

3DeVOK Mapping Software

Customized High-precision Color 3D Digitization Solution Designed for 3D Scanners

1. 3DeVOK Mapping Software Introduction

1.1 3DeVOK Mapping Software - Intro

After the high-precision laser 3D scanning by Scantech, as for the high-definition mapping in the post-processing part, the 3DeVOK team from Scantech provides a brand new solution: 3DeVOK mapping software. The software uses photogrammetry, AI image recognition, texture fusion, and seam line editing technologies to achieve efficient and accurate mapping.

The software is highly integrated (the traditional way of post-processing requires multiple 3D software working simultaneously, and has high requirements on capabilities and experience of the post-processing personnel), and highly automated (the automation rate has reached over 95%, making it easier to use. There is no high professional requirement for the post-processing personnel. In addition, since most of the processing is automated, the person responsible for the post-processing can use multiple computers and process multiple models at the same time), highly efficient (the time of mapping on an object with mid-mesh has reduced to only half an hour, while the traditional processing takes at least 2-5 hours), the above advantages significantly improve the production efficiency of high-definition mappings and greatly reduces the production cost. In terms of fineness, the 3DeVOK smart mapping software achieves 0 loss of image resolution and restores every texture detail on the object to the greatest extent.

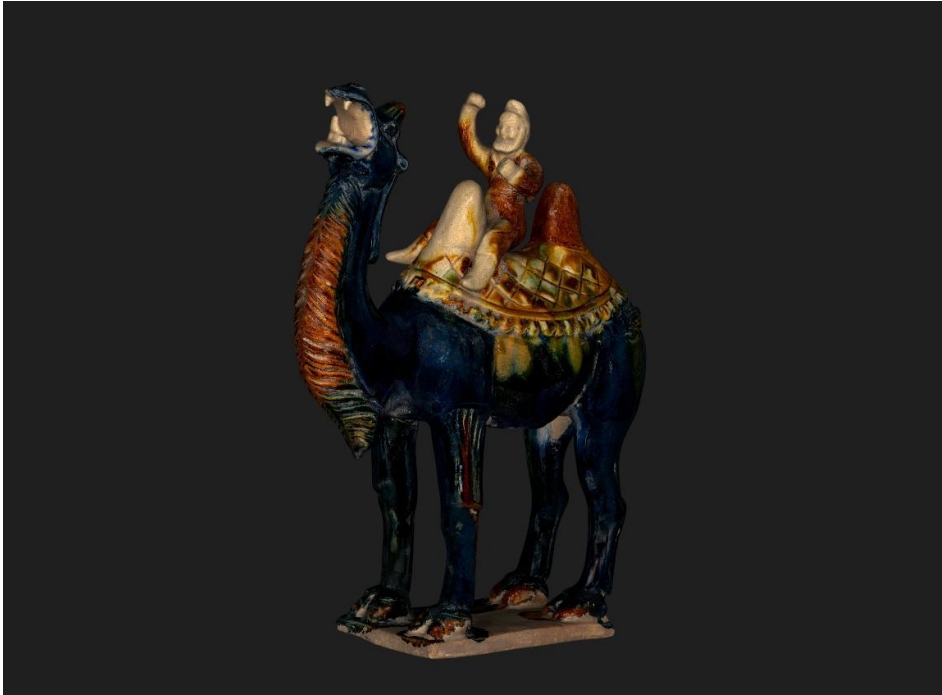
1.2 Software Advantages

- ✓ **Highly automated and intelligent:** more than 95% of the work is automatically handled by the software
- ✓ **Simple operation:** you can get started with one day of training, skilled in one week of use, even with no former experience
- ✓ **Efficient output:** it only takes 30 minutes to process the mid-model (300thousands -1million faces) and high-model
- ✓ **High-definition and lossless quality:** it supports 4K, 8K, and 16K ultra-high-resolution texture mapping output to ensure the quality of texture mappings
- ✓ **Precise mapping:** natural and seamless texture fusion, texture accuracy $\leq 0.1\text{mm}$, color uniformity (color consistency between multiple photos) $\geq 95\%$, image spot (foreign object mapping, light spot, lens contamination, etc.) $\leq 0.01\%$

