

iReal 3D User Manual

Applicable to iReal 2E, iReal M3 Release 3.2

2023



INTRO

Welcome to iReal 3D an easy-to-use and powerful professional scanning software.

You can learn how to use iReal 3D scanner by following this tutorial.

iReal 2E and iReal M3 are handheld color 3D scanners launched by SCANTECH (HANGZHOU) CO., LTD. for professional-level 3D designers and 3D engineers.

iReal 2E is a 3D scanner projecting speckles onto the scan target, and its emission light source consists of three VCSELs. It has a large depth of field and field of view, designed for medium and large-sized objects and portrait scanning.

iReal M3 is a dual-infrared laser 3D scanner, its emission light source consists of 2 VCSELs + a group of infrared parallel lasers. It can meet the requirements of most art (including portrait) and industrial design products.

The iReal 3D scanner can easily obtain 3D data of the surface of an item and generate standard 3D data formats (.asc/.stl/.obj, etc.) through the software's own data output post-processing algorithms. This helps engineers to use third-party software for model modification, design, replication, and 3D printing.

The iReal 3D scanner and 3D solutions are now widely used in many fields, such as medical rehabilitation and personalized precision treatment, 3D digitization and conservation of cultural relics (restoration of cultural relics, 3D printing, and reproduction of cultural relics, virtual display of cultural relics, digital topography of cultural relics, etc.), 3D art design and innovative design development, human body 3D digitization (3D printing portrait, art portrait customization, 3D virtual character image, film/animation CG character modeling, clothing 3D (customization, etc.), virtual 3D display (virtual simulation, online 3D display, e-commerce 3D display, AR/VR virtual scene presentation, etc.).

By specializing in the underlying technology of 3D scanning and independently developing more advanced 3D algorithms, iReal 3D is committed to bringing smarter 3D digital technology to every person and every organization, and jointly building a more realistic 3D virtual world.

The final interpretation of the User Manual is reserved by iReal 3D.

Please refer to the official website of iReal 3D (<https://www.ireal3dscan.com/>) for more information and the latest materials.



 **IREAL 3D**

<https://www.ireal3dscan.com/>

0571-85370380

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ABOUT US



[SCANTECH \(HANGZHOU\) CO., LTD.](#) is a global provider of comprehensive 3D solutions. We specialize in R&D, production, and sales of 3D scanners and 3D systems and boast a long history of developing hardware and software. We offer two main product categories: industrial high-precision 3D scanners and professional cost-effective 3D scanners, including portable 3D scanners, tracking 3D scanners, industrial automated 3D systems, and professional color 3D scanners.

Our product line stretches from metrology grade online and offline equipment and consumer grade color 3D scanners, which are widely applied in areas of aerospace, automotive/rail transport, mechanical manufacturing, medical care, and rehabilitation, digital arts for TV and film, education and research, cultural heritage protection, 3D printing, and VR/AR. We commit ourselves to helping companies fulfill optimized solutions to quality and efficiency and open up a vast territory for 3D digitization.

1.1 Main Structure

iReal 2E main structure display figure:



iReal M3 main structure display figure:



1.2 The Principle of 3D Scanner

Working Principle of Infrared Parallel Laser 3D Reconstruction: iReal M3 projects seven infrared parallel lasers onto the scanned object, which was deformed by the geometry of objects, and its two sets of calibrated industrial cameras will capture the laser beams on the object. Then corresponding spatial coordinates (X, Y, Z) of the laser beams can be calculated according to the image parallax obtained by the cameras. In this way, we can continuously acquire the dynamic 3D information of laser beams when using the 3D scanner. By scanning and alignment, we will get serial 3D point cloud data, which can be encapsulated by the software to generate the corresponding 3D model (3D mesh model).

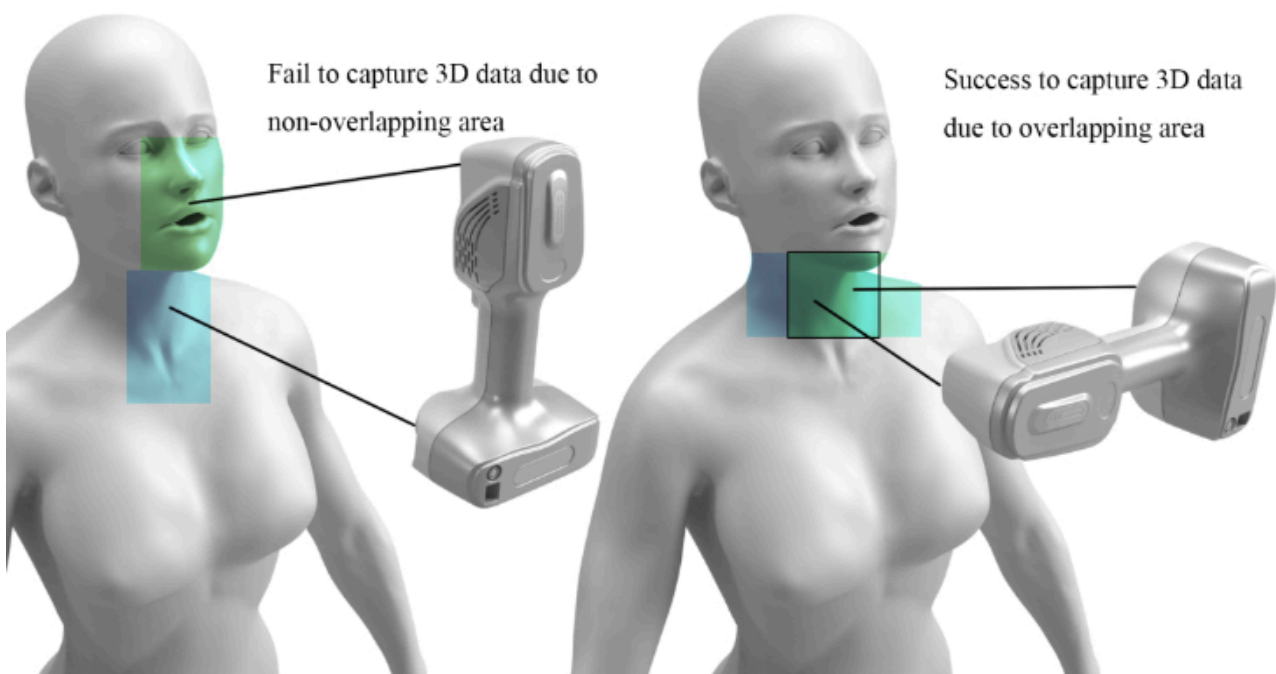
The iReal infrared speckle scanning mode (a mode owned by iReal 2E and iReal M3 devices) is quite similar, differing only in the light source and projection. It involves projecting a non-periodic random digital scatter onto the object's surface, and the morphology of the random digital scatter is then modulated by the information on the object's surface. Due to the randomness of the digital scatter, the height information of any point on the object surface can be uniquely determined by the tiny field of the scatter image there, and thus the 3D information of the object surface can be accurately measured. The 3D point cloud data (.asc/.ply) of the object surface is obtained by scanning and stitching from multiple angles, and then the point cloud is reconstructed to form a triangular mesh by the meshing algorithm, and the 3D model of the object (.stl/.obj) is obtained.

Warning:

The common field of view of the two black and white cameras is required to calculate the 3D point cloud.

When we violate this principle, for example, one camera cannot see the scanned position properly during scanning, the 3D point cloud at that place will not be acquired.

Illustration of scanning angles for neck and chin



CONFIGURATION REQUIREMENTS

Minimum Configuration	
OS	Win10 or above
CPU	Intel and AMD are available, Intel 7 generation or more
RAM	32G and above ¹
Graphics card	NVIDIA discrete graphics card, support CUDA9.0 ² and above, the latest graphics card driver
Port	USB3.0 interface, and sufficient power supply, the more devices mounted on the same serial interface, the more likely the power supply will be insufficient
Recommended Configuration Requirements	
OS	Win11 & Win10
CPU	Intel I7-8750H and above
RAM	32G RAM and above, 32G recommended
Graphics card	NVIDIA GTX1050Ti and above, dedicated GPU memory 4G and above, CUDA9.0 and above
Port	USB3.0

Important:

- ▶ Power supply: When the scanner is working, please plug in the power supply and set it to high-performance mode.
- ▶ Environment: If protective software (such as 360 or computer manager) is installed, unpredictable errors may occur.

2.1 Operating Instruction

Hint:

- ▶ This product is a precision instrument, please handle it with care and do not drop it. When the scanner is not in use, please unplug all cables from the scanner to prevent the scanner from tripping over the cables and causing damage to the device.
- ▶ The scanner is turned on when the cable is connected and turned off when the cable is unplugged. There is no separate switch button.
- ▶ The dongle must be inserted into the 3.0 USB port of the computer when scanning, otherwise, you can't scan. It is very valuable, please keep it with care.

- ▶ The computer must have two or more USB ports at the same time. If the ports are not enough, please use a hub.
- ▶ Please copy the permanent authorization file (.RGF) in case of loss.
- ▶ When storing the cable, please fold it gently along the previous crease, and please do not fold it in half violently so as not to reduce the service life.
- ▶ This product is not dustproof or waterproof, please pay attention to the surrounding environment when using it.



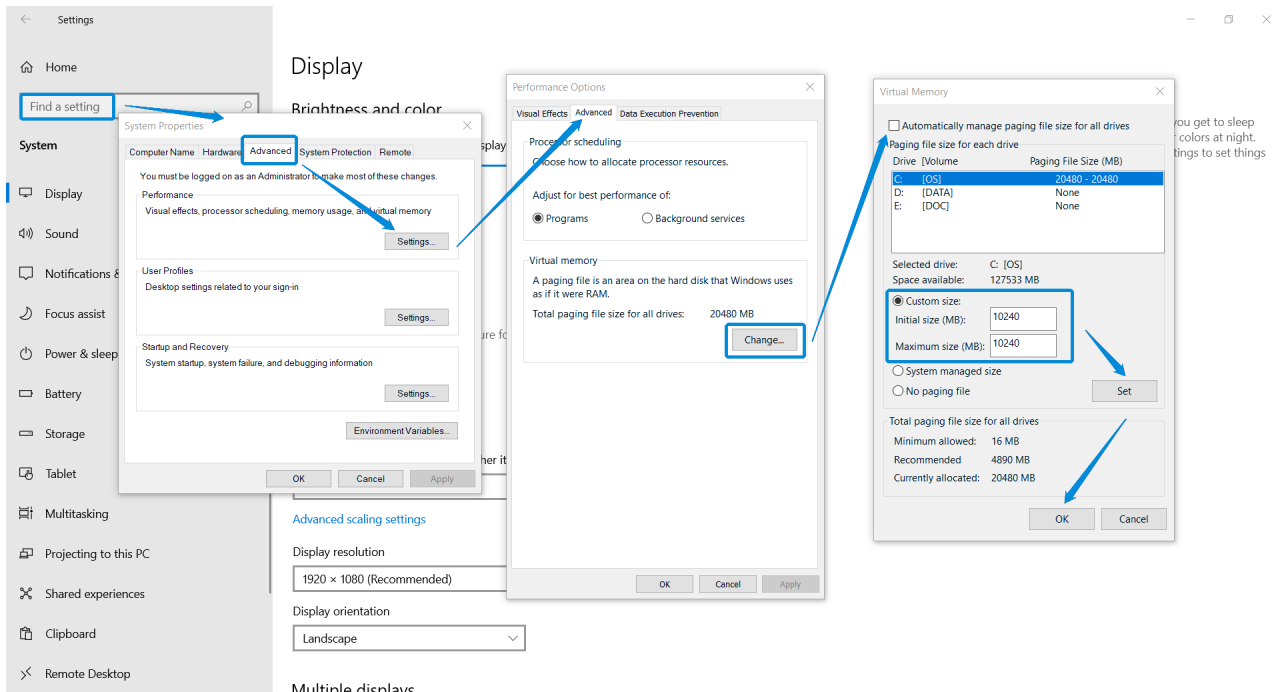
Figure: iReal M3 3D Scanner

2.2 Virtual Memory

When the scan encounters a sudden flashback, and after observing the task manager, you find that the memory has been completely occupied, please check whether the computer has opened a lot of memory-consuming software, such as other 3D software, rendering software, browsers with many web pages open, etc.

If you still have insufficient memory after closing the above programs, it is recommended to purchase hardware to increase physical memory, or increase virtual memory. Adding Virtual memory may cause the software to be slower when calculating, which is caused by the fact that virtual memory is far less efficient than physical memory.

In short, setting up virtual memory allows the not-so-rich memory to meet temporary data storage requirements again.



Notes:

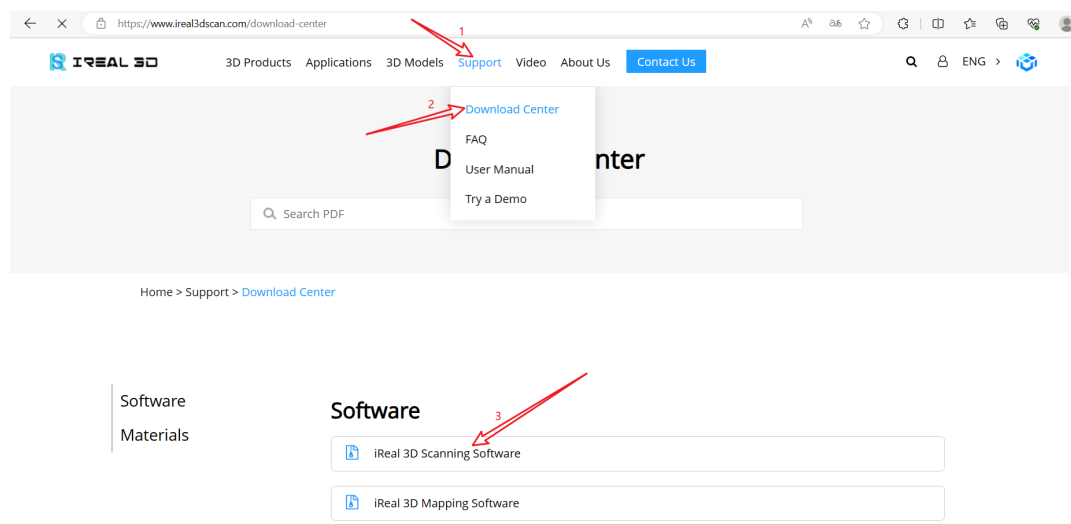
[1] When your memory is barely enough, it may not be enough to scan some large objects, you can modify [Virtual Memory](#) to solve it temporarily.

[2] You can check the current CUDA version through Help >> System Information >> Components in the NVIDIA Control Panel.

DOWNLOAD & INSTALLATION

3.1 Software Download

The software installation package can be downloaded by searching for the download link: [iReal 3D Scanning Software Download](#) .



3.2 Software Installation

1. Double-click the iReal 3D software installation package, select the corresponding language, and click Next.
2. Select the installation directory, check Agree to the license terms, and click Next.
3. Wait for the installation to complete.
4. Click Finish to complete the software installation.
5. After opening the software, [Import Configuration File](#) and set up [Environment Settings](#) .

