

POP 2 3D SCANNER

User Manual

V 1.0



POP 2 3D Scanner

Visit our official website www.revopoint3d.com for the latest software and documents.

⚠ The operating temperature range of this product is 0°C to 40°C (32°F to 104°F). It does not meet military, industrial or even the full commercial operating temperature range. Operate the product appropriately and only in situations limited to this temperature range.

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Product Profile

Introduction

The newly developed POP 2 3D scanner has gathered functions of a handheld 3D scanner and a desktop 3D scanner, bringing together the company's latest scientific research results. It adopts self-developed 3D camera hardware technology and high-speed intelligent chip, which contributes to a higher performance and directly outputs accurate depth information of an object.

The core hardware of POP 2 applies the principle of binocular + Micro-structured light, and with the help of the proprietary micro projecting chip, POP 2 ensures fast acquiring high-accuracy (up to 0.1mm) 3D point cloud data. And it supports texture scanning to directly generate vivid 3D models for color 3D printing. As of intelligent algorithms, POP 2's built-in high-performance 3D calculation chip can effectively ensure smoothly scanning without stalling even if it is used with an ordinary computer.



Specifications

Product Name	3D Scanner
Product Model	POP 2
Technology	Dual camera infrared structured light
CPU	Dual core ARM Cortex-A7
Single capture accuracy¹	Up to 0.1mm
Single capture range	210mm x 130mm
Working distance	150 ~ 400 mm
Minimum scan volume	20×20×20 (mm)
Scan speed	Up to 10 fps
Light source	1 class infrared Laser
Alignment	Feature, marker and color
Press button	Yes
Output format	PLY, OBJ, STL
Texture scan	Yes
Special object scanning	For the transparent and highly reflective objects, please use scanning spray powder.
Outdoor scanning	The cover is needed to avoid interference of intense light
Scanner weight	195g
Dimensions	154.6 x 38.2x 25.6 (mm)
Printable data output	Able to export 3D model directly to 3D printing
Required computer configurations	Windows 8\10, 64-bit, Android, iOS, MAC
Wi-Fi	2.4GHz
Connector Type	Micro USB
Note	*The aforesaid accuracy is acquired in standard lab environment, which might vary subject to actual operating environment.

Packing List



POP 2



Tripod



Quick Setup Kits



USB A / C



Phone Holder



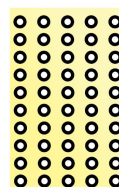
2-in-1 Mobile Cable



Plastic Sheet



Warranty Card & Inspect Certificate



Markers



Blu Tack



Sample Sculpture

Hardware Connection

Laptop Connection



*The display screen resolution recommended is 1920×1080.

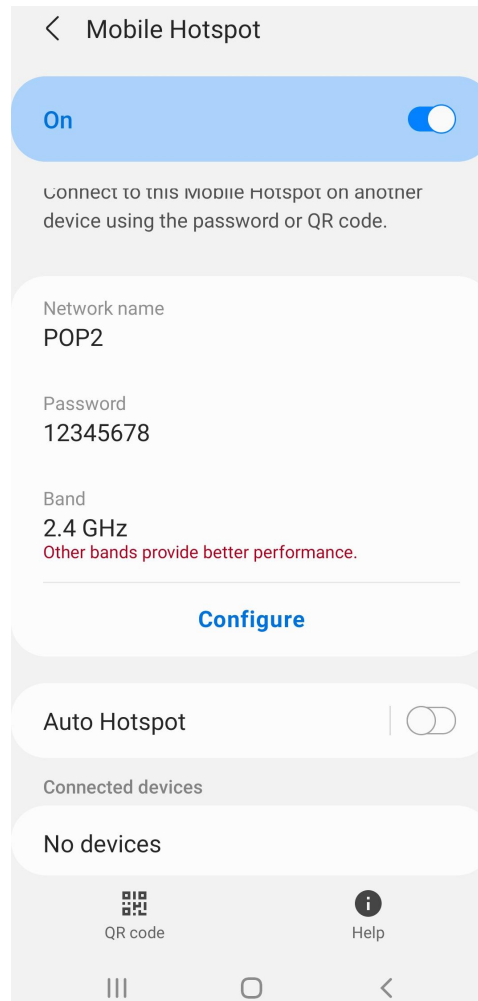
Make sure the POP 2 scanner is connected to a **USB 3.0+** port, because USB 2.0 will not supply sufficient operating current. An indicator of this is repeated power resets and lost connections.

Wireless Connection to a Smartphone

A smartphone can provide a Hotspot for the POP 2 scanner. The POP 2 scanner should be powered via a battery/power supply rated for 1 amp, minimum (2 amps is better).

Set personal hotspot on your smartphone:

Device Name: POP 2
Password: 12345678



How to revise the name and password

1. Download Handy Scan app at www.revopoint3d.com/download/pop/ and install in a PC;
2. Open “Handy Scan”, Click “Device Info” -> “Wi-Fi Setting” -> Input a name and a password as needed.

***Letters, numbers and the underscore are the only characters allowed in the password.

⚠ The POP 2 3D scanner can only connect to one device at a time. If the POP 2 is already connected to another device, it will not connect to your phone’s Hotspot.

Indicator Legend



Green:
Working Normally



Projector in red:
Normal

⚠ Do not look at the front light of the projector closely for a long time! Refer to Standards for Class 1 Lasers for details.

Software Installation

System Requirements



Windows: Win 8/Win 10
Memory: ≥4G



Mac: Mac OS 10.15 and above



Android: ≥Android 6.0
Memory: ≥4G



iPhone: iPhone 6s and all models after;
iPad Pro, iPad & iPad Air: 3rd generation and above
System Version: ≥ iOS 11

USB mode or Wi-Fi Mode Support

	Windows	Android	iOS/iPad	Mac
USB Mode	YES	YES	TBD	YES
Wi-Fi Mode	YES	YES	YES	YES

Install Software

Windows 8/10: The Handy Scan installation package also installs Handy Studio.

Android, iOS, Mac: The Handy Scan installation package only installs Handy Scan.



Handy Scan



Handy Studio



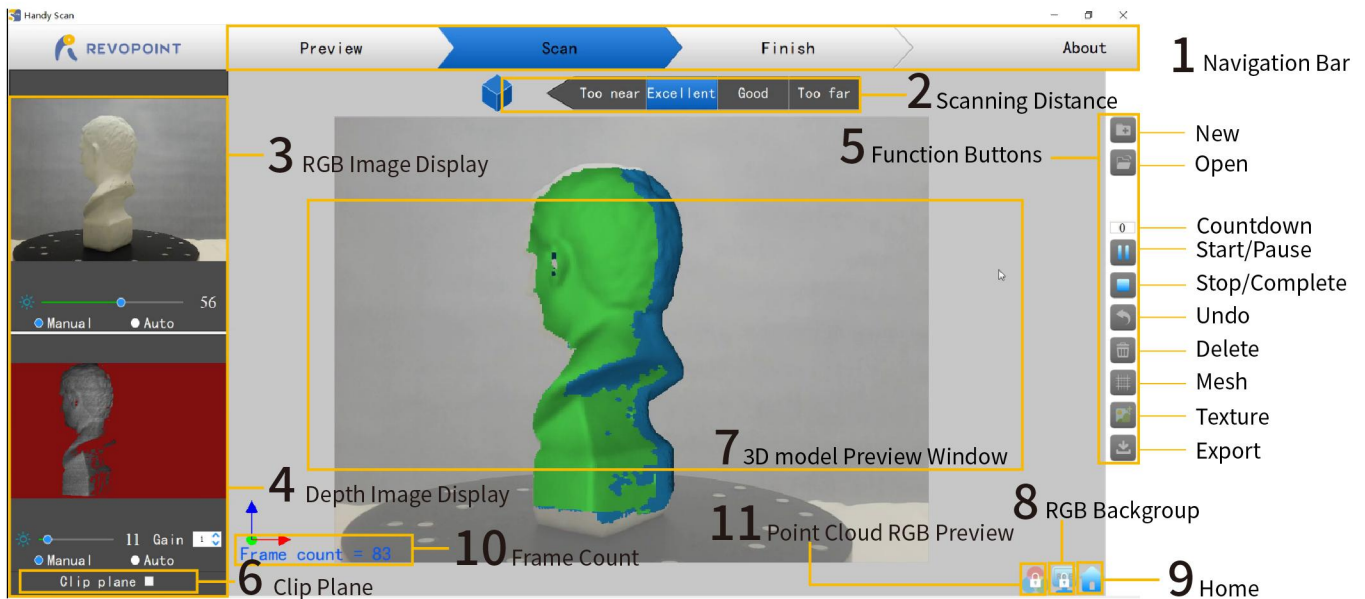
Handy Scan

Installed Software

	Windows	Android	iOS/iPad	Mac
Handy Scan	YES	YES	YES	YES
Handy Studio	YES	NO	NO	Coming Soon...

Scan Software: Handy Scan

User Interface



- 1. Navigation Bar:** Presents scanner status (Preview/Scan/Finish) and About (version information).
The POP 2 must be connected for all of the information to be displayed.
- 2. Scanning Distance:** Too near, Excellent, Good, Too Far.
Placing the POP 2 so that it is in the Excellent zone will have the best balance of coverage and resolution. Adjust the optimal distance according to the prompt.
- 3. RGB Image Display:** Display the image captured by the RGB Texture camera.
- 4. Depth Image Display:** Present the 3D point cloud data that can be captured.
Brightness and Gain can be manually adjusted for best results (the areas not displayed in red will return point cloud data while scanning). Some Scan Modes allow for Automatic adjustment to find the best setting, but it is normally best to switch to Manual before scanning to prevent exposure variations that interfere with data capture).
- 5. Function Buttons:**
- New:** Define a new project. Specify the Scan Mode (Feature, Marker, Face, Body or Dark and whether to capture color data or only the shape of the scanned object).
 - Open:** Input a previously-scanned 3D model.
 - Start/Pause:** Start or pause scanning.
 - Stop/Complete:** Stop the current scanning project. A POP 2up will allow choosing between completing the scan (fusing the Point Cloud) or deleting the entire project to start over.
 - Undo:** Undo several scanned frames of the model at a time. Unlimited Undo operations, but there is no Redo.
 - Delete:** Delete all scanned frames, but not the project definition. Remains in same Scan Mode to continue the project.
 - Mesh:** Maps the scanned 3D point cloud data into planes or triangles. This operation can also be performed in Handy Studio with higher resolution.
If "No Color" was selected when the Scan Mode was defined, the model only consists of point cloud and mesh information.
If the "Color" option was selected, then the model will also contain the color information of each point.

Texture: Match pixels of the picture on the mesh model to improve the texture and color resolution.

Export: Export the completed 3D model.

6. Clip Plane: Remove unwanted planes in the scene such as turntable, desktop, or floor. But if you want scanned objects containing planes, please untick this option.

7. 3D Model

Preview Window: Display the current 3D model data. The view of the model may be dragged or zoomed in the 3D Model preview area by the mouse (Left: Rotate the model; Wheel: Zoom in/out).

