KSCAN series 3D scanner

User Manual



V1.2

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1 Preface

Please be sure to read this user manual carefully before use.
After reading it, please keep it in a safe place for future reference.

Basic label

This manual will use the following labels to describe different significance, so please read carefully and make sure understand all of labels.

Danger	Fail to obey the announcement will cause dangerous situation or injuries and deaths
Warning	Fail to obey the announcement may cause dangerous situation or injuries and deaths
Caution	Fail to obey the announcement may cause minor injury
Attention	Fail to obey the announcement may damage product or surrounding
Notice	During scanning process, must obey announcement and use product correctly

Please use it correctly

To avoid malfunction of the KSCAN series and to ensure proper use, please observe the following precautions.

Normal Announcement

Caution	➢ Before starting work, please confirm the function and performance of this product, and the equipment can operate normally. ➢ If the product malfunction, please turn off the power immediately for preventing other damage. ➢ Please don't change temperature suddenly during product use, otherwise condensation will cause equipment failure.
Attention	➢ For out of the working range, and modified products, the company does not guarantee its function and performance. ➢ When this product is combined with other equipment, it may not be able to satisfy the function and performance depending on the conditions of use and the environment. Therefore, please pay attention to it before use.

Operation Announcement

Warning	➢ Please choose the correct power supply voltage. Otherwise malfunction will cause failure or fire. ➢ Please do not disassemble or modify the unit. Otherwise malfunction will cause failure or fire. ➢ Before using this product, please make sure that the power socket is well grounded to prevent leakage!
Attention	➢ In order to use this product properly and safely, please try to avoid the following places, otherwise it may cause malfunction. ■ high humidity or dust; ■ Corrosive or flammable gas; ■ Splashes of water, oil, chemicals; ■ static electricity. ➢ Dirty dirt, water or oil stains may affect the use of the product and cause measurement deviations; ■ When it is attached to the surface of the product glass: please blow off the dirt with clean air or wipe off the dirt with a clean soft cloth. Alcohol and other liquids may cause irreversible damage to the paint surface of the product! ■ When it is attached to the surface of the object: please blow off the dirt with clean air or wipe off the dirt with a clean soft cloth. ➢ If the measuring object vibrates, it may cause a deviation in the measured value. ➢ After turning on the power, wait about 5-10 minutes before use. Since the circuit will not stabilize immediately after the power is turned on, the measured value may be deviated. ➢ Turn off the power immediately when the following phenomenon occurs. If you continue to use it, it may cause equipment failure. ■ Water or foreign matter inside the device; ■ The device is dropped, or the casing is damaged; ■ The device emits smoke or an unusual smell.

Storage Announcement

Attention	➢ Do not wipe the product with a damp cloth, volatile oil, thinner, etc. Otherwise, the product may be discolored or deformed. When the soil is dirty, use a cotton cloth to remove the diluted neutral detergent, wring it out, wipe it, and then wipe it off with a soft cloth. ➢ Please try to avoid the following places for storage; ■ high humidity or dust; ■ Corrosive or flammable gas.

Notes on regulations and standards

Safety precautions for laser products

The laser wavelengths of the KSCAN series are as follows:

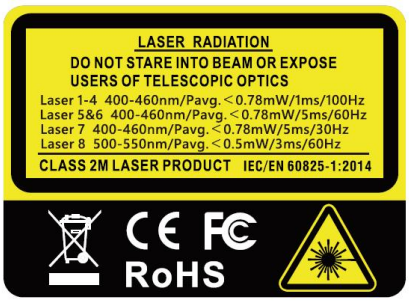
Type	KSCAN-X
Blue wavelength	450nm
Infrared wavelength	-

This product is classified as Class 2M Laser Product according to IEC 60825-1.
Complies with 21 CFR 1040.10 and 1040.11 except for conformance with IEC 60825-1 Ed. 3., as described in Laser Notice No. 56, dated May 8, 2019.
Caution: Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Warning	➢ If you do not control and adjust according to the procedures specified here, you may injure the human body (eyes, skin, etc.). Therefore, please be sure to observe the following items. ➢ About Class 2M laser products： ➢ Please don't stare at laser and specular light； ➢ Please do not intentionally point the laser towards people, especially the eyes； ➢ Please pay attention to the reflected light path of the laser. The laser will be specular and diffuse. If there is danger of being reflected by the reflected light, please cover the reflected light with a baffle； ➢ Do not use a concentrator, magnifying glass or microscope to observe the laser output within 100mm. ➢ This product does not have a mechanism to turn off the laser irradiation when disassembling. Please do not disassemble it.

Warning Label

All bottom of products come with IEC warning label like this:

KSCAN-X


CONTENTS

1 PREFACE 2
2 INTRODUCTION OF HANDHELD 3D SCANNER 7
2.1 Overview of products 7
2.2 Working Principle 7
2.3 Main Components 7
2.4 Device Connection 10
2.4.1 Wireless connection 10
2.4.2 Wired connection 11
3 SOFTWARE INSTALLATION 12
3.1 Computer configuration requirements 12
3.2 Software installation 12
3.3 Software unloading 12
3.4 Software running environment check 13
3.5 Dongle 13
3.6 SET and RGF files 13
4 SOFTWARE INTRODUCTION 14
4.1 Function menu 14
4.1.1 File 14
4.1.2 Acquisition 15
4.1.3 Optimize 17
4.1.4 Feature 17
4.1.5 Tool 18
4.1.6 Linkage 18
4.1.7 Configure 19
4.1.8 Window 19
4.1.9 Help 19
4.2 Program Setup content 20
4.3 Data manipulation 23
4.3.1 Scanning parameters 23
4.3.2 Catalog tree 25
4.4 General utility tool 26
4.4.1 Scan state 26
4.4.2 Non-scanning status 26
4.5 3D display 27

4.6 Real-time information 29
5 SCANNING PROCESS 29
5.1 Calibrate 29
5.2 Scan Markers 31
5.3 Scan Data 32
5.4 Optimize data 33
5.4.1 Disconnected Components 33
5.4.2 Connected Components 33
5.4.3 Manual selection 34
5.4.4 Isolated point 34
5.5 Wrap 34
5.6 Save data 35
5.7 Splice data 36
5.7.1 Marker Splice 36
5.7.2 Laser Point Splice 37
5.8 Scanning skills: Device key control 38
5.9 Scanning skills: Workflow 39
6 OTHER COMMONLY USED FUNCTIONS 39
6.1 Background plane 39
6.2 Multi-Resolution 41
6.3 Data Protection 42
6.4 Create Features 42

2 Introduction of handheld 3D scanner

2.1 Overview of products

Handheld 3D scanners usually include the light source (laser or white light, etc.), structured light projector, two (or more) industrial cameras, a computing unit for 3D digital image processing, and accessories such as calibration plates and marker points for calibrating the device. Industrial cameras obtain 3D data of objects based on machine vision principles, and use marker point information for automatic data stitching to achieve basic 3D scanning and measurement functions.The handheld 3D scanner is easy to carry, free to use, and has strong practicality.

The handheld 3D scanner produced by SCANTECH (HANGZHOU) CO., LTD. uses multiple line lasers to obtain the 3D point cloud data of the object surface, the operator holds the scanner and adjusts the distance and angle between the scanner and the object in real time, and it will automatically obtains the 3D surface information of the object. The scanner can be easily carried to an industrial site or production floor , according to the size and shape of the object, also with the working environment, can do the effective and accurate scanning.

2.2 Working Principle

The KSCAN scanner is an instrument that uses the binocular vision principle to obtain a spatial 3D point cloud. The working position is obtained by using the mark points to obtain the spatial position of the scanner and the measured object, and the laser light is emitted by the laser emitter to illuminate the surface of the workpiece to be scanned, and then the industrially calibrated industrial camera captures the reflected light, and is calculated. Shape data of the workpiece.

2.3 Main Components

The main components of the KSCAN series are shown in the following figure.



NO.	Component	Description	
①	Camera	High performance industrial camera, please do not touch with your hands.	
②	Indicating Laser	When scanning with an invisible light source, the laser will project a green box to indicate the field of view.	
③	Scanning Laser	High precision laser emitter, do not touch with your hands.	
④	1/4 Threaded Hole	Used for connecting accessories such as tripods.	
⑤	Switch and LED	When the battery is powered on, long press this button to turn on/off, and the indicator light will turn green when the device is powered on.	
⑥	Phone Holder	Can be transferred to the standard phone clip.	
⑦	Display	Display basic device information and scanning status information.	
⑧	Button	▷II	①Press: Turn on/off scanning. ②Double-click: Switch the laser line.
		M	①Press: Switch the+/- key function (before starting scanning: Adjust Exposure/Adjust Resolution; scanning: View Scaling/Adjust Exposure). ②Long press: Can be defined in the program settings - Button Function.
		-	①View Scaling: Zoom Out ②Adjust Exposure: Reduce exposure by 0.5ms per press ③Adjust Resolution: Reduce resolution by 0.1mm per press
		+	①View Scaling: Zoom In ②Adjust Exposure: Reduce increases by 0.5ms per press ③Adjust Resolution: Reduce increases by 0.1mm per press
		C1	Can be defined in the program settings - Button Function.
⑨	LED	Connection status: Blue breathing - device starting, Green flash - detected network card but not yet connected to router, Green Breath - Connected to the router but not yet connected to the software, Green constantly on - Connected to software. Scanning status: Green - normal distance, Red - too close distance, Blue - Distance too far away. Low power status: Red flashing and buzzer sounding.	

⑩	Cable Interface	Power interface and Type B interface for connecting USB cables
⑪	USB Interface	Used for accessing wireless networks, each interface can be operated independently or both can be utilized simultaneously for optimal connectivity.
⑫	Battery Compartment	Push open the battery compartment cover to load the battery and support uninterrupted battery swapping

Notice	The function of all keys in the scanner only works under the condition that the scanning software is running.