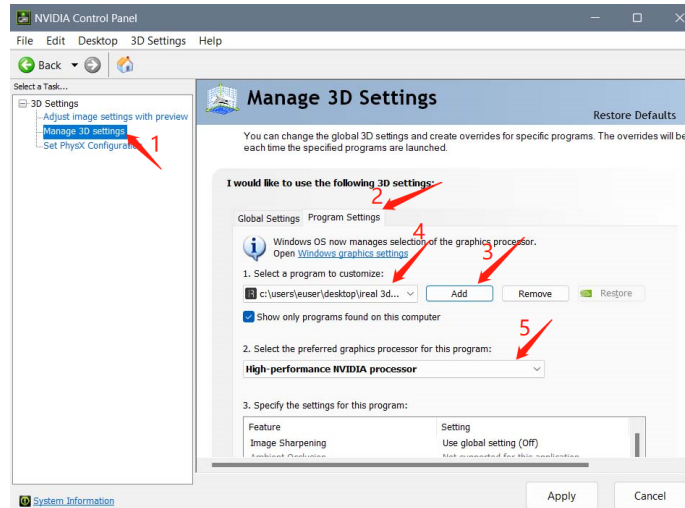
Warning:

- ▶ Close the protective software before installing the software and during the scanning process, otherwise, it may cause unpredictable errors.
- ▶ The software should be installed on a disk with a relatively large storage space such as the D disk.

3.3 Environment Settings

If the system is not running on a discrete graphics card by default 1 , you need to set up a discrete graphics card to run.

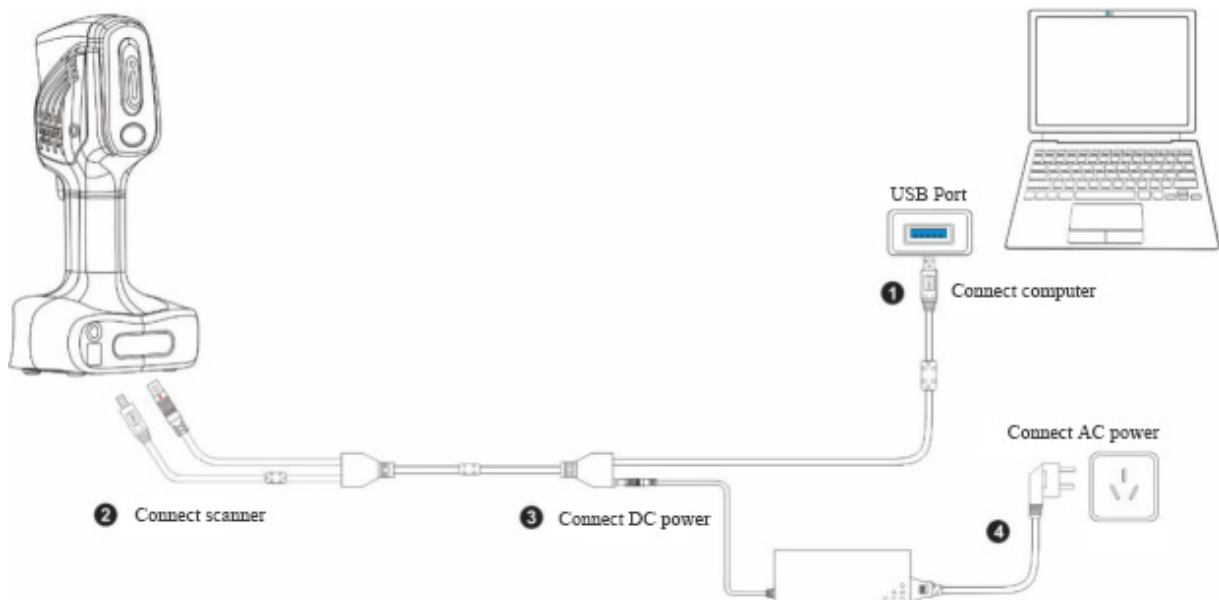
Right-click on desktop >> NVIDIA Control Panel >> Manage 3D Settings >> Program Settings >> Preferred Graphics Processor option for this program >> Select High-Performance NVIDIA Processor (if this option is not available just skip it) >> Add >>iReal 3D.exe >> Apply.



3.4 Scanner Connection

Connect the device to the computer as shown in the figure below, and then turn on the power.


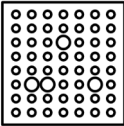
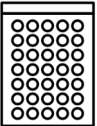





Important:



Step 2: When inserting the cable into the scanner, please turn the arrow to the top, and then gently plug it in. When pulling it out, pinch the metal ring backward and pull it out gently, do not pull the wire violently.

PRODUCT LIST

4.1 Introduction of Accessories

Picture	Name	Function
	Scanner	This is the main precision equipment, please do not drop it.
	Calibration	When the internal structure of the scanner in factory, parameters has some deviation due to external factors, this board can be used for calibration. Please do not place anything on the calibration plate in case of affecting the accuracy. After calibration, please immediately put the calibration plate away.
	Reflective Markers	When the scanned object has no features, these reflective markers can be stuck on or around the object's surface to facilitate positioning.
	The Power Adapter	Inport: 100~240VAC, 50/60HZ, 1.3A Export: 24V=3.75A, 90W MAX
	Cable	For data transmission
	Waterproof Case	The outer packing box can be used for daily storage and carrying.
	USB Drive	iReal 3D scanning software user manual Quick guide Configuration files
	Dongle	For security reasons, please plug in the dongle every time to scan.

IMPORT CONFIGURATION FILE

5.1 Configuration File

The configuration file is also called iRealSET folder. iReal 2E contains 8 files and iReal M3 contains 10 files. iRealSET folder contains files that relate to some of the scanner's internal parameter settings and software license time, the specific parameters and license files are different for each scanner.

The iRealSET folder needs to be manually imported after software installation, or after a software update in order to use the scanner properly. To avoid loss, it is recommended to make more backups.

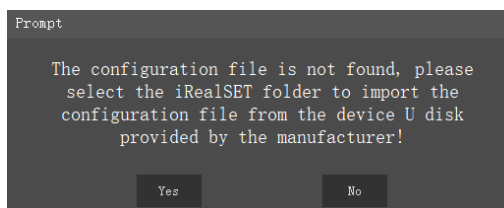
Important:

- ▶ After starting the iReal 3D scanning software for the first time, the system will automatically prompt that you need to import the profile device to use it properly, if you miss this guide you can use other ways to import it manually.
- ▶ The configuration file is the third important thing besides the scanner and calibration. Please keep it properly (better make several copies). When the software is reinstalled or upgraded, it needs to be reimported.

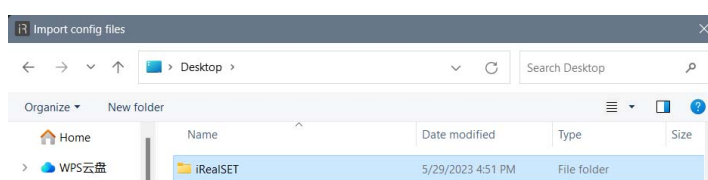
5.2 Import Configuration File

5.2.1 Boot up to import configuration file

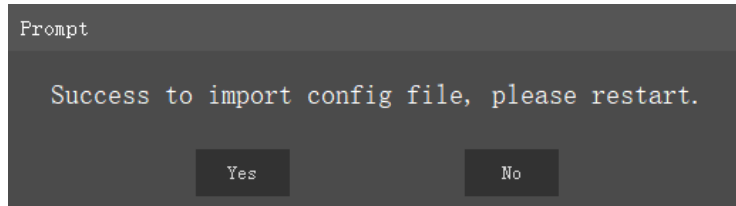
1. Plug the USB that can be found in the waterproof box into your computer.
2. After opening the software for the first time, the system will prompt you to import the configuration file.



3. Click Yes and the following small window will pop up, select the iRealSET folder in the USB disk, and click OK.

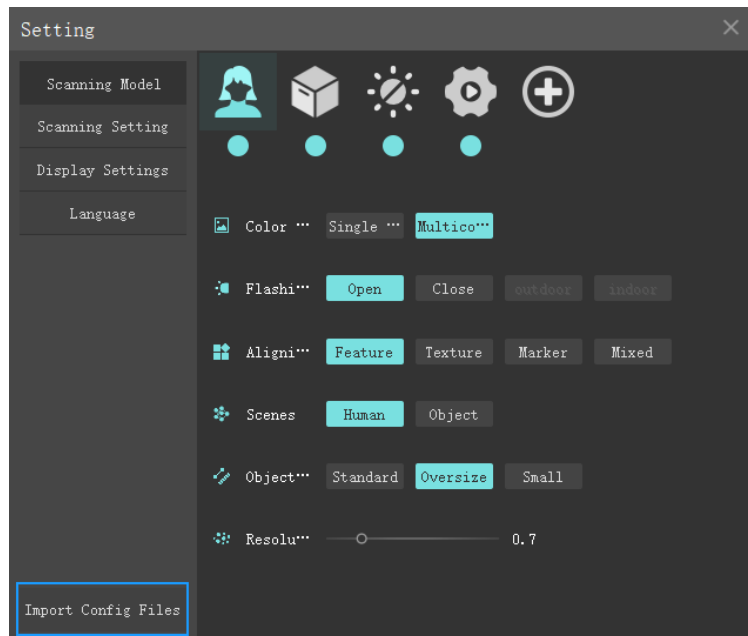


4. Once finish importing, click Yes to restart the software.

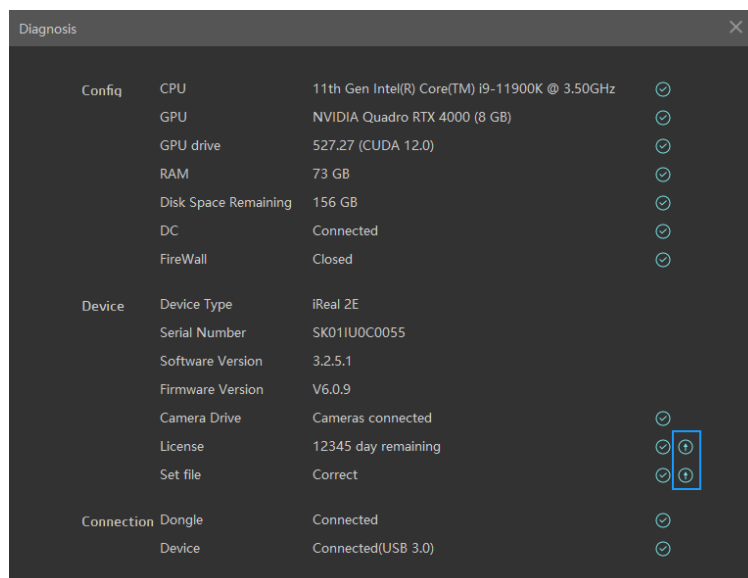


5.2.2 Two other methods of importing configuration files

Method 1: Click Settings>>Select Import Profile>>Check iRealSET folder>>Click OK>>Software restart.



Method 2: Click Diagnostics>>Select the up arrow on the right side of the profile>>Select the iRealSET folder>>Click OK>>The software restarts.



5.3 Authorization File

The file with the suffix .RGF in the configuration file is the license of the software.


When the file is lost or expired, you cannot scan it anymore. You can view the remaining license in the setting interface if you have done [Import Configuration File](#).

The file with the suffix .RGF in the configuration file is the license of the software.

When the file is lost or expired, you cannot scan it anymore. You can view the remaining license in the setting.

For more information about updating the authorization file, please visit the official website of iReal 3D (www.ireal3dscan.com) to watch the related videos.

5.4 Update License

When the icon  appears in the lower left corner of the software, it indicates that your license has expired or will expire. Please contact the sales to obtain the latest license.

How to replace the license:

1. Please check the authorization file first. Its file name is generally **SK01IU0DXXXX.RGF** with 12 bits and the wrong name will lead to a failed import.

The file name is consistent with the nameplate on the bottom of the scanner. Right-click to copy the file.

2. Find the iReal 3D software icon on the desktop, and right-click to open the file location. If the installation location is a shortcut in the Start menu, please open the file location again. When many .DLL files appear, it indicates the real installation location.

3. Usually you scroll up to find and open the iRealSET folder, the contents of the folder should be as shown on the right.

4. Right click to paste and replace the .RGF file.

5. Restart the iReal 3D software, open the help menu, and you can see that the license has been updated.

name▲	volume	type
<input type="checkbox"/> AC12030055.bdb	1.41 KB	BDB
<input type="checkbox"/> DeviceSet.DST	24 Byte	DWG TrueView Sheet Set
<input type="checkbox"/> SK01IU0C0055.init	54 Byte	INIT
<input type="checkbox"/> SK01IU0C0055.iparc	192 Byte	IPARC
<input checked="" type="checkbox"/> SK01IU0C0055.ORI	2.79 KB	ORI
<input type="checkbox"/> SK01IU0C0055.RGF	5.25 KB	RGF
<input checked="" type="checkbox"/> SK01IU0C0055_2.ORI	2.79 KB	ORI
<input type="checkbox"/> XBDW.bdw	304 Byte	BDW

QUICK CALIBRATION

6.1 Why Need to Calibrate



Accuracy Calibration: Because the principle of the scanner needs to know the distance and angle between scanner cameras, and the angle between two cameras is often due to temperature changes, violent bumps, and other force majeure factors leading to parameter changes, so in order to make the reconstructed data more accurate, smoother when stitching, and more accurate when scanning marker points, so the internal parameters of the camera need to be calibrated by calibration board. The calibrated parameters are saved to [Configuration File](#).



White Balance: The purpose is to calibrate the color reference to the current light environment to prevent causing ambient light pollution.

Caution:

- ▶ When using the scanner for the first time, it should be calibrated for accuracy before scanning.
- ▶ There is no need to calibrate the white balance for first time use.

6.2 When to Calibrate

In the following cases:

1. The first time you use the scanner.
2. The scanner has not been used for a long time.
3. The equipment is shaken/transported.
4. The amount of scanning data per frame is less.
5. The data alignment isn't smooth under the default modes.
6. Markers cannot be recognized.

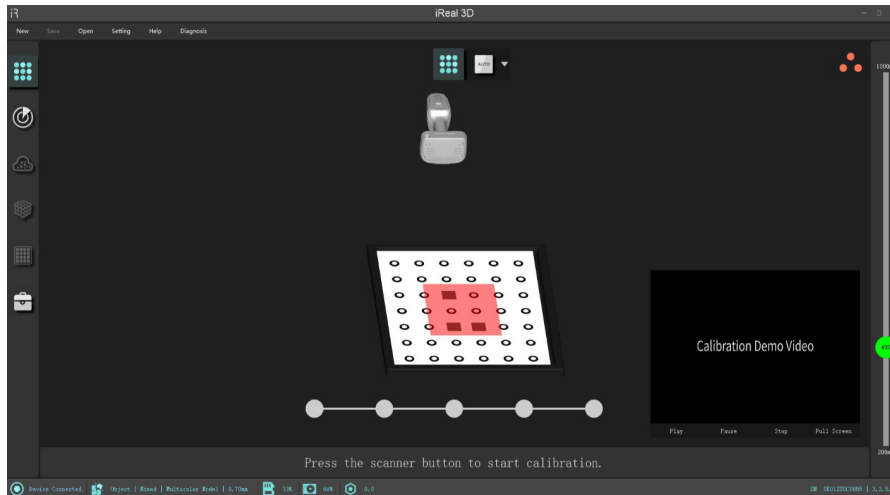
When to do the white calibration

1. The color is seriously distorted after mapping.
2. When the light environment is particularly complex, such as under red light, under green light, etc.