2. 3DeVOK Mapping Software

Main Applications

2.1 3D Digitalization of Cultural Relics

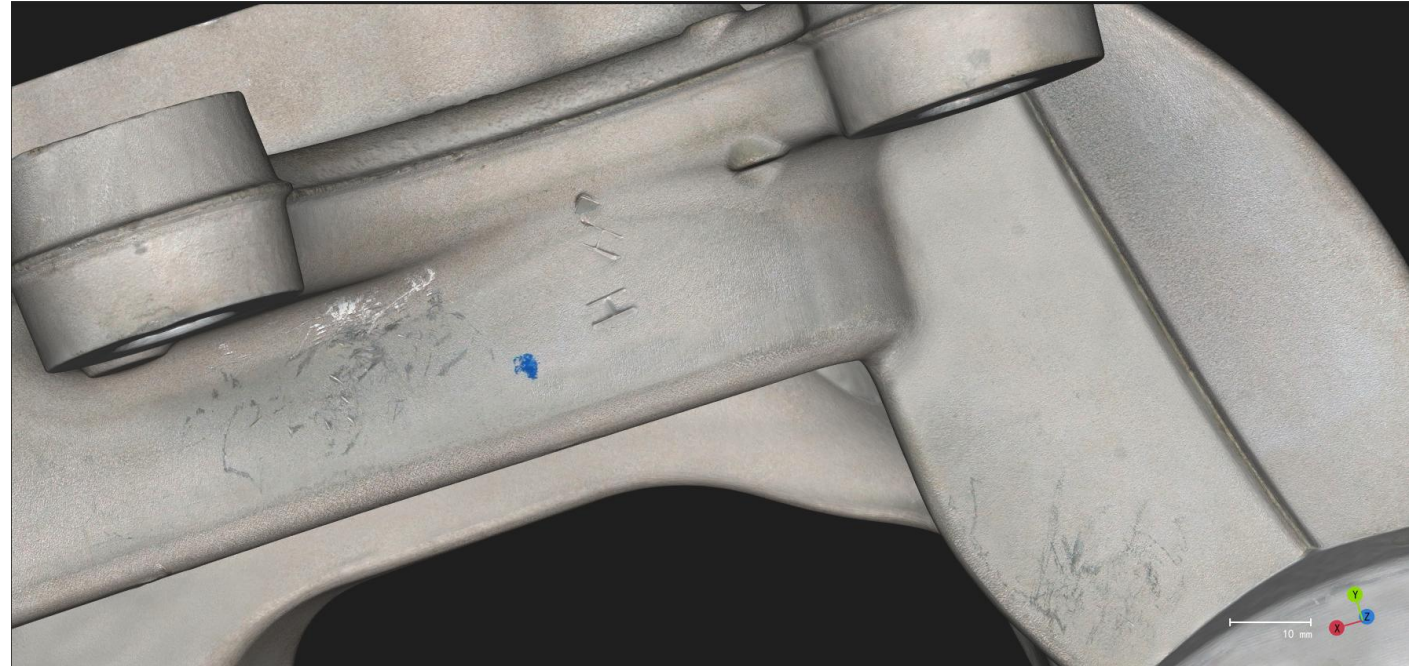


Case link: <https://www.ireal3dscan.com/3d-model/sancai/>

More models and cases, please check our official website:

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

2.2 3D Inspection of Damaged Industrial Parts



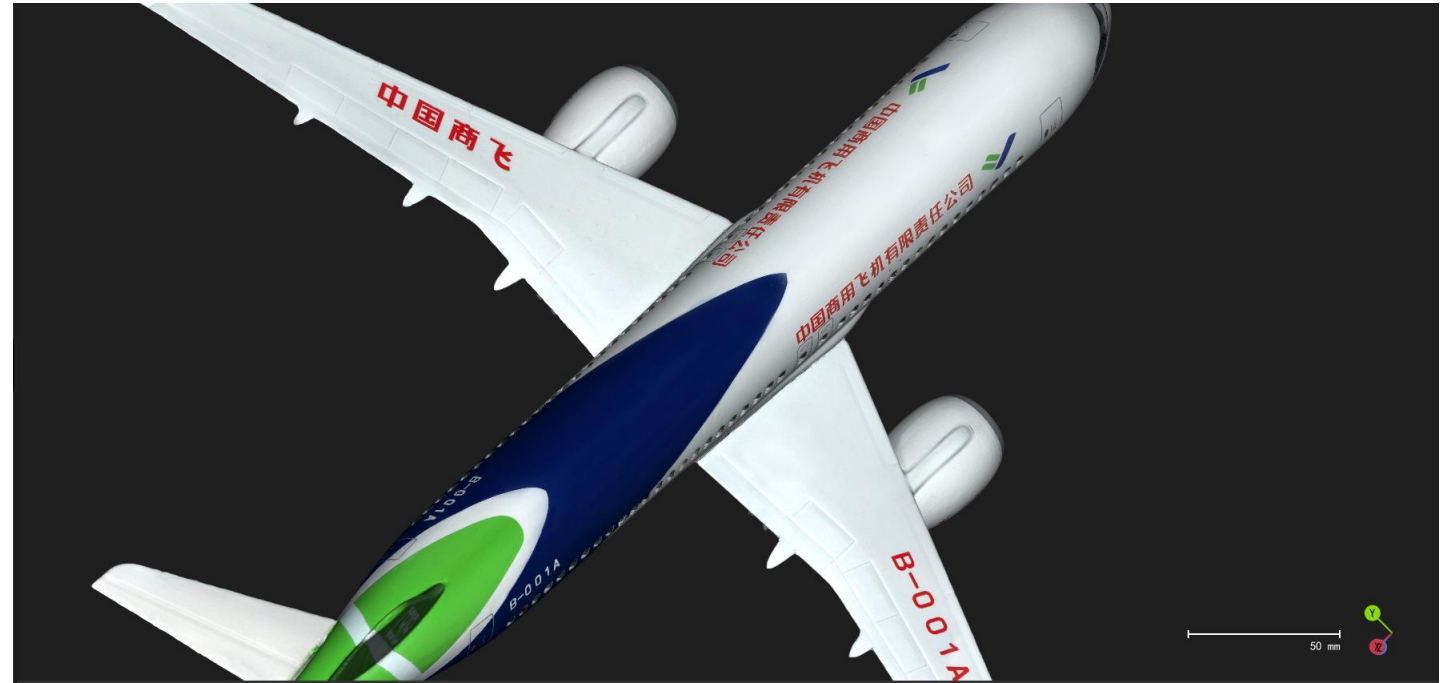
<https://www.ireal3dscan.com/3d-model/aluminum-steering-knuckles/>

2.3 Helmet Pattern Mapping



[Click here to view the 3D model](#)

2.4 3D Digitization of Aircraft Model



[Click here to view the 3D model](#)

2.5 3D Digitization of E-commerce Products



[Click here to view the 3D model](#)

2.6 3D Digitization of Shoes



[Click here to view the 3D model](#)

2.7 3D Digitization of Fruit Texture



[Click here to view the 3D model](#)

2.8 3D Face Model for Medical Aesthetics



[Click here to view the 3D model](#)