2.4 Device Connection

2.4.1 Wireless connection

KSCAN supports a fully wireless connection method for wireless power supply and wireless data transmission.

The scanner has been pre-configured with the following SSID and password when shipped from the factory:

- Default SSID: KSCAN_xxxx (xxxx is the last four digits of the device serial number)
- Default password: sk123456

You need to set the same SSID and password for the router, and then follow the steps below:

1. Turn on the router
2. Connect the computer with scanning software to the router and launch the software
3. Properly insert the wireless network card into the scanner and place the battery in the battery compartment of the scanner, then press and hold the power button to start the device.
4. Waiting for the tracker and scanner to come online

Danger	➢ Please use only the manufacturer-approved batteries. Do not use any other batteries without proper verification. ➢ Battery Safety Warning: Please use and store batteries properly. Never short-circuit, crush, or drop batteries as this may cause damage or safety hazards. While manufacturer-approved batteries include short-circuit protection mechanisms, these should never be deliberately triggered or relied upon for regular operation. ➢ Battery Polarity Warning: Always observe correct battery polarity when installing batteries. While the device includes reverse polarity protection, improper installation may still damage the device or reduce battery life. ➢ Please use the battery within the specified operating temperature and battery temperature range. While the device includes temperature protection, avoid activating this mechanism.
Attention	➢ Please use the wireless network card recommended by us. Non-recommended network cards may experience connection issues due to driver compatibility, and transmission speed may be limited due to bandwidth constraints. ➢ Please use the router model recommended by us. Non-recommended routers may have limited transmission speed due to bandwidth issues.

Wireless Connection Management:

To modify the SSID and password in the software for devices already connected (whether via wired or wireless connection), click the "Wireless Connection" icon, enter the window and edit.

WiFi Reset:

If the system cannot connect, or when the manually modified built-in SSID and password have been forgotten, press and hold both the "-" and "+" buttons on the scanner until the buzzer sounds a long beep to restore the factory default SSID and password.

2.4.2 Wired connection

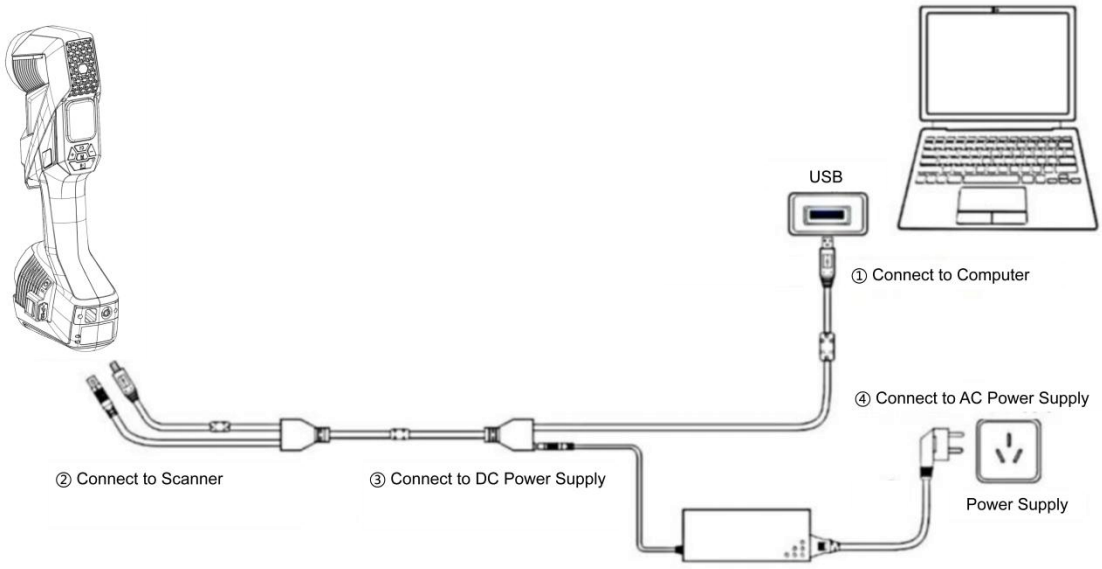
The connection of the device includes two-step operations such as connecting the power supply to the scanner and connecting the scanner to the computer. The connection cable includes the power adapter cable and the USB cable. The power adapter provides power to the scanner, and the USB cable has four ports, which are connected to the computer, power adapter and scanner.

First step: Connect the USB cable Type A port to the USB 3.0 port on the computer side;

Second step: The USB cable power port and Type B port are connected to the corresponding interface of the device (when connected, attention should be paid to the direction of the arrow at the cable interface to maintain the same, otherwise the interface may be damaged);

Third step: Plug the power adapter port into the DC port of the USB cable;

Forth step: After checking that the above steps are correctly accessed, finally connect the power adapter plug to the power socket.



3 Software installation

This product requires the scanning software DefinSight. This chapter mainly describes the operating environment and installation steps required for the software.

3.1 Computer configuration requirements

Scanning software for real-time processing of scanning data transmitted in real time during the scanning process, the selection of the appropriate hardware configuration can effectively improve the efficiency of the entire scanning system. The computer parameter configuration requirements for installing scanning software are detailed in the table below.

Item	Recommended Configuration	Minimum configuration
CPU	i9, 16 cores and 24 threads	12th i7 with 8 cores and 16 threads
Memory	64G	32G
Graphic Card	NVIDIA 12G graphic	NVIDIA 4G graphic
Interface	USB3.0	
System	Win10/Win11，Win7 supports but not recommended	

Attention	➢ The computer memory is related to the maximum amount of scanned data. If you need to scan projects with large amounts of data, please enable virtual memory in advance ➢ In Real-time Mesh scanning mode, the upper limit of scanned data is also related to video memory

3.2 Software installation

1. Copy the installation software from the USB disk of the device
2. Right-key DefinSight vx.xx .exe . Install the package, to run in administrator mode
3. Follow the installation program to guide, and complete the software installation

Attention	➢ Protective software may have an impact on software installation and use ➢ Software installation requires administrator privileges

3.3 Software unloading

1. Go to the control panel and select the programs and features
2. Select the software in the list, and then click uninstall
3. Follow the uninstall program guide to complete the software uninstall

3.4 Software running environment check

1. Check whether the computer power supply is Set to high performance status: Right-click the battery icon of the computer to ensure that you have switched to the high performance power plan
2. Check if the graphics card driver is the latest version
3. Check if the graphics card is Set to high performance: Right-click the desktop blank area to enter the NVIDIA control panel and make sure that the preferred graphics processor is high performance NVIDIA processor

3.5 Dongle

To enter the scanning software normally, you need to plug in a physical dongle. Dongle can be found in the iron box in the equipment safety box.



3.6 SET and RGF files

For the normal use of the equipment, it is necessary to select valid and supporting profiles and authorization documents. The configuration file (SET) records the calibration parameters of the scanner, and the authorization document (RGF) controls the duration of the scanner.

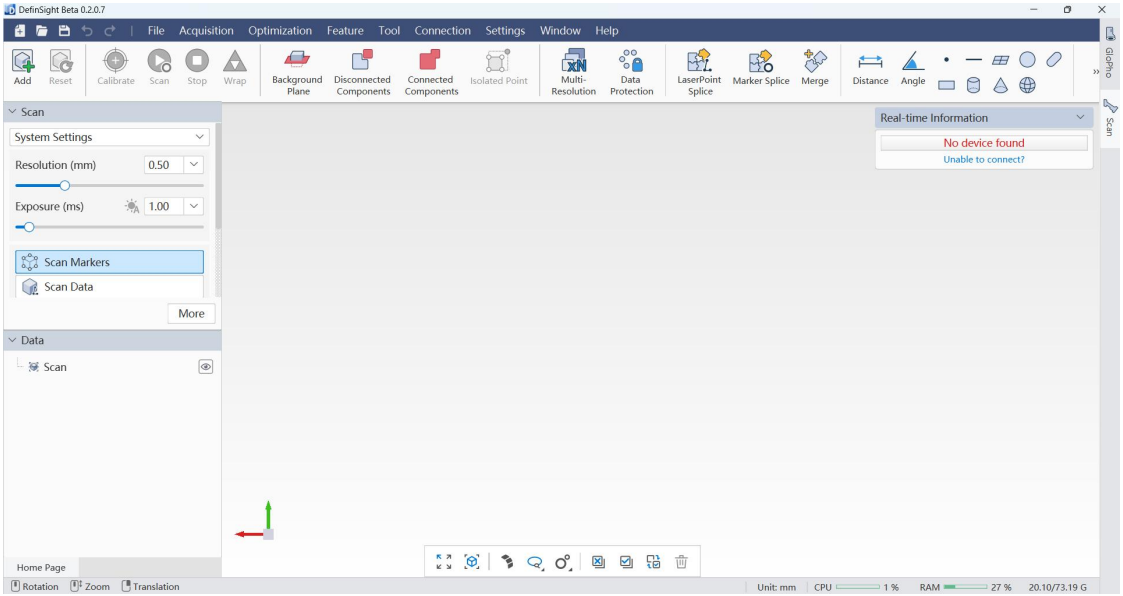
In general, after the device is connected to the computer, it will automatically download the built-in configuration files and license files of the device, and can be connected without manual operation.

When the device is temporarily authorized, the following prompt will appear on the interface after the authorization time expires. At this time, click "License Expiration" and select a new LIC file (named *. LIC) in the pop-up resource manager. Please contact the manufacturer for the new LIC file.



4 Software introduction

This chapter mainly introduces the scanning software interface and its icons. The interface mainly consists of five parts: Menu option bar, operation toolbar, directory tree, 3D display area and real-time status of the device. As shown in the figure below.