8. RGB Background: Hide or show the background in the 3D Model Preview window.

9. Home: Reset the view of the model to the default position in the 3D Model Preview Area.

This is determined by the first scanned frames of the object.

10. Frame Count: Display the frame count of acquired 3D model data. The maximum number of frames that can be scanned in one batch is determined by the memory of the computer or mobile phone.

11. Point Cloud

RGB Preview: Check Color/No-color point cloud data.

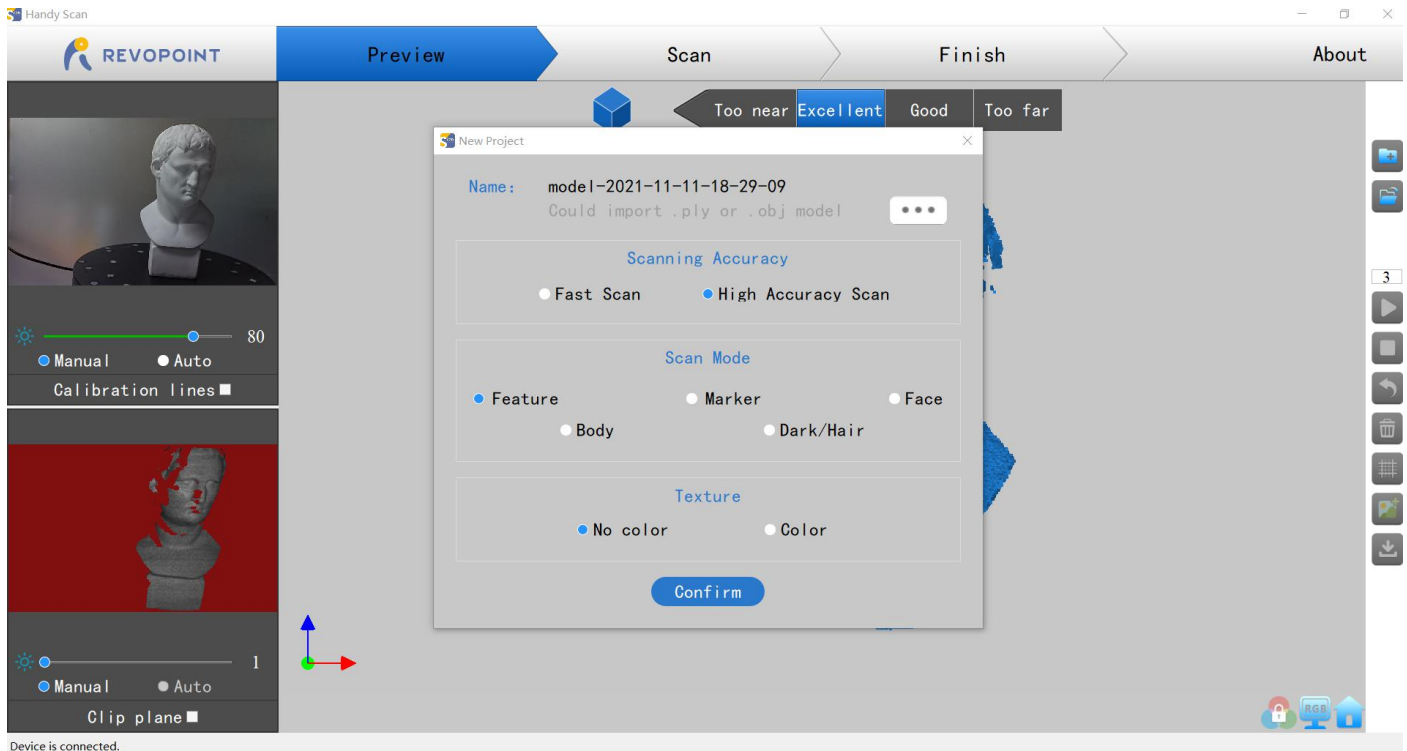
Scan Accuracy/ Mode Introduction

Scan Accuracy: Fast Scan and High Accuracy Scan

Fast Scan: It can make users quickly scan an object, but the accuracy in this mode is relatively lower than high-accuracy scan.

High-accuracy Scan: It's added to meet users' needs to higher-precision data capturing. In High-accuracy mode, the processing time for point cloud fusion/mesh/texture will be relatively longer.

The differences among these 5 modes are mainly exposure and gain settings:



- **Feature mode:** Designed to scan objects with unique shapes such as sculptures and easily-identifiable features.
- **Marker mode:** Designed to scan objects that have large, smooth areas or regularly-repeating features that could fool the POP 2's internal pattern recognition capabilities. Flat planes like a board or symmetrical objects like balls or bowls are usually suitable to scan with this mode. Place tracking markers irregularly on or around the objects. Remember to distribute the markers so they do not have repeating patterns because the scanner determines the relative location of each frame of point cloud data by identifying the unique patterns formed by the markers. Plan ahead to keep six or more markers in view for each frame during the scanning process.
NOTE: *Marker mode is not available with the Wi-Fi (Hotspot) connection (the data link is too slow for the interactive procedure used by this mode to track the patterns).
- **Face mode:** Designed to scan the human face. The exposure and gain are set according to typical skin reflectivity (no Automatic exposure adjustment).
- **Body mode:** Designed to scan a human body or larger objects from a greater distance than is used for the other modes. The exposure and gain are set accordingly (no Automatic exposure adjustment).
- **Dark mode:** Designed to scan objects with darker surfaces, such as black or dark gray clothes, black boxes, dark hair, etc. However, not all dark objects can be successfully scanned. One example would be black leather shoes because leather absorbs light (or they are so shiny that they reflect too much light). The exposure and gain are set accordingly (no Automatic exposure adjustment).

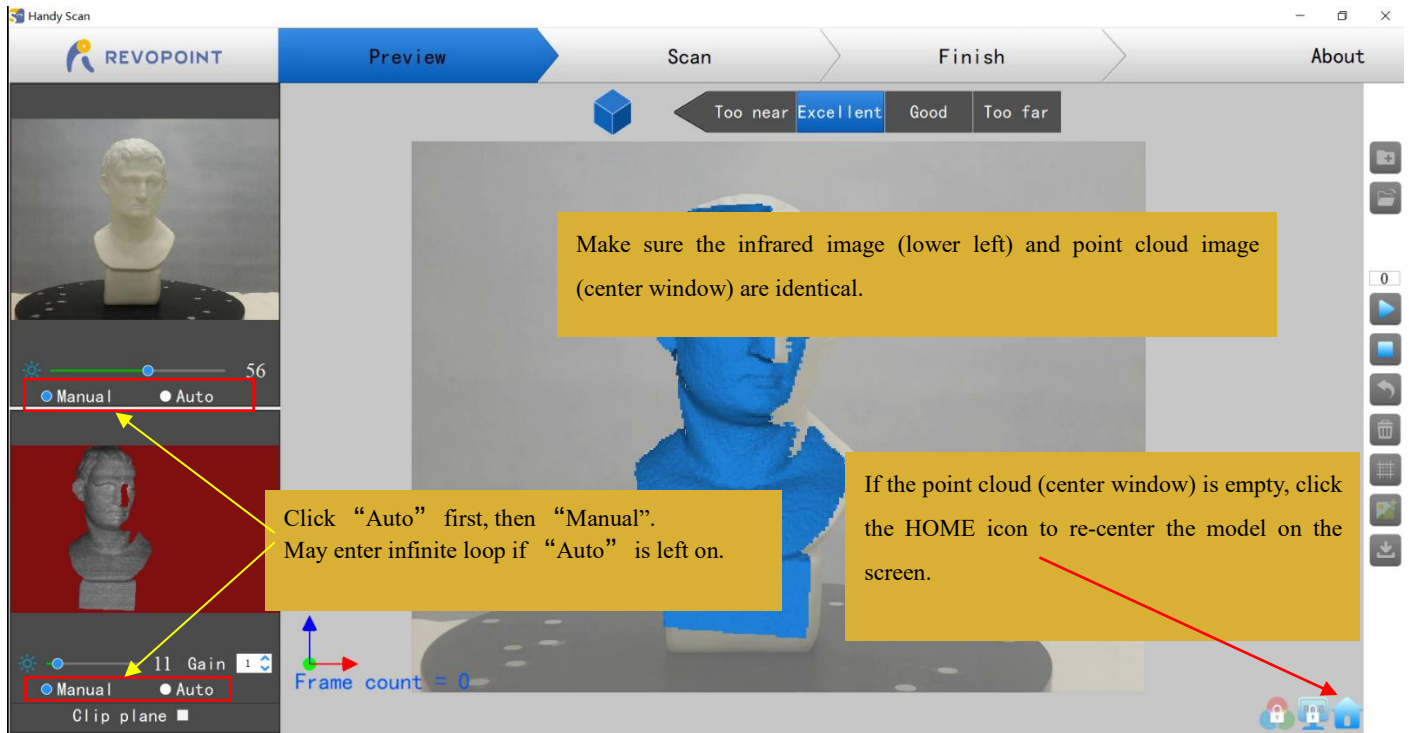
Scan Parameters

Adjust Camera Parameters

- **RGB Camera:** (Upper left preview window) Select "Auto" first, then "Manual" to obtain a decent image quality, avoiding over or

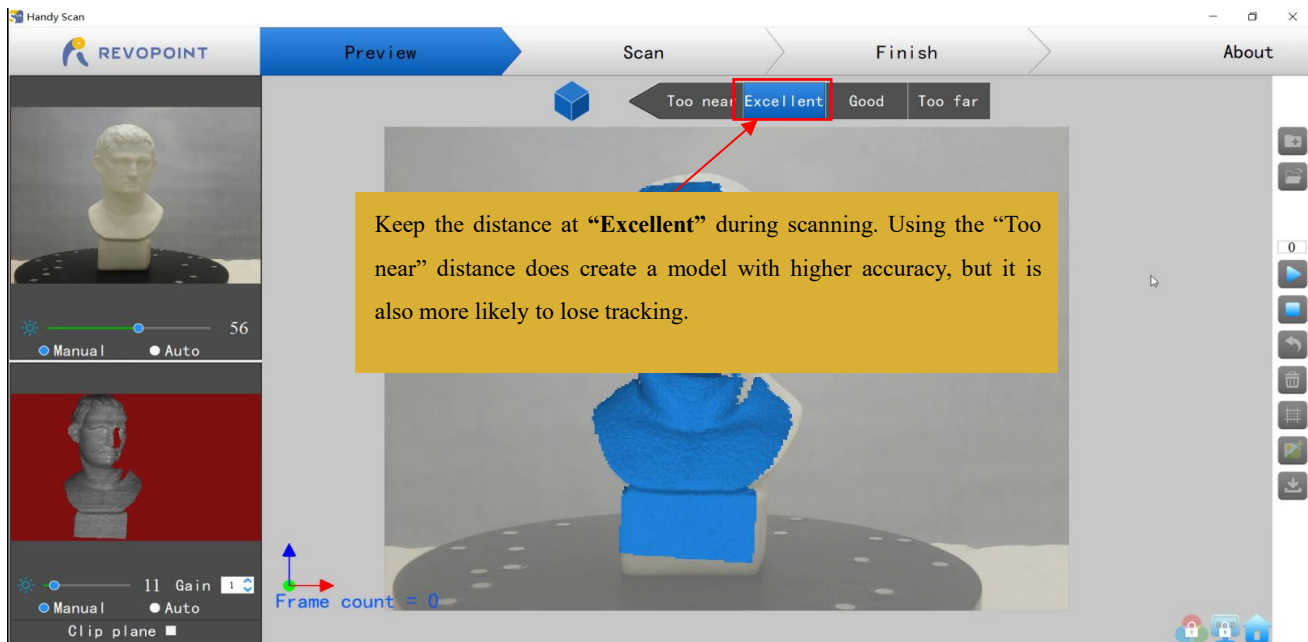
underexposure.