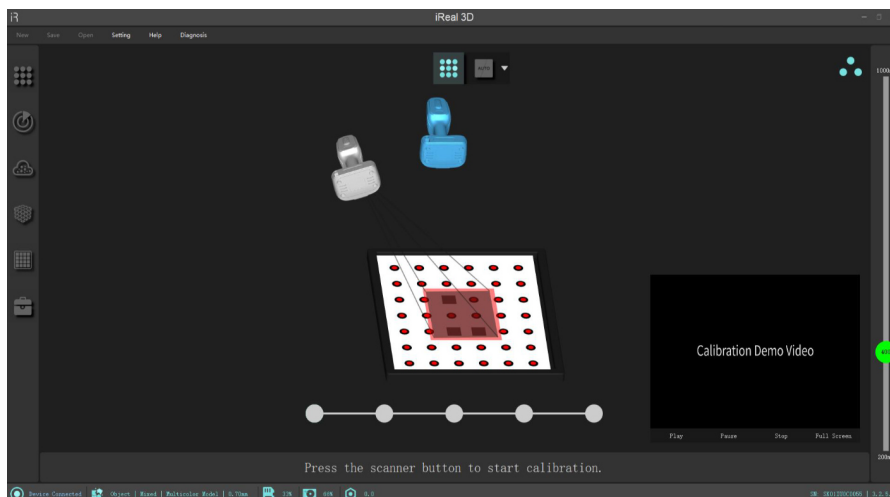
6.3 How to Calibrate

6.3.1 Accuracy Calibration(iReal2E as an example)

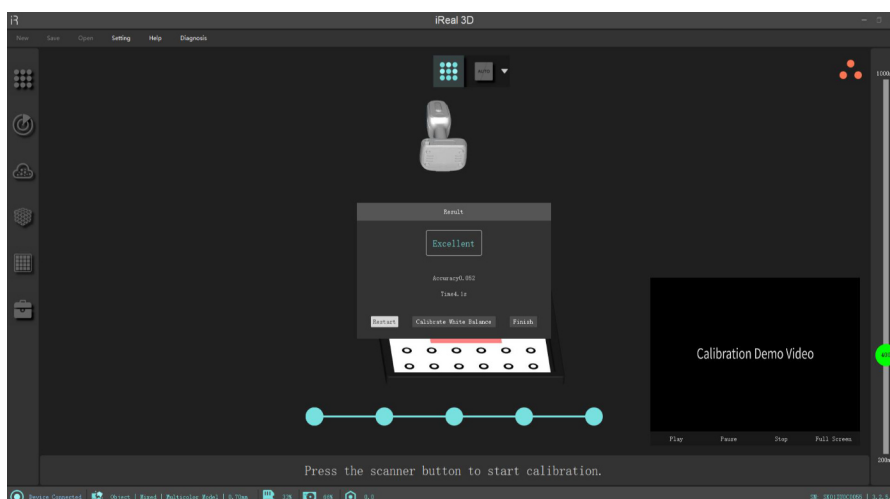
1. Connect the device, take out the calibration plate, put it as the way software shows, put it as the way software shows, wait for the connection, and click the calibration icon.



2. Connect the device, take out the calibration plate, put it as the way software shows, wait for the connection, and click the calibration icon.



3. Calibration finished.



Error:

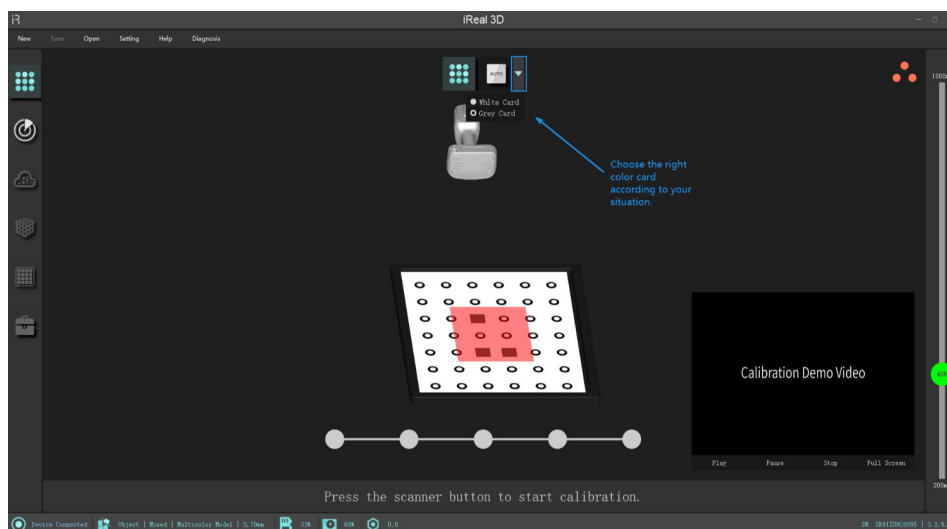
- ▶ The calibration plate cannot be inverted, and it should be opened like a book.
- ▶ The inverted calibration plate is calibrated without any feedback from the interface.

Hint:

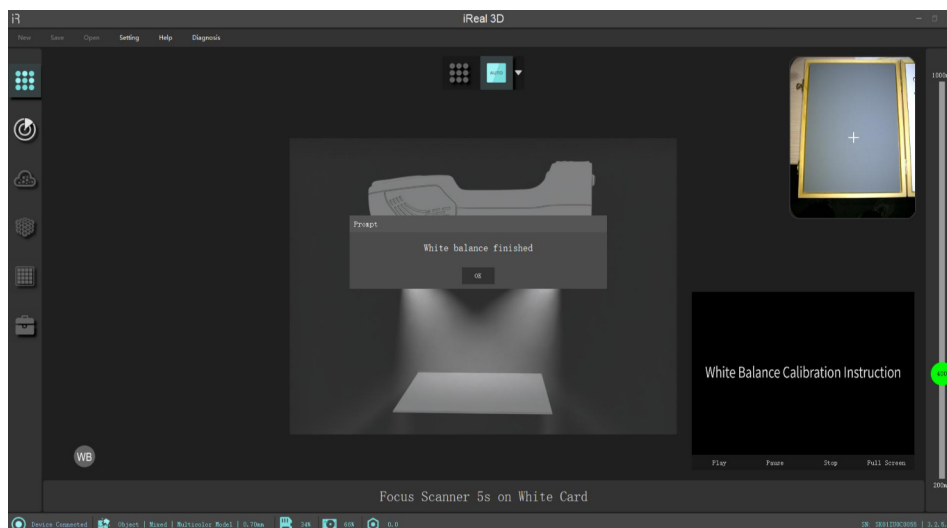
The three points in the upper right corner represent three camera lenses. When the three points are blue, it means that the lenses “see” the markers on the calibration plate. If they are orange, it means that they can’t see the markers. At this time, you need to change the angle.

6.3.2 White Balance



1. As shown, the calibration comes with a gray card, and A4 white paper can be used as a white card.



2. Align the scanner with the gray card or white card, and keep it at a distance of 400 - 500mm for 5 seconds.



Error:

- ▶ Do not choose the wrong cards to calibrate the white balance. For example, use A4 paper to calibrate the white balance but choose the gray card.
- ▶ If the  color is very abnormal, it is possible that you operate the scanner improperly. You can click the WB button in the lower left corner to reset the white balance.
- ▶ The environment can also be quickly returned to the factory settings using the WB button  if it reaches the normal room.

SCANNING PROCEDURE

7.1 Preparation

1. Observe the scanned objects: objects, creatures, size, color, material, deformation, etc;
2. Observe the scanning environment: dark, bright, narrow, dangerous, etc;
3. Quick Calibration first;
4. Click Scan, enter the scan interface;
5. Select or create a new scanning mode. By default, there are 4 modes: Human Body Scanning Mode, Colorful Object Scanning Mode, and LED Off Mode, Infrared Laser Mode (iReal M3);
6. Set Resolution;
7. The scanner is connected. If it is not, please check the diagnosis.

7.2 Start Scanning

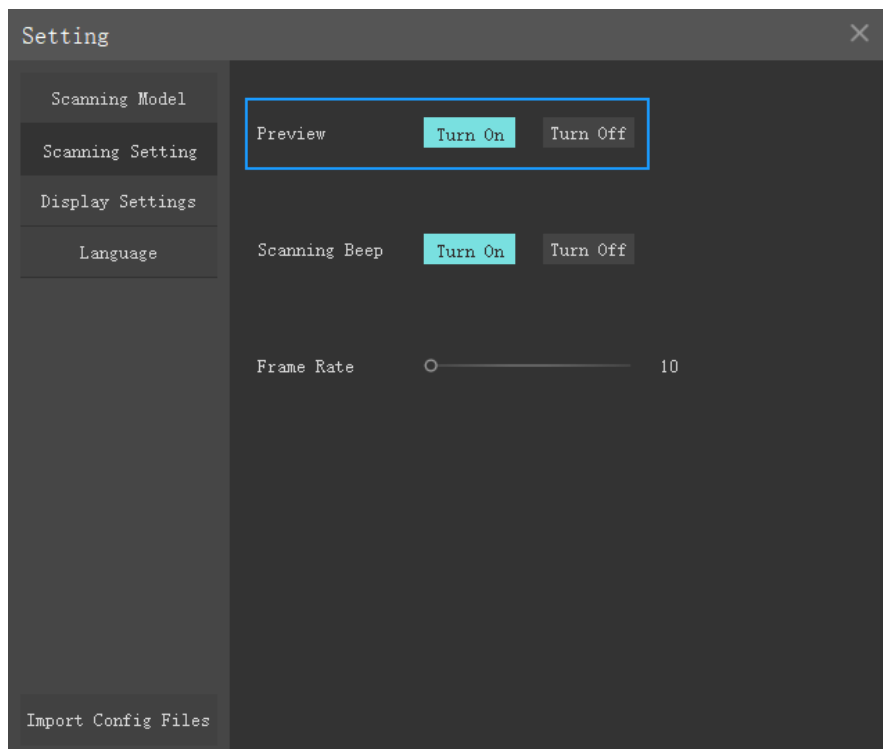


Fig 1: How to turn off scan preview





1. Click the button on the scanner to enter the preview state where you can observe the software interface will appear as some “shadow” that is the scanner capturing some 3D point cloud data (point cloud). It can help check whether the scanned object is easy to be scanned and whether the distance is appropriate through the point cloud sparse degree.
2. Click the button on the scanner again to pause the preview, click again to officially start scanning, and complete the scan according to some scanning tips and scanning techniques.
3. When you have become proficient in using it, if you do not need to preview before scanning, you can click Settings to turn off the preview function. As shown in the picture above.

Hint:




- ▶ The process when using the markers splicing method will not be the same as the normal process. For more details, please check the tutorials on the website (www.ireal3dscan.com).
- ▶ The causes of sparse point clouds may be: too close, or too far away, you can observe the distance bar on the right to determine; the swept object is too bright, too dark, too small, or too transparent, scanning spray can be used.
- ▶ Impact of too sparse point cloud: If feature splicing is used for scanning, it will result in poor splicing, no splicing, no splicing finding, and splicing errors.

7.3 After Scanning


Finish scanning

When the scan is complete and no other operations are needed, you can either save the project as a scan in the menu bar so that you can continue scanning next time, or you can click the Finish button  to perform a point cloud calculation, before which you can select a  different resolution in the drop-down box on the right  and then perform the point cloud calculation. After scanning, if you change the resolution again, it is recommended to click the [Data Quality Color Map](#) button  to see if additional scanning is needed.

Point cloud processing interface

Enter the point cloud processing interface after the calculation is completed: the upper tool-bar can be done to remove isolated points , non-connected items , and other operations, click the drop-down box next to the meshing , select the way to fill the hole, whether to optimize the mesh, whether to simplify the mesh (recommended use), whether to fill the holes of markers, whether to fill a small hole and then generate the mesh.

Mesh processing interface

Mesh processing: the upper toolbar can do mesh simplification,  mesh refinement and other operations,  click the drop-down box next to the map,  select whether to map smooth-ing and then generate a map.

Hint: 3 ways to fill holes

1. Not Close Holes: No hole filling, fast speed, suitable for importing the third software for processing.
2. Close Small Holes: In the Human Scene, the model will have the edge extension but not in the Object Scene. Most of the holes will be filled.
3. Fully Close Holes: all the holes will be filled, if some obvious holes can not be filled, the effect of using full closure will be less than ideal, the algorithm still needs to be optimized.

7.4 Saving Projects & Files

Based on the scanning procedure, we have 4 different projects, each of which represents a data type and an interface, respectively.

Data Type	Interface	Data Type To Be Saved
Original Scanned Data	Scan Interface	Scan Project (.epj)
Point Cloud Data	Point Cloud Interface	Point Cloud Project (.apj), Point Cloud file (.asc)
Mesh Data	Mesh Interface	Mesh Project (.spj), Mesh File (.stl/.sk/.obj (monochrome model) /.ply)
Mesh Data with Texture	Texture Interface	Mesh File (.stl/.sk/.obj (colorful model)/.ply)

Hint:

Save the .obj file, please do not use Chinese names, some third-party software does not support, which leads to mapping can not be automatically linked, this time we can manually specify the material and mapping solution. This time we can manually specify the material and texture to solve.

FILE FORMAT

Saving files and projects need to be noticed.

What kind of data you need to save depends on which steps you completed and what files you want to save.

Table 1: File Format

	Name	Data Type	Requirement	Description
Save file	.mk2	Marker File	When scanning markers	Save marker data
	.sk	Mesh File	After wrapping	Data format unique to scantech
	.asc	Point Cloud File	After processing point cloud	Can be wrapped in other softwares
	.ply	Mesh File	After wrapping	Common mesh data with colors
	.stl	Mesh File	After wrapping	For 3D printer
	.obj	Mesh File	After wrapping/mapping	3D data exchange format with texture(still white mold after encapsulation)
	.map	Mapping Project	After wrapping	It can import to iReal 3D Mapping software to optimize the textures
	Preservation Project	.epj	Scan Project	During scanning
.apj		Point Cloud Project	After processing point cloud	2 point cloud files or point cloud projects can use Model Alignment (White mold can also be saved point cloud project)
.spj		Mesh Project	After wrapping	The .stl in Mesh project can be used for Map after repairing iReal 2E scanned model

8.1 Open Files or Project Files

Click to Open File or Open Project according to the file format. Before opening, please clear the data that is opening in iReal 3D Scanning software, otherwise, the Open button will be gray and cannot be used.

