file.

÷	Offline activation wizard	×
	IIExportActivatePlease enter the device serial number and export your activation file (C2SN3D)NOTE: The exported request file is only for this scanner.	
	FreeScan    FreeScan    FreeScan	>
	Export Request File (C2SN3D)	

2. Log in to passport.shining3d.com<sup>IZ</sup> on the computer with Internet connection, upload the C2SN3D file and fill in the relevant information on the Offline Activation page. Wait a moment to download the spawned SN3D2C file.

N.	elcome to Shining 3D Pass	port & A 🗐 🕤
An account allows you to	Offline Activation	s you are interested in.
Home	Add or drag in request file	t & Downloads
Offline Activation ①	Automatically download the activation file	shout your binding products
	Cancel Activate	

3. Copy the SN3D2C file to the computer without Internet connection, then import the file into the software for offline activation.



4. Start to use the device after the successful activation.



## Running

If you are using the device for the first time, after logging in and launching the software, it will automatically go to the calibration interface. You need to complete the calibration before using the device properly. Once the calibration is done, the next time you enter the software, it will skip this step and go to the scan mode interface. You can choose the appropriate mode for scanning based on your actual application scenario.



- If the software takes a long time to start after running, you can open Windows Security Center > App and Browser Control after closing the software, disable SmartScreen for apps and files, and then restart the software.
- Please make sure to reserve at least 15 GB of storage space on the system drive and the software installation drive before running the software.

## Interface

SHINING 3D	Device FreeScan	Calibration 01.15.24 - 19:13 🖋 O	Scan Mode In Progress	Scan -	Post-Processing - O	Measurement Tools - O	\$¢ \$, \$
							2
الأقامين المحر							

# Check the device connection status by To Connected abnormally, check the device connection and then click the device.

## ① Navigation Bar

Button	Description
Device	To display the device status: Online / Offline. Device online: To show the device name. Device offline: Click of to reconnect the device.
Calibration	Click O on the corresponding position in the navigation bar to start calibration.
Scan Mode	Click O on the corresponding position in the navigation bar to switch to the scan mode interface. There are different modes you can select.
Scan	Click O on the corresponding position in the navigation bar to start scanning.
Post Processing	Click a or after scanning, it will go into the post-process interface where you can do mesh and mesh editing. You can also click on the corresponding position in the navigation bar to switch to the post-process interface.
Measurement	Click O on the corresponding position in the navigation bar to switch to the measure interface where you can measure your model.

## ② Settings and Feedback



Reverse Engineering Service: By sending us the scanned project files and specific information, we can assist you with reverse engineering.



Option	Description
Official Website	Open the official website of SHINING 3D to learn about the company's products and information.
Fackbook	Check the Fackbook account of SHINING 3D and get latest information.



#### **General Settings**

- Preview: To preview the scanning effect before scanning when enabled.
- Global Marker Mode: You can select real-time scanning or still photography before using Trak Mode. For specific scanning operations, please refer to Scan Markers and Photogrammetry.
- Shape Detection Optimization: To improve the accuracy of sphere diameter at the cost of some details of the scanned data.
- Scanner Tone: To turn on / off the scanner's beep.

#### **Laser Scan Settings**

• Scanning Distance Indication Method: There are two methods to indicate the scanning distance. During scanning, you can adjust the scanning distance according to the color indication.

Blue: The scanning distance is too far.

Green: The scanning distance is proper.

Red: The scanning distance is too close.



Laser Line Indicator



Scanning Distance Indicator

• The Laser Line Closes Intelligently: Not to project laser lines without a recognition of data when enabled.

#### **Probe Setting**

Select or switch to a third-party software for using the probe<sup>1</sup>.

#### **Factory Default**

Click **Recover** to restore the software to its factory settings.



• About: To view related scanner information, software version, etc.

- System Diagnose: To check if the computer meets the operating conditions. If all items show  $\checkmark$ , it means that the configuration meets the operation requirements. If not, please resolve the problem according to the prompts in the interface. Click **Refresh** to diagnose the system again.
- Support: You can open the user manual, get remote assistance and check contact information of technical support here.

1. The probe is an optional accessory and needs to be purchased separately.

## Upgrade

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

#### Caution

If you need to perform the firmware / software upgrade, please ensure that all your devices are online simultaneously.

#### Firmware Upgrade

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



Windows (C:) > shining3d >	FreeTrak_TRAK >
名称	修改日期
E pijeceze	2024/3/21 11.01
耳 processManager.exe	2024/3/21 17:07
PSCP.EXE	2024/3/21 17:07
🔳 pskill.exe	2024/3/21 17:07
😔 S3D_Teamviewer.exe	2024/3/21 17:07
📧 scanhub.exe	2024/3/21 17:07
📑 ScanService.exe	2024/3/21 17:07
Shining3DUserAccount.exe	2024/3/21 17:07
sn3DCommunity.exe	2024/3/21 17:07
Sn3DProbeControllerService.exe	2024/3/21 17:07
📑 TrakFirmwareUpdate.exe	2024/3/21 17:07
🔐 uninst.exe	2024/3/22 10:37
VCppWallCreation.exe	2024/3/21 17:07

When you need to upgrade the firmware of the freeprobe, please first confirm that the probe is connected to the computer hotspot, and then start **TrakFirmwareUpdate.exe** in the software root directory.

#### Caution

- If the upgrade fails, please power off the device and reconnect it to try it again.
- Make sure that the device is powered on during the upgrade; avoid interruption of the upgrade due to power cuts.
- Do not use mismatched firmware, 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.