3. Main Process

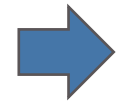
3. Main Process

1. DATA COLLECTION

Laser 3D Scanning

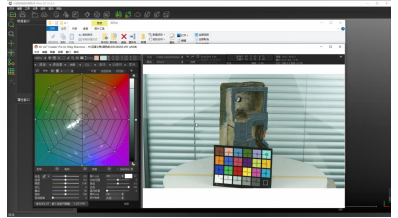


Photos Collecting

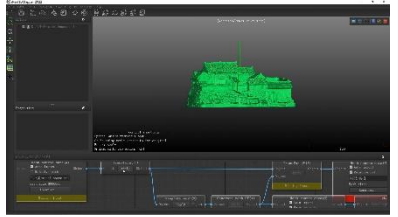


2. PRE-PROCESSING OF MODELS AND PHOTOS

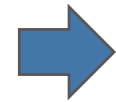
Photos Color Adjustment



Mesh Pre-processing

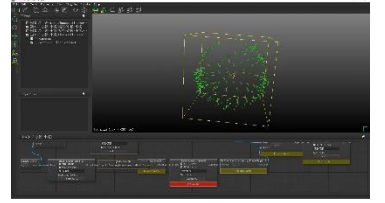


Photos Object Extraction



3. FULLY AUTOMATIC MAPPING

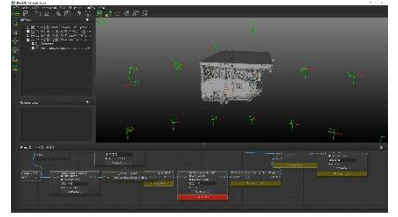
Relative Orientation



Absolute Orientation



Fine Registration



3. Main Process

4. SMART MAPPING

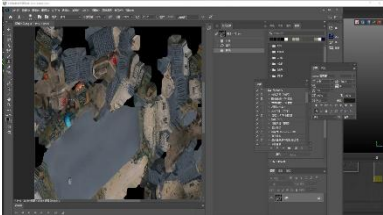
Automatic Mapping



Seam Line Editing

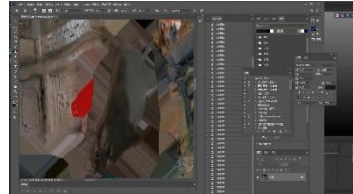


Smart UV Generating and Transferring

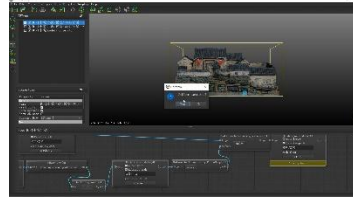


5. MAPPING EDITING AND BAKEN

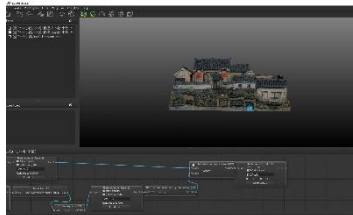
Refine Textures
Linkage
Photoshop/
Blender



Uniform After Refine Textures



Bake Albedo and Normals

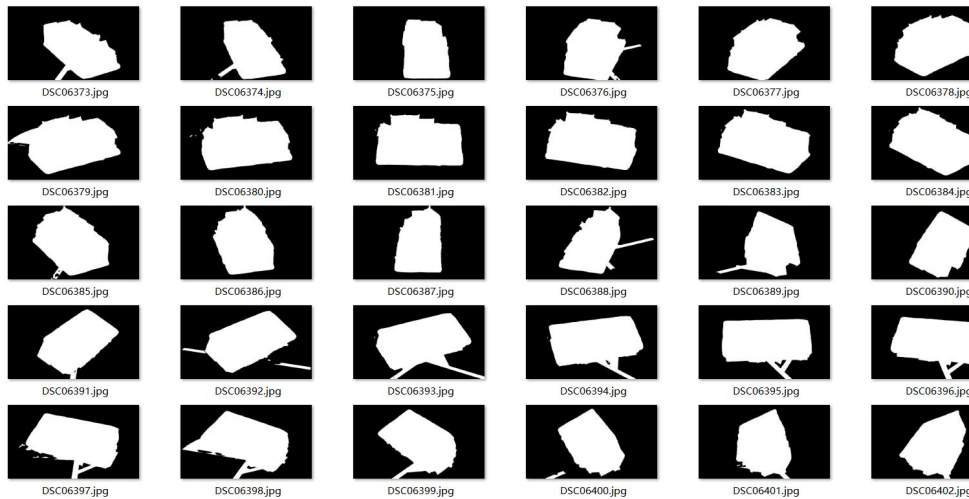
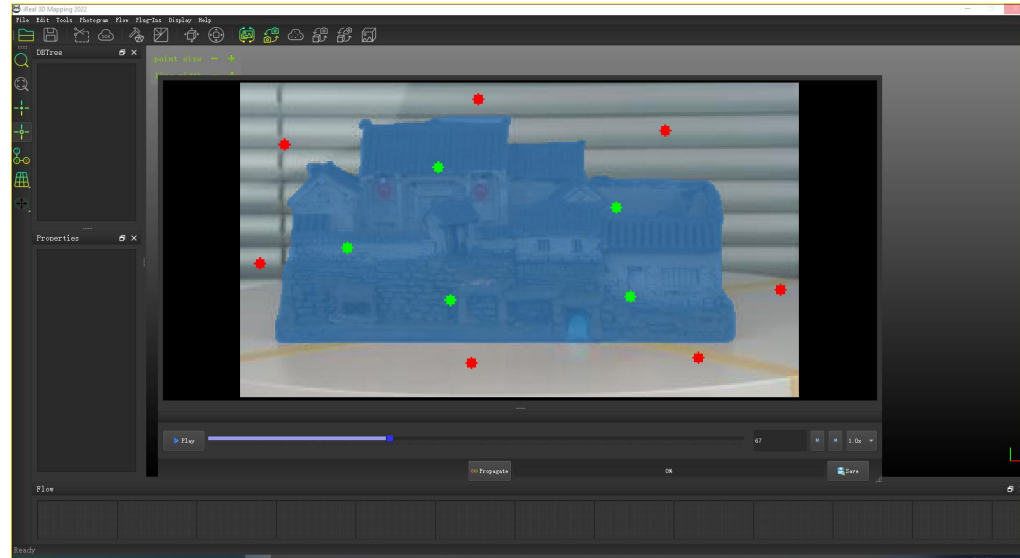