4.1 Function menu

The function menu mainly includes 5 file functions, such as New, Open, Save, Cancel and Advance, as well as 9 application functions, such as File, Acquisition, Optimization, Feature, Tool, Connection, Settings, Window, and Help.

4.1.1 File

Name	Icon	Function Description
New		“New” function will clear all data in screen area.
Open		Item file: . pj 5; Projrct file: . pj 3; Maker file: .mk2, .umk, .asc, .igs, .txt; Laser point file: .asc, .igs, .txt; Mesh file: .stl , .ply , .obj; Model file: .stp, .step.
Open recent projects		Item file: . pj 5; Projrct file: . pj 3; Maker file: .mk2, .asc, .igs, .txt; Laser point file: .asc, .igs, .txt; Mesh file: .stl , .ply , .obj; Model file: .stp, .step.

Save		Save the corresponding file with the same file format as above. Also, you can save the mesh file as.ply, .obj.
Save as copy		Save a copy of the corresponding file in the same format as above. Also, you can save the mesh file as .ply, .obj.
Import		Projrct file: . pj 3; Maker file: .mk2, .asc, .igs, .txt; Laser point file: .asc, .igs, .txt; Mesh file: .stl , .ply , .obj; Model file: .stp, .step.
Export		Projrct file: . pj 3; Maker file: .mk2, .asc, .igs, .txt; Laser point file: .asc, .igs, .txt; Mesh file: .stl , .ply , .obj; Model file: .stp, .step.
Add		Add a scan object
Reset		Empty the current scan data and Reset the initial state

4.1.2 Acquisition

Level 1 function name	Secondary function name	Icon	Function Description
Scan	Calibrate		Use the alignment board for quick calibration equipment
	Scan		In this state, click the start button on the device or click the icon to enter the scan state (the icon appears as pause)
	Stop		Click this button to end a certain scan
	Wrap		Point cloud encapsulation
Data Deletion	Background Plane		Filter the data below the background plane, and focus on scanning the artifact ontology

	Connected Components		Automatically select the data that is not connected to the main body
	Disconnected Components		Click manually to select the desired section
	Isolated Point		Automatically select the isolated chores
Partial Processing	Multi-Resolution		Select zoom in or out and click the icon, select the multi-resolution area, and start the scanning
	Data Protection		Click the icon to protect the selected area
Splicing	Marker Splice		Common marker points were selected to splice multiple copies of the data
	Laser Point Splice		Multiple data were stitched together according to the characteristics of the laser point cloud
	Merge		Consolidation of multiple data
Intelligent Guidance			Be able to customize the workflow after guiding operations according to the Set workflow
Probe	Manage Probe		Manage the Probe
	Calibrate Probe		Calibration Probe
	Detect		Start the detection

4.1.3 Optimize

Function name	Icon	Function Description
Temperature Compensation		The data were corrected for the temperature and the thermal expansion coefficient
Refine		Refine mesh features
Simplify		Simplify mesh features
Sharpen		Sharp mesh features
Manifold		Automatically selects data that are not connected to the mesh body
Quick Select		Select the mesh data within the angle
Fill Hole		Fill in the holes in the mesh
Feature Correction		The mesh data were corrected for the hole-position detection results
Remove Features		Remove the selected mesh area and smooth the fill
Remove Spikes		Automatically smooth the single-point tip on the mesh
Polish		Hold down the left button to smooth the mesh area

4.1.4 Feature

Function name	Icon	Function Description
Distance		Measure the distance between the two features
Angle		Measure the angle between the two features

Point		Build point features
Line		Build straight line features
Plane		Build plane features
Circle		Build circular features
Slot		Construct elliptical groove features
Rectangular		Construct rectangular groove features
Cylinder		Build cylindrical features
Cone		Build cone features
Sphere		Constructing spheroid features

4.1.5 Tool

Hole Inspect		Set the hole position detection type and parameters

4.1.6 Linkage

Airgo		Linkage airgo
ZEISS Quality Suite		ZEISS Quality Suite
Polyworks		Polyworks

Geomagic		Geomagic
Verisurf		Verisurf mesh loader

4.1.7 Configure

Function name	Function Description
Scanner Management	The management software records the connected devices, profile information, and equipment license information locally
Scale Bar Management	Management ruler information
Program Settings	Modify user configuration, customize work Settings, scan Settings, display Settings, key Settings, language Settings, mouse and keyboard Settings

4.1.8 Window

Customize the ribbon displayed in the main interface to make different functional modules hidden or displayed. Specific operational functional modules include: Add and Reset, Scan, Data Deletion, Partial Processing, Splicing, Probe, Data optimization, Feature, Hole Inspect, AirGo, ZEISS Quality Suite, Polyworks, Geomagic, Verisurf, Workflow, and Restore default.

4.1.9 Help

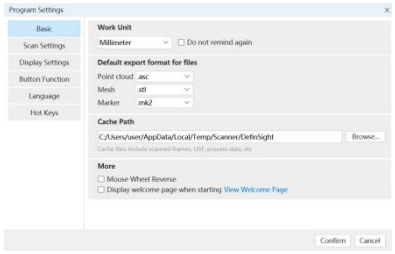
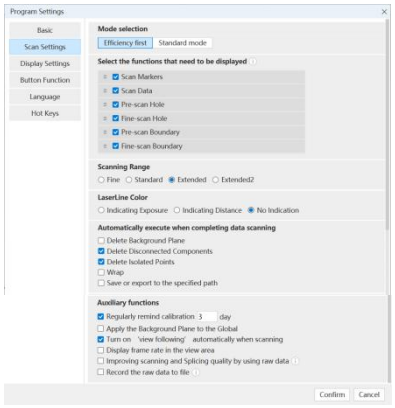
Function name	Icon	Function Description
User Manual		Open the DefinSight software user manual
System Detection		Test tests on the current equipment environment information
Diagnostic mode		Diagnosis and preliminary investigation of the current equipment faults to solve some problems by themselves
What's New		View the DefinSight new version feature
Update Logs		View the DefinSight update log

Website		Enter the official website of Scan Tech
Welcome page		Go to the DefinSight software welcome page
About		View the current software version information

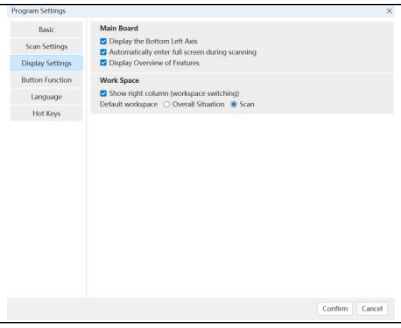
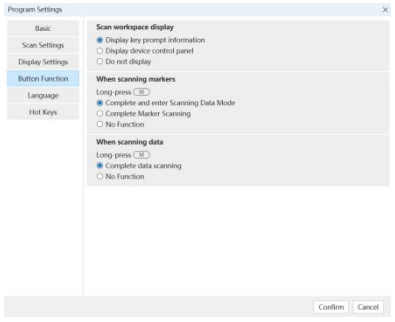
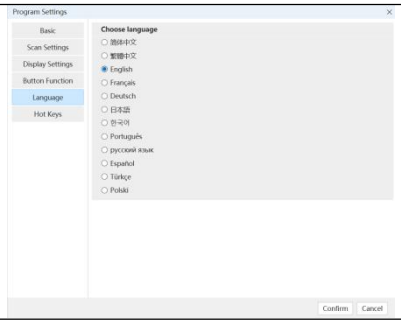
4.2 Program Setup content

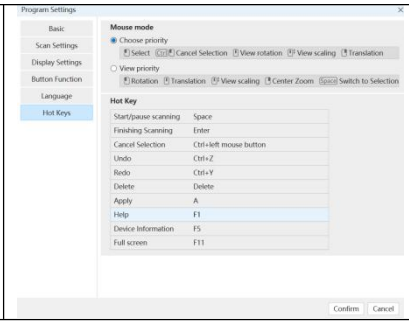
In configuration-program Settings, you can modify user configurations to customize work Settings, scan Settings, display Settings, key Settings, language Settings, mouse and keyboard Settings.

The specific role are described in the relevant modules below.

Setting type	Interface	Description
Basic		You can adjust work scan units, file default export format, cache path, and other work display Settings Work unit: Inch, foot, millimeter, centimeter, micron; Point cloud:.asc, .igs, .txt; Mesh:.stl , .ply , .obj; Marker:.mk2, .asc, .igs, .txt
Scan Settings		**Mode selection**: Set the scanning mode, can switch efficiency priority and standard mode, in the standard mode can enter the real-time mesh scanning mode; **Function selection**: Close or adjust the order of the scanning function to modify its display form in the main interface, the specific content includes "Scan Makers, Scan data, Pre-scan hole, Fine-scan hole, Pre-scan boundary, Fine-scan boundary"; **Scanning Range**: The point scope can be specified to fine, standard, expand or expand 2 forms Select Fine: In the fine mode, the scan data quality is high, but the depth of field range

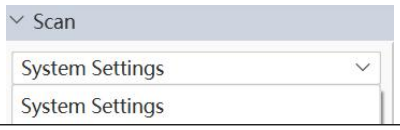
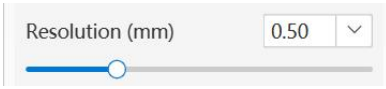
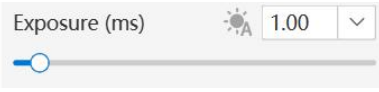
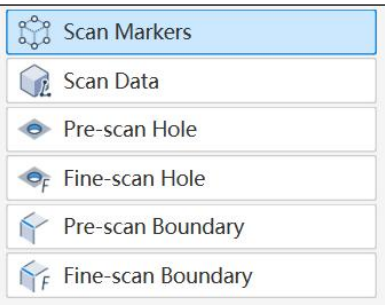
		is limited Select Standard: In the standard mode, the scanning data maintains a good balance, with a moderate range of depth of field, suitable for most routine scanning requirements Select Extended: In the expansion mode, the quality of scanning data meets the basic requirements, and the range of depth of field is significantly increased, which is suitable for complex scenarios requiring large scanning depth; **LaserLine Color** : Set the color indication mode of the laser line, can indicate the exposure, indicate the distance, or no indication; **Automatically execute when completing data scanning**: You can set any of the following operations to be performed automatically when the data scanning is completed, including ‘Delete background planes, Delete unconnected items, Delete isolated points, meshding, Save or Export to a specified path’; **Auxiliary functions**: You can turn on the following functions "Regular reminder calibration, background plane application to global, automatically open the view following when scanning, display the scanning frame rate in the view area, use the scanning original information to improve the scanning and splicing quality, and record the scanning original information to the file"