#### Caution

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

## Calibration

## Preparation

You can re-adjust parameters of the device through calibration, which not only ensures the accuracy of the device, but also the scanning quality.

#### Note

Calibration is required under the following conditions:

- The scanner was severely shaken or vibrated during transportation.
- The scanner is used for the first time or it is not in use for a long period of time (1-2 weeks).
- The accuracy drops during scanning, such as frequent alignment failures or the inability to recognize markers.
- Incomplete data is acquired or the quality of scanned data drops during scanning.

#### Caution

- Do not wipe the calibration board with chemical liquids.
- Do not put heavy objects or sundries on the calibration board.
- After using the calibration board, put it in the flannel bag.
- The calibration board can only be used for the calibration of the device.
- Keep the calibration board away from corrosives, metals and sharp objects to avoid corrosion or damage.
- Make sure that the markers on the calibration board aren't damaged or stained, and that the front side of the calibration board is clean and free of scratches.
- Make sure both the scanner and tracker are online before or during calibration.
- After powering on the device, please heat it to a proper temperature (about 35°C) before the calibration to ensure accuracy and precision.

## Calibration

Please follow the guidance to start the calibration.

#### 📋 Note

To enlarge the calibration interface, press F11 for the full-screen display. While in full-screen mode, press F11 or • Esc to exit the full-screen display.



- 1. Stand in the visual field of the tracker with a calibration bar.
- 2. Move the bar to a correct position and the calibration will start.
- 3. Change its direction.

#### Note

- Do not cover or damage the markers on the calibration bar.
- If the tracker fails to recognize the calibration bar, please follow the guidance and adjust the direction of the bar to make sure it is at a right position in the front view and the top view.

#### **Scanner Calibration**

Tilt leftward Tilt							ri	Tilt ghtward	Place the calibration board horizontally. Align the center point of the scanner handle with that of the gray circle on the calibration board. Slowly move the scanner parallel to the calibration board and vertically upward from a low position.
downward	•	•	•	0	•	•	к 0	Height(0 / 6)	Vertically upward
	0	0	•	•	0	•	•		
	0	•	•	0	•	•	0		Calibrate
	•	•	0	0	0	•	•		
	0	•	•	0	•	•	•		
	0	0	•	•	0	•	•		
	•	•	0	•	0	•	•		
Tilt upward									

- 1. Place the calibration board horizontally.
- 2. Adjust the distance between the scanner and the calibration board according to the height box.
- 3. Place the scanner in the same direction as shown in the figure and align the center point of the scanner handle with that of the gray circle on the calibration board.
- 4. Press the scan button on the scanner to start.
- 5. Move the device upward slowly until all height boxes turn green.

#### **System Calibration**

Press the scan button	to go to the next step	
	✓ Next	

- 1. Place the system calibrator in the visual field of the tracker, and move it to a right position in the front view and the top view.
- 2. Click **Next** to do system calibration.

3. Align the three-dimensional graphics and coordinates of the device with the diagrams on the interface one by one, and complete the calibration of all positions.



The orientation guide diagram for the current calibration position



Adjust the position of the device to align the three-dimensional graphics with the orientation guide diagram.

**Probe Calibration** 

1. Please enter the diameter of the probe. You can enter a value between 0.3 (inclusive) and 6 (inclusive), with a maximum of one decimal place (unit: mm).



2. Move the calibrator of FreeProbe into the position according to the guidance.



3. Place the tip of the probe at the specified position according to the interface diagram, and adjust the position of the probe to align with the red indicator diagram multiple times until the entire probe calibration is completed.



The navigation bar on the top of the interface will display  $\checkmark$  when the calibration is successful. If no calibration is performed for more than 7 days, <sup>(1)</sup> will appear and prompt you to calibrate the device again to ensure scanning accuracy.

#### Note

When hovering the cursor over <sup>(1)</sup>, you can see the exact time when all devices are calibrated. You may need to calibrate the device when the corresponding time is yellow, and not to do when it is green.

## Scan Mode

#### Trak Mode

This mode requires both the tracker and scanner to be online. Once selected, you can quickly obtain scanning data without placing markers on the object in **Scan Mesh**. It is suitable for medium to large-scale 3D scanning of static / dynamic scenes in manufacturing industries such as aerospace, automotive, rail transportation, energy, etc.





#### Laser Mode

This mode requires both the tracker and scanner to be online. Once selected, markers need to be placed on the object in **Scan Mesh** to obtain data.

#### **Probe Mode**

When you need to perform measurements on your scanned model by the probe, you can choose this mode. For specific connection methods and operating instructions, please refer to FreeProbe Operation.



## Scan

## **Project Settings**

After calibration, please create a project group before scanning, or you can import the existing project group file.



## Create a Project Group

To create a project group, please refer to two ways as follows:

- After selecting the scan mode, the project group interface will automatically appear. At this point, select New project group. In the file dialog that appears, enter the name and path for the project group, then click Confirm. All data related to this project group will be saved to the specified path.
- In the scan interface, click in the right sidebar. In the pop-up window, click **New project group**. The following steps are the same as mentioned above.

## Open a Project Group

To open a project group, please refer to two ways as follows:

- After selecting the scan mode, the project group interface will automatically appear. At this point, select **Open** project group. In the file dialog that appears, choose the specified project group or search for it, then click **Open**.
- In the scan interface, click in the right sidebar. In the pop-up window, click **Open project group**. The following steps are the same as mentioned above.

#### 📋 Note

- The current project group (if there is) will be saved automatically when you choose to open anther project group.
- If you need to perform additional scans on imported project, please use the same device that scanned the data of the imported project.

## **Project Management**

You can create, import, remove or delete projects in one project group.