- **IR camera:** (Lower left preview window) When available, switch to "Auto" to find the best overall exposure and then to "Manual" to prevent Handy Scan from continually adjusting the exposure during the scanning process and possibly locking the user interface.









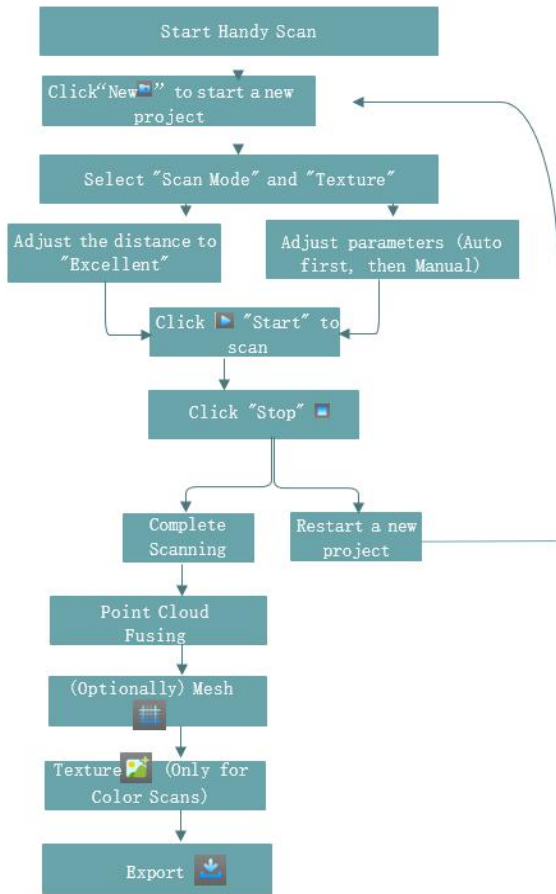
Adjust Distance

The top area of the 3D model preview window shows the distance. Place the POP 2 scanner or the object to confirm an **"Excellent"** distance and keep it during scanning. If you want better details than the standard, you can move the POP 2 closer to the object, but tracking can be a problem.




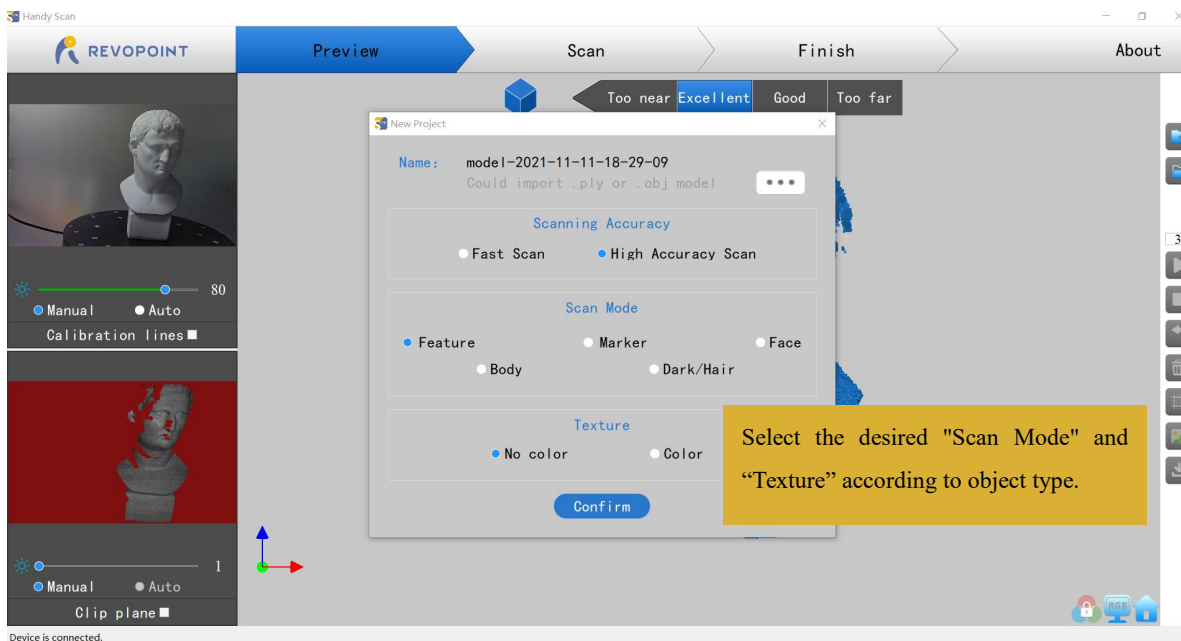
Operation Workflow

Place an object on a table → Connect POP 2 to your PC → Start **Handy Scan** → Click "New"  to start a new project → Select "Scan Mode" and "Texture" → Adjust the distance to "Excellent" → Adjust parameters (Auto first, then Manual) → Click "Start"  to scan → Click "Stop"  to complete scanning → (optionally) "Mesh"  → "Texture"  (Only available for Color scans) → Click "Export"  to output the 3D model (3 file formats supported: .ply, .stl and .obj.)



Start a New Project

Click  to start a new project: Select the Scan Mode and Texture.




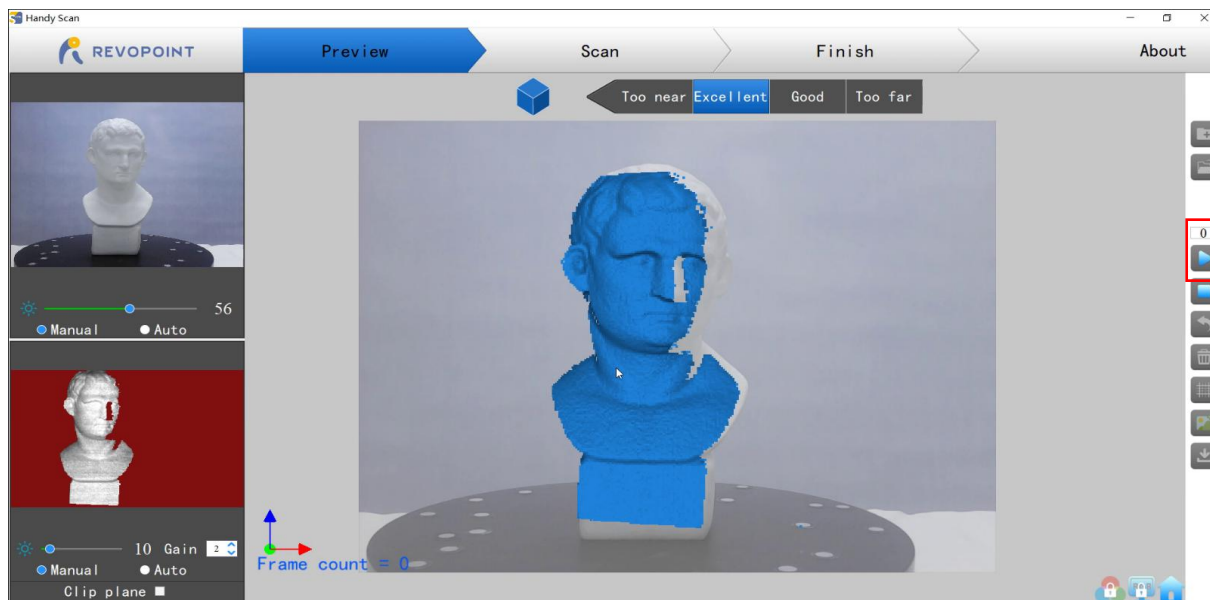
Color: The object to be scanned has both color and shape information in the scanned 3D model.

No color: The scanned model has no color information; only the shape information is captured.

“No color” is by default. If you want a color 3D model, please be sure to select "Color" in the Texture section.

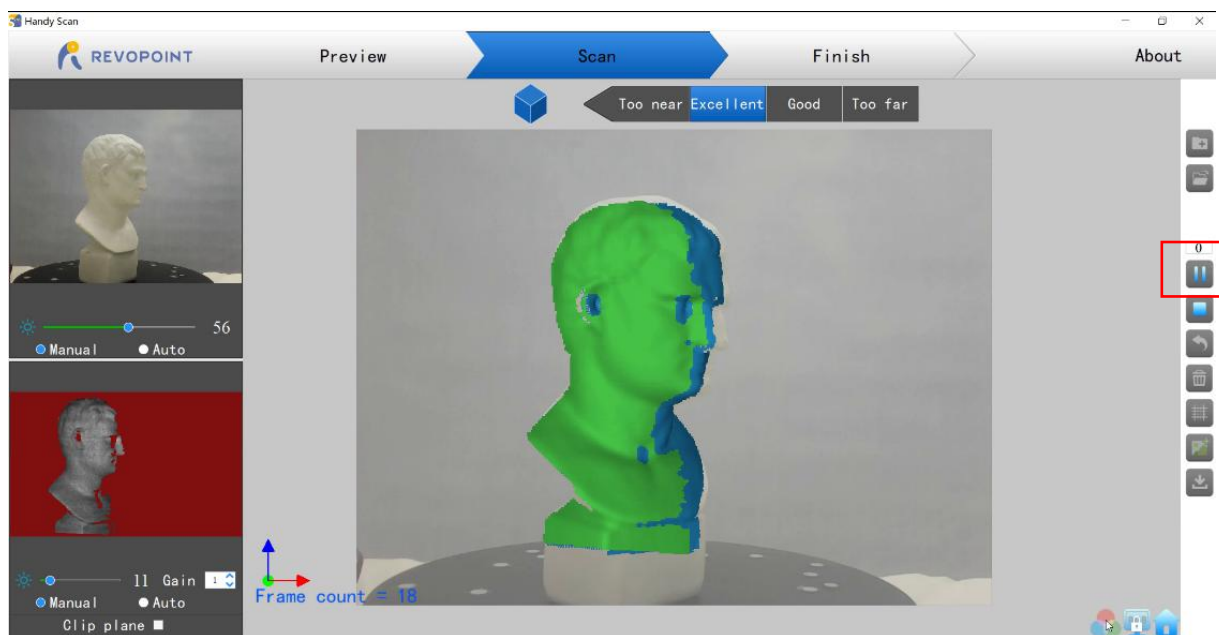
Start/Pause Scan

Click  to Start/Pause scan. The number above the Start button is the countdown before scanning starts.