8.2 Project Characteristics

The common characteristics of the scan project, point cloud project, and mesh project:

1. After saving, a folder with the specified name will be generated in the specified location.
2. Multiple files are contained in the folder.
3. Select the index file (.epj/.apj/.spj) when opening project files.

8.2.1 Scan Project

Folder directory structure: .epj file (index file), Datalmage folder, iRealSET folder, TextureImage folder, g.lp file, mark.show file, p.tsdf file, pro.smf file, s.show file.

Scan projects usually have a relatively large amount of file data, which is not conducive to data transmission and sharing. If there are no special circumstances, it is not recommended to save.

Name	Date modified	Type	Size
Datalmage	6/28/2023 4:08 PM	File folder	
iRealSET	6/28/2023 4:08 PM	File folder	
TextureImage	6/28/2023 4:08 PM	File folder	
1.epj	6/28/2023 4:08 PM	EPJ File	25,334 KB
g.lp	6/28/2023 4:08 PM	LP File	3,126 KB
mark.show	6/28/2023 4:08 PM	SHOW File	9 KB
p.tsdf	6/28/2023 4:08 PM	TSDf File	7,027 KB
pro.smf	6/28/2023 4:08 PM	SMF File	1 KB
s.show	6/28/2023 4:08 PM	SHOW File	12,623 KB
version	6/28/2023 4:08 PM	File	1 KB

If the scan project can not be opened normally, it may be due to the lack of computer memory, data preservation is not complete, data integrity or not can check the Datalmage folder, where each data serial number is continuous and uninterrupted, and the data is not 0KB, it is normal.

Name	Date modified	Type	Size
data_fin.image	12/6/2022 1:50 AM	IMAGE File	0 KB
data0.image	6/28/2023 3:52 PM	IMAGE File	17,867 KB
data1.image	6/28/2023 3:55 PM	IMAGE File	19,912 KB
data2.image	6/28/2023 3:55 PM	IMAGE File	12,551 KB
data3.image	6/28/2023 3:55 PM	IMAGE File	22,699 KB
data4.image	6/28/2023 3:55 PM	IMAGE File	15,735 KB
data5.image	6/28/2023 3:55 PM	IMAGE File	11,566 KB
data6.image	6/28/2023 3:55 PM	IMAGE File	14,169 KB
data7.image	6/28/2023 3:55 PM	IMAGE File	9,737 KB
data8.image	6/28/2023 3:55 PM	IMAGE File	13,631 KB
data9.image	6/28/2023 3:55 PM	IMAGE File	20,599 KB
data10.image	6/28/2023 3:55 PM	IMAGE File	13,200 KB
data11.image	6/28/2023 3:55 PM	IMAGE File	10,522 KB
data12.image	6/28/2023 3:55 PM	IMAGE File	19,483 KB
data13.image	6/28/2023 3:55 PM	IMAGE File	17,754 KB
data14.image	6/28/2023 3:55 PM	IMAGE File	19,505 KB
data15.image	6/28/2023 3:55 PM	IMAGE File	15,545 KB
data16.image	6/28/2023 3:55 PM	IMAGE File	7,870 KB
data17.image	6/28/2023 3:55 PM	IMAGE File	5,029 KB
data18.image	6/28/2023 3:55 PM	IMAGE File	5,193 KB

Note:

- ▶ The scan project can be saved at any time during scanning, and it supports rescanning the object for the next time. The premise is that the object doesn't have any deformation.
- ▶ You can leave the site for processing data after saving the project files, but checking the data if it is complete is necessary.

8.2.2 Point Cloud Project

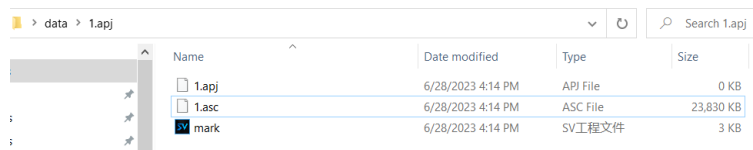
Folder directory structure: .apj file, .asc file and TextureImage (speckle scan image file) or .mk2 (M3 laser scan markers file)

The two .asc project files can be put together into one model, including mapping data, using the function of Model Alignment of iReal 3D scanning software.

.apj file: index file.

.asc files: ordinary .asc files that you can copy or even open with third-party software for wrapping into .stl.

TextureImage folder: It stores the texture data, which can only be read by iReal3D. As long as this folder is there, iReal will try to paste the textures from the TextureImage file to the .asc file or .stl file when opening the .asc project file or .stl project file, even if the .asc and .stl are not the original source files.



8.2.3 Mesh Project

Folder directory structure: .spj file, .stl file, TextureImage folder .

.spj file:

Index file.

.stl file:

The .stl 3D file can be regarded as a 3D model with a single color used for 3D printing and archiving. It also supports to be read and processed in third-party software, for example, importing .stl file to repair or sculpture 3D software to optimize data and save it as a file with the original in the original folder, then opening it in iReal 3D to recalculate the textures.


TextureImage folder:

Same as a point cloud project.

Note:

- ▶ The biggest function of point cloud project is to do model alignment using 2 point cloud projects.
- ▶ When the .asc in the folder becomes .stl, the point cloud project has actually become a mesh project and you can use iReal3D for mapping, provided that the coordinates have not been modified in the project where the .asc file is wrapped into .stl.

SCANNING MODE





Before we start scanning we need to select the appropriate scanning mode according to the object to be scanned, the default factory settings include portrait mode, object mode, no light mode, infrared laser mode, such as not selecting the default use of object mode .

If you often use non-default mode in your daily work, we can manually customize a suitable mode and set it as the mode. To do this, open the settings screen or click the "+" icon in the mode selection bar to enter the mode settings and create [Custom Mode](#).

The four default scan modes are described first below.

9.1 The Default Mode

The three default modes have something in common: [Feature Splicing](#) mode, scanning distance of 200mm-1000mm, resolution of 0.7mm.

Mode	Icon	Performance
Colorful Object Scanning Mode		<p>Colorful obj. file</p> <p>The flashing light is turned on</p> <p>There will be no extension edge in closing small holes</p> <p>Accurate algorithm</p>
Human Body Scanning Mode		<p>Colorful obj. file</p> <p>The flashing light is turned on</p> <p>Default: Close small holes with extension edge</p> <p>Default on Hair Enhancement</p> <p>Non-rigid Fitting Algorithm</p>
LED Off Mode		<p>Object with no color</p> <p>The flashing light is turned off</p> <p>Accurate algorithm</p>
Infrared Laser Mode		<p>Scanning distance of 300mm-700mm</p> <p>Resolution of 0.5mm</p> <p>Marking point splicing</p> <p>Exposure value of 0.5</p>

9.2 Custom Mode

In actual work, the custom mode may be the most used mode. How to add a custom mode?

1. Open the setting menu and click the plus sign, or click the plus sign directly (see Figure 1);
2. Set the *Working parameters* needed;
3. Name the mode (see Figure 2);
4. Choose one icon;
5. Click Save.

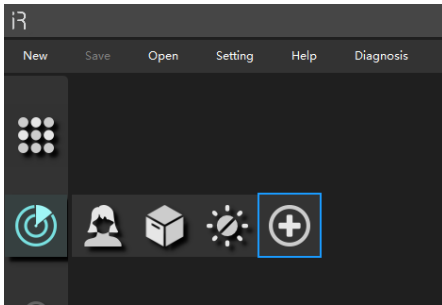


Figure 1

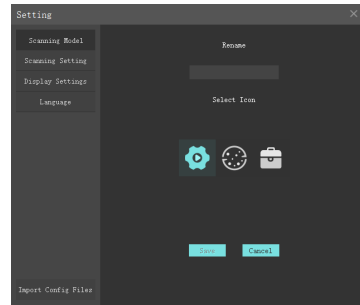
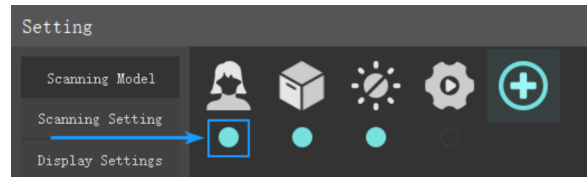


Figure 2

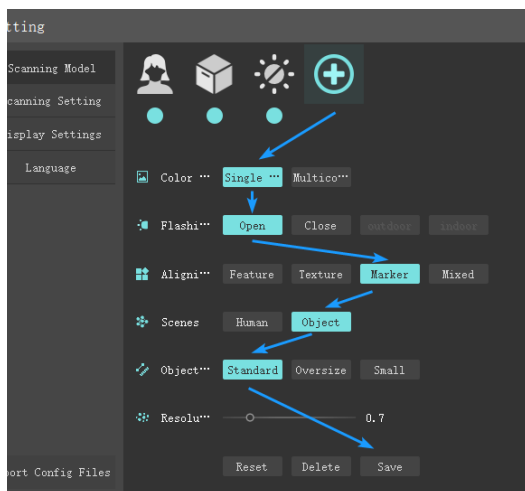
9.3 Home Page Hide

The blue dots below each icon are clickable and

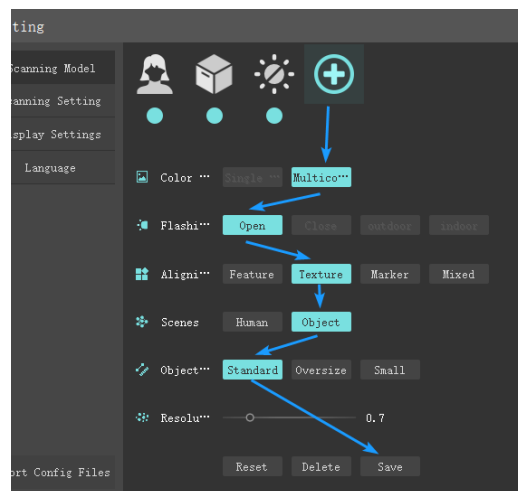
You can hide or show the mode icon on the home page.



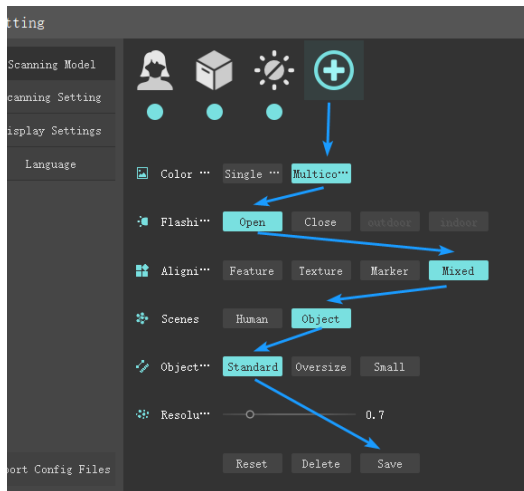
9.4 Commonly Added Custom Mode



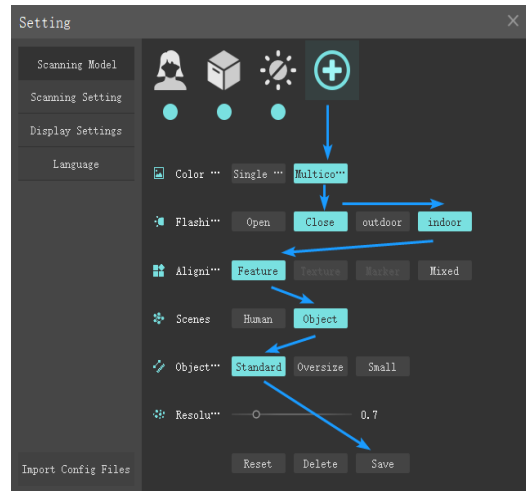
The Mode of Marker Splicing



The Mode of Texture Splicing



The Mode of Mixed Splicing



The Mode of LED off and with Textures

9.5 Working Parameters

Hint: After scanning, the resolution can be modified. The modified model will have an impact on the effect.

Name	Icon	Introduction
Light Source		Infrared Light Source
Color		Whether the scanned model has color, that is, whether the color camera works. If the single color is selected, the model has no color.
Flashing Light		If the fill light is turned on, the pictures taken by the color camera are bright, but the fill light is too dazzling. If the fill light is turned off, the color will be dark, which is suitable for situations where the requirements for texture quality are not high.
Alignment Methods		See the next chapter for the working principle of scanner connection
Scene		<p>Different algorithms are used in different scenes</p> <p>Non-rigid fitting algorithm: the scanned person is hard to keep still for a long time during scanning, such as breathing and blinking, but the algorithm will judge and correct the wrong postures based on the slight movement of the body to avoid scan errors.</p> <p>Accurate algorithm: object splicing is a normal algorithm, which just simply finds matching features for splicing.</p>
Size		<p>Select the right parameters based on the objects' size</p> <p>Standard: Suitable for 50cm-200cm objects</p> <p>Oversize: Suitable for more than 200cm objects</p> <p>Small: Suitable for 20cm-50cm objects</p>
Resolution		The default resolution is different for various object sizes.

SPLICING METHODS

10.1 Quote

Why do our scanners need splicing? Because the scanned object is usually complex, it is far from the complete reconstruction of the object by only imaging, forming point clouds and packaging in a moment. Just like building blocks, you can't tell whether it is a cat or a dog by only one block. Only by continuously scanning can the model complete gradually. This process is called splicing.

In theory, we can keep scanning to get a 3D model, but in fact, there are many factors that prevent us from scanning smoothly. For example, when the object is too smooth or too symmetrical, the data alignment will fail under feature splicing.

Learning about the splicing principles may inspire us. For feature splicing, place some crumpled paper under a plant, so that we can smoothly scan the other features.

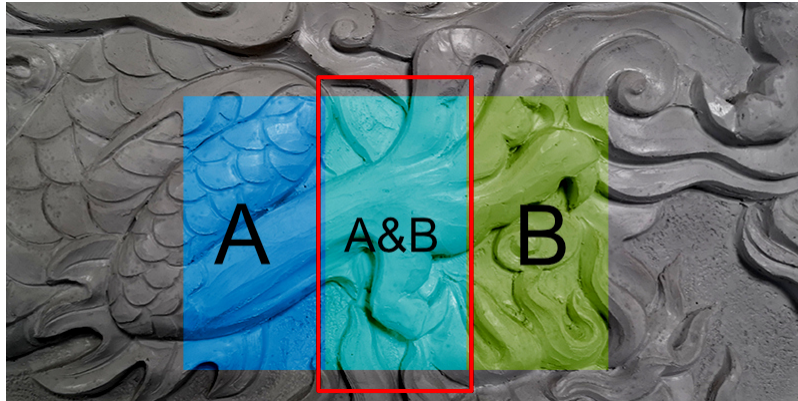
Let's learn about the splicing methods of iReal 2E 3D scanner.