In the scan interface, click **Project Group** in the upper left and you will see the panel.



lcon	Function	Description
	Create a new porject	Click to create a new project.
Ľ	Open a project	Click to import a project. You can right-click one in the list to rename it.
Ð	Remove a project	Click to remove the project from the list, which still exists in the folder and you can add it in the list by opening it.
Ń	Delete a project	Click to delete the project, which can not be recovered.
© Ø	Visible / Invisible	Click to show / hide the data or markers.

## Preparation

#### Caution

- Ensure the lens is free of scratches or damages.
- Ensure the device is connected and powered on.
- Ensure a secure joint of the scanner with the tripod and make them stable.
- Do not touch the lens with your fingers lest fingerprints be left to affect data acquisition.

#### Note

When scanning mesh in Trak Mode:

- No need to place markers on the objects.
- Make sure the object to be scanned is in the visual field of the tracker.
- Do not cover, touch or damage the balls on the scanner when it is working.
- Do not move the object and the tracker during scanning.
#### Note

When scanning markers in Trak Mode or Laser Mode:

- Need to place markers on the objects.
- Place the markers evenly and randomly.
- Do not use damaged or incomplete markers.
- Do not use greasy, dusty, or dirty markers.
- Do not attach the markers to a surface with high curvature.
- If the device fails to capture markers, it will not emit laser lines.
- Four markers are required for the alignment of common areas.
- Ensure that the device's camera can scan at least 3 markers within the normal scanning range.
- Please attach markers, whose diameter is smaller than 6 mm, to the edges or small areas of the model.
- Ensure that the distance between markers is about **0.5 m** when scanning markers in **Trak Scan** and the distance between markers is about **20-100 mm** when scanning in **Laser Scan**.



# Interface

**Function Preview** 



# ① Camera Window

To display the actual scanning scenarios so that the user can set scanning parameters.

## 2 Project Group and Scan Setting

To manage your project group and set scanning parameters.

## $\bigcirc$ Scan Mode

To switch among Scan Mesh, Partial HD Scanning and Scan Markers.

## ④ Parameter Settings

See more details in Parameter Settings.

## (5) Remaining Memory, CPU Usage and GPU Usage

- Remaining Memory: To display the percentage of remaining memory.
- CPU Usage: To display the CPU Usage of the computer in real time. You may need to close other unrelated software if it is too high.
- GPU Usage: To display the GPU Usage of the computer in real time.

## 6 Preview / Scanning Window

To preview the model and check the scanned model.

## ⑦ Data Editing

To edit data after scanning. See more details in Data Editing.

## **® Keyboard Shortcuts**

To change the perspectives and move the model by the composition of keys.

# 9 Buttons

Click to preview the scanning; click to start scanning; click to pause scanning.

# 1 Function

To import the project file and to align, delete and save the model data.

## (1) Model Mesh

See more details in Mesh Processing.

## 12 Others

Display FPS, frame amount, point amount of the project and other information.



Click to center the model and adjust the view size to fit the screen automatically.



View controller:

- When adjusting the model, a coordinate system reference is provided.
- You can quickly adjust the model view by clicking on different faces of the view controller.

# Settings

You can adjust scan settings during pre-scanning or scanning, including the mode, light source, object, brightness and so on, to achieve an ideal result.

Camera windows			
Project List Scan Setting			
Scan Mode			
🗹 Open global markers file			
Scan Global Markers			
Scan Mesh			
Partial HD Scanning			
High-speed mode ()			
Light Source Mode ①			
Object ①			
☆ <u> </u>			
Data Quality Indic 🖲 🛛 🌑			
Local Enlarged View 🛛 🕥			
View Lock 🗉 🕥			
Field of view <sup>①</sup>			

## Scan Mode

You can select Scan Mesh, Partial HD Scanning or Scan Markers.

### Note

When the scanner is in **Scan Mesh** and there is only one project within the project group, you can adjust the point distance in real time.

## High-Speed Mode

You can improve the scanning speed when it is enabled.

## Light Source Mode

FreeScan TE25	Description
50 Lines	50 crossed lines are ready to scan a large object.
7 Lines	7 parallel lines are ready to scan fine details.
1 Line	A single laser line is ready to scan deep holes and pocket area.

## Object

Select the mode according to the material of the object you are ready to scan.

## **Brightness**

Drag the slider and adjust the brightness until the scanned data or the markers are clearly visible and complete. Too high brightness may result in much noises in the scanned data.

## Data Quality Indicator

Quality of the scanned data can be displayed by different colors: blue represents a high quality and yellow represents an insufficient scanned data, which needs further scanning. Insufficiently scanned data may disappear or become anomalous after editing.

#### 📋 Note

This function is not available for scanning in scan markers mode.



## Local Enlarged View

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



# View Lock

The view in the scanning interface will not vary with the movement of the scanner when the function is enabled.



# Field of View

When the scanner is outside the view field of the tracker, the scanner may not be able to scan data or the quality of the scanned data may be poor. In such a situation, you can enable this function. Once enabled, the view field of the tracker will be visualized in the 3D scene, allowing you to see the relative positions of the tracker, scanner, and the object being scanned.

During scanning, you can use this function to adjust the position of the tracker to ensure that the object being scanned and the scanner are within the view field of the tracker.



#### Caution

If you move the tracker in a real-world scene, the model position of the tracker in the 3D scene will not change, but the relative position of the scanned object in the 3D scene will change in real-time.