Before scanning, please remove all distracting objects and make sure no irrelevant stuff is in the scanning area.

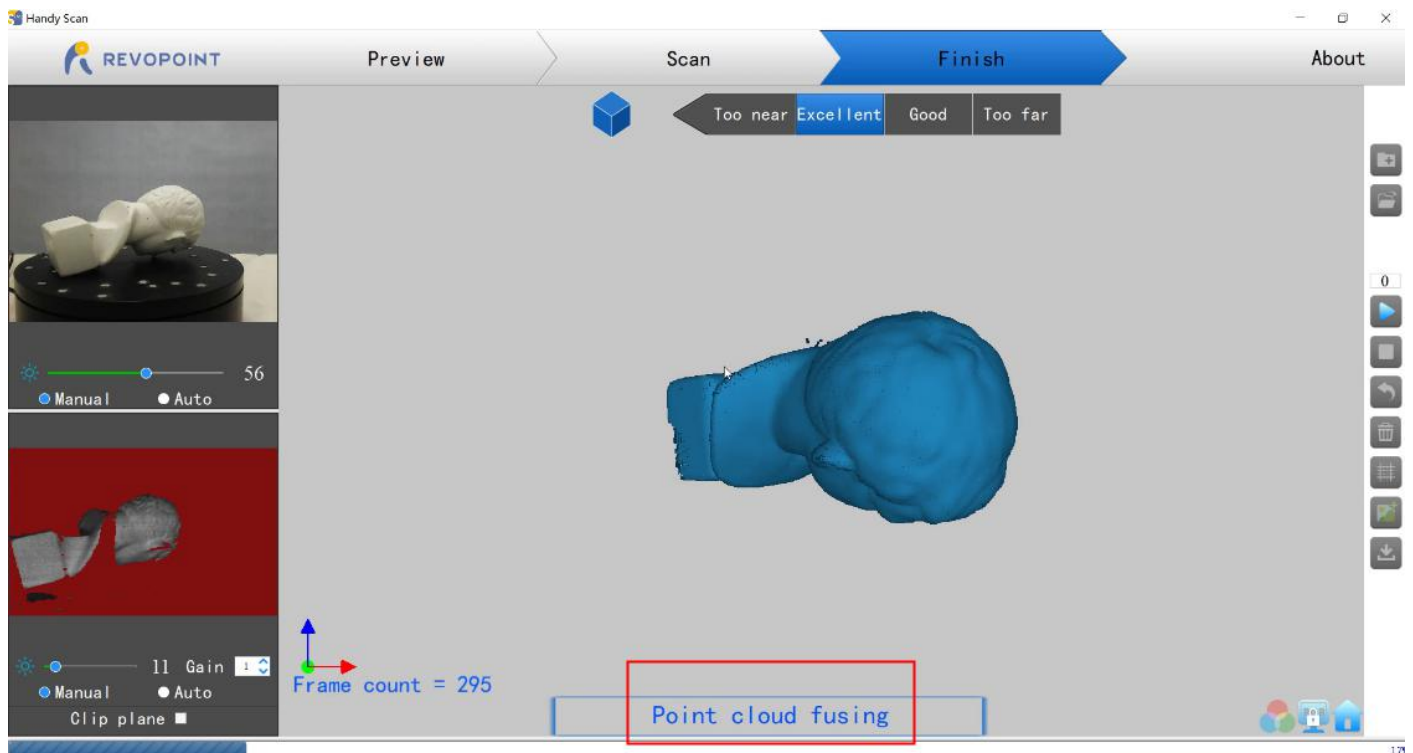
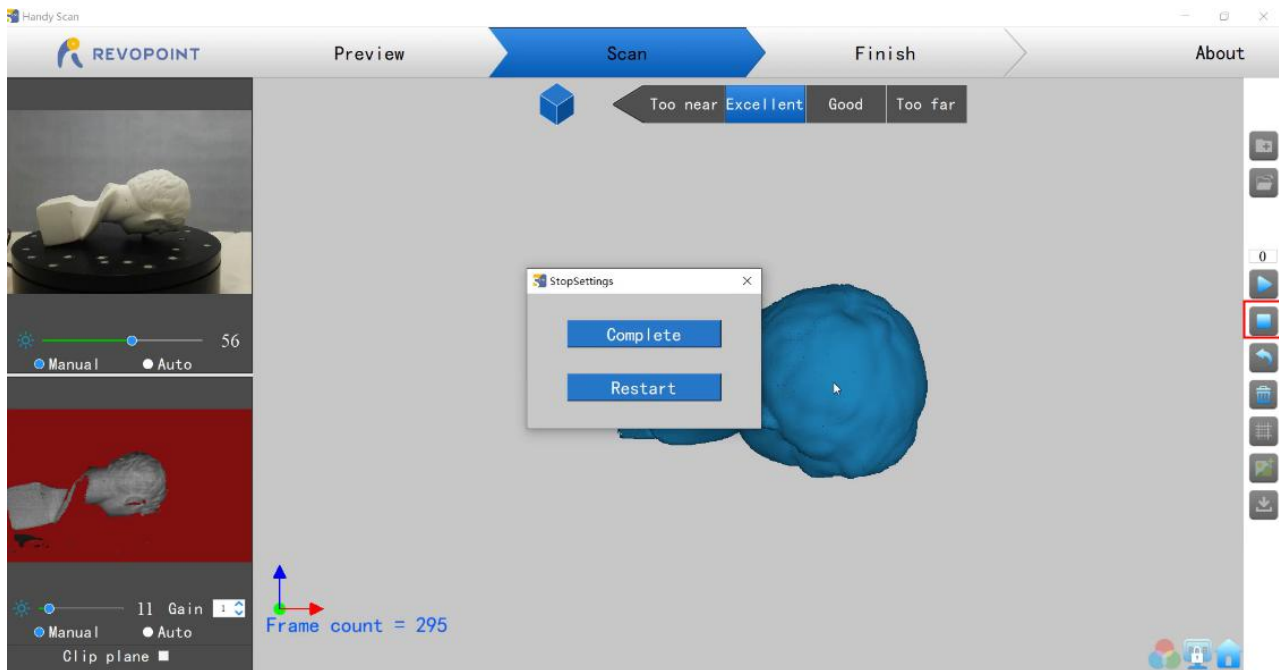
During scanning, please make sure the point cloud in the lower left window is adequate and the distance remains "Excellent". Move the scanner slowly and deliberately during scanning while keeping a relatively fixed distance. Already-scanned sections of the model are displayed in blue. Unless there are holes in the scan, there is no advantage to continuing to scan a blue area (and it will waste memory and processing time).




While scanning, the 3D Model preview window (center) will display the captured data (shown in blue) and the current data (shown in green). The currently-scanned area (lower left window) will not display the already-scanned portion of the model that is seen in the 3D Model preview window.

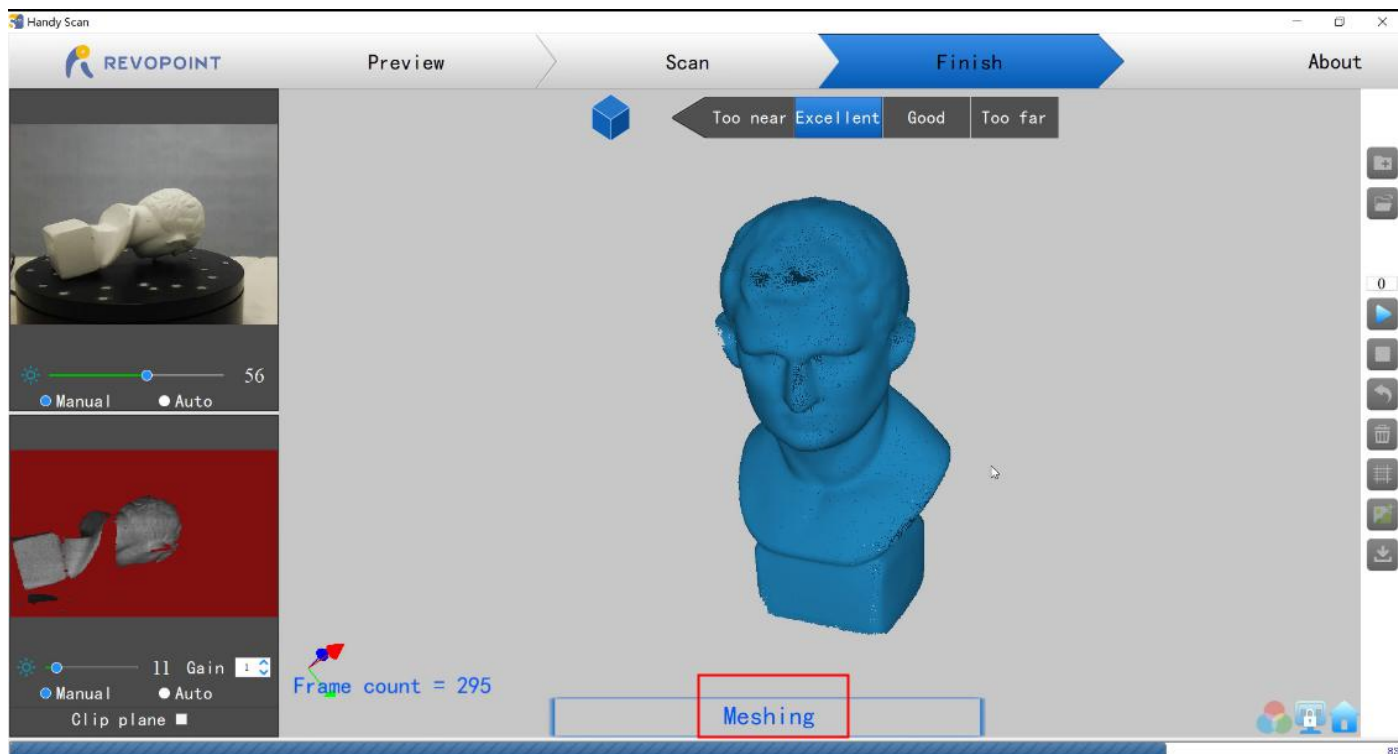
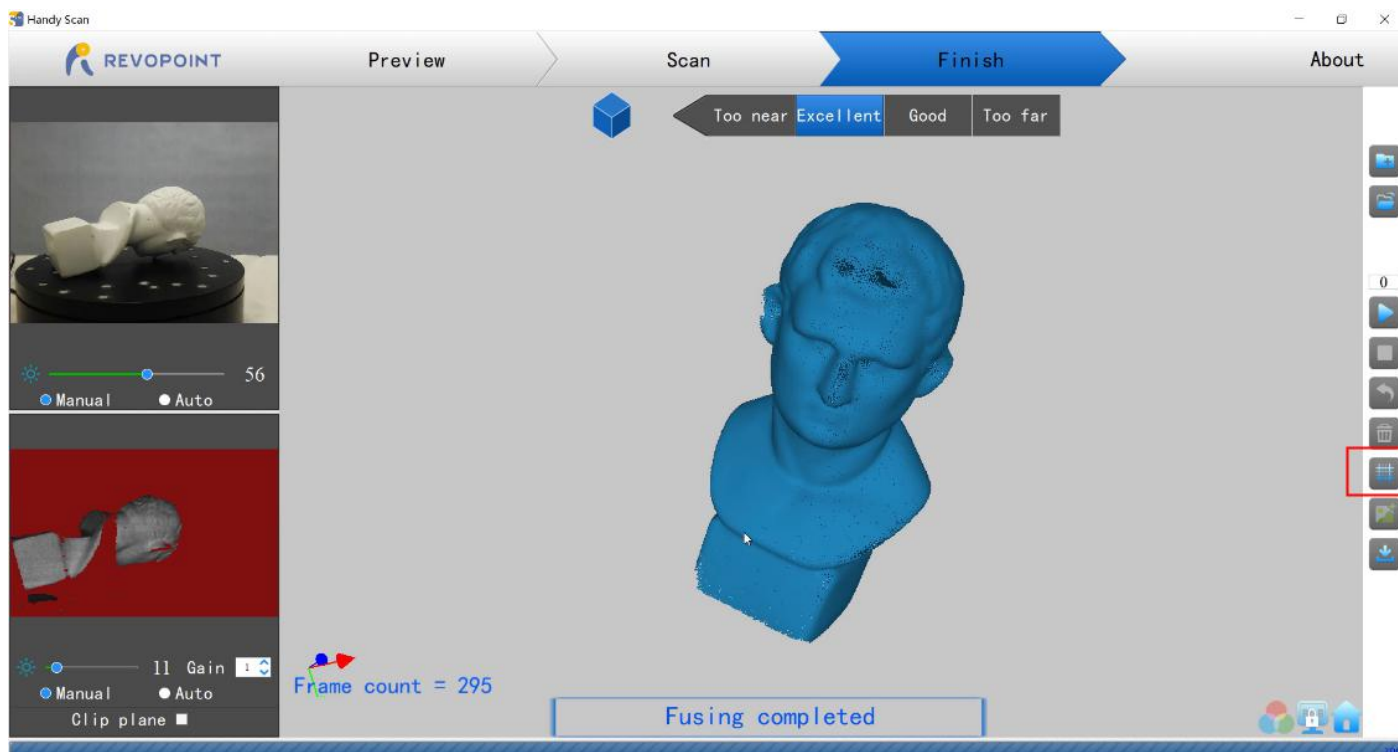
Stop Scan