Splicing Methods	Principle
Feature Splicing	If the scanned object has obvious geometric features, such as clay sculptures, the scanner can splice accurately according to the point cloud data in each frame
Texture Splicing	It is similar to feature splicing, the scanner can splice according to the rich patterns, like as paintings
Marker Splicing	With the aid of reflective markers, the scanner makes the splicing by identifying their positions in space
Mixed Splicing	The mixed splicing will combine marker splicing and feature splicing together, just weight differently

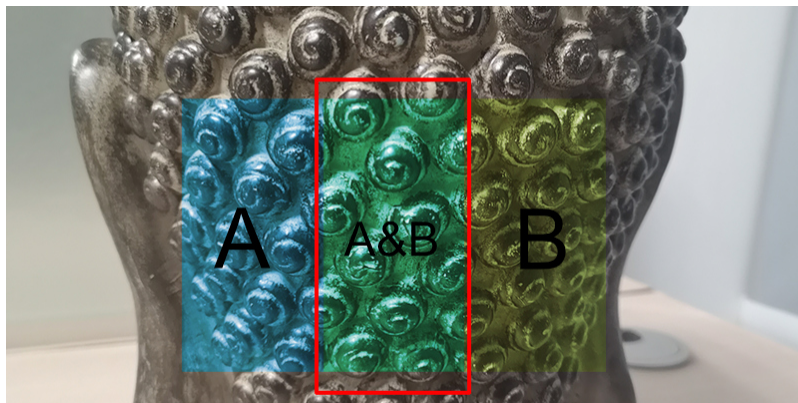
10.2 Feature Splicing

Feature splicing is the most commonly used splicing method, which is used in the three default scanning modes. It is very convenient and simple.

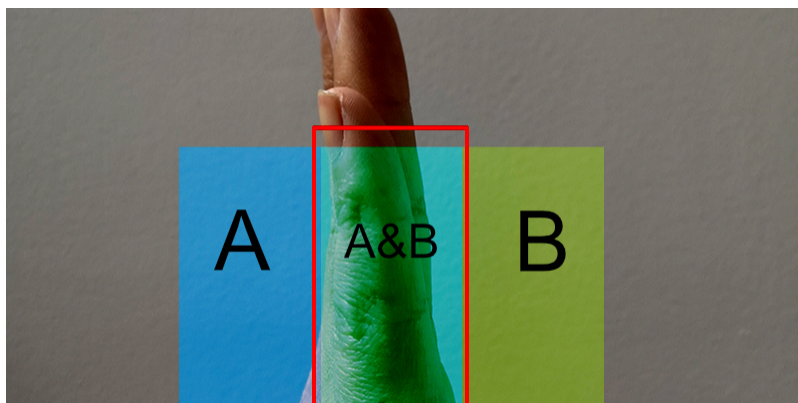
However, convenience also means a higher requirement of the [Scanning Objects](#). In this splicing method, splicing failures, and splicing errors often appear. Here are the various situations:



Rich common features, splicing success



Repeated common features, splicing failure



Less common features, splicing failure



Less point cloud in common features, splicing failure

We should try our best to avoid the above splicing failure, so keep the scanner on the areas with rich features in order to maintain the splicing success status.

Sometimes we want to use feature splicing, but [Scanning Objects](#) has no features on its surface. We can use the principles of feature splicing to create some features to help us scan.

10.3 Texture Splicing

As the name implies, it is a new way of splicing according to the pattern changes on the object.

If you want to use texture splicing to scan a white paper or fabric, it will fail to do that because of no pattern on white paper and repeated pattern on fabric. Also, texture splicing has lower accuracy than feature splicing, and is easier to be wrongly spliced. So generally we won't choose texture splicing for scanning normal objects, while we usually use that for scanning paintings.

10.4 Marker Splicing

The method of using special black and white circular dots to align data is called marker splicing which is advantageous when scanning objects with few features, and with high accuracy, not easy to have scan errors, and good stability, but we need to remove the markers and the glue will be left on the surface. Therefore, it's recommended to be used when we need to obtain accurate 3D models, such as scanning car floor mats and industrial parts.

Important:

- ▶ Marker splicing can be used for obtaining 3D models with higher accuracy such as 3D scanning car floor mats and industrial parts.
- ▶ Markers are not suggested to reuse.
- ▶ The alignment accuracy is 0.1mm/m under markers splicing.

10.4.1 What is a Marker?

A dot that can be recognized by the scanner is called a marker that is generally round, reflective, etc. The following figures show two of the more commonly used markers: normal and magnetic markers. Please

note that the scanner should recognize at least 4 or more multiple markers on a single frame.

Why should I stick so many markers on the object? It can be understood that a single marker is only recognized as a coordinate point in space. There are many such isolated coordinate points, we need three/four adjacent markers to geometric identifiers with high uniqueness. These points can be used for stable and accurate splicing.

Please contact our sales manager to purchase markers officially.



Inside 6 outside 10 reflective marker points



Magnetic marker points

Important:

- ▶ Only see more than 4 markers the scanner will work to splice data.
- ▶ Various angles are needed to scan the markers to ensure recognition accuracy.
- ▶ When scanning markers, they will be shown in 4 colors: white, red, green, and blue. White means the markers have been scanned, red means are being scanned, *green* means the isolated markers, and blue shows markers on the back.

10.4.2 How to Stick Markers

The distance between the 2 markers is from 30mm to 80mm, which shall be determined according to the actual situation. If the change of surface curvature is small, the distance can be appropriately larger, the maximum distance is 80mm. If there are many features with large curvature changes, the distance can be appropriately narrowed, the minimum distance is 30mm. Note that markers shall be randomly distributed.

Posting point notes:

1. Posting point density: the distance between each two marking points is about 6-8cm most suitable;
2. The more irregularly the marker dots are posted, the less likely it is to be misspelled.
3. For non-planar items, it is better to arrange marker points in all dimensions of the item to allow higher accuracy in marker point recognition and stitching.
4. Marker points should not be attached to the edges, otherwise the edge data may be missing when the point cloud is generated.



5. Reflective marker points have two specifications in total: the standard specification is 6mm inside and 10mm outside, and the small marker points are 3mm inside and 6mm outside, because the data are missing where the marker points are pasted, so for small items or items with more geometric features, the small marker points can be used. For large items, you can use the marker point of 6 inside and 10 outside, which has high recognition accuracy.

6. When the marker point is pasted on the circular curved surface, do not bend the marker point to avoid affecting the marker point recognition accuracy.

10.4.3 Add New Markers

When scanning, discontinuous scanning sometimes occurs. At this time, we need to add new markers. After sticking new markers on the object, click Add a Marker to continue scanning. However, it is not recommended to use this function in a large area because its accuracy is not high and may cause noisy points if you keep scanning for a long time.

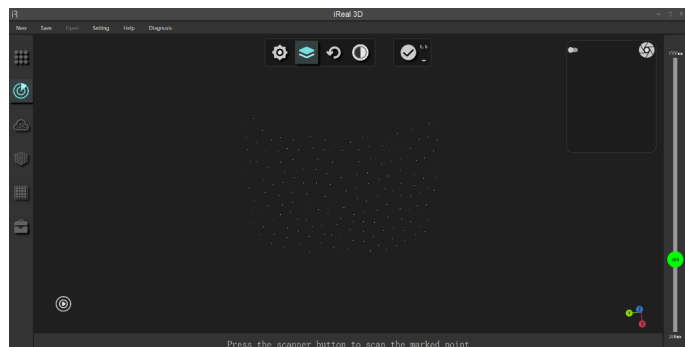
Usage:

1. Click [Custom Mode](#), select the marker splicing, and maintain this mode.
2. Stick reflective marker around [Scanning Objects](#) or on the surface. After that, click Add a Marker to continue scanning.
3. Press the button on the scanner to start scanning the new markers. (No need to scan the other scanned markers)
4. Click Finish. 
5. Press the button on the scanner again to scan the object's surface.
6. Click Finish  again to process the data into a point cloud.

10.4.4 Scan Demo (Take iReal M3 as an example)

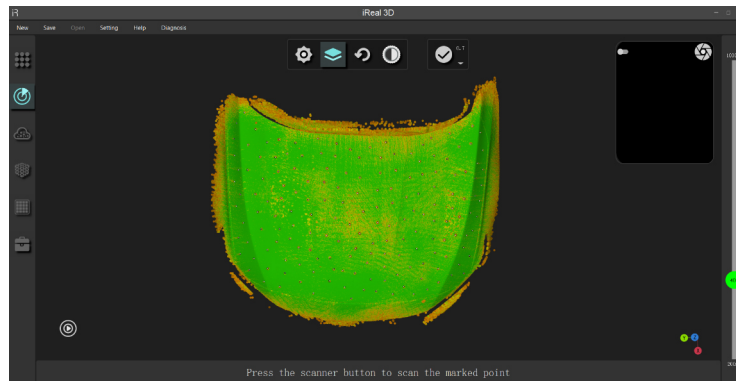
Note: The scanning process of iReal 2E and iReal M3 is the same, the only difference is that 2E adopts speckle to scan while M3 is laser lines.

1. After sticking markers, press the button on the scanner to scan all the markers, and then stop scanning. Click the Finish icon above to achieve fine registration of the markers, optimize markers' accuracy, and eliminate some markers with low accuracy.

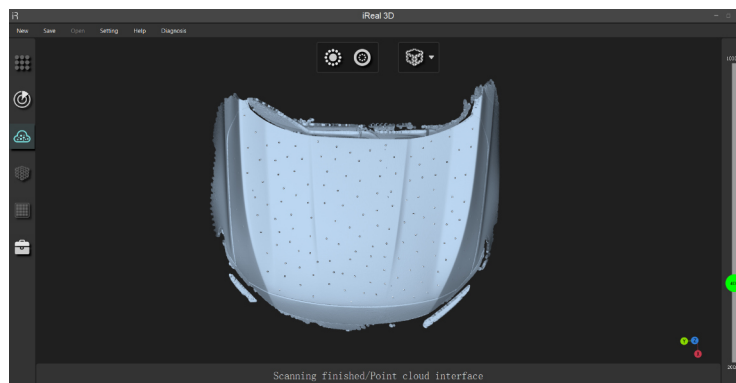


2. After scanning markers, press the button on the scanner again to scan the object surface. The splicing is based on the markers. For markers splicing mode, the scanning process of iReal 2E and iReal M3 is the same, while the only difference is

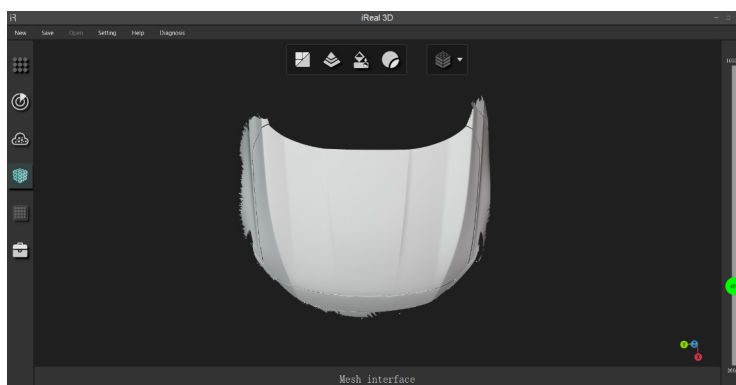
their light sources. After that, click Finish to process the data into a point cloud. The software will enter the point cloud interface automatically.



3. In the point cloud interface, there are operations like deleting isolated points and disconnected components. Click the triangle on the right of the wrap icon to select the holes filling mode. Then click the wrap icon.



4. After the point cloud is wrapped, it enters the mesh interface. After that, you can perform a series of operations such as measuring the perimeter length. The mesh effect is shown in the following figure.



10.5 Mixed Splicing

The mixed splicing will combine marker splicing and feature splicing together, just weight differently. The objects with partial flat, patterns, and rich features are suitable for mixed splicing.

Marker splicing > Feature splicing

When using mixed splicing, cover flat areas in groups of 2 reflective markers. The larger the plane area, the more markers will be stuck.

MATTERS NEEDS ATTENTION DURING SCANNING

11.1 Scanning Objects

11.1.1 iReal 2E Scanning Optimal Materials

1. The matte and light-colored items are easily spliced when scanning.
2. The texture captured will be better if scanning objects with rich colors.
3. It has obvious color differences when scanning a single-colored object using the Colorful Object Scanning Mode.
4. Spray is required for the objects that are black, transparent, and highly reflective.

11.1.2 iReal 2E Optimal Size

Scan objects with sizes above 25cm and below 10m, large objects need to be scanned in multiple lengths and finally stitched together in third-party software.

11.1.3 iReal M3 Scanning Objects

Adopted infrared laser light source, in material adaptability than iReal 2E, has the following scanning advantages:

1. Most black and shiny, reflective items can be scanned without scanning spray.
2. Stronger adaptability to the size of the scanned item (from 5cm).
3. Better detail reproduction.
4. Higher data integrity.

11.1.4 Spray

The scanning spray is often sprayed on the surface of the object before scanning so that the surface presents a good diffuse reflection shape. It effectively improves the scanning data quality, makes the surface black, reflective, transparent, and other objects easier to scan, and obtains high-quality point cloud data.

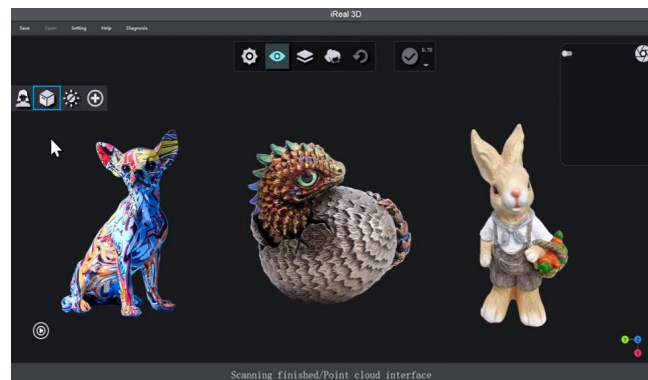


Table 1: Objects need to be sprayed

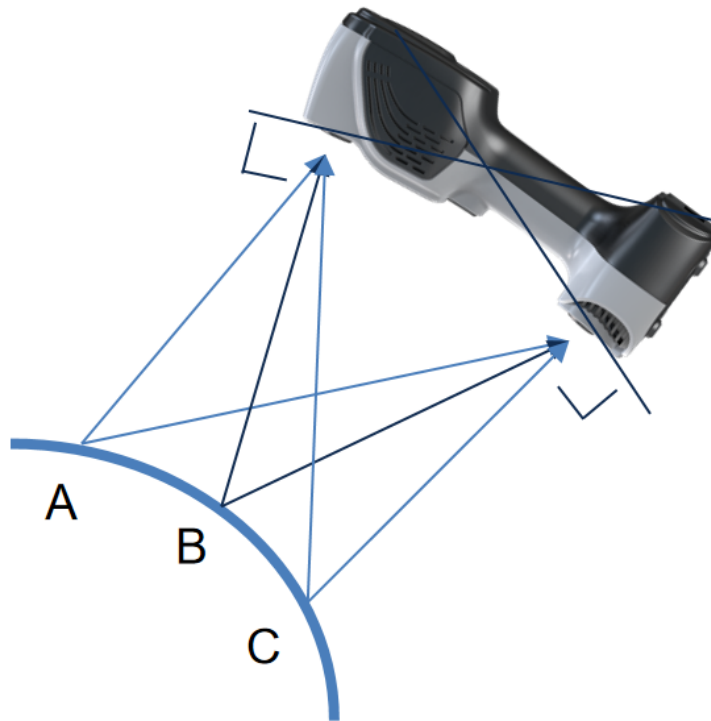
Material	Examples	Reasons
Transparent material	Glasses Transparent Plastic Jelly	As the scanner light will penetrate the glass, the camera cannot accurately capture the position of the reflected light, so the scanner cannot scan it. If it is a translucent object, the reflected light signal received by the camera is insufficient to complete data acquisition. In addition, impurities in translucent articles will affect the reflected light, and the disordered reflected light will lead to incorrect data acquisition.
Penetrating Material	Jade Jadeite	When the scanner light hits the object's surface, it will penetrate into the interior of the object, causing the light position captured by the camera not the object's surface contour, thus affecting the accuracy of the scanning data.
Highly Reflective Material	Mirror Highly Reflective Metal Surface	The camera should have captured the diffuse reflection light after the scanner light hits the object surface, while highly reflective materials such as mirrors will have mirror reflection on the light because the surface is too smooth, making the two cameras of the scanner unable to capture the reflected light at the same time, so they cannot scan.
Dark Black Object	Black Vase Black Leather	Because black objects absorb light, there is less light information reflected to the camera, so the scanning speed will slow down or the data will not come out.