## Intelligent Resolution

After enabling **Intelligent Resolution**, the software automatically adjusts the mesh resolution based on the curvature of the scanned object. Multiple scans are required during the scanning process to achieve high-quality data and make the features of the scanned object more clear. After selecting **High Intelligent Resolution** / **Standard Intelligent Resolution** and generating mesh, click **Apply** in the **Mesh Processing** interface to view the intelligent resolution effect: areas with high curvature will have higher data density.

#### 📋 Note

- Enabling High Intelligent Resolution requires a point distance in the project greater than 0.4 mm.
- Enabling Standard Intelligent Resolution requires a point distance in the project greater than 0.2 mm.
- Intelligent resolution is only available for Scan Mesh in the Trak Mode and the Laser Mode.
- Intelligent resolution only applies to individual project files. Different project files within a project group can have different intelligent resolutions.

# Scan Mode

# Scan

Laser scan can quickly and accurately acquire 3D data of the scanned object. Featured in contact-free measurement, high sampling rate of data, active emission of scanning light source, low requirements for use, and strong environmental adaptability, laser scan can be used in complex environments, and acquire complete 3D data of large and complex objects into the computer, thereby reconstructing the corresponding 3D model as well as various geometric data concerning the points, lines, surfaces, and solids.

## Scan Mode

Mode	Description
Scan Mesh	Directly scan to generate mesh. This mode is suitable for most scanning scenarios.  Note: When the global markers are not fully scanned, you can click Add new global markers to scan new global markers in the Scan Mesh mode.
Partial HD Scanning	<ul> <li>This mode is suitable for:</li> <li>There are missing data in a specific area after scanning an object in Scan Mesh.</li> <li>There are missing data in a specific area of the imported project, requiring you to delete the data in that area and rescan it.</li> <li>You can both save scanning time and get an ideal scanned data by this way.</li> </ul>
Photogrammetry	<ul> <li>This mode is only supported in Trak Mode.</li> <li>This mode is suitable for: <ul> <li>Need to scan large objects.</li> </ul> </li> <li>Need to move the model and scan it from different angles.</li> <li>The external environment during scanning is unstable.</li> </ul> <li>The scanner does not project laser lines during the scanning process.</li> <li>You can import the global markers file and scan for adding new global markers.</li> <li>After completing the scan, you can save the data or switch to Scan Mesh to continue scanning.</li> <li>You can place a calibration bar in the scanning scene to ensure the accuracy.</li>
Scan Global Markers	This mode is only supported in <b>Laser Mode</b> . By scanning the surface of an object with markers, you can quickly obtain the global markers data. The scanner does not project laser lines during the scanning process. You can import the global markers file and scan for adding new global markers. After completing the scan, you can save the data or switch to <b>Scan Mesh</b> to continue scanning.



# Scan Operation

Press the scan button on the scanner or click the icons in the interface to switch among **Preview**, **Scan**, and **Pause** (also in this order).

Function	lcon	Description
Preview	$\diamond$	To preview the scanned data and adjust scan parameters for better scanning effects. The scanned data won't be saved.
Scan	$\triangleright$	To start scanning. During scanning, keep the scanner right toward the object to be scanned at a proper distance according to the prompt in the interface. You can adjust the brightness of the scanner according to the brightness and color of the object during scanning. The scanned data will be saved.
Pause	00	To pause scanning. And you can edit the scanned data.

# Scan Mesh

You can directly scan the object and the software will generate mesh.



### Steps

- 1. After completing the pre-scanning, click or press the scan button on the scanner to start scanning.
- 2. Click again or press the scan button to pause scanning; click again or press the scan button again to resume scanning.



3. Click ito save the data.

## Add New Global Markers

When the markers are not fully scanned in **Scan Global Markers**, you can choose **Add New Global Markers** to scan new global markers.

#### Caution

- Preview scanning is not available when scanning new global markers.
- Add New Global Markers is only available during mesh scanning in Trak Mode (real-time scanning) and Laser Mode.
- Add New Global Markers is only available when there is global markers data for the current project within the scanning process.

#### Steps

- 1. Click Add new global markers to scan new global markers.
- 2. Click for press the scan button to pause scanning; click again or press the scan button again to resume scanning.
- 3. After scanning, click 🖾 to optimize global markers.

#### Note

After completing the scan for adding new global markers, you can either click D on the right side or press the scan button on the scanner to scan mesh.

# Partial HD Scanning

### Steps

1. Switch to Partial HD Scanning after acquiring the data in the Scan Mesh.



2. Review the scanned data to identify areas that need to be rescanned.

È Note
Click to view the data from different angles. You can also rotate it by holding down Left Button or move it by holding down Middle Button to confirm the area that needs to be scanned in detail.

3. Select the identified areas and rescan them.

(1) Select  $\square$ ,  $\bowtie$  or  $\heartsuit$  in the editing bar.

② Press and hold <u>f Shift</u> + <u>Left Button</u> and then move the cursor to select an area on the scanned object. The selected area will be displayed in red.

- 4. Set the point distance.
  - ① Drag the slider \_\_\_\_\_ or adjust the point distance by the up and down arrows



- ② Click Confirm and a second window will pop up for confirmation.
- 5. Click **Confirm** and the selected data will be deleted.
- 6. (Optional) Click or press the scan button on the scanner to preview the model and adjust scan parameters for better scanning effects.
- 7. After completing the pre-scanning, click or press the scan button on the scanner to start scanning.
- 8. After scanning, click b to save the data.

# Scan Global Markers

Scanning global markers refers to the collection the markers. By collecting such markers, the markers data of an object can be quickly obtained.

# Trak Mode

- 1. Select Trak Mode (still photography) > Scan Markers.
- 2. (Optional) Click on the right sidebar or press the scan button on the scanner to preview scanning.
- 3. Click on the right sidebar or press the scan button on the scanner to start scanning.