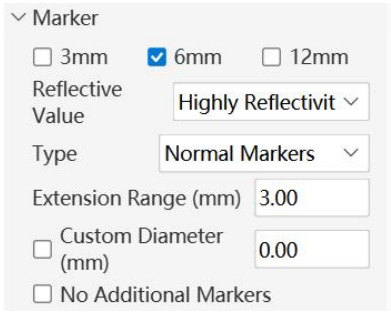
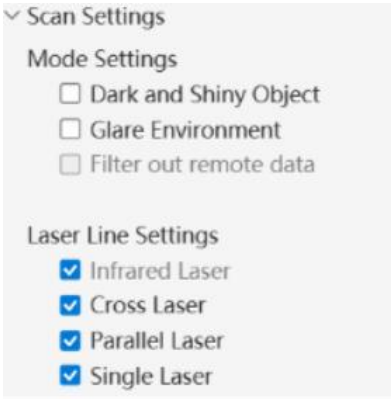
		Note: Using the function of scanning original information to improve scanning and splicing quality improves the data quality by analyzing and processing massive original information to improve the data quality, and the processing time will increase significantly. If you need to skip the marker scan, and scan the data directly, it is recommended to open this option.
Display Settings		Set up the main panel display content and the default workspace
Button Function		Set the key function, customize the display content of scanning workspace, scanning mark time press m function effect, scanning data time press m function effect; The effect of pressing M can be selected as: Complete and enter the scanning data mode, complete the Maker scan, no operation; The effect of scanning mark time pressing M can be selected as: Complete data scanning, no operation;
Language		Support For Simplified Chinese, Traditional Chinese, English, French, German, Japanese, Chinese, Portuguese, Russian, Spanish, Turkish, And Polish

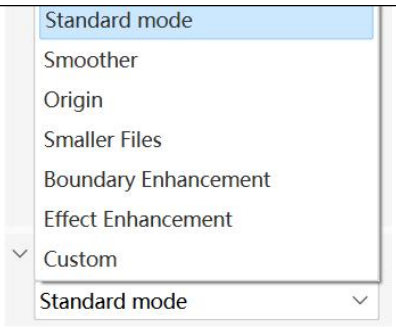
Hot Keys		Select the mouse operation mode according to the use habit, and introduce the corresponding function operation of each shortcut key

4.3 Data manipulation

4.3.1 Scanning parameters

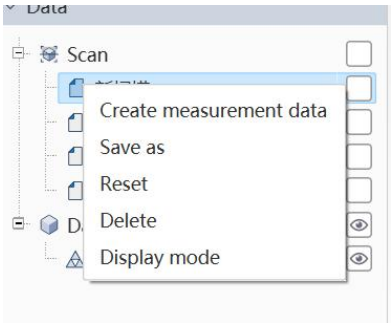
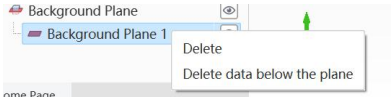
Parameter type	Interface	Parameter Description
Templet		The template contains all the following parameters in this table to save a custom template to quickly Set the scan parameters
Resolution (mm)		Set the parameters of the density degree of the point cloud data: The larger the value, the thinner the point cloud, the smaller the data amount, the faster the scanning speed, and the poor the detail of the object
Exposure (ms)		Set the parameters of the laser line: The larger the value, the brighter the laser, and the darker the piece The recommended exposure value of the general piece is Set to "1"
Scanning Mode		Select scanning mode It is recommended to use the marked point mode to complete the Maker scan and then enter Scan Data mode The sheet metal hole needs to complete the Pre-scan Hole before entering the hole

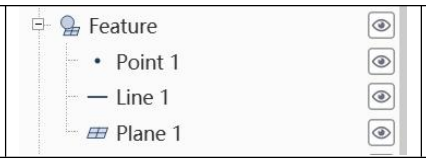
Markers Settings		Diameter: Only identify the selected diameter marking points, can be selected and customized Reflective Value: Divided into high reflective, low reflective and non-reflective, standard marking points with high reflective Type: Select ordinary and magnetic marking points as required Extension Range: Fill the sampling range of the Maker. If there are pits, try to increase this parameter No Additional Maker: After checking, no new Maker will be added during the scanning laser point. It is recommended to start it
Scan Settings		**Dark and Shiny Object**: Improve the point efficiency of black bright artifacts, but the frame rate may be reduced, and there is a greater probability of flying point flying line **Glare Environment**: When open, it can reduce the impact of ambient light, and it is recommended to open only when needed **Filter out remote data**: After turning on, the laser scanning is restricted by the distance from the marked point, and the laser point too far away from the marked point will be eliminated in real time **Laser line Settings**: The checked distance corresponds to the currently available laser types (Infrared Laser, Cross laser; Parallel Laser; Single laser)

Wrap Mode		Set up the wrap mode Use five templates directly and customize whether to fill the Makers and to automatically simplify; select the degree of mesh smoothness, boundary smoothing and boundary sharpening

4.3.2 Catalog tree

The Catalog tree can classify store all objects in the project, at the same time for the different objects of the current project, directory tree global state can be displayed / hidden operation, double click rename the current selected object name, more when the tree content can select multiple objects, the specific operation content is as follows

Object type	Interface	Function Description
Scan data objects		Objects in the Scan, Reference, and Data categories can be right-clicked. Save as: Save the selected data file Reset: Ability to Reset the selected scan data Delete: Delete the selected data file Display mode: After entering the function (1)Hide all other objects; (2)The objects entering this mode are rotated around the current field of view; (3)The view size and angle can be adjusted freely in this mode; Exit the "Display mode" Except for the mouse movement and roller operation
Background plane		Ability to operate on the background plane you created Delete: Delete the selected background plane Delete data below the plane: Delete the point cloud data below the selected plane

Feature object		Be able to manipulate the created features, view the feature parameters, and delete the selected corresponding features

4.4 General utility tool

In the scanned and non-scanned states, the toolbar different visible and available icons.

4.4.1 Scan state

Tool name	Icon	Function Description
Auditory tone cues		When turned on, the prompt tone will play when the scan distance is too far or too close
View Following		Switch to follow view / fixed view
Display percentage of Marker		The percentage of marker point scans is displayed / hidden
Zoom In		Amplification view
Zoom Out		Minimize the view
Best view		Switch to the optimal size and angle

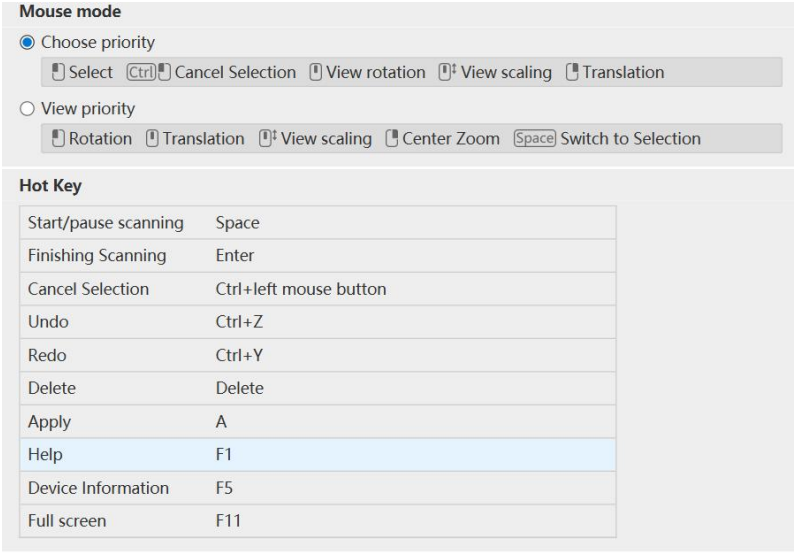
4.4.2 Non-scanning status

Tool name	Icon	Function Description
Full screen		Switch to a full-screen view
Best view		Switch to the optimal size and angle
Select Single Layer		When on, data on the back of the current view cannot be selected
Line Tool		Left key to click many times to draw, right key to confirm

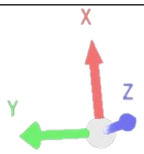
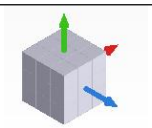
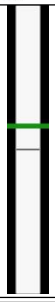
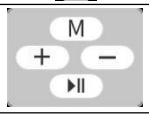
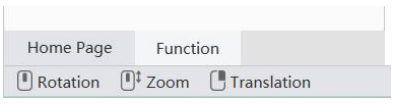
Rectangle Tool		Hold down the left button to drag and draw
Lasso Tool		Hold down the left key ring to select the drawing
Brush Tool		Select by brush drawing
Laser Point		Select a type of,, the laser point
Marker		Select the type as the marker point
Clear All		Deselect all of the points Description: When switching a selection type, all points of the original type are automatically unselected
Select All		All points are selected
Invert Selection		Switch the selected / unselected status of all the points
Delete		Delete the currently selected point

4.5 3D display

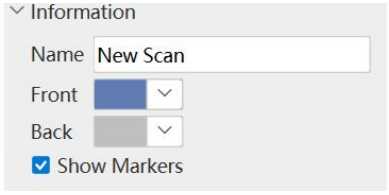
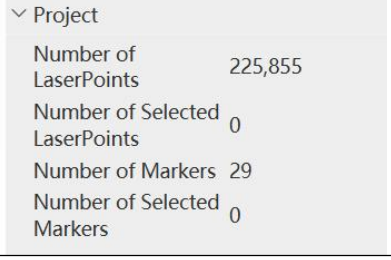
In the 3D view area, you can use the mouse to control the view, the operation definition can be switched in the program Setting, and the currently selected operation function key definition is displayed in the lower left corner of the software.