11.2 Scanning Speed

Although the iReal scanner is very fast, remember not to scan it too fast, because you don't know if you have scanned some dead corners. Instead, you need to rescan the object from all angles. Rescanning is also the process of checking the scanning data. You can also use [Data Quality Color Map](#) to view the scanning data. It is better to scan the model green. If the above requirements are not followed, the data may be noisy or orange peel.

11.3 Scanning Angles

Both black and white cameras see best at a near vertical angle above and below the scanning angle (point B in the figure), with the greatest amount of outgoing points, and the least amount of outgoing points in A and C. When scanning objects, especially in dead-end areas, the scanner can be rotated at any angle to ensure that both black and white cameras see the object at the same time.



11.4 Scanning Distance

It's optimal to keep the distance between the scanner and the object from 250mm to 450mm during scanning which can help capture high-quality 3D data. The scanner is based on camera imaging, so there is a problem with depth of field. The scanning distance of the scanner is 280mm - 1000mm, 720mm in total. Sometimes we need to limit the farthest or closest scanning distance to filter objects we don't want to scan. You can use the scanning distance in [Real-time Scanning Parameters Settings](#) to modify it.

11.5 Splicing Lost Retrieval Skills

Under [Feature Splicing](#):

Move back to the previously scanned area and stay for about 2s. If still can't continue to scan, please change to a position with obvious features. When scanning, try to scan the area with many features first,

so that it is easier to splice. If it is not spliced for a long time, you can press the button on the hardware to stop scanning, then aim at the scanned area again and continue scanning.

Under [Texture Splicing](#):

When we don't have any features, we can artificially create features for splicing.

Under [Marker Splicing](#):

It may be that there are few markers, so you can stick a few more on the sparse areas to continue scanning. However, the added marker point accuracy is not high.

11.6 How to Obtain Higher Alignment Accuracy

1. The scanning path needs to form a closed loop using [Feature Splicing](#).
2. Scan the markers with multiple angles under [Marker Splicing](#) mode to have higher scan accuracy.
3. When scanning medium and large objects (such as sculptures and full bodies), try to scan from the middle to the four sides, similar to the pyramid path, from top to bottom.
4. Multi-angle scanning will make feature splicing have stronger constraints and the accuracy is better.

11.7 Out-of-office Task List

Equipment	Parts	Statement	Optional
The scanner in good condition LED lights up Shaking without abnormal noise	Scanner Calibration Plate Cables Power Adapter 6mm/3mm Markers Dongle U Disk	Configuration File >7 days Quick Calibration Success Connected	Power Strip Hub Spare Line Demo Samples The Product Brochure Turntable

HUMAN SCANNING



12.1 Non-rigid Fitting Algorithm

The scanned person is hard to keep still for a long time during scanning, such as breathing and blinking, but the algorithm will judge and correct the wrong postures based on the slight movement of the body to avoid scan errors.

12.2 Scanning Setting

1. When scanning the human, please select the “Human Body Scanning Mode”, and keep an eye on whether the [Hair Enhancement](#) is turned on. You can select different resolutions next to the Finish icon in



advance. The default and recommended resolution is 0.7mm.

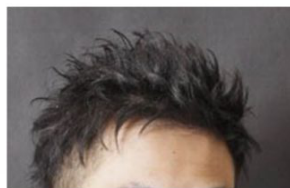
2. When the resolution is 1.0mm, the scanning details are relatively rough, which is suitable for users with low requirements for details. And this resolution is also very suitable for beginners, because it is easier to get started.

3. When the resolution is 0.2mm, the scanning details are fine, which is suitable for users with high requirements for details. Please note that the data at this resolution will be large. The point cloud will be 30 million or more, generally a computer cannot scan a person completely at 0.2mm. So 0.2mm is only suitable for scanning half of the body, face, hands and other relatively small parts.

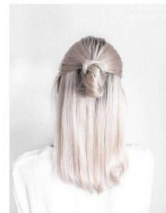
12.3 Hair Requirements

You can apply dry cleaning shampoo or colored spray on your hair, or wet your hair with water to put your hair up, which will help to scan.

Observe the following hairstyles to check which one is suitable for 3D scanning.



Short Hair, Discrete Hair such similar hairstyles are hard to scan.



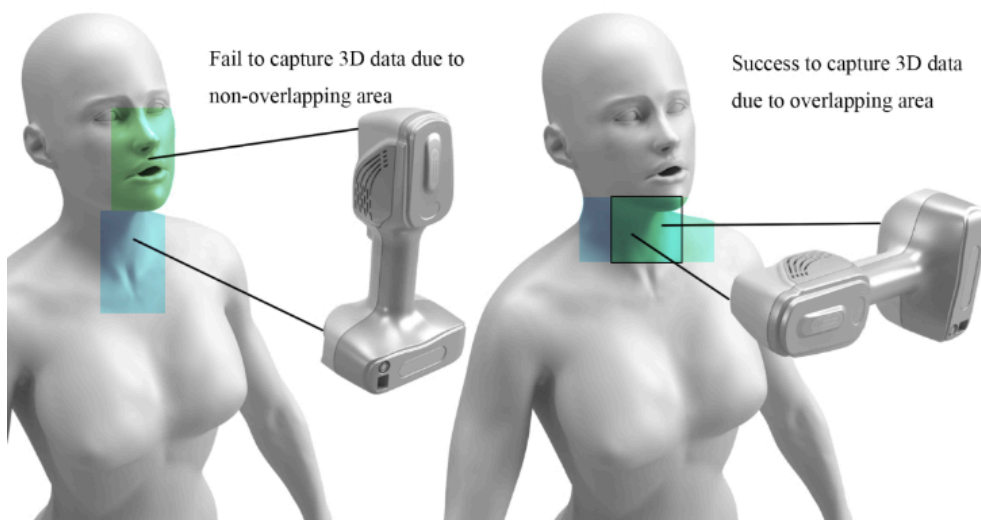
Hair needs to be stitched together on the side of the body, so try to bundle it up or tie it up for better scanning. (Right picture's hair style is easier to scan than left picture's)

These types of hair are easy to scan

12.4 Dead Angle Scanning

The chin belongs to the dead angle, which can be scanned by the following methods.

Illustration of scanning angles for neck and chin



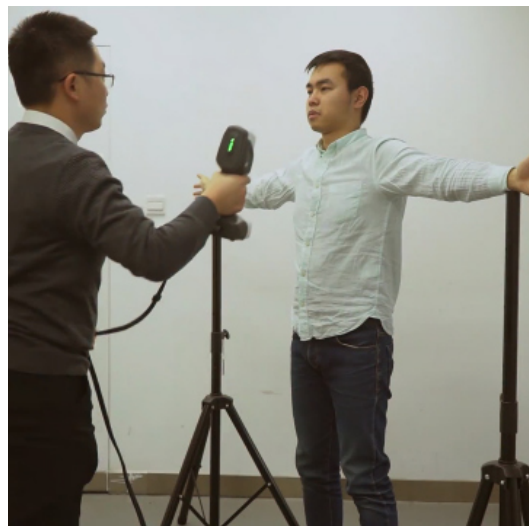
12.5 Scanning Posture

12.5.1 Scanned-Human Requirements

1. If the scanned person wants to open his eyes to scan, his eyes must focus on one place because the eye movement will also drive his body to rotate.
2. Finger holding together is better than finger splaying for scanning. If finger splaying, on the one hand, the finger is easy to shake, leading to wrong splicing; on the other hand, it is difficult to scan the finger seam completely. You have to change various angles to slowly fill that seam, which will cost a longer time, while the model may not be able to persist.
3. Assistive devices can be used for special postures, such as A-Pose and T-Pose, to fix the human body so that the body won't change or deform during scanning.



A-Pose



T-Pose

12.5.2 Scanning-Human Requirements

1. Before scanning, tell the person being scanned not to move as much as possible and look straight ahead.
2. When scanning, if the scanning amplitude is large, it is easier to cause stacking/splicing failure and more noise.
3. It is better for people around to keep quiet because your conversation will easily cause mood fluctuation of the person being scanned, which will obviously increase the body undulation.
4. When scanning the arms, it is much easier to scan with the arm close to the body than the posture of hands on hips because the latter needs to scan the inside of the arm, increasing the scanning difficulty and time.
5. When scanning the arm/leg in a specific shape, it is difficult to maintain that posture, so you need to complete the scanning at one time, and then not scan again.

12.6 Scanning Distance

1. When scanning the face, the scanning distance should be around 400mm, because of good quality at a short distance.
2. When scanning the head, it is better to control the distance between 500-700mm, because we need the features near the head to splice. Standing on a chair to scan the hair is a way if we need the features near the head to splice. Standing on a chair to scan the hair is a way if it is hard to scan the top of the person being scanned with a standing posture. Should keep careful!
3. If the requirements for other parts are not high, 450-600mm is the best distance or you can also get a little bit further.

12.7 Object Not Suitable for Scanning

1. Not to scan objects that are easy to deform such as skirts, tulle, and other objects that are easy to float.
2. It's difficult to scan reflective, mirrored, and light-transmitting items, e.g. glasses, watches, jewelry, decorations, and black and bright leather shoes that should be taken off before scanning.
3. Articles that are thin/small/sharp/long and easy to float with breath/shake should be taken off or covered before scanning. It is troublesome to repair the drawings in the later stage.

12.8 Scanning Order












The scanning path needs to form a closed loop to increase the accuracy of feature stitching. The whole process should be smooth and fast so that the scanning effect is better. For parts that are easy to change, try to finish scanning at one time, better not to rescan. For example, you can scan the head first, then scan other parts, and then do not scan the head again in subsequent scanning, because the head may be displaced from the body, and the scanning may be overlapped again.














Recommended scan path for full-body portrait: Start → chest → front face → ear → side face → forehead and bangs → chin → abdomen → left front leg → abdomen → right front leg → abdomen → right front arm → right side arm → left front arm → left side arm → left back arm → right back arm → right back leg → left back leg → back of the head → top of the head → end.

TOOL BAR

The toolbar accompanies our entire workflow, from scanning to post-processing to exporting.

Let's introduce them one by one.

Interface	Icon	Name	Description
Scan		Real-time Scanning Parameters Settings	Based on your scanning requirement, change the scanning parameters
		Filed of View	On: 3D view moves with the scanner Off: 3D view does not move with the scanner
		Data Quality Color Map	Red: point cloud quality is not high Green: point cloud density meets the current resolution requirements
		Hair Enhancement	Better scanning of hair after activation
		Retract frame	It can automatically choose the wrong data and manually delete it when having scan errors
		Finish	Finish scanning
Point Cloud		Isolated Points	The isolated points around the model can be found and deleted manually
		Disconnected Components	The area separated from the main body can be found and deleted manually
		Wrap	Process the point cloud data into a mesh
		Mesh Simplify	Reduce the current mesh data to 60%
		Mesh Refine	Increase the current mesh by 3 times

Point Cloud		Manual Hole Filling	Manually click the boundary to fill holes according to curvature
		Matcap	Change the model display material
		Mapping	Map according to photos, no map in LED-Off mode or single color scanning
Mapping		Texture Adjustment	Adjust the hue and saturation and etc
Tools		Import to GOM Inspect	One-button connection to GOM Inspect
		Model Alignment	Align 2 point cloud files or projects to a point cloud file or project
		Marker Point Stitching	Two-point cloud projects are stitched together into one point cloud/project
		Measuring Girth	Draw a line to measure the girth
		Select Surface	Select surface and calculate its area
		Select Point	Select 2 points to calculate their distance, select 3 points to calculate their angle
		Magic Wand Tool	Select an area based on its color, and calculate its area
		Create coordinate system	Select an angle, click this icon and export its coordinate
		Clear	Clear data

13.1 Real-time Scanning Parameters Settings

Feature Value


Range: 0-100; Default: 5.

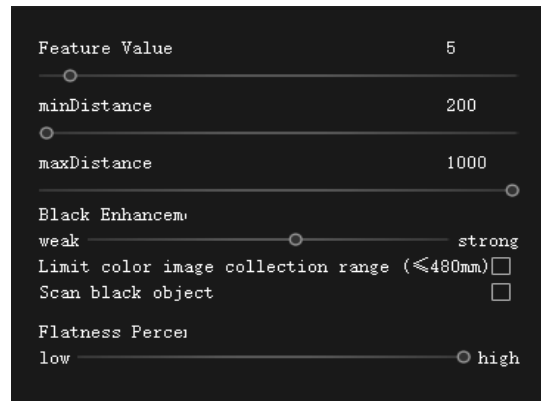
This parameter only affects the splicing success rate in [Feature Splicing](#) mode.

The programmer evaluates all objects to distinguish between strong features and weak features. If the value is adjusted to 30, only features that reach 30 will participate in splicing, then weak features below 30 will be ignored. Generally, weak features are easy to be identified incorrectly, leading to splicing errors.

The increase will improve the accuracy of splicing, but also make the splicing harder.

It can be used in feature/mixed splicing.

Observe the real-time feature value  in the lower left corner of the status bar to learn more about common objects' feature value.



Scanning Distance

Value: 280mm-1000mm, 720mm total.

This parameter is set to control the scanning depth of field within a reasonable range. It can ensure better details while scanning smoothly, and also limit the farthest/nearest scanning distance to filter the surrounding debris.

The closer the distance is, the better the detail will be, making more areas turn green under the function of [Data Quality Color Map](#), but also reducing the splicing smoothness.