### 📋 Note

During the scanning process, adjust the scanning distance based on the color indications on the scanning interface border:

- Blue indicates that the scanning distance is too far.
- Yellow indicates that the scanning distance is too close.
- No color indicates that the scanning distance is suitable.
- 4. Change the scanning perspective (move the traker or the scanned object) and click to scan other markers. The software will automatically align the new markers with the former ones.
- 5. Click on the right sidebar to optimize the markers.
- 6. Click to save data, or choose Scan Mesh to continue.

## Laser Mode

- 1. Select Laser Mode > Scan Markers.
- 2. (Optional) Click on the right sidebar or press the scan button on the scanner to preview scanning.
- 3. Click  $\mathbb{D}$  on the right sidebar or press the scan button on the scanner to start scanning.
- 4. After scanning, click to stop scan.
- 5. Click on the right sidebar to optimize the markers.
- 6. Click to save data, or choose Scan Mesh to continue.

#### Note

In Laser Mode, after obtaining the global markers, you may notice additional colors outside the global markers.

- If there is an orange circle outside the markers, it indicates that the quality of the scanned markers is low.
- If there are no additional colors outside the markers, it means that the quality of the scanned markers is normal.
- Markers with an orange circle may disappear or be displayed abnormally after data processing.
- Once the markers are optimized, the color indication disappears.
- There is no color outside the newly added global markers in **Scan Mesh**.



# Photogrammetry

#### 📋 Note

In the **Trak Mode** (real-time scanning), after scanning the global markers, you may notice additional colors outside the global markers.

- If there is an orange circle outside the markers, it indicates that the quality of the scanned markers is low.
- If there is no additional color outside the markers, it means that the quality of the scanned markers is normal.
- Markers with an orange circle may disappear or be displayed abnormally after data processing.
- Once the markers are optimized, the color indication disappears.
- There is no color outside the newly added global markers in the **Scan Mesh**.



#### Steps

- 1. Place the calibration bar near the object to be scanned.
- 2. Select Trak Mode > Photogrammetry.
- 3. (Optional) Click on the right of the panel or press the scan button on the scanner to preview scanning. The user can check the scanning performance and adjust parameters.
- 4. Click on the right and the tracker starts to scan the markers. At this time, the left side of the interface will display the number of markers that can be aligned and the total number of recognized markers.

#### 📋 Note

If the calibration bar is placed, only scan the markers on one side of the bar.

5. Change the scanning perspective (move the traker or the scanned object) and click to start scanning other markers. The software will automatically align the new markers with the former ones.

### Note

During the scanning process, adjust the scanning distance based on the color indication box that appears on the scan interface:

- Blue indicates that the scanning distance is too far.
- Yellow indicates that the scanning distance is too close.
- No color indicates that the scanning distance is suitable.

## 6. Click to stop.

7. Click to optimize the markers.

### 🗎 Note

Note

After optimization, recognized markers on one side of the bar will disappear.

8. After finishing global markers scanning, click b to save data, or choose Scan Mesh to continue.

### After completing the scan, you can remove the calibration bar and then switch to Scan Mesh to continue.

#### Caution

The global markers of imported files can not be optimized by the calibration bar.

# Data Editing

A variety of tools are provided to process the 3D data. Users can use these tools to reduce image noises and obtain accurate 3D data.

## **Bottom Panel**

After pausing or completing the scanning, you can use the following tools to edit the data.



lcon	Function	Description
Ð	Multi view	To view the scanned data from 6 different angles.
	Cutting plane	To create a plane to do quick cutting. See more details in Cutting Plane.

lcon	Function	Description
	Data editing	To edit the selected data. Click it again and you can switch the mode.
	Edit markers	To edit the markers. Click it again and you can switch the mode.

lcon	Function	Description
$\otimes$	Select visible	To select the outer data.
	Select through	To select the inner and outer data.

lcon	Function	Description
	Rectangular	To select a rectangular area by holding down <u>î Shift</u> + Left Button, which will then turn red.
1	Polygon	To select a polygonal area by holding down <u><code>î Shift</code> + <u>Left Button</u>, which will then turn red.</u>
$\mathbf{Q}$	Lasso	To select an area at will by holding down <b>P</b> Shift + Left Button, which will then turn red.
/	Line	Hold down <u>f Shift</u> + <u>Left Button</u> and move the cursor to draw a straight line to select the area.
Ś	Paint brush	To brush an area with red solid circle, which will then turn red. Press <u> </u>
ALL	Select all	To select all data.
×	Unselect	To cancel all selection.
<b>B</b>	Connected domain	To select the area connected to the chosen part.
蓜	Invert	To revert the selection.
	Delete Selected Data	Click it or press Delete to delete the selected data.
5	Undo	To undo the last deletion.
2	Redo	To redo the last operation.
$\times$	Cancel edit	To cancel all edits and quit the editing mode.
$\checkmark$	Apply edit	To apply all edits and quit the editing mode.

### ▲ Caution

Once the edit are applied, the data can not be recovered only if you re-load the file.

# **Right Panel**

lcon	Function	Description
\$>,	Preview / Scan / Pause	To preview the scanned data / To start scan / To stop scan.
E	Global markers optimization	To optimize the global markers.
	Project group	To create / open a project group. About the project group, please refer to Project Settings.
金	Delete your scan	To clean the current data to redo scan.
53	Alignment	To align the data as you need, please refer to Alignment.
Do	Save your scan	To save the scanned data in the specified format locally.
Â	Mesh optimization	To do mesh optimization and mesh processing. This function is recommended if you scan the mesh without scanning global markers first. This process will improve the overall accuracy of the mesh, but may take a longer time.
*	Mesh processing	To do mesh processing. This function is recommended if you scan the mesh with scanning global markers first.