In addition, in the view area, there are the following objects to indicate or click on.

Name	Icon	Function Description
Center Axis		Show the axes in the middle of the view
Bottom Left Axis		Show the axes in the lower left corner
Distance indication bar		Indicates the distance of the scanner to the workpiece To ensure the scanning effect, control the scanner within the green range
Device button panel		Implement the soft trigger of the device keys, used for remote control
Current view properties		The lower left corner of the software shows the current software
Workstation properties		Lower right corner of the software shows the current software work unit and the occupied cpu and ram

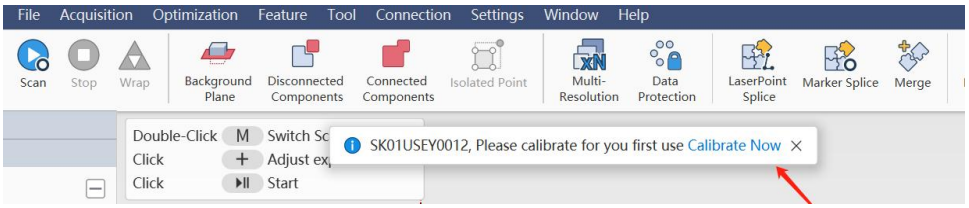
4.6 Real-time information

Status type	Interface	Explain
Scan the property		Displays the real-time scan frame rate, the number of scanned faces Displays the total number of identified marker points and the number of markers within the current field of view
Display property		You can modify the object name and the surface colors
Wrap property		Check the “Display Gridlines”, display the mesh data mesh line Check “show Vertices”, display the vertices of the mesh data Check“Plane Shading”, the triangular mesh display is more realistic Check“Smooth Shading”, the triangular mesh display is smoother
Select poperties		Displays the total number of laser points and marker points for the current engineering file Displays the number of currently selected laser points and marker points

5 Scanning process

5.1 Calibrate

If the equipment is not used for a long time, or the equipment is shaken / transported, or the laser line is dotted during scanning, rapid calibration is required to calibrate the camera parameters. After the device is successfully launched, it will prompt "SN, Please calibrate for you first use", and click "Calibrate now" To enter the scanner calibration process.



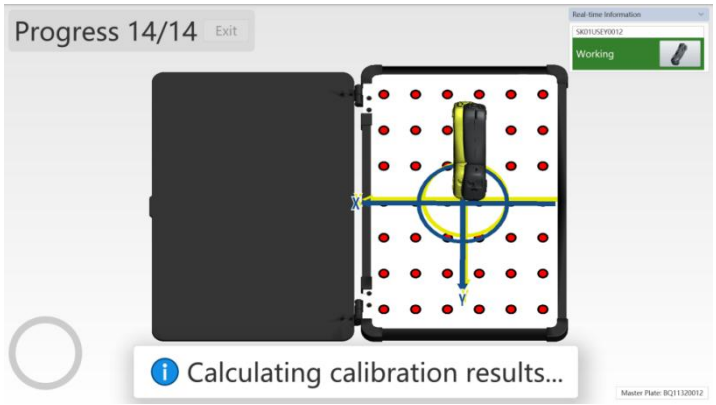
View the last calibration time in “Help-System detection”.

Pre-preparation

Remove the comparison panel from the waterproof box and ensure that the comparison panel is placed forward and that there are no other marking points or highly reflective objects nearby.

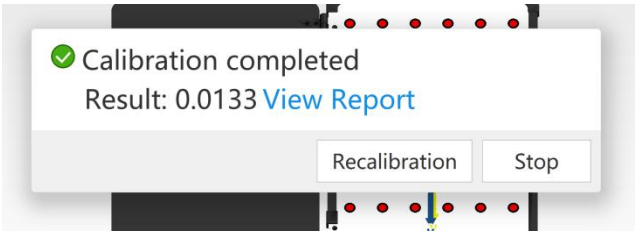
Operating steps

1. Click on the calibration icon under the scan menu.
2. Click the start-stop key on the device to trigger the device laser.
3. Move the scanner directly above the alignment board and raise the scanner appropriately until the scanner model appears on the interface.
4. Follow the interface guide, follow the model to move the scanner so that the blue box coincides with the red box until the blue box is green. Complete the calibration of the 14 poses in turn.



Quick marking skills: The first 10 steps successively raise the scanner, and the last 4 steps are right tilt, left tilt, upper tilt and lower tilt scanner.

5. After step 14, the software automatically calculates and output the results of the calibration.



. The result of the fast standard is only used as the relative measure of the calibration, and does not represent its absolute accuracy.

6. Click "Stop" to end the quick calibration.

5.2 Scan Markers

The marking points are generally made of special high reflective material. The scanner can accurately identify the heart coordinates and be used to locate the measured workpiece. DefinSight support direct scanning of marked points and laser points in laser sheet mode, but to improve splicing accuracy and efficiency, we recommend to use the marked point mode before scanning the point cloud.

Pre-preparation

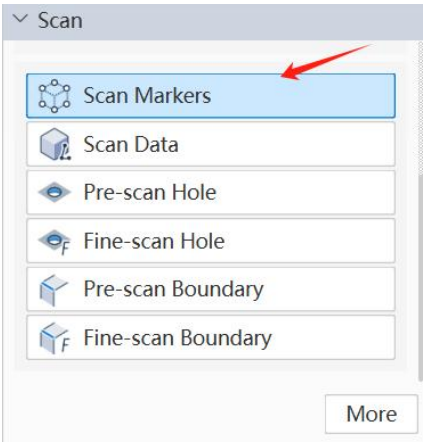
1. Place the markers on or near the workpiece.

Makers should not be attached to obvious features to prevent data loss of key features; avoid pasting into regular shape to prevent misidentification.

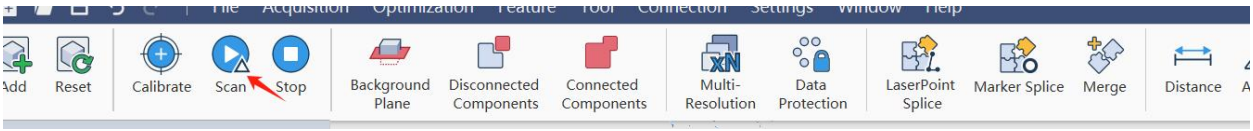
2. Modify the marker parameters in the parameter configuration area, see "5.3.1 scan parameters" For details.

Operating steps

1. Select scan mode as scan Maker, showing the corner of the scan icon.

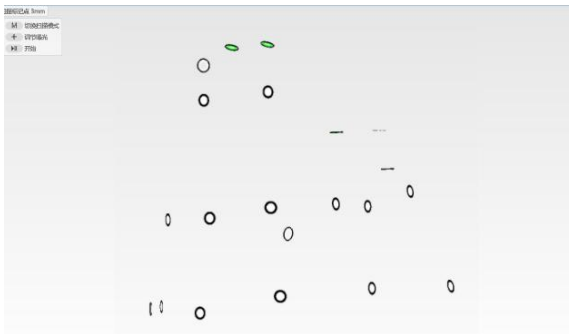


2. Click the scan icon under the scan menu to enter the scan status.



3. Click the start-stop key on the device to trigger the device fill light.

4. Move the scanner close to the workpiece and watch the distance between the scanner and the marker so that the triangle on the distance bar is as green center as possible. Markers were identified by different tilt angles (directly above, front / rear / left / right tilt 45 degrees).



Note: During the process of scanning the marking point, the marking points are green, blue and white. The green is the marking point within the current field of view. The blue indicates that the scanning angle of the marked point is not complete, and the white indicates that the scanning angle of the marked point is complete. During moving the scanner, the green dots are displayed alternately with the other colored dots. The target of the scan marker is that all blue points become white, and the icon can be clicked to determine the completeness of the marker scan by the percentage displayed on the interface.

5. Click the completion icon under the scan menu to complete the Makers scan, and the software will automatically optimize the Makers.

5.3 Scan Data

3D scanner constructs the 3D form of a workpiece from a series of laser point clouds, and the process of scanning the data is the process of digitally constructing the solid workpiece. In DefinSight software, the laser points are displayed as a laser sheet. In DefinSight software, the scanning data has two forms: ‘LaserPatch’ and ‘real-time mesh’, of which the ‘real-time mesh’ mode is to build data in the form of triangular mesh during the scanning process. The ‘real-time mesh’ mode constructs the data in the form of triangular meshs during the scanning process, which requires high computer performance; the ‘LaserPatch’ mode needs to manually generate the mesh through meshing. The following operation is an example of the ‘LaserPatch’ mode.

Operating steps

1. Select the scan mode as "LaserPatch", when the corner of the scan icon shows the laser point.
2. Click the scan icon under the scan menu to enter the scan status.
3. Click the start-stop key on the device to trigger the device laser.
4. Move the scanner close to the workpiece and watch out for the distance between the scanner and the workpiece so that the triangle on the distance bar is as green center as possible. Scan the artifacts through different angles.
5. Optional operation: Switch to the appropriate laser type for different scanning requirements. Double-click the start and stop key on the device to switch laser types. Different types of devices support one or more of infrared laser, cross blue light, parallel blue light, and single-ray blue light. Among them, cross blue light is suitable for conventional scenes, infrared laser is suitable for large surface scanning, cross blue light is suitable for detail scanning, and single line blue light is suitable for deep hole scanning.
6. Click the pause icon under the scan menu to enter the pause state. At this time, the invalid data can be deleted to optimize the scanned data.
7. Click the completion icon under the scan menu to complete the laser point scan.