Click  and the "Complete" button in the POP 2up to fuse the point cloud data, or press the "Restart" button to delete the data and return to the Preview section.




Meshing

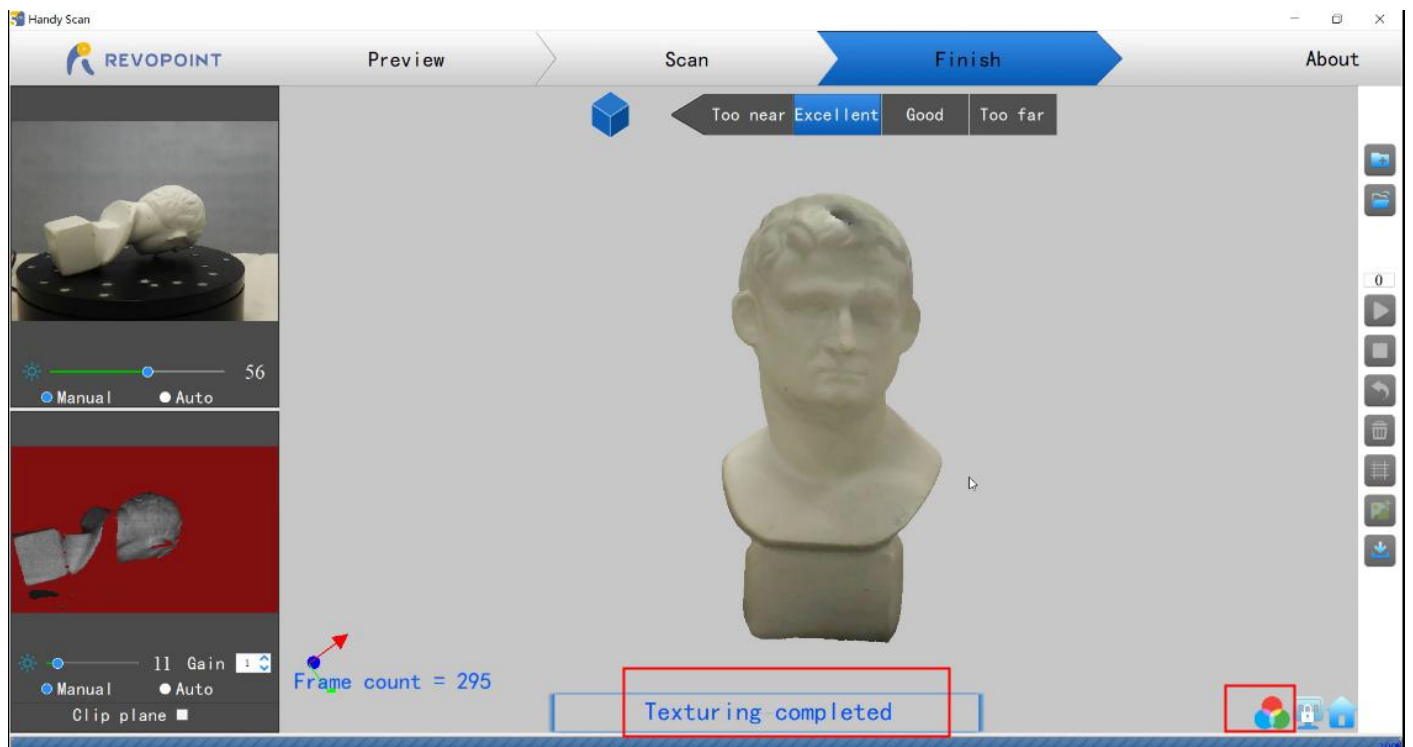
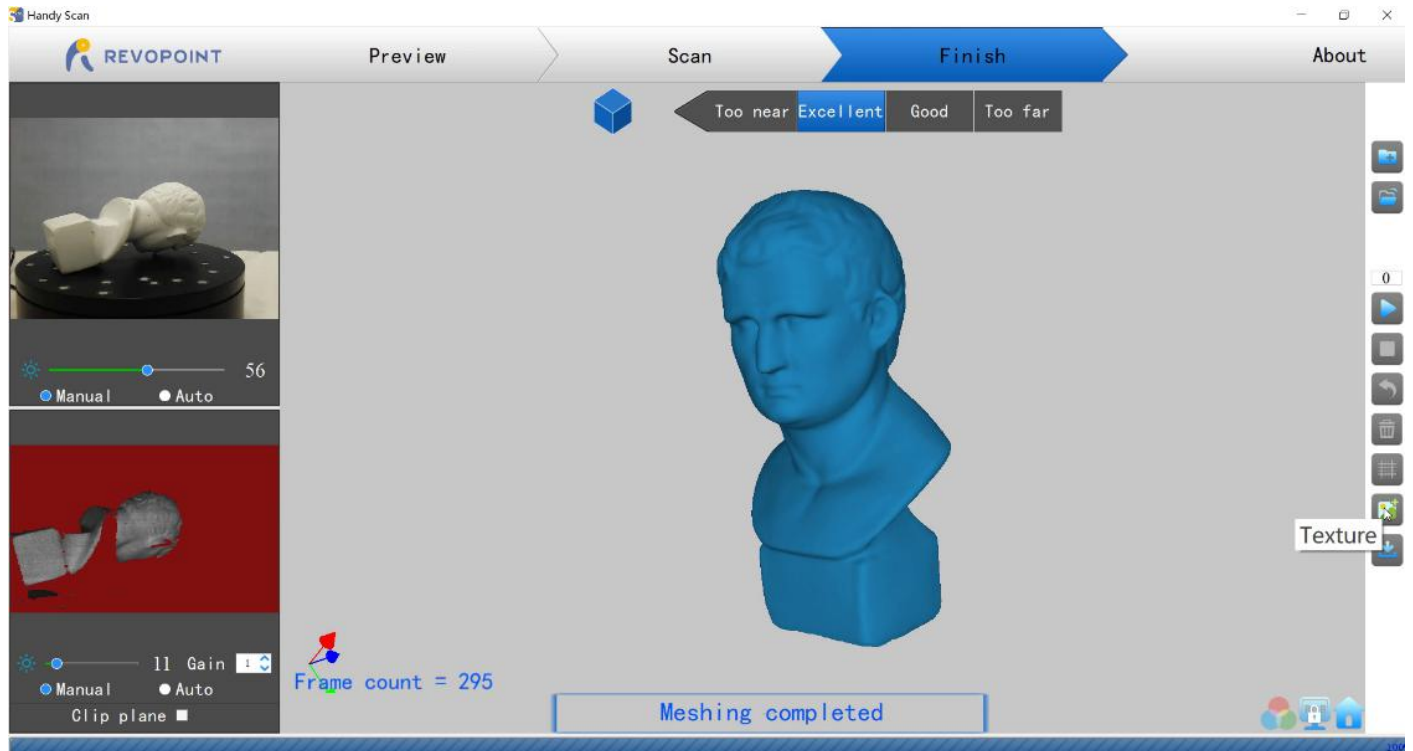
Click  to start converting the scanned point cloud data into a mesh. This is an optional step; the Handy Studio app can also mesh the point cloud data, and will do so at a higher resolution, but it will take longer to process. Handy Scan was designed to process at a lower resolution on computers and smartphones to reduce processing time and to increase workflow.



Texture

The Texture function only applies to scans made with the "Color" option selected (see section "Start a New Project").

Click  to apply texturing to the model.