# **Keyboard Shortcuts**

Shortcut	Function
Hold down Left Button and move the cursor	To rotate the data
Hold down wheel button and move the cursor	To move the data
û Shift + Left Button	To select an area
^ Ctrl + Left Button	To cancel the selection
Middle Button	To zoom in / out the data
Space	To apply all edits
Delete	To delete the selected data

# Context Menu

Function	Description
Select all / Invert / Deselect / Delete selected data	The same as edit tools. You can use these functions by shortcuts.
Fitting view	To display the data at the center appropriately.
Connected domain / Select through / Select visible	The same as editing tools.
Switching the display type	To display the data in point, line, plane and line-plane.
Set rotate center	The rotation center can be set on the data by the left mouse button.
Reset rotate center	After reset, the center of rotation is at the data center.

# **Cutting Plane**

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

Creation



2. Select the creation method and follow the interface prompts to create a cutting plane.

Method	Instruction
Scan data fitting	The plane that the selected data are in will be the cutting plane.
Creating straight line	The plane that the straight line cuts through will be the cutting plane.
Markers	The plane that the markers (at least three) are in will be the cutting plane.

### 3. Click Create Plane.

## Setting

Illustration	Instruction
Cutting Plane     X       Positioning (mm)     0.00	• Delete selected data / markers: Check the box and the data/markers to be deleted will turn red. Click <b>Apply</b> and the data/markers will be deleted.
Delete the selected data	You can not delete all data.
Invert Delete Plane	<ul> <li>Please keep at least 3 or more markers on the front of the cutting plane.</li> </ul>
Reset Apply	Invert: To revert the selection.
	• Delete Plane: To delete the cutting plane and go back to Create cutting plane.
	• Reset: To reset all operations after creating the cutting plane.
	Apply: To apply all edits.
	<ul> <li>Positioning: After creating the plane, fill in a number in the positioning</li> </ul>
	box or drag the cutting plane normal arrow <b>to</b> to translate the cutting plane.
	• Rotate the cutting plane: Cutting plane can be rotated around an axis
	by dragging either ball

# Alignment

Through alignment, multiple scanned data are combined into a larger mesh, thereby effectively solving the problem of incomplete data collection at one time.

#### Caution

When more than two project files with scanned data are present in the project list, these projects can be aligned.

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



Mode	Description	Note
Auto Feature Alignment	<ol> <li>Choose Auto Feature Alignment.</li> <li>Select a project to be aligned in the fixed window and the floated window respectively.</li> <li>Click Apply to align them.</li> </ol>	Objects with repeated features, like a round or a ring, or with small size are not suitable for this mode.
Manual Feature Alignment	<ol> <li>Choose Manual Feature Alignment.</li> <li>Manually choose at least 3 common feature points on the data in the fixed window and the floated window respectively.</li> <li>Click Apply to align them.</li> </ol>	The chosen points should not be in a line.
By Markers	<ol> <li>Choose <b>By Markers</b>.</li> <li>Select a project to be aligned in the fixed window and the floated window respectively.</li> <li>Click <b>Apply</b> to align them.</li> </ol>	The two projects should have at least 3 markers in common.
Manual Markers Alignment	<ol> <li>Choose Manual Markers Alignment.</li> <li>Select a project to be aligned in the fixed window and the floated window respectively.</li> <li>Manually choose at least 3 common markers on the data in the fixed window and the floated window respectively.</li> <li>Click Apply to align them.</li> </ol>	The chosen markers should not be in a line.

### Note

Manual alignment serves as an alternative method of auto alignment. You can choose it when auto alignment fails.

# FreeProbe Operation

# Installation

1. Insert the battery into the slot at the bottom of the device.

2. Press the button on the left rhombic button to turn on. The indicator will turn cyan after powering on. For more button operations, please refer to FreeProbe's appearance.

## Connection

- 1. Power on the probe and wait for its indicator to become cyan.
- 2. Run the FreeScan Trak software.
- 3. Select Probe Mode to open the third-party software.



4. Connect to the probe in the third-party software and wait for the probe's indicator to become green.



How to connect the probe in Geomagic Control X



How to connect the probe in Polyworks Metrology Suite

#### 📋 Note

- If the probe cannot connect successfully, please open Network & Internet > Mobile Hotspot and set the network band to 2.4 GHz.
- If you are using a desktop computer, you can turn on the mobile hotspot by inserting a wireless network card. If the mobile hotspot cannot be turned on after inserting the wireless network card, please contact technical support.

### Calibration

When the probe has not been used for a long time or its accuracy has decreased, please perform Probe Calibration before use.

### Add Points & Measurement

#### Steps

- 1. Select Trak Mode to scan and finish mesh optimization.
- 2. Select the third-party software to be opened in Probe Setting, and the scanned model files will be automatically imported into the opened third-party software.
- 3. Now you can use the probe to add feature points and do measurement in the opened third-party software.

### 📋 Note

- Please exit the third-party software before continuing to use the FreeScan Trak software.
- You can directly input the existing model to Polyworks to add feature points and measure.
- To add feature points with the Probe, ensure its tip is within the range of the FreeTrak's camera and in the same plane as the camera. Gently poke at the object to be measured, and click the functional buttons.