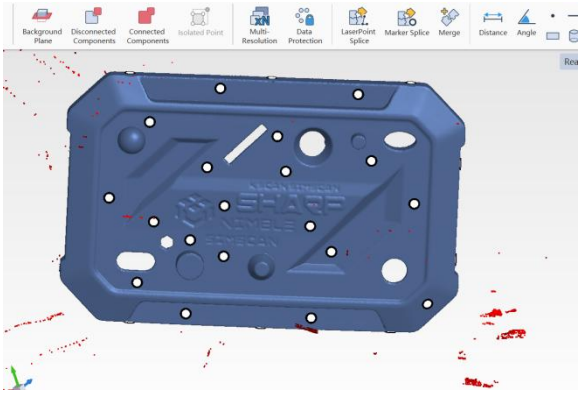
5.4 Optimize data

After scanning the marker and laser points, the main data can be optimized by deleting irrelevant data such as background and noise. To complete this step, you need to select the deleted data, then click the delete icon in the toolbar, or click the delete button icon on the keyboard.

There are several ways to select the data to be deleted as follows:

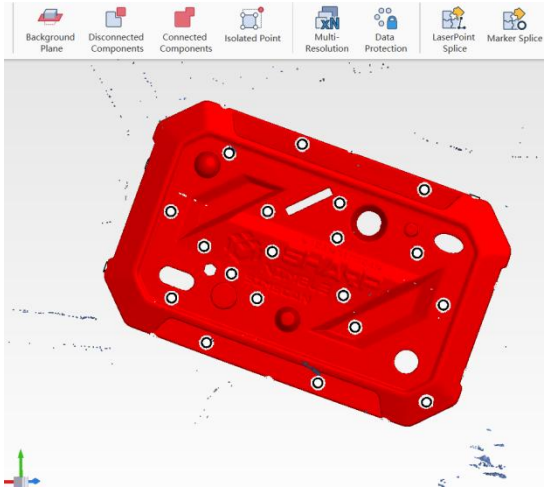
5.4.1 Disconnected Components

Click "Non-connected item", the software will automatically select the data not connected to the subject, and display it in red, when the red data can be directly deleted. Support manual adjusting sensitivity to adjust the selection range.



5.4.2 Connected Components

1. Click "Connect item" To enter the function, and then manually click the body part, when the software will select the whole body and display in red.



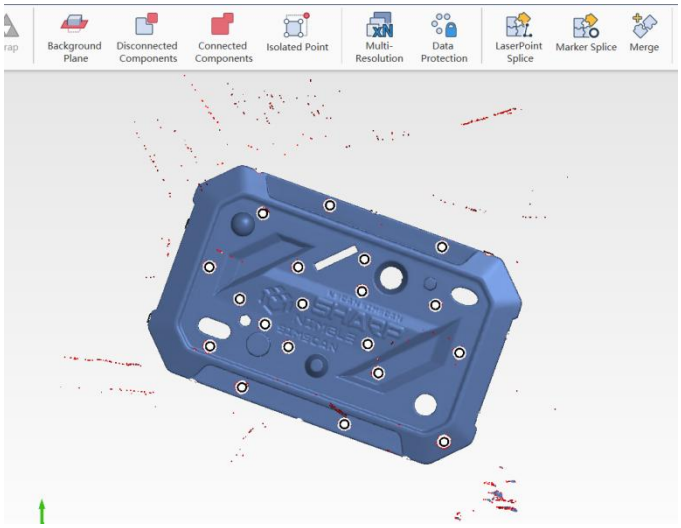
2. Click the reverse selection icon, select the irrelevant data, and then you can directly delete the red data.

5.4.3 Manual selection

Use the fold, rectangle, lasso, and brush tool in the toolbar to manually circle the data to be deleted in the 3D view.

5.4.4 Isolated point

Click "Isolated point", the software will automatically select isolated miscellaneous points and display them in red. At this time, the red data can be deleted directly. Support manual adjusting sensitivity to adjust the selection range. Hide the isolated point function in the standard mode.

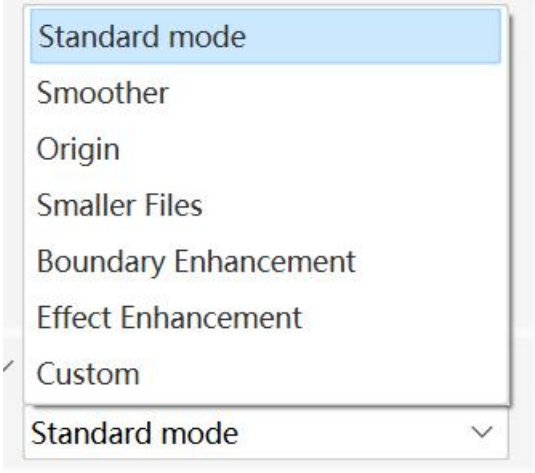


5.5 Wrap

Mesh is to encapsulate the point cloud data, so that it exists in the form of a surface, and the meshded data can be saved as.stl, .ply perhaps. File in obj format for 3D printing as well as reverse engineering.

Operating steps

1. In the scan details page, select the Wrap mode, or select custom, to manually Set the wrap parameters.



2. Click the mesh icon under the scan menu to mesh it.

The mesh contains the following parameters:

(1) Fill in the marker Hole: Delete the surrounding data of the marker points, and then fill in the marker points

(2) Boundary optimization: To improve the accuracy of mesh boundaries.

Edge optimization: Reign the edges of the packaged mesh data to obtain a smoother mesh edge data.

(3) Automatic simplification: During mesh encapsulation, reduce the number of different meshs in flat areas and characteristic areas to obtain the packaged mesh data with less data volume.

(4) Smoothing: Adjust the position of the mesh vertices, constantly optimize the mesh data, and smooth the overall mesh data

(5) Boundary smoothing: The boundary is smoothed, the higher the processing degree, the stronger the smoothing degree

(6) Boundary sharpening: To sharpen the mesh edge, the higher the processing degree, the stronger the sharpening degree

5.6 Save data

The scanned data can be saved as a project file, Maker file, laser point file or mesh file according to the actual requirements.

Project file (. pj 5): Records all the scanning information, including the background planes and features associated with the scan data.

Laser point file (.asc /.igs /. Txt): The 3Dal coordinates of each laser point are recorded, which needs to be "Completed" Before scanning.

Maker file (.mk2/.txt /.asc /.igs /.xml): The 3D coordinates of each marker are recorded.

Mesh file (.stl /.ply /.obj): The polygonal mesh model composed of triangular surface needs to be saved after the "mesh".

5.7 Splice data

For large volume, or it is difficult to scan the complete workpiece at once, the data splicing function can be used to combine multiple pieces of data into a complete data. In the DefinSight software, splicing can be done based on marker points or laser points.

5.7.1 Marker Splice

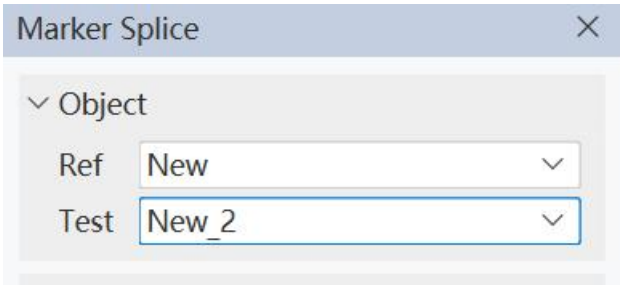
Common marker points were selected to splice multiple copies of the data.

Pre-preparation

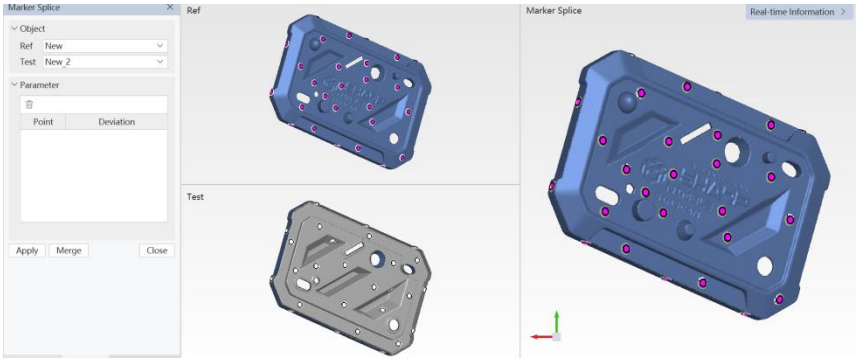
Open or scan all the data that needs to be spliced.

Operating steps

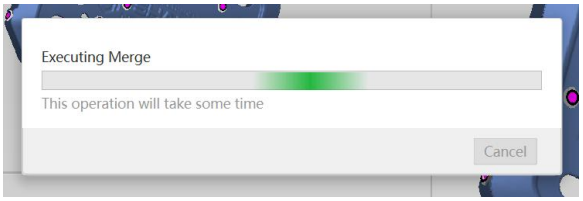
1. Click the Marker Splice icon under the scan menu to enter the function.
2. Under the object column, select a data as the reference object and a data as the data object. Note: After stitching, the coordinates of the data object will change.



3. In the window in the lower left corner, select as many common markers as possible. The selected marker points are shown in red. If you misselect unnecessary markers, use the ctrl + left mouse button to unselect.



4. Click "Apply", the software automatically performs the calculation and feedback the results.



5. Optional: If there is a large mark in the list, delete the mark and click apply again.
6. Optional: Check "Merge", and a new merge data is generated after stitching.
7. Click "Close" To exit the marker point splicing function.