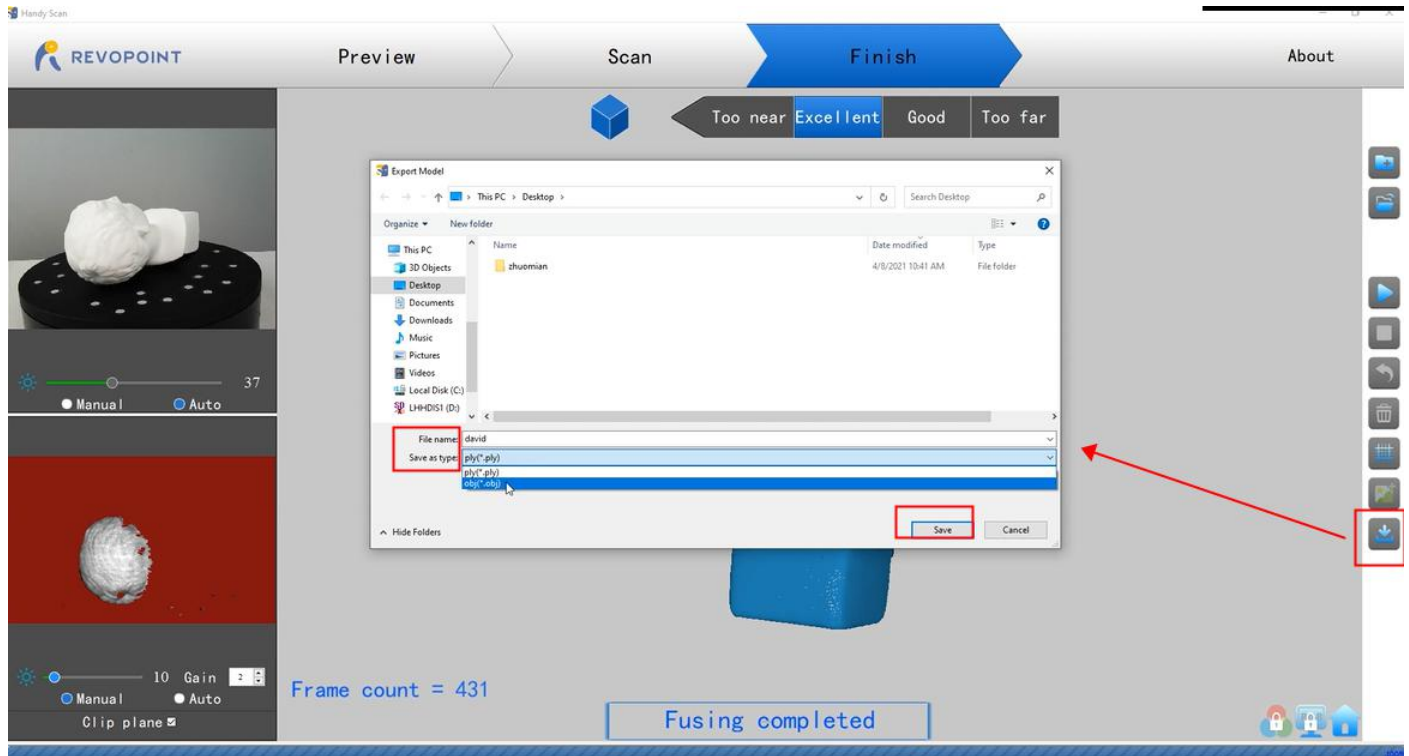


Export

Click  to export the 3D model.

Select a file format (obj., stl., & ply. are supported) and a file name.

HINT: It would be convenient to select the file folder named “handylookdata” because that is the default directory for Handy Studio.



File Naming Conventions

If you save the scanned 3D model as a .PLY file

- NAME.ply (Point Cloud)
- NAME_mesh.ply (Mesh no color)
- NAME_mesh_tex.ply (Mesh with color)
- NAME_mesh_tex.jpg (Texture color image)

If you save the 3D model as an .STL file:

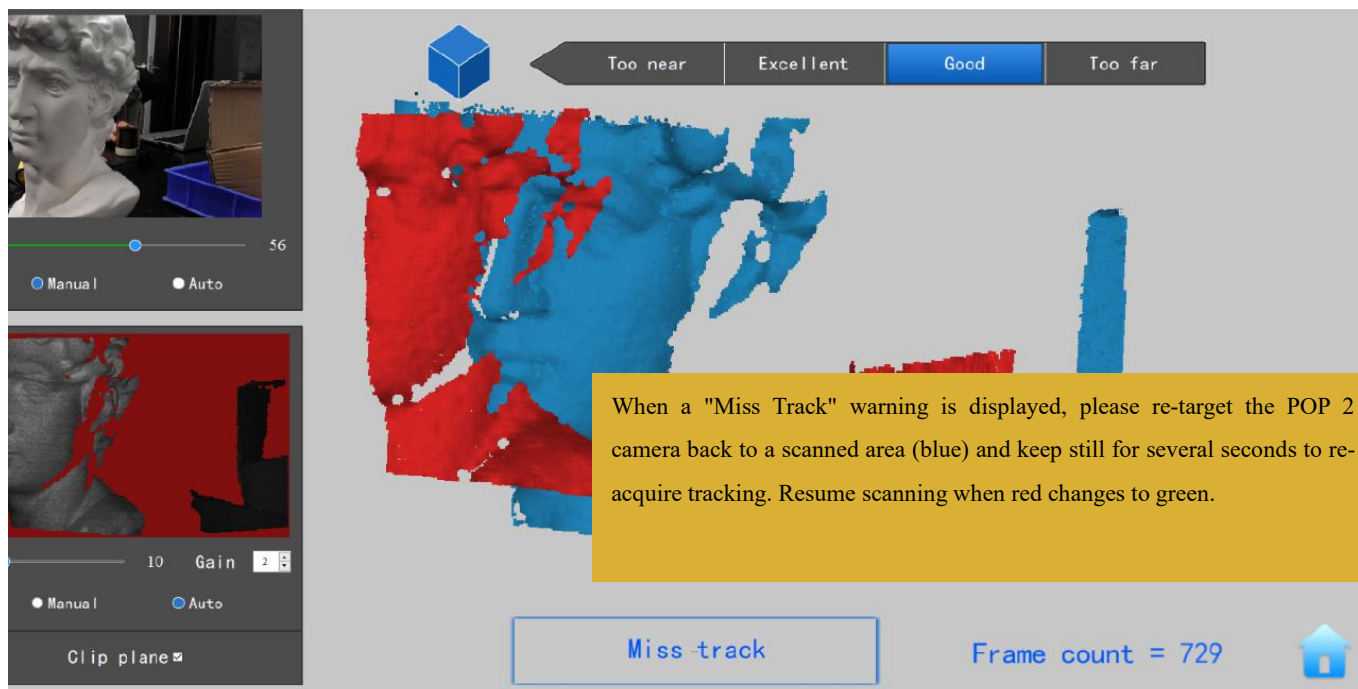
- NAME.stl (Point Cloud)
 - NAME_mesh.stl (Mesh no color)
- **color models are not saved in the STL file format**

If you save the 3D model as an .OBJ file:

- NAME.obj (Point Cloud)
 - NAME_mesh.obj (Mesh no color)
 - NAME_mesh_tex.obj (Mesh with color)
 - NAME_mesh_tex.mtl
 - NAME_mesh_tex.jpg (Texture color image)
- NOTE:
- NAME_mesh_tex.obj,
 - NAME_mesh_tex.mtl &
 - NAME_mesh_tex.jpg are the three components of a color 3D model in the OBJ file format.

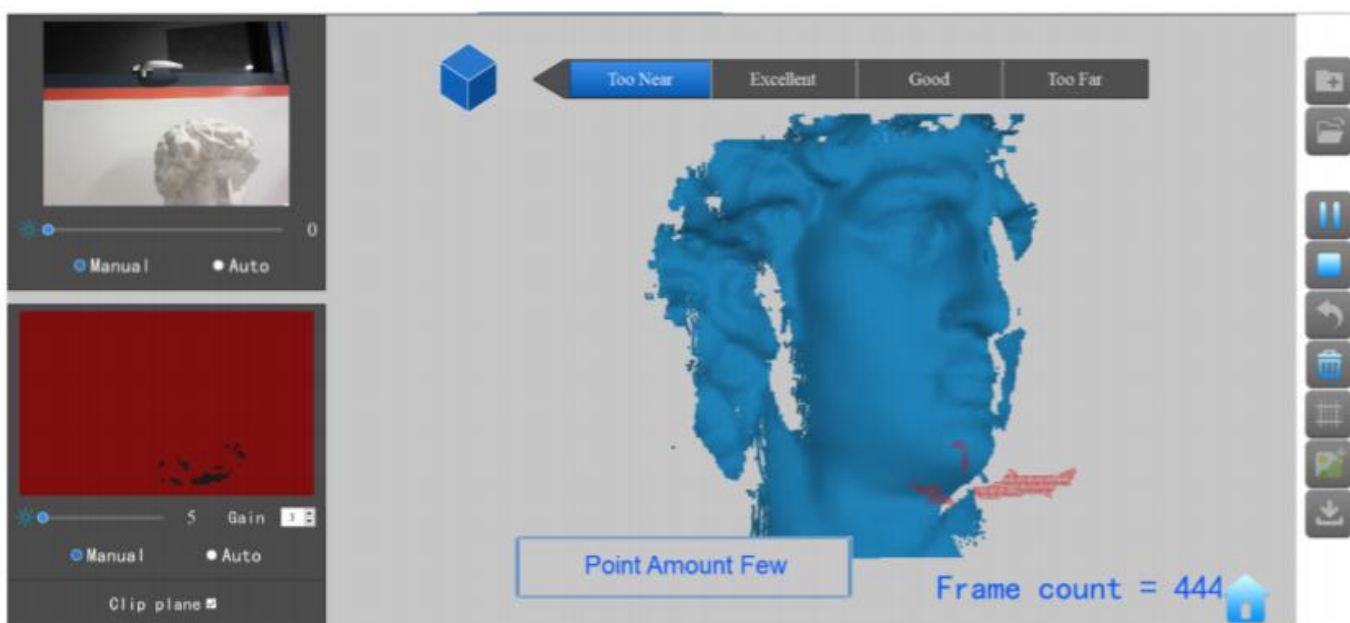
Operation Tips

Miss Track



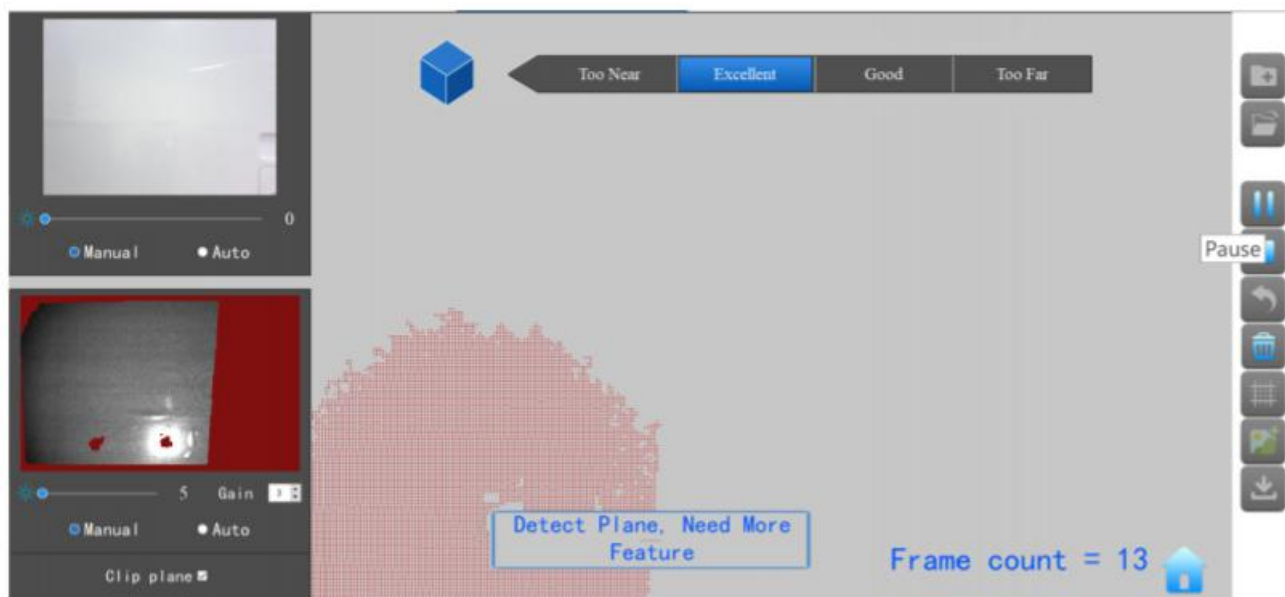
If the 3D Model Preview window displays a "Miss track" notice during scanning, please re-target the POP 2 3D scanner to a previously-scanned area (blue) and keep still for several seconds so that the POP 2 can re-acquire tracking. When the red portion of the display changes to green, scanning can resume.