720° HIGH-PRECISION MAPPED MODEL



3.1 Automatic Extraction of Photo Subjects

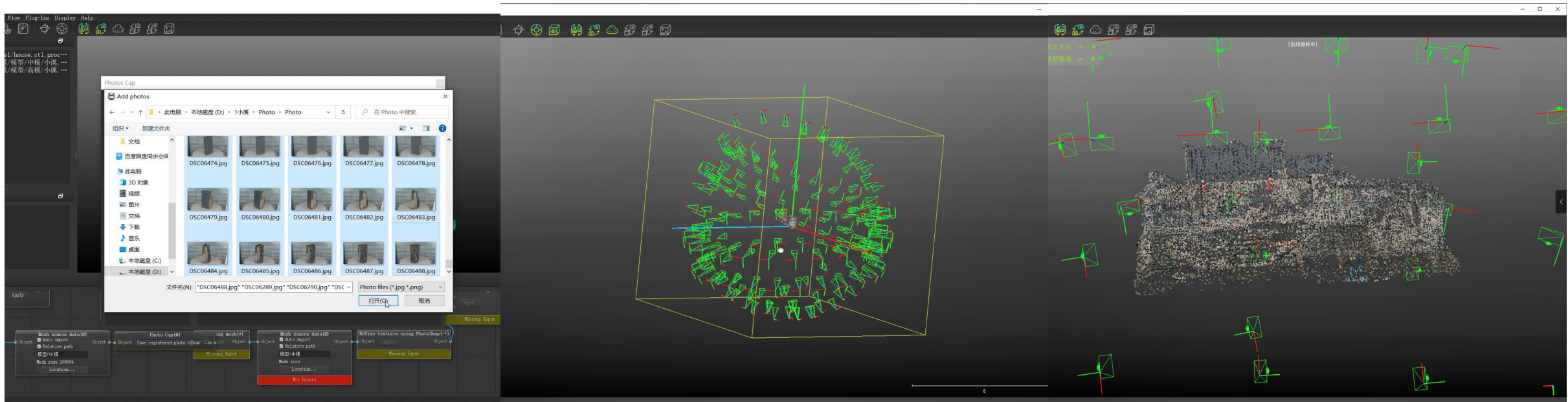
Through AI image recognition technology, the extraction of the main parts of all photos is automatically completed (the white is the automatically recognized main part), which is used for the next step: relative orientation of photos.



3.2 Relative Orientation of Photos

Import all photos with one click, automatically calculate the relative positions of hundreds of photo sets within 5-10 minutes , and complete the relative orientation of all photos.

Using the texture features (the main part) between the photos, automatically calculate, complete the relative spatial position sorting of all photos, and then build a sequence virtual camera and feature sparse vertice for all photos.