## **Battery Specifications**

- · Battery type: Rechargeable lithium-ion battery
- Battery model: 14500 battery (AA size)
- Nominal voltage: 3.7 V

#### 📋 Note

The device only comes with a probe charging case. Please prepare the batteries for the probe yourself according to the specifications mentioned above.

## Cautions

Before using the battery and the probe charging case, please read the following safety precautions to prevent dangerous situations such as battery explosions.

### Caution

- Do not charge the battery for a long time.
- Do not reverse the positive (+) and negative (-) terminals.
- Do not directly solder the battery terminals.
- Do not disassemble the battery and the charging case at will.
- Do not put the battery into a fire or apply direct heat to it.
- Do not place the battery in a microwave oven or pressurized container.
- Do not use or store the battery near any source of heat such as a fire or heater.
- Do not short-circuit the battery by connecting wires or other metal objects to the positive (+) and negative (-) terminals.
- Do not connect the battery directly to wall outlets or car cigarette-lighter sockets.
- Replace the damaged battery shell to prevent leak or fire accident.
- Do not put any objects on the charging case when it's charging the battery, in order to keep good ventilation and heat dissipation.
- Do not connect the charging case with power for a long time. Cut off the power after using the charging case to avoid safety hazards.
- Store the battery and the charging case in an environment that is clean, dry, and free of inflammable materials like powder, liquid, and metal scraps.
- Do not use the battery if it gives off an odor, generates heat, becomes discolored or deformed, or appears abnormal in any way. If such batteries are in use or being recharged, remove them from the device or charger immediately and discontinue use.

# Post Processing

# Mesh Processing

After the scan is completed, click or for enter the **Post-processing** > **Mesh processing** interface where you can optimize the scanned data.

ltem	Description	Note
Optimization	To optimize the data and reduce noises. A filter with high level may cause the data to lose some details.	<ul> <li>None: No optimization.</li> <li>Standard: To optimize data slightly and preserves data characteristics.</li> <li>Med: To reduce the noise on the surface of the scanned data.</li> <li>High: To reduce the noise on the surface of the scanned data and make the data smoother.</li> </ul>
Smooth	To denoise the data and make it smooth to improve the quality.	When <b>Optimization</b> is set to <b>None</b> , this function is not available.
Remove small floating parts	To remove small floating parts unrelated to the model.	Drag the slider or click the arrows to adjust the ratio of removing small floating parts. 0 means not to remove them.
Max triangles	To set a max plate number as an upper limit to simplify the data.	Input an appropriate number.
Fill small hole	To auto fill the small hole according to its perimeter.	The default perimeter equals to or is less than 10 mm. You can adjust it according to your requirements.
Remove spike	To remove spikes and unfold the single spike in the polygonal mesh.	1
Marker hole filling	To fill in holes in the surface of the object that are covered by markers and therefore are not scanned.	1
Recommended parameters	To use recommended optimized data when enabled.	1

Button	Description	
Preview	<ul> <li>Click <b>Preview</b> to preview the effects after applying the settings.</li> <li>If adjustments are needed, click to discard the current operation and reconfigure the parameters.</li> </ul>	
Confirm	Click <b>Confirm</b> for final confirmation.	

# Mesh Optimization

After the model data is meshed, the software automatically switches to the **Post-processing** interface.

Alternatively, you can directly click the navigation bar to enter the post-processing interface. Click to select the file for post-processing; or directly drag the file in STL, OBJ, PLY format into the post-processing interface.

# Mesh Optimization

ltem	Description	Note
Simplification	To simplify the data by reducing the number of triangles. Drag the slider or click the arrows to adjust the ratio. The default is 0.	The simplification will not be iterated.
Mesh Optimization	To optimize the quality of the data. Drag the slider or click the arrows to adjust the ratio. The default is 0.	/
Smooth	To denoise the data and make it smooth to improve the quality. Drag the slider or click the arrows to adjust the ratio. The default is 0.	/
Remove Small Floating Parts	To remove small floating parts in the scanned data. Drag the slider or click the arrows to adjust the ratio. 0 means no removal.	The removal will not be iterated.
Auto Hole Filling	To auto fill holes whose perimeter is less than the input value after the selection of type.	Types:
Manual Hole Filling	To fill the hole manually by clicking the edge of the hole after the selection of type. The edge of the hole to be filled is displayed green, and that of the chosen hole is displayed red.	/
Cutting Plane Tool	To adjustment the coordinate of the data with a custom plane as the bottom.	1

### 🔨 Caution

After post-processed, the data will not be saved automatically. Please save your data in time.

### Bottom Panel



See more details in Data Editing.

## **Right Panel**

lcon	Function	Description
	Open File	To open a file (STL, OBJ, PLY format) for post-processing.
	Save Your Scan	To save the scanned data in a specified format to a specified location.
仝	Share You Scan	To share the model with your Sketchfab <sup>12</sup> account.
$\widehat{\mathbf{Y}}$	Third-party Software	To open the project with third-party software.

# Measurement

# Measurement

When you complete the mesh optimization, it will automatically enter the measurement interface, or you can directly click on the corresponding position in the navigation bar to switch to the measurement interface to import data. Then you can perform operations such as creating features, alignment, and measurements here.

### Note

- On the Measurement interface, you can use multi view.
- On the Measurement interface, you can operate by right mouse button and shortcuts.

Additionally, it also supports clicking in the right-side function bar to import models (including third-party 3D models).

#### Note

- Support opening files in the type of STL, OBJ and PLY.
- Support dragging the model file into the software interface.

# **Create Features**

Click and a **Create Feature** window will pop up on the left.