5.7.2 Laser Point Splice

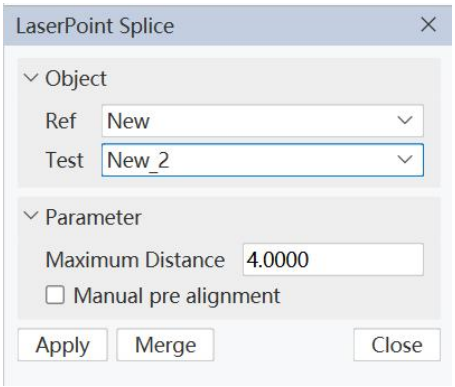
Multiple data were stitched together according to the characteristics of the laser point cloud.

Pre-preparation

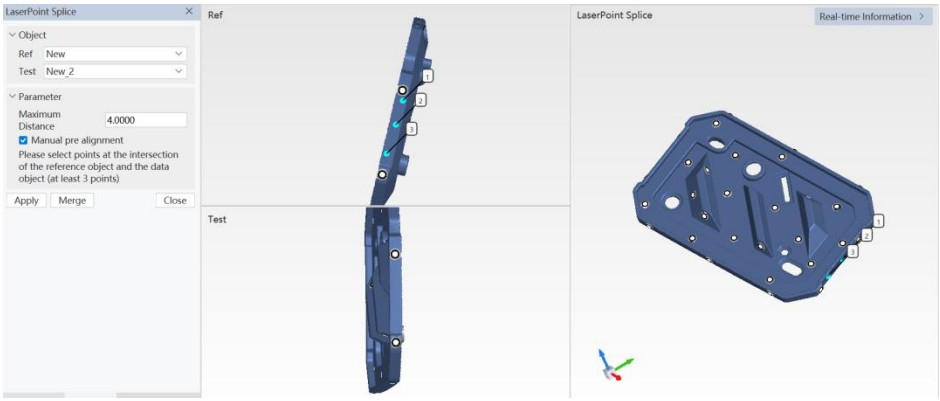
Open or scan all the data that needs to be spliced.

Operating steps

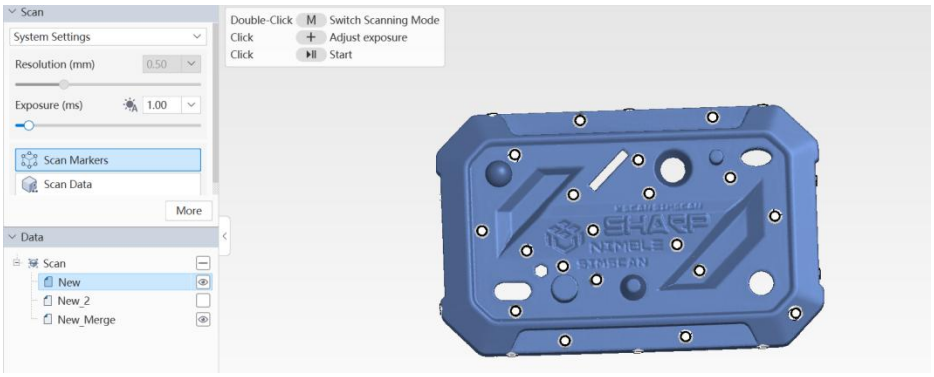
1. Click the Laser point splice icon under the scan menu to enter the function.
2. Under the object column, select a data as the reference object and a data as the data object. Note: After stitching, the coordinates of the data object will change.



3. Click "Manual pre alignment", in the upper and lower left windows, click to select three Sets of public laser points. The serial number label appears near the selected point.



4. Click "Apply", the software automatically calculates, performs the best-fitting alignment, and feedback the results.



5. Select "Merge" To merge the data object and the reference object into the new data named "Reference object _ merge", and the merge successfully automatically "Close"

6. After the complete stitching, a new merged data will be generated.

7. Click "Close" To exit the laser point splicing function.

5.8 Scanning skills: Device key control

In the new DefinSight software, the device keys can have richer control functions, combined with the default template configured on demand in advance, can realize without the mouse, using the device keys to complete the control of the entire scanning process.

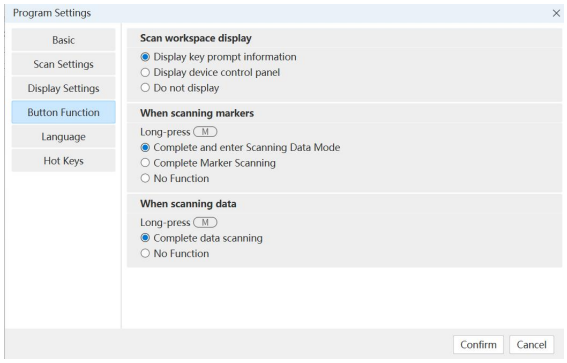
1. After opening the software, you can directly click the start and stop key⏯ on the device to enter the scanning state;

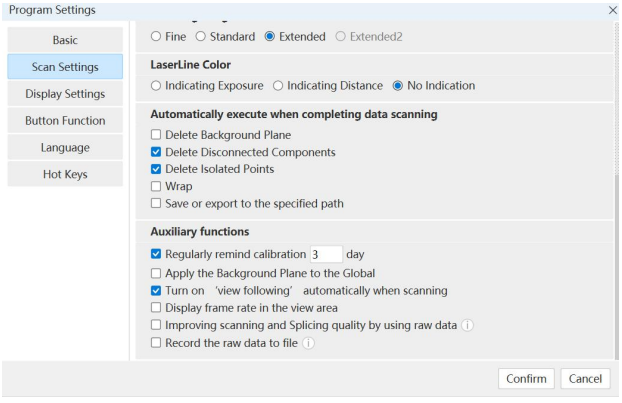
2. Click the start and stop key⏯ on the device again to trigger the device fill light and scan the marking point;

3. After completing the marking point scanning, click the M key[M] on the device to perform the marking point optimization-switch to the laser face mode-enter the scanning state. At this time, click the start and stop key⏯ on the device to trigger the laser of the device for the laser point scanning;

4. After completing the laser point scan, long press the M key[M] on the device to perform the laser point optimization-delete the data below the background plane-delete the non-connected items-delete the isolated point-mesh, to directly generate the required files.

Description: M key Setting and one key operation content can be customized in program Settings



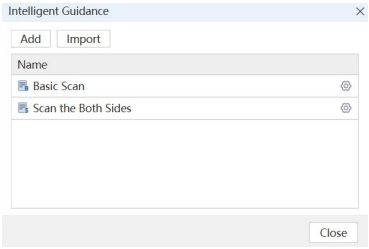


5.9 Scanning skills: Workflow

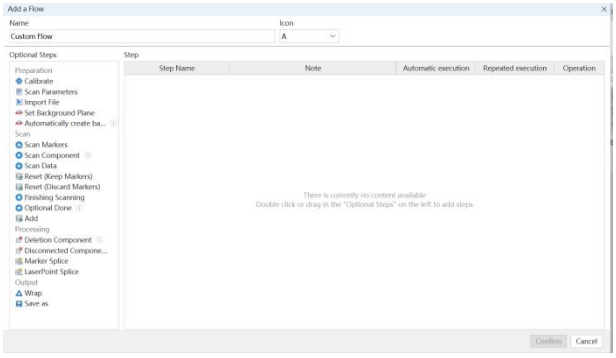
DefinSight's Workflow feature provides a one-stop operational wizard that easily guides through every step of the process, from device calibration to final scanning, through preset workflows. Whether you are a novice or an experienced user, the intelligent guidance ensures that the scanning process is efficient and accurate, making complex workflows simple to navigate.

1. After opening the software you can click， Access to Workflow；

2. Functional interfaces store previously customised workflows and can also add or import functions from the catalogue；



3. Click “Add” to customise the workflow operation and sequence.



4. Click “Import”， can import .scanguide custom workflow files

5. Click on the workflow that has been created, you can enter the set process in the sequence of operations

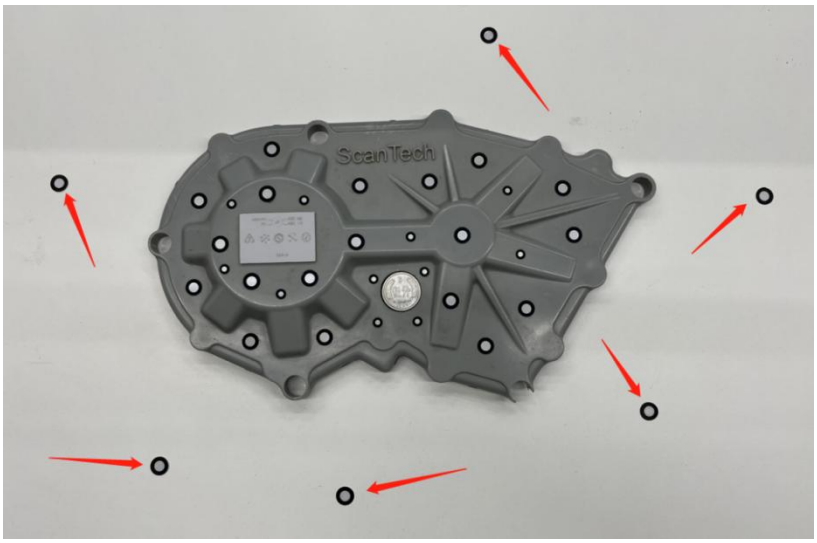
6 Other commonly used functions

6.1 Background plane

The background plane function establishes a virtual barrier between the artifact and the table, and automatically filters the data below the background plane during scanning to obtain the artifact data without the invalid point cloud.