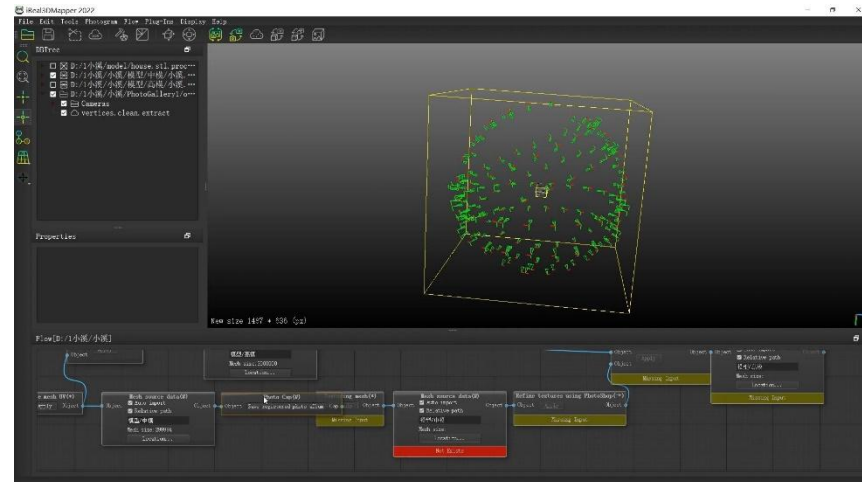
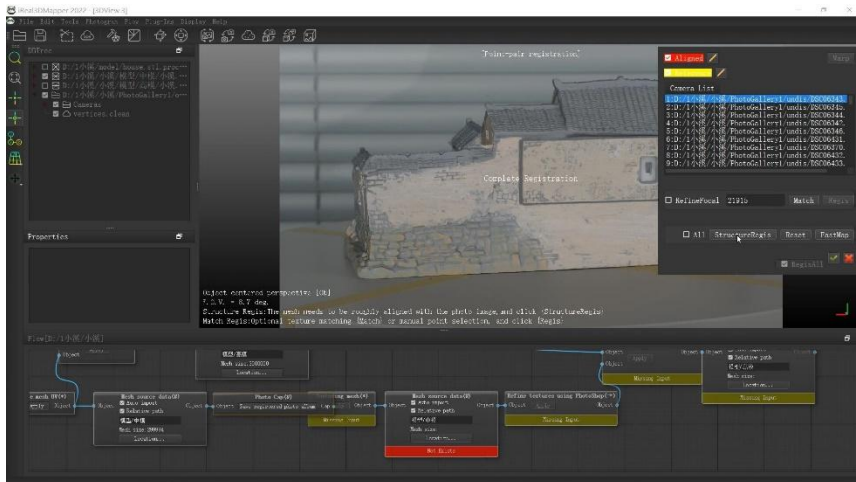
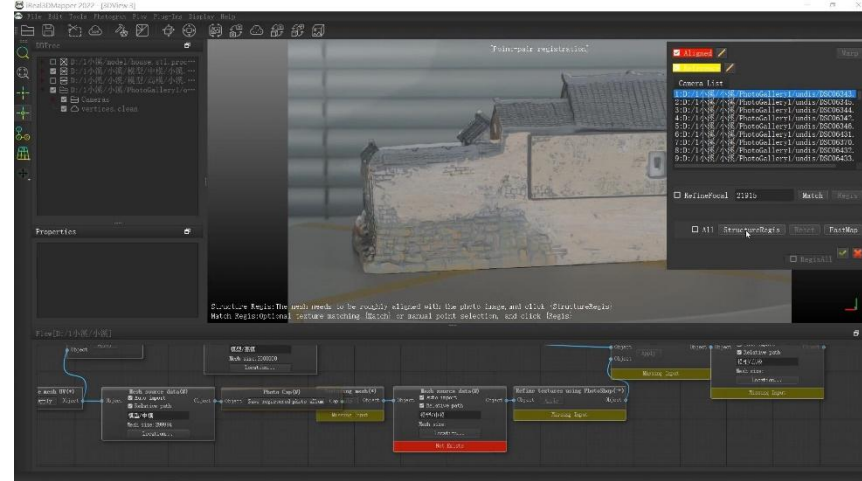
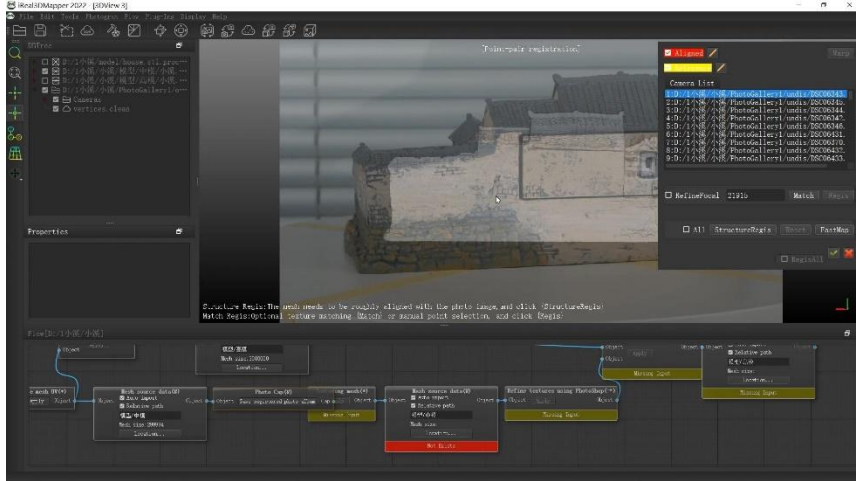
Import hundreds of photos with one click