Point

Creation Method	Description	Note
Selected Points	<ol> <li>Click on the data to select a point.</li> <li>Click <b>Create</b> to create a point.</li> </ol>	1
Line-Plane Intersection	<ol> <li>Click the existing feature lines or choose lines in the drop-down list.</li> <li>Click the existing feature planes or choose planes in the drop-down list.</li> <li>Click <b>Create</b> to create a feature point which is the intersection between the non-parallel line and plane.</li> </ol>	<ul> <li>The feature line can't be in the feature plane.</li> <li>The feature line can't be parallel with the feature plane.</li> </ul>

Line

Creation Method	Description	Note
Point-Point	<ol> <li>Click the data or existing feature points to select the point.You can tick the checkbox before From or To and re-select the feature points.</li> <li>Click Create to create a line.</li> </ol>	/
Plane-Plane Intersection	<ol> <li>Click existing feature planes or choose planes in the drop-down list.</li> <li>After selecting two planes, click <b>Create</b> to create an intersection of two non-parallel planes.</li> </ol>	<ul> <li>Create two feature planes in advance.</li> <li>The feature planes can't be parallel to each other.</li> </ul>

Plane

Creation Method	Description	Note
3 Points Fit	<ul> <li>Click the data or existing feature points to select the point and click <b>Create</b> to create a plane.</li> <li>Tick the checkbox before the three points and re-select the point. Click <b>Create</b> to create a plane.</li> </ul>	The three points can't be in a line.
Point-Line Fit	<ul> <li>Click existing feature lines or choose lines in the drop-down list and click <b>Create</b> to create a plane.</li> <li>Click the data or existing feature points to select the point and click <b>Create</b> to create a plane.</li> </ul>	The point can't be in the line.
Best Fit	When there are selected data, click <b>Create</b> to create a plane that has the smallest deviation from the selected area.	1

# Align

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

Click to enter the alignment interface. Click it again to exit.

### Caution

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



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 alignment interface.

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

3-2-1 System Alignment

3-2-1 system alignment aligns data by selecting the point, line and plane. Before alignment, 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 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 **Align** to start the coordinates transformation. When the lines are perpendicular to the plane, the transformation fails, so the alignment fails.

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

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

**Quick Alignment** 

The coordinate frame is displayed on the model when the model is rotated to the expected angle.

Pre	cise Alignmei	nt 3-2-1 Sy	stem Ali	Quick Alignmen	nt
	Please adjust t click the "Align to the right)	he object to "(Z-axis is u	a suitable f p, X-axis is i	ront view and forward, Y-axis	
		al	ign		
	Move the coord the object	linate syster	n to the bot	tom center of	
				Close	

Click **Align** to move the coordinate frame to the center of the object, and the position of the coordinate frame is that the Z axis is parallel to the screen and faces upward, the X axis is perpendicular to the screen and the Y axis is parallel to the screen and faces to the right.

Click Move to move the coordinate frame to the center of the bottom of the object.

Click **Reset** to restore the coordinate frame to its original state (before opening the function).

Click Close to apply the adjusted coordinate frame and exit.

### Note

If you are not satisfied with the alignment result this time, you can re-adjust the model and perform it again.

# **Measurement Tools**

Three kind of measurements can be done in the software: Distance, Surface area and Volume.

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

Measurement	Description	Note	
Distance	<ul> <li>Calculate the straight-line distance</li> <li>between two points on the surface of the model.</li> <li>Total is the 3D distance.</li> <li>X, Y and Z are the projection of the segment to the respective planes.</li> </ul>	Click on the surface of the model to pick two points, the calculation will be done automatically.	
Surface Area	Calculate the surface area value.	You can use editing tools or shortcuts to select data.	
Volume	Calculate the volume of the <b>watertight</b> data.	It shows the volume in mm <sup>3</sup> and the coordinates of the bounding box. DNote: Only available for watertight mesh.	

# Save and Export

# Save Data

You can save the scanned data.

Click , select the save path and the file format, and enter the file name.
Format	Data Type	Saved as	Application
ASC (whole scan)	Optimized point cloud	Scan.asc	<ul> <li>Data checking</li> <li>Quick export and no need for post-operation</li> <li>Use other software to post-possess the data</li> </ul>
STL	Mesh	Scan.stl	<ul><li> 3D printing</li><li> Reverse engineering</li><li> Compatible with most post- processing software</li></ul>
PLY	Mesh	Scan.ply	<ul><li>Compact size</li><li>Easy for editing</li></ul>
OBJ	Mesh	Scan.obj Scan.jpg Scan.mtl	Compatible with most post- processing software
3MF	Mesh	Scan.3mf	<ul><li>Compact size</li><li>Compatible with Microsoft 3D printing software</li></ul>
P3	Global markers	Scan.p3	<ul><li>Reuse the markers' position</li><li>Contain the cutting plane</li></ul>
ASC (global markers)	Global markers	Scan_markers_project.asc	<ul><li>Reuse the markers' position</li><li>Contain the cutting plane</li></ul>
ТХТ	Global markers	Scan.txt	<ul><li>Reuse the markers' position</li><li>Contain the cutting plane</li></ul>

## Data Sharing

You can upload the mesh to Sketchfab.

Click 1 to upload the meshed data to Sketchfab, where the title, username and password are required to be provided. You can register an account on the Sketchfab<sup> $\square$ </sup> to view the shared models.

Note

The files uploaded are in .stl format.

## Third-party Software

You can import scanned mesh into the third-party software.

Third-party Software	Use for
Cx Geomagic Control X (2023)	Metrology
Dx Geomagic Design X	Reverse Engineering
Ge Geomagic Essentials	Mesh Editing
Polyworks Metrology Suite (2023)	Metrology

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