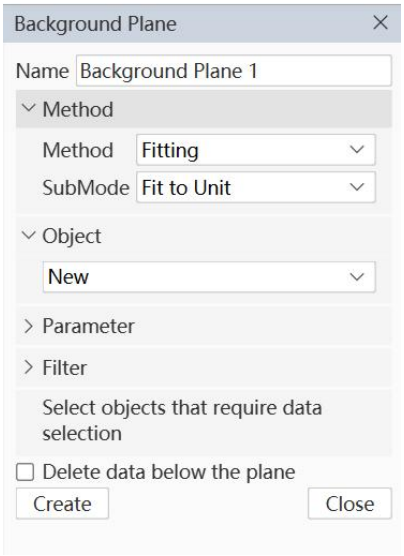
Pre-preparation

Paste more than 3 marking points on the table surface of the workpiece.



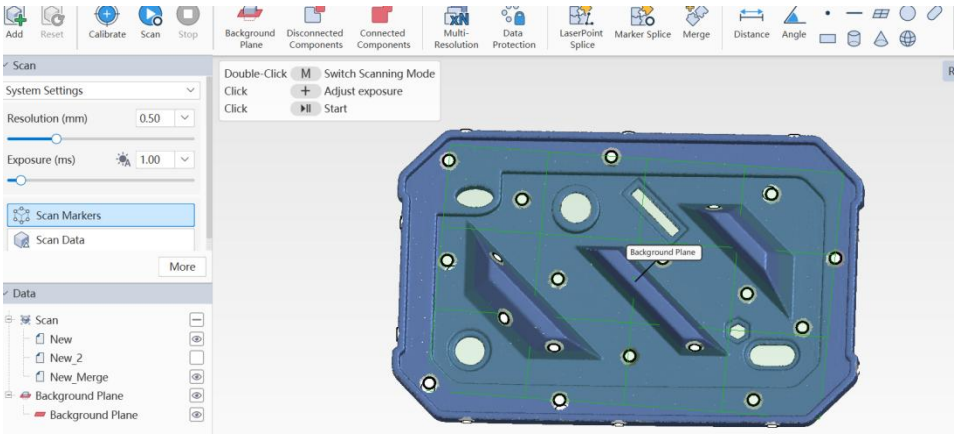
Operating steps

1. Complete the marker point scan.
2. Click the background plane icon under the scan menu to enter the function.
3. Select “fitting” and circle the Makers in the view area.



Description: This manual describes only one way to create a background plane. In the actual use process, you can also create parameters, select points and other background planes based on the existing cloud data. Optionally check "Automatic scanning after creating features", "Delete data below the background plane" And other convenient functions.

4. View the preview effect.



5. Complete the background plane creation.

Background Detected Cards

During a Scan Marker operation, if the background plane has not been set for the current project, when you pause or end the marker scanning, the software will automatically fit all detected background auxiliary cards to create the background plane.

6.2 Multi-Resolution

The multi-resolution feature allows users to scan more detailed data or dilute data in a manually selected area at an existing resolution.

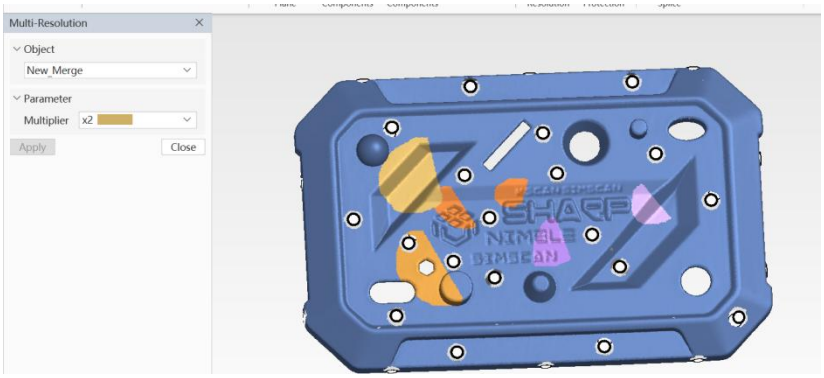
Pre-preparation

Complete the data scan.

Operating steps

1. Click the multi-resolution on the menu bar to enter the multi-resolution function, and select the operation object and operation multiplier on the right side.(2,4,8,1, / 2, / 4 the higher the level, the more detailed the data), choose different rate circles will be displayed in different colors.

2. In the 3D view area, the area to be swept, and the selected area is shown in special color.



3. After the circle selection, click the application, and the highlight color will display the precision sweep rate of the area.

4. Click on the scan icon to re-scan in the fine scan area.

. If you need to cancel the precision sweep, you can Set the precision scan level to 1, and then repeat the above operation.

6.3 Data Protection

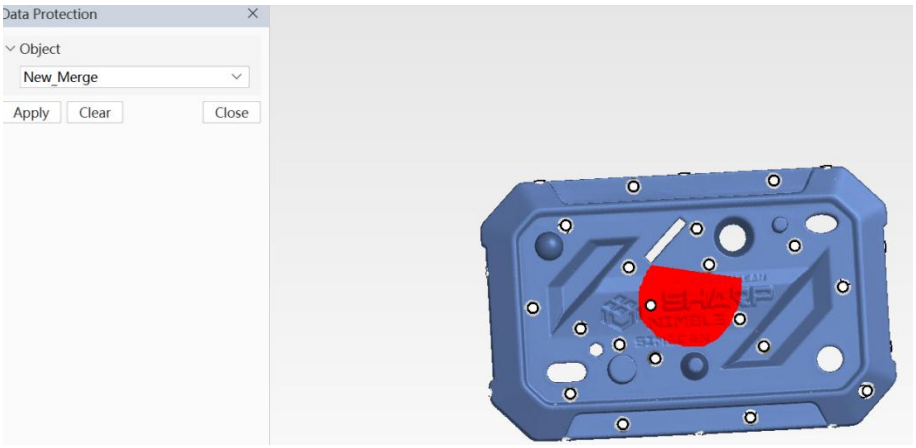
The data protection function allows the user to select a part of the engineering data to protect the data. During subsequent operations, all operations such as selection / delete are invalid for the protected data.

Pre-preparation

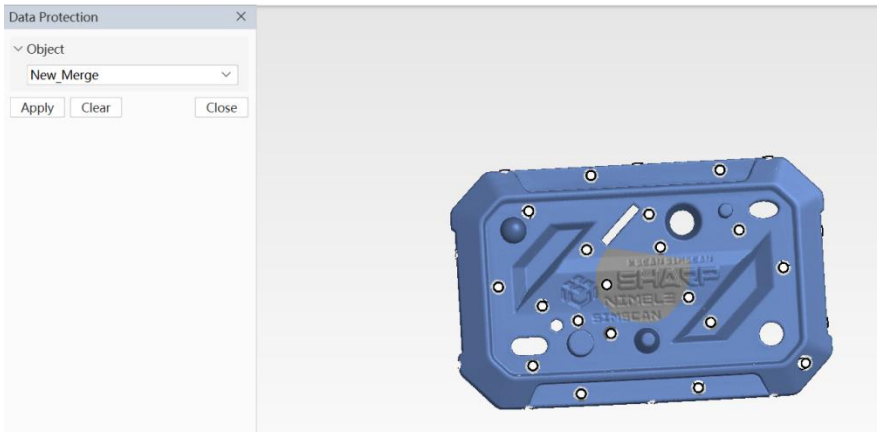
Complete the data scan.

Operating steps

1. Manual manually the data for protection.



2. Click the data protection icon under the scan menu to complete the data protection Setting, and the protected area is displayed in gray.



To cancel the data protection, click Multi-Resolution - ×1, Circle the data protection area and then click “Apply”.

6.4 Create Features

DefinSight software supports building features in many ways, as detailed in the table below.

Feature	Parameter	Method
Distance	Distance, distance x, distance y, and distance z	When measuring the distance between features, the circle degenerated to the center, the circle groove, elliptical groove and rectangular groove to the center point, the ball to the center, and the cylinder and cone to the axis. Distance will eventually be transformed into one of three ways: Point to point distance, point to line distance and point to surface distance. Methods: Select features in the parameter bar or click directly in the 3D view
Angle	Angle degree	Methods: Select features in the parameter bar or click directly in the 3D view
Point	Point coordinates	Methods: Anchoring, Digitization, Fitting, From Intersection, From Projection; Anchoring: Click on a point Intersecting Submode: Two lines, lines and plane, three planes, lines and ball; Projection Submode: The projection of points in the straight line, the projection of points in the plane, the projection of points in the ball, the projection of points in the cylinder, the projection of points in the cone.
Line	Starting point coordinate, end point coordinate, direction, and length	Methods: Anchoring, Digitization, Fitting, From Intersection, From Projection; Anchoring: Select two points. Fitting Submode: Fitting to the unit; Intersection Submode: Two planes; Projection Submode: The projection of a straight line on the plane;
Plane	Coordinates, direction, main vector, radius, length, width, etc	Methods: Digitization, Select from Mesh, Fitting; Choose Submode: Three points; Fitting Submode: The plane.

Feature	Parameter	Method
Circle	There are center coordinates, direction, radius, etc	Methods: Anchoring, Digitization, Fitting, From intersection; Intersecting Submode: Plane and cylinder, plane and cone, plane and ball; Fitting Submode: Fitting; Choose Submode: Three points.
Slot	There are central point coordinates, direction, main vector direction, length, width, etc	Method: Anchoring, Digitization, Fitting; Fitting Submode: Elliptical groove.
Rectangular	There are center point coordinates, direction, main vector , length, width, etc	Method: Anchoring, Digitization, Fitting; Fitting Submode: Rectangular groove.
Cylinder	Base point, direction, radius, and height	Method: Digitization, Fitting; Fitting Submode: Cylinder.
Cone	Direction, half angle, height, base radius, top radius	Method: Digitization, fitting; Fitting Submode: Cone.
Sphere	Ball center coordinates, radius	Methods: Digitization, Select from mesh, Fitting; Fitting mode: Sphere; Choose Submode: Four points.