Sequence virtual camera

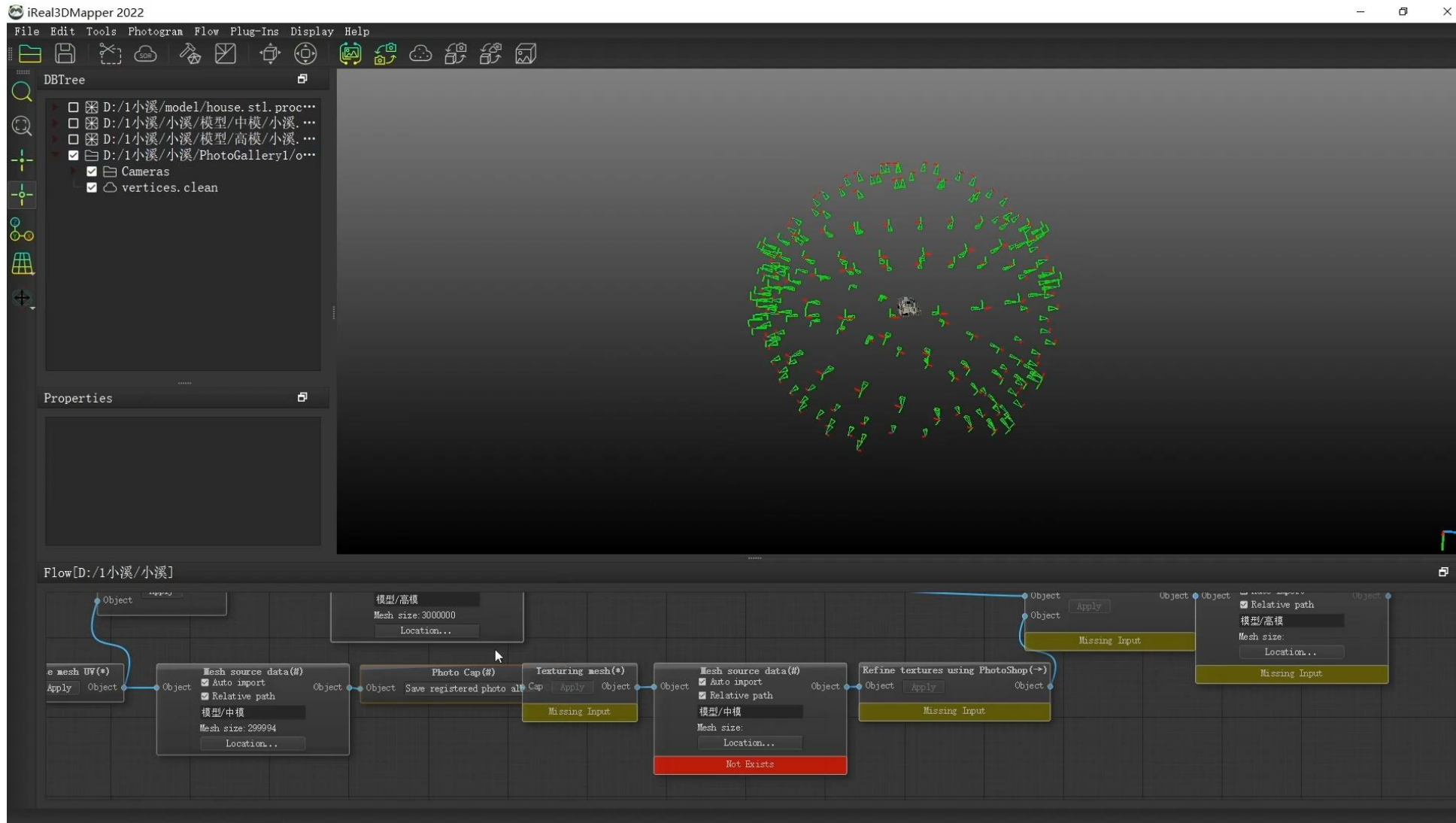
Reconstructed sparse vertice

3.3 Absolute Orientation - Manual Alignment

Select a photo, place the 3D model in the same size and position as the photo, analyze the similar structural features of the photo and the model through an intelligent algorithm, complete the automatic precise alignment of a single photo and the model, and then automatically construct the spatial mapping relationship between the model and the photo with one click.