Too Few Points

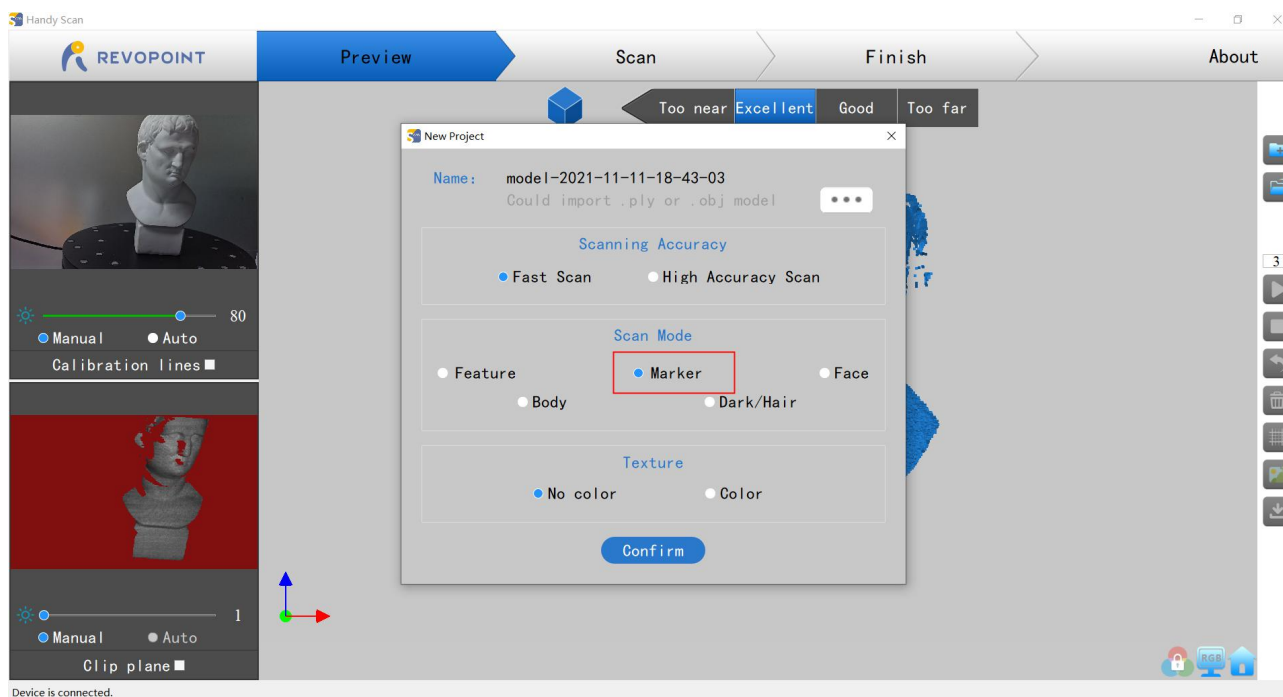


If the "Point Amount Few" prompts appear, check whether the distance between POP 2 and the object is too close or too far and adjust the distance between the POP 2 and the object so that the distance indicator highlights "Excellent" before scanning is continued.

Detect Plane

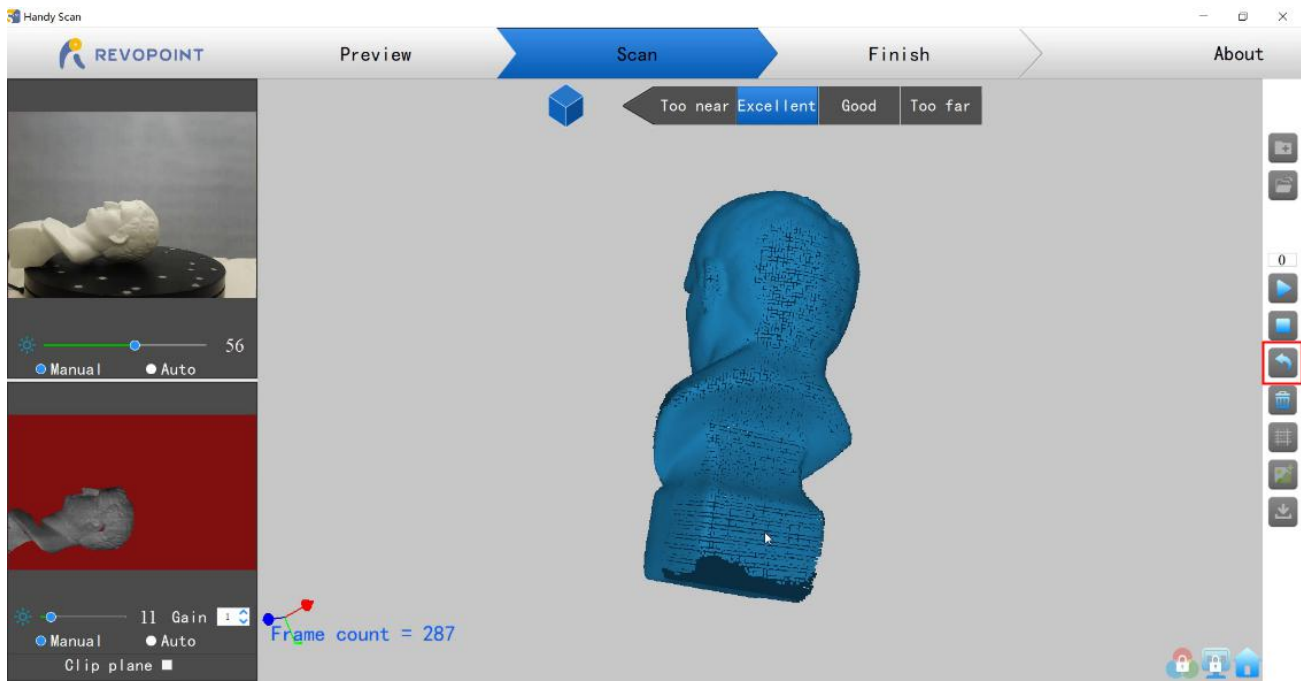


This prompt appears when a plane or object with too few features is scanned and the POP 2 cannot properly relate the frame’s point cloud to the other frames. If no usable data has been scanned, the best course of action is to Stop scanning, select Restart to clear out the useless data, then start a new project, this time selecting Marker mode after attaching markers to the scanning surface or the surrounding area to solve this problem. If a significant amount of scan data has been acquired, then Pause the scan, use Undo as necessary to eliminate the chaff, then Stop, Complete and Export the scan data before continuing in Marker mode.



Undo scan

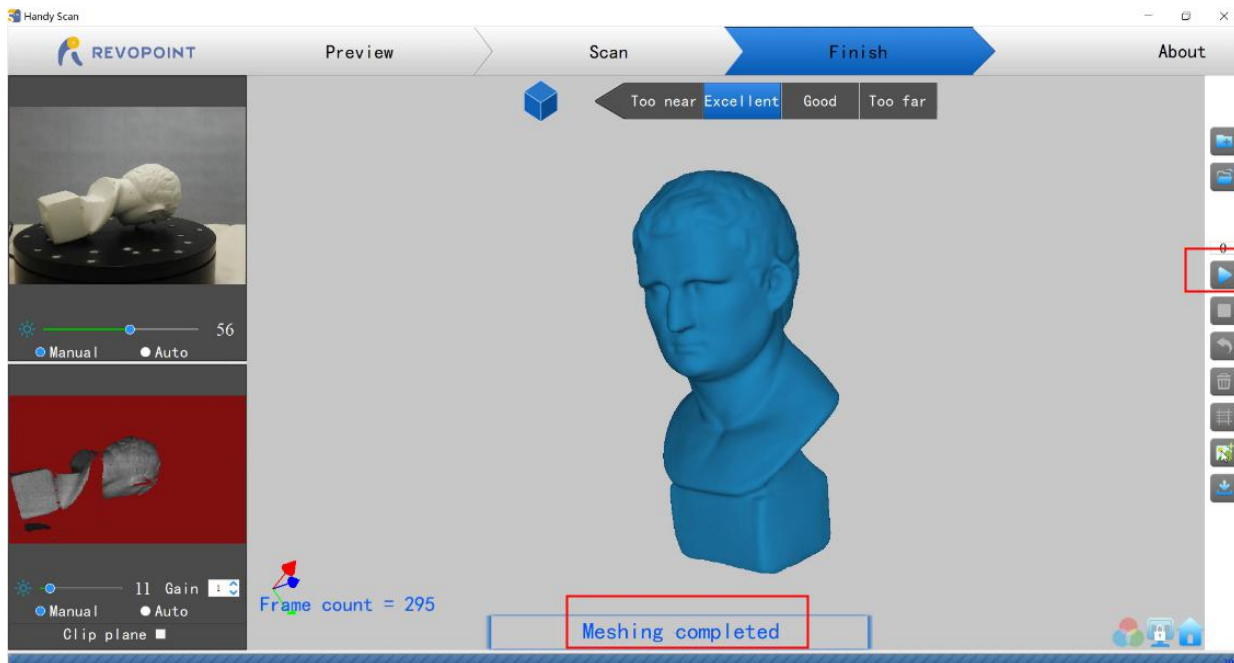
If a point cloud alignment error appears in scanning, you can click  repeatedly to the point that the 3D model is clean enough to continue or save.



Continue Scan


• **Continue Scan After Mesh** :


It is possible to continue scanning an object after the point cloud data has been meshed. This can be necessary if the scanning controller (a computer or smartphone) runs out of RAM to capture more frames or if holes in the scan data are discovered. Don't forget to close the RGB mode before continuing. This process can be repeated as needed until the model meets your requirements.