The farther the distance is, the poorer the detail is, making more areas turn red under the function of [Data Quality Color Map](#), and the splicing will be more smooth.

In any mode, we can click the Real-time Scanning Parameters Settings to change the scanning distance.

Add New Markers

Hidden by Default.

This parameter is only for the [Marker Splicing](#) model. After activation, it can identify the new markers to make splicing more smooth.

Black Enhancement

This parameter affects the amount of black object's point cloud. The higher the value is, the easier it is to scan black objects. Therefore, if scanning black objects, please adjust this item in time.

Limit Color Image Collection Range

Inactive by default. Turn on the function to allow the color camera to work under the appropriate scanning distance, avoiding obtaining poor-quality images.

When it is turned on, you can make the color camera take pictures only at the right distance to prevent getting poor-quality images and affecting the whole model. When color is selected as the color model, the color of the object will be captured only when the scanning distance is 250mm-450mm, then the 3D window real-time scanning screen will be blue, too far and too close will have no mapping, and the 3D window real-time scanning screen will be black, this option requires a high scanning technique, check it according to the actual need.

This parameter has higher requirements for scanning technique, please select based on your real situation.

13.2 Filed of View

On: Default

The 3D window moves with the scanner so that during the scanning, we can quickly know where we are scanning.

Off:

The 3D window will not move during 3D scanning that is suitable for targeted scanning in the final complementary scanning phase so that the focus will not be affected by the automatic window movement.

13.3 Data Quality Color Map

Why do we have Data Quality Color Map

We need to know that to be rich in detail, you need to scan close up and for a long time.

It's easy to see whether you get too close because it will fail to scan. But how can we know the standard of "long-time scanning"?

At this time, the Data Quality Color Map can help us check the 3D scanned data.

How to use Data Quality Color Map?

We know that after scanning you still can change the resolution. For details, see [After Scanning](#).

After changing the resolution, don't rush to click Finish. Click the Data Quality Color Map to check that the whole data is covered by the green to red chromatograms. Based on this, we can decide whether to continue scanning.

1. With more red areas: The data quality is not good and the point cloud density is lower than the current resolution.
2. With more green areas: The data quality is good and the point cloud density is the same as the current resolution.

After wrapping, the green data is good, while the red data will be orange peel-like.

Hint:

When scanning humans, please do not use Data Quality Color Map. Because people will move, the data will be double-layer. During real-time scanning, the longer time you scan, the more red data you will see.

The relationship between Data Quality Color Map and resolution

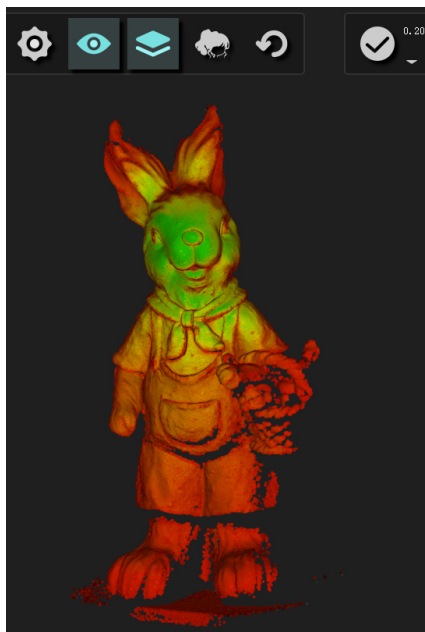
When opening the function, we can easily find that the same 3D data will be shown in different colors under various resolutions.

The data shows a few areas with green under the resolution of 0.2, while the area will increase when changing to the resolution of 1.0.

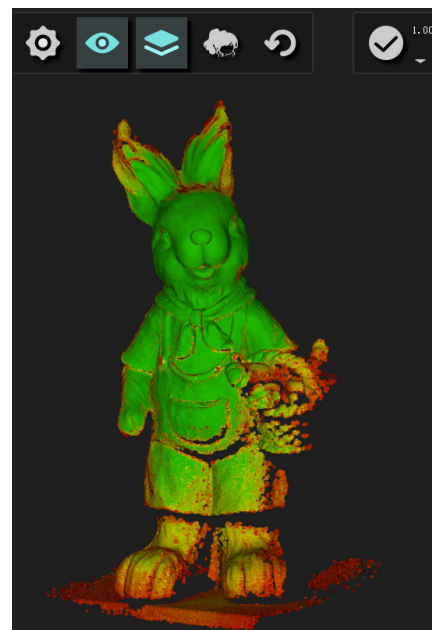
This is because the higher-resolution model has higher requirements for details, so the areas that could barely meet the standard before will instantly fail to meet the requirements.

Summary:

So we can judge whether the data quality is qualified under the target resolution based on the color values provided by the chromatographic display, if not, just open the scanner and continue scanning.



0.2mm resolution



1mm resolution

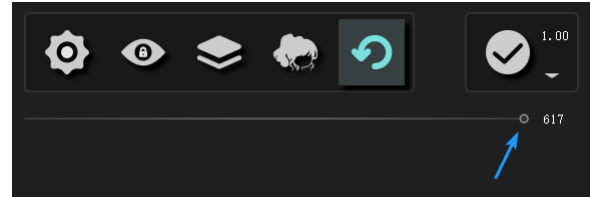
13.4 Hair Enhancement

In human body scanning mode, it is activated by default.

Human hair is the most special, it's thin and messy. In the past, there were few scanners that could scan hair. Even now, not all hair is suitable for scanning. Don't forget to use the function of [Hair Requirements](#) when you want to scan hair.

13.5 Retract Frame

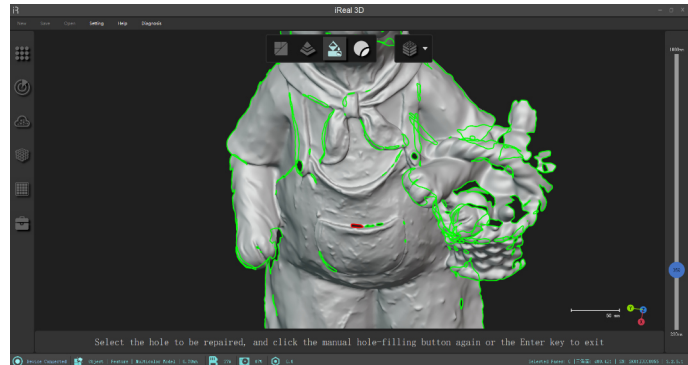
When there is an error in splicing, you can stop scanning, click the retract frame icon (shown right), pull the ball to the left, and recall up to 100 frames each time. And we can withdraw continuously, even back to the scanning starts.



13.6 Manual Hole Filling

After activation, mouse over the green hole, the hole will become red and the hole will be filled automatically according to the curvature after clicking, if you are not satisfied with the effect of filling the hole, you can press Ctrl+Z to withdraw.

Press Enter or click the Manual Hole Filling icon again to exit the mode.



13.7 Wrap

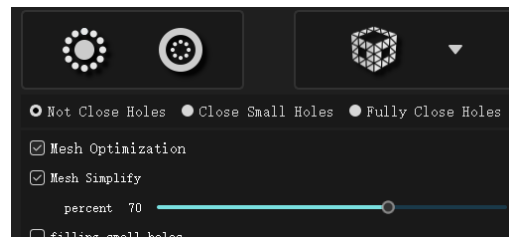
The encapsulation function is subdivided, including Hole Patching Method, Mesh Optimization, Mesh Simplification, and Small Hole Patching.

Way to fill the hole: Non-Closed, Semi-Closed, Fully Closed three ways.

Grid Optimization: Smooth Triangle Grid, Uniform Triangle Grid Size.

Mesh Simplification: reduce the number of triangular mesh faces while maintaining model detail.

Fill small hole: check the box and the hole perimeter adjustment axis appears, you can set the hole size to fill the hole.



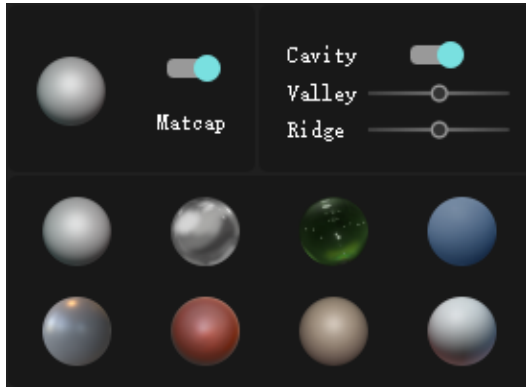
13.8 Matcap

The Matcap allows you to change the material display of the .stl model. 8 different materials enable the 3D model to be displayed in a more varied and more interesting form. By adjusting the valley and ridge, the model can show different artistic details and be more three-dimensional.

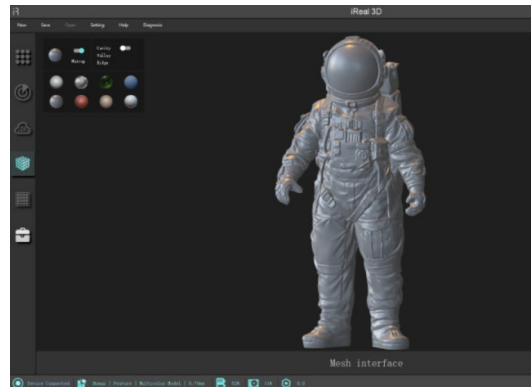
Cavity: Off by default

Ridge: make the concave part of the 3D model darker;

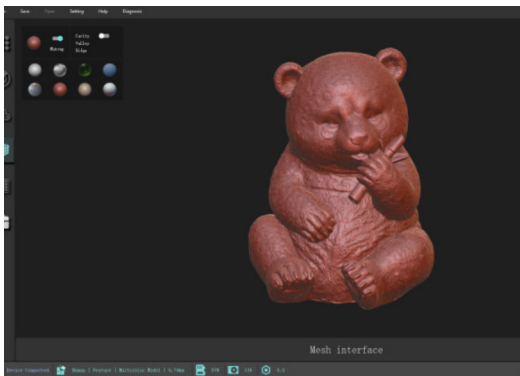
Valley: make the convex part of the 3D model brighter.



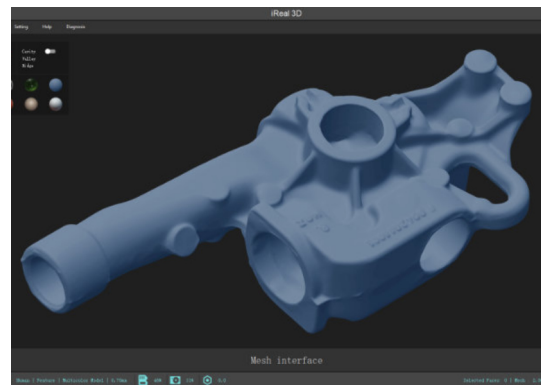
Matcap Type



Lime Material



Laterite Material



Matte Blue Material

13.9 Texture Adjustment

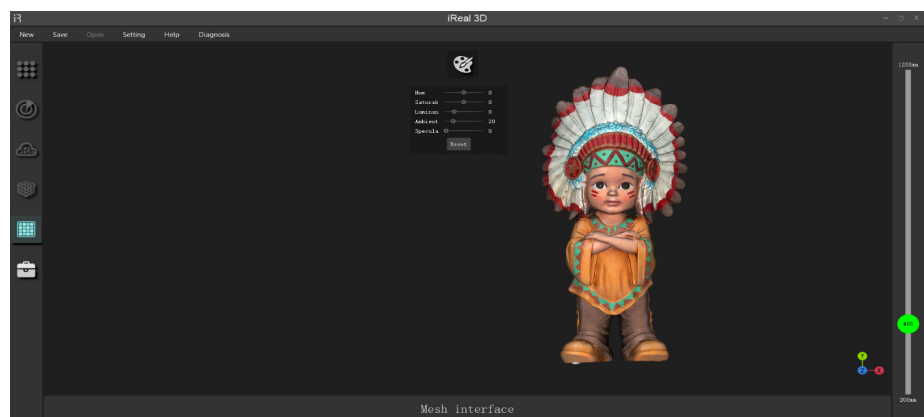
Hue: Change the hue of the texture itself, such as changing it from red to blue. You can adjust the value slightly when the color is distorted.

Saturation: When the saturation is 0, the texture is black and white; when the saturation is too high, there will be noise.

Luminance: Increase the brightness of the texture as a whole.

Ambient: Ambient light brightness, texture itself has not changed.

Specula: Change the reflective intensity of the model. The first three will change the texture itself, the rest two won't.

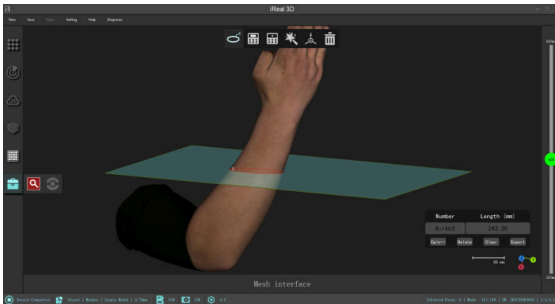


Note:

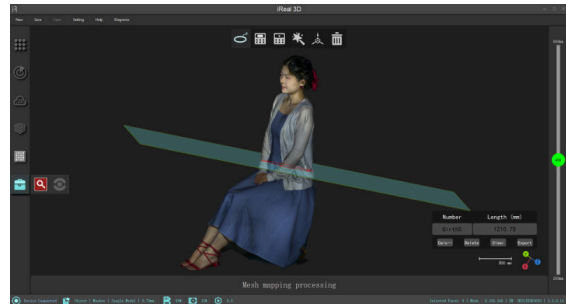
The three options Hue, Saturation, and Brightness affect the mapping effect of the model, while Ambient Light and Specular Light are only visible in the software.

13.10 Measuring Girth

Draw a line on the model (left-click the mouse), and automatically generate a cross-section, which can automatically calculate the girth of the cross-section. For example, draw a line on the waist/head, and the corresponding waist/head perimeter can be automatically calculated.