3.3 Absolute Orientation - Manual Alignment

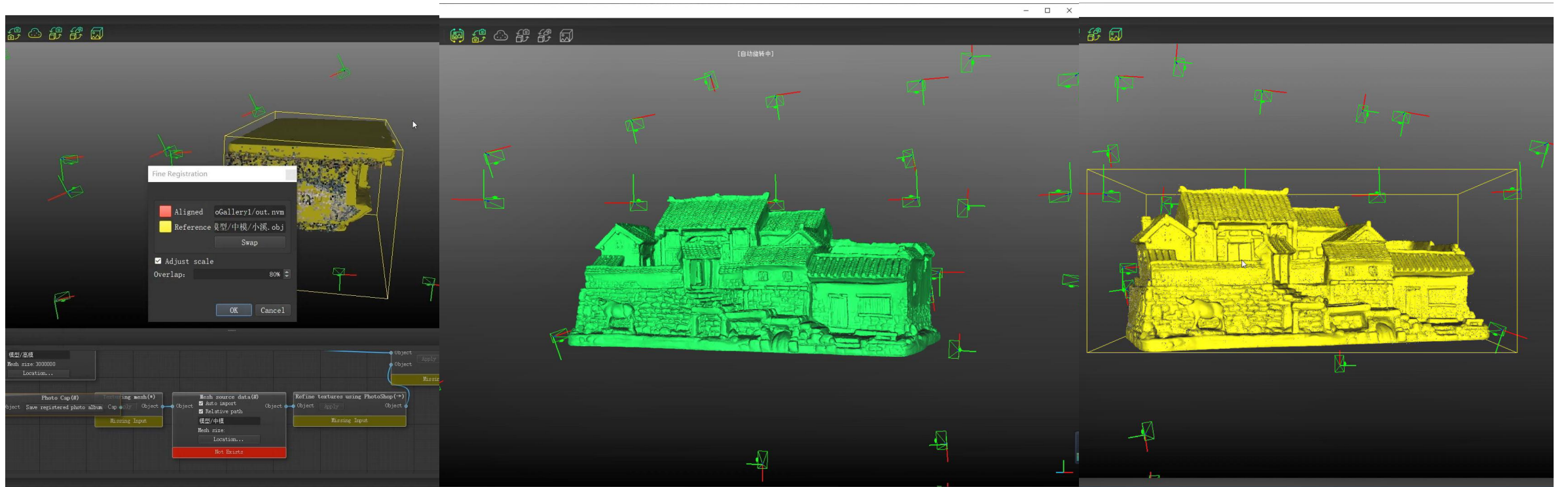


Absolute orientation of photos - manual alignment (video demo)

3.4 Fine Registration

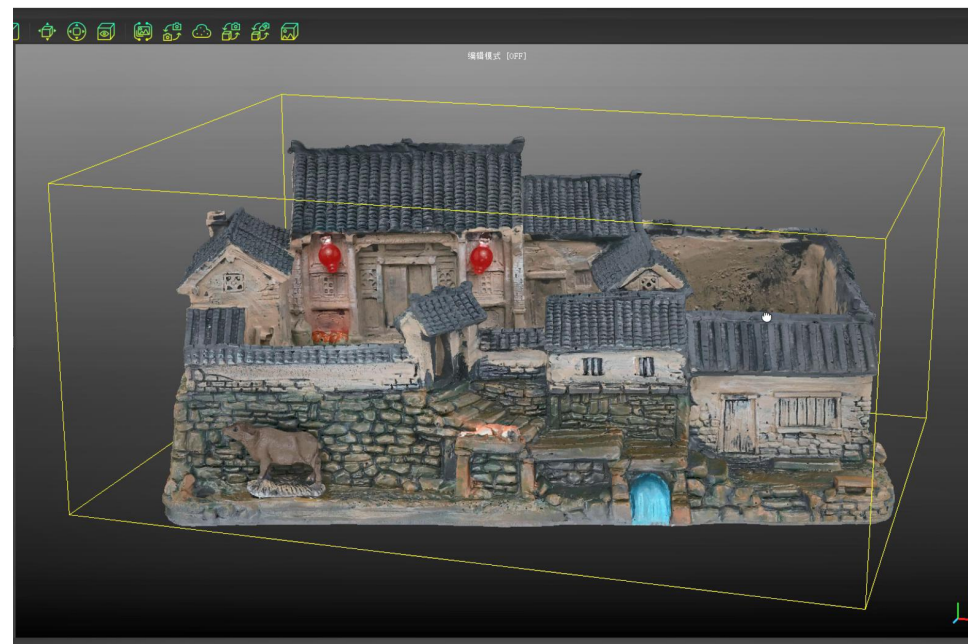