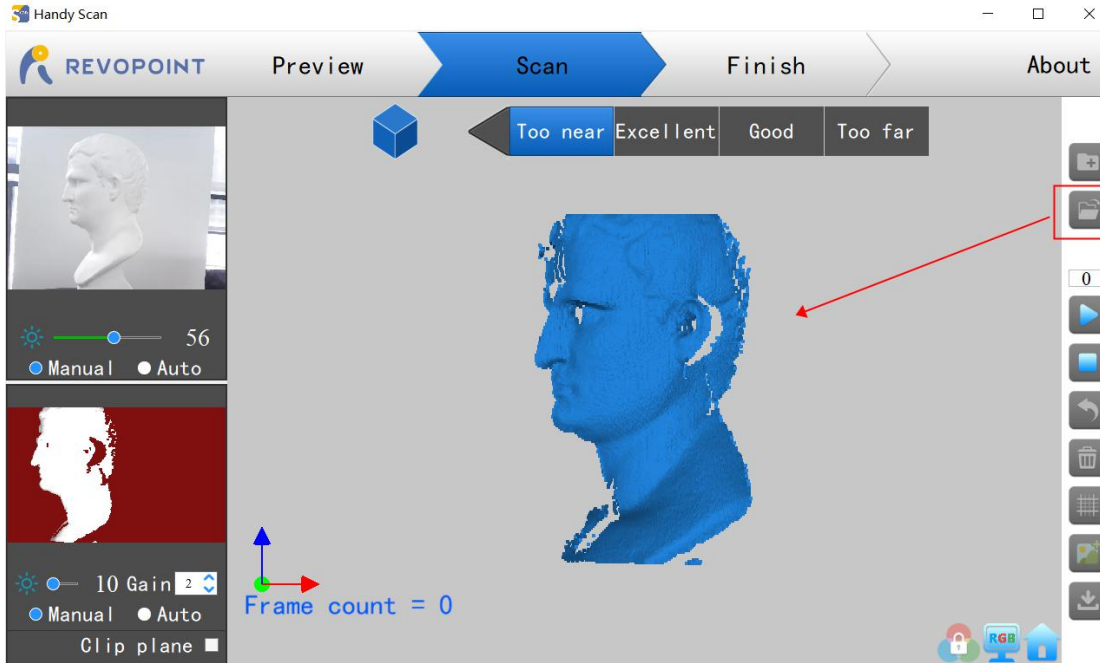
• **Open a model file**  **to scan over holes:**

3D model files with defects can be fixed by continuing the scanning process:

First, click  to open this file in Handy Scan.

Second, click  to scan the object associated with the 3D model.

*** This process can be repeated several times until the 3D model meets your requirements.



Keyboard Shortcuts

Press the "Space Bar" on your computer keyboard to toggle between Start and Pause.

Handy Studio (Windows only)

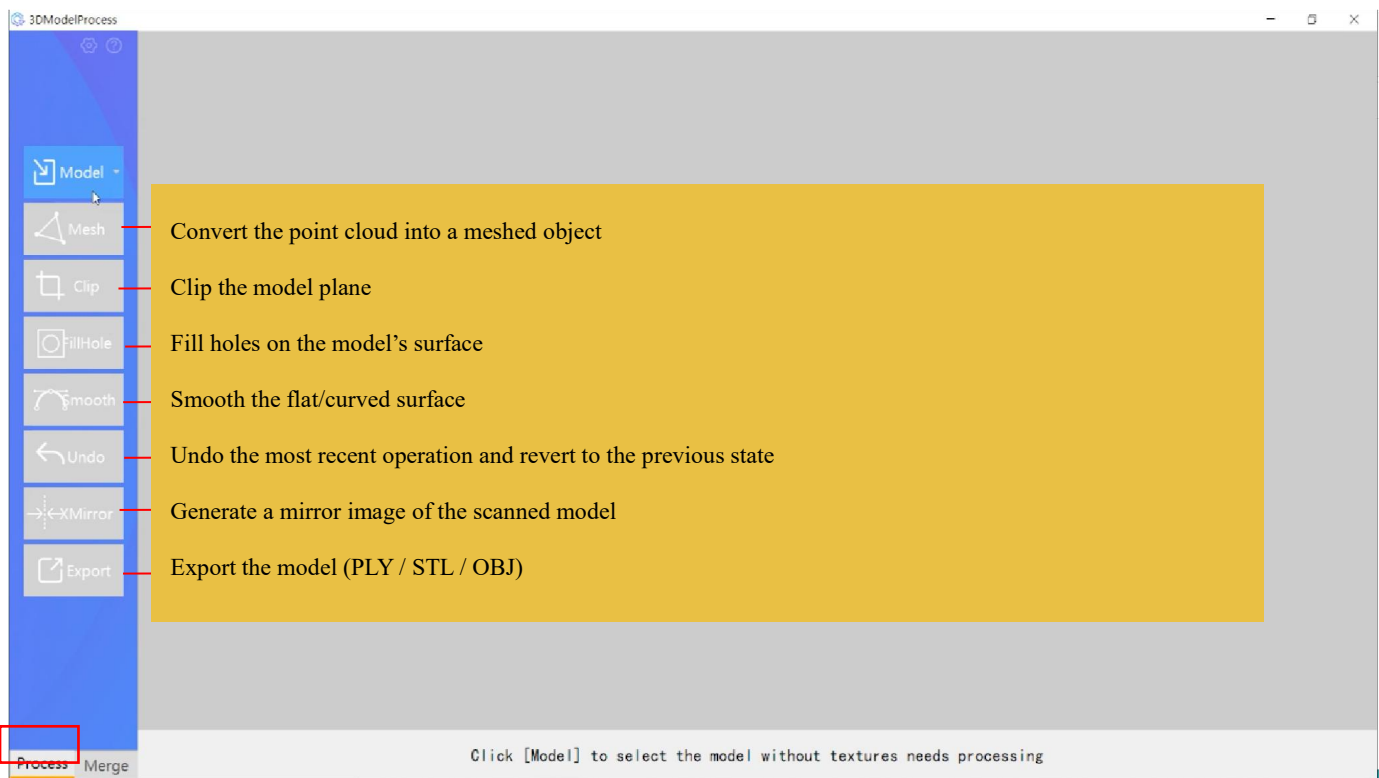
Handy Studio includes the ability to modify individual 3D models created by Handy Scan and to align two different 3D models so that they can be merged into a new 3D model.

Double click to open the post-processing software: **Handy Studio**.

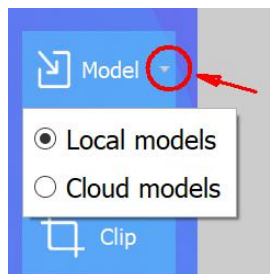
Both single model and multi-model processing are supported in the **Handy Studio**;

The "**Process**" button at the bottom left of the menu bar is for single-model processing, and "**Merge**" is for multi-model processing.

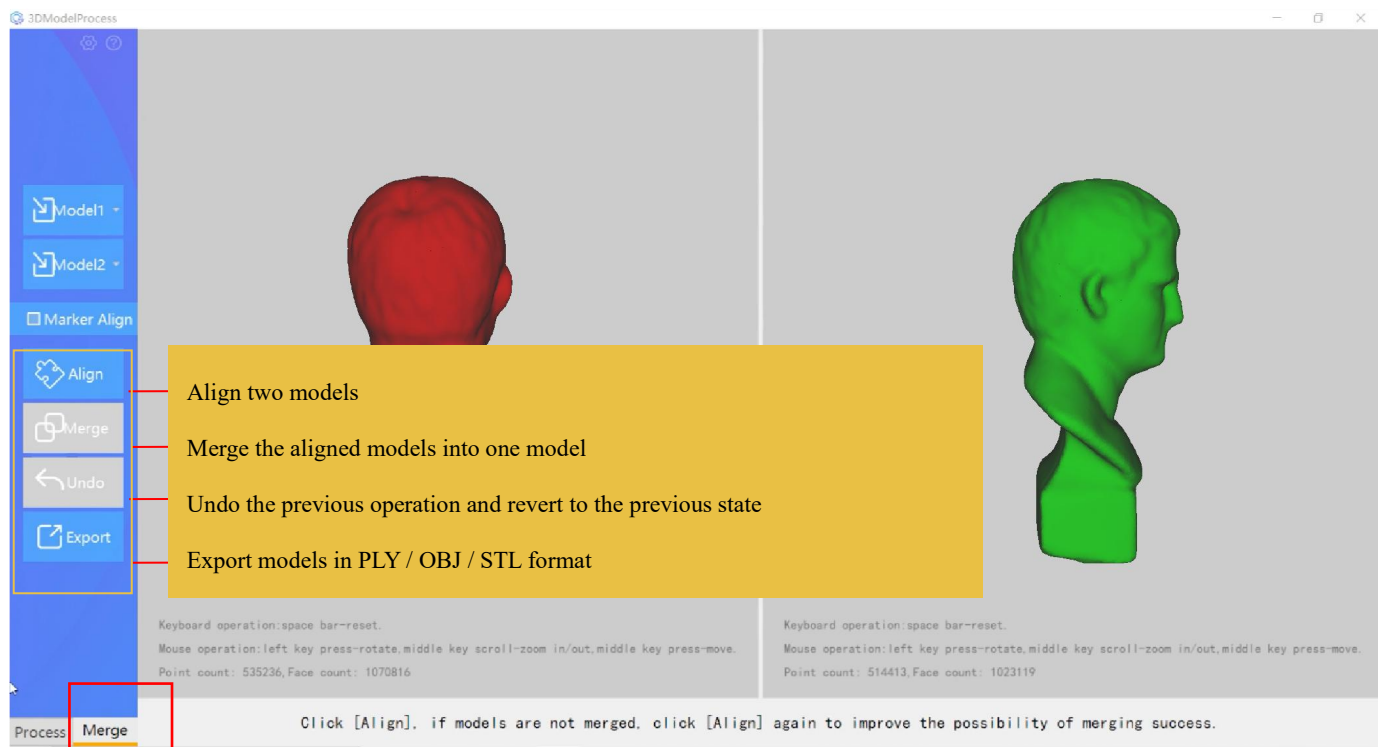
Process (Single Model processing)



Files may be accessed from local drives or from a cloud server. To select, click on the drop-down menu arrow on the right side of the Model button.



Merge (Multiple Models Processing)



1. Click "**Model 1**" and "**Model 2**" to import 3D models into Handy Studio.
2. If there is sufficient overlap, the "Align" command will interleave the point clouds.
3. If the alignment is satisfactory, press the "Merge" button to join the two objects as a new 3D model and export it with a new file name.
4. If the alignment is unsatisfactory, press the "Align" button again to see if there is improvement.
5. If repeated use of the "Align" button produces nothing of value, press the "Undo" button to return to the original state.
6. At this point, the "Marker Align" option may be explored.
7. Adjust the orientation of the two objects so that the same points can be seen.
8. Identify three points on each model that should overlap and click on the same point on each model until the three points are identified on each object.
9. Select "Align".
10. If this technique fails, consider re-scanning one or more objects for a sequence of alignment operations.

FCC STATEMENT :

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) This device must accept any interference received, including interference that may cause undesired operation.

Warning: Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.

- Increase the separation between the equipment and receiver.

- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

- Consult the dealer or an experienced radio/TV technician for help.

FCC Radiation Exposure Statement: This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

Frequently Asked Questions (FAQ)

If you need any help, please visit our official website or official Forum:



www.revopoint3d.com/support/



<https://forum.revopoint3d.com/>

Warning

The product cannot be returned if the
"Warranty Void If Seal Is Broken"
label is damaged or removed.

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