Measure the arm perimeter



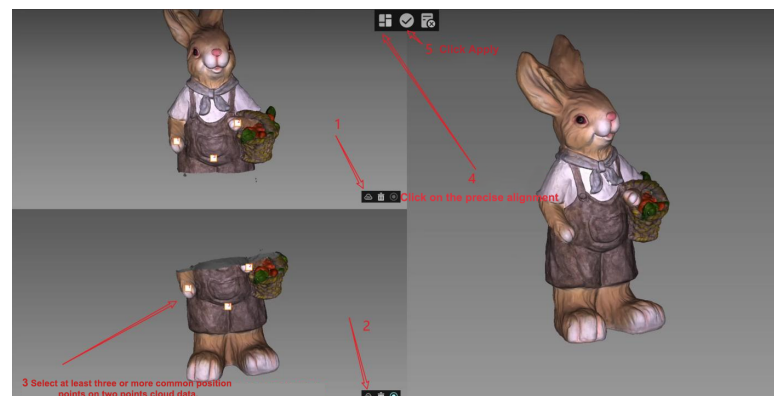
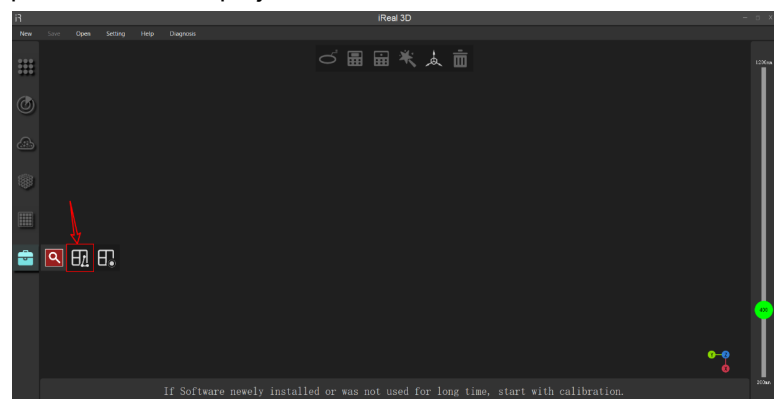
Measure the waist perimeter

13.11 Model Splicing - Feature Splicing

Align 2 point cloud files or projects to a point cloud file or project.

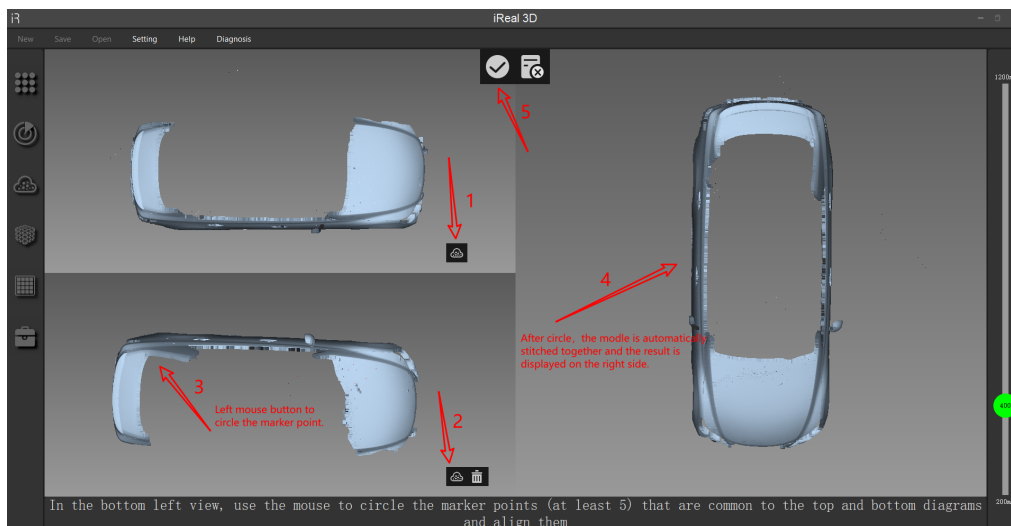
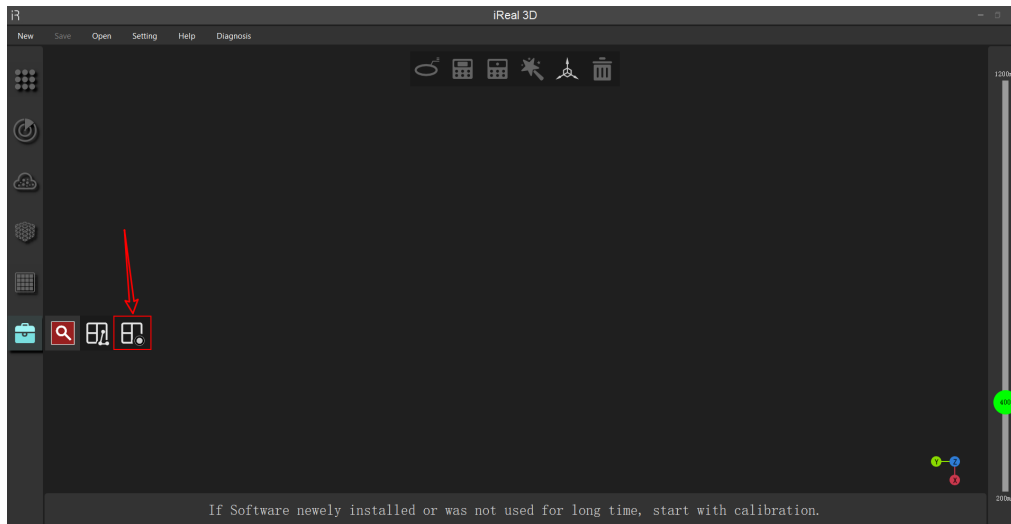
1. Prepare point cloud A&B, open the model alignment interface (Shown below).
2. Import them to the left windows.
3. Find more than 3 common points between A and B. If you click wrong, you can delete them and try again.
4. Click the Fine alignment button  first and then click the Finish button.

Video: How to do data stitching completely and flawlessly [Click to watch](#).

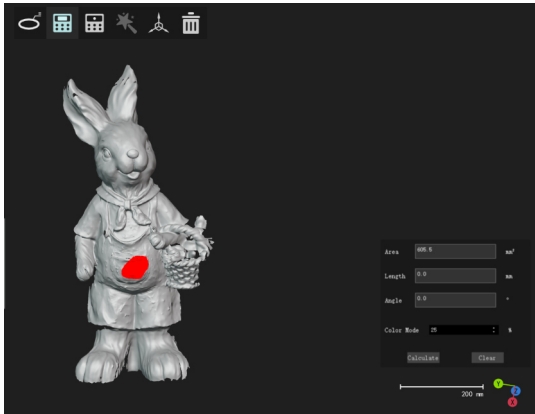


13.12 Model Splicing - Marker Splicing

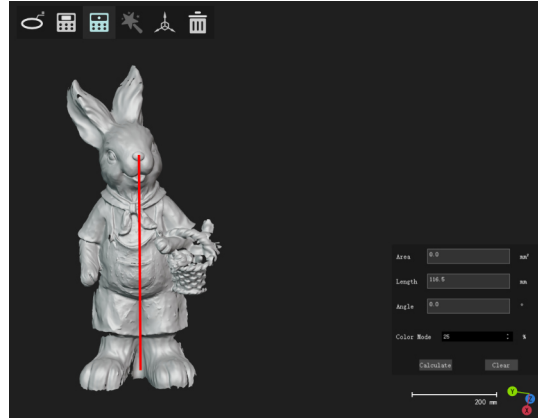
1. Combining two point cloud projects into one point cloud/point cloud project.
2. Prepare point cloud project A and point cloud project B, and open the model stitching interface (as shown below).
3. Into the two windows on the left, respectively.
4. Left mouse button to select at least four common marker points.
5. Click Finish.



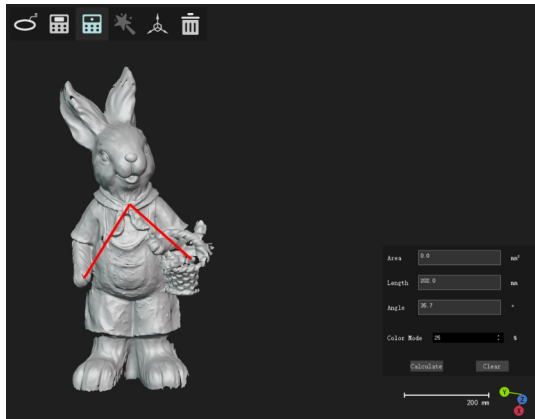
13.13 Select Surface, Point, Magic Wand Tool



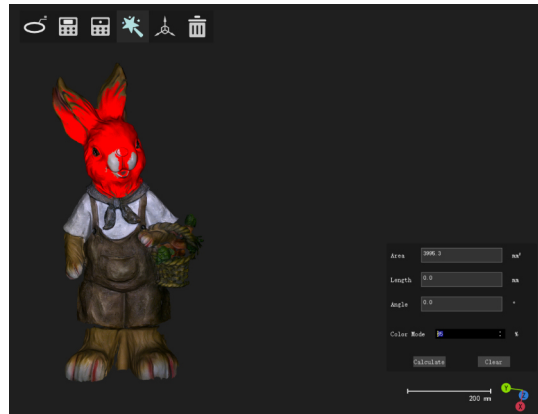
Select Surface: Calculate its area



Select Points: Select 2 points to calculate their distance



Select Points: Select 3 points to calculate their distance and angle



Magic Wand Tool: Select an area based on its color

RIGHT-CLICK MENU

In the 3D window right-click menu is a tool we often use that can greatly help us to complete the scanning work faster. Now we will take you to know the specific functions of each command.

14.1 Delete

Shortcut key: Del

Purpose: During the scanning process and data processing, we often have to remove some redundant data in order to generate a cleaner model.

14.2 Best View

Function: Beginners will be a bit rusty when operating 3D models, and maybe you don't know what to do next when the model is found outside the view. Right-click the best view to quickly place the model in the middle of the 3D window.

14.3 Setting the Center of Rotation

Function: Manually select a point to set the axis at which the rotation will take place.

14.4 Resetting the Center of Rotation

Function: Reposition the center of rotation in the original position.

14.5 Grid Selection

Selection of visible: selection of only the data of the triangles on the front side of the 3D window.

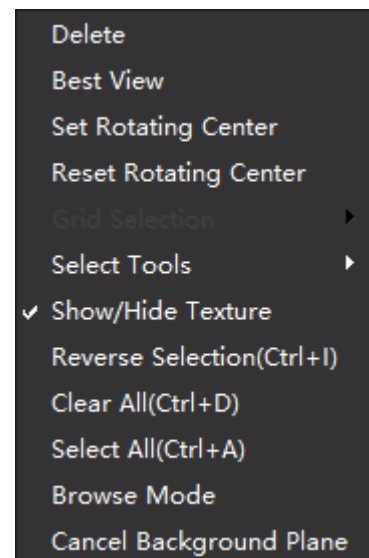
Select Through: All of them, including front back and hidden triangle data.

14.6 Selector Tool

Lasso Selection: Makes the selection tool act like a lasso to select irregular areas.

Rectangle selection: makes the shape of the user's selection in the 3D window appear rectangular.

Discounted selection: Define the area of an irregular polygon by clicking on a finite number of points.



Ellipse selection: Makes the shape appear elliptical when the user selects it in the 3D window.

Circular selection: Makes the shape appear circular when the user selects it in the 3D window.

14.7 Select Object

Select Object: Select the operation object, including two kinds of point clouds and marker points; you can switch the object according to the demand.

Marker Point: When you select a marker point as the operation object, you can set the background plane, and delete redundant marker points.

Point Cloud: When you select a point cloud as the operation object, you can perform operations such as deleting the point cloud.

14.8 Show/Hide Textures

Shortcut key: Ctrl+Q

Function: When scanning and post-processing, you can show or hide the texture back and forth to see the model.

14.9 Quick Selection

Invert selection: Selects those remaining unselected point clouds or triangle meshes.

Deselect all: Deselect all point clouds or triangle meshes.

Select all: Select all point clouds or triangle meshes.

14.10 Rowse Mode

Function: Let the model rotate by itself to show, you can drag the model to adjust the rotation attitude at will.

14.11 Background Plane

In Marker Splicing mode, after scanning markers, left-click on more than 4 markers and then create a background plane to automatically filter the background plane.

MODEL POST-PROCESSING

15.1 Steps of Repairing iReal 2E Scanned Model

Preparation:

iReal 3D & Gom Inspect / Geomagic Wrap

Scan the color model and save it as a Mesh Project file.

Process:

1. Open File Explorer and import the stl files from the Mesh Project folder into Geomagic Wrap or Gom Inspect.
2. Some common steps to simply repair the model: Fill All, Mesh Doctor, Remove Spikes, and Defeature.
3. Replace the .stl (Binary) with your repaired one. Also you can copy the original .stl file in case of needs.
4. Open iReal 3D, import >> Mesh Project.
5. In the Mesh interface, click on the Mapping.
6. Go to the Mapping interface, then save the .obj file, so that the model is more complete and has a mapping.

15.2 Replace the Laser Scanned Model

Preparation:

iReal 3D & Gom Inspect / Geomagic Warp

.stl file

Process:

1. Similar with Map after repairing iReal 2E scanned model.
2. Replace the original .stl model with a better model (such as the ZBrush carved model and the laser-scanned model) and then map it.
3. It should be noted that the new model and the old model should be completely aligned ¹. Only in this way, the position will not be disordered when mapping. The alignment methods vary from software to software. You can use software such as Geomagic Wrap / Gom Inspect to align.

15.3 Human Body Model Repair

Model Result Requirement:

iReal 3D & ZBrush & Geomagic Wrap & Blender

No holes, flat soles, no non-manifold 2 Mesh, clear facial features, accurate color

Process:

1. In human body scanning, the floor will stick together on the bottom of the foot. We use Wrap to delete it: Wrap >> Polygons >> Trim with plane > Definition: three points >select three points on the floor>> Apply > OK.
2. Hole repair is relatively simple: Wrap > Polygons >> Fill single >>The sole plate uses flat to fill the hole, and the rest parts use curvature to fill the hole.
3. Use the Mesh Doctor to analyze the model as a whole, including non-manifold edges.
4. Save the .stl file and import it into the ZBrush software. The steps are as follows: Tools >> Import >>Select the .stl file>>Drag and drop it in the 3D view with the left button>> T >> Tools >> Geometry Editing > Dynamesh >>Select the resolution and click again>>Sculpt the five features and body>>Blank position ctrl+Left click and drag fast Dynamesh>>Export the stl again.
5. Map after repairing iReal 2E scanned model.
6. After Texture Adjustment, save the .obj file.
7. Use Blender to repair the texture, the steps are: File >> Import >> Wavefront (.obj) >> Select the obj file >> Select the model >> Texture drawing >> Clone tool >> Save the texture separately when finished.

Hint

Learn more about Geomagic Wrap crop patching and Blender texture drawing on the Internet.

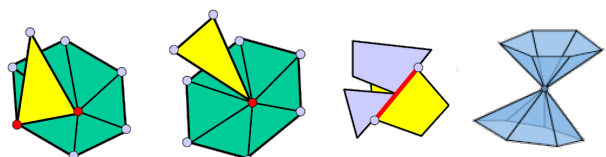
Notes

[1] Alignment: The overlap of two different models in the same spatial coordinate system, i.e., the two models have the same coordinates. Because the mapping coordinates in the scanning project are based on the old model before replacement, so when the old and new models are aligned, only the new model can find the old model.

[2] Most of the algorithms in triangular mesh surfaces are based on the manifold mesh, which is defined as follows:

1. A lattice edge shared by one or two lattice triangular face pieces;
2. A ring of neighborhood triangles of a mesh vertex forms a closed or open sector.

All triangulated surfaces that do not meet the above definition are non-manifold meshes, and several examples of non-manifold meshes are given below:



Ending Words



Finally, we wish you all the best in using it! Please contact us if you have any questions.



 **IREAL 3D**

<https://www.ireal3dscan.com/>

0571-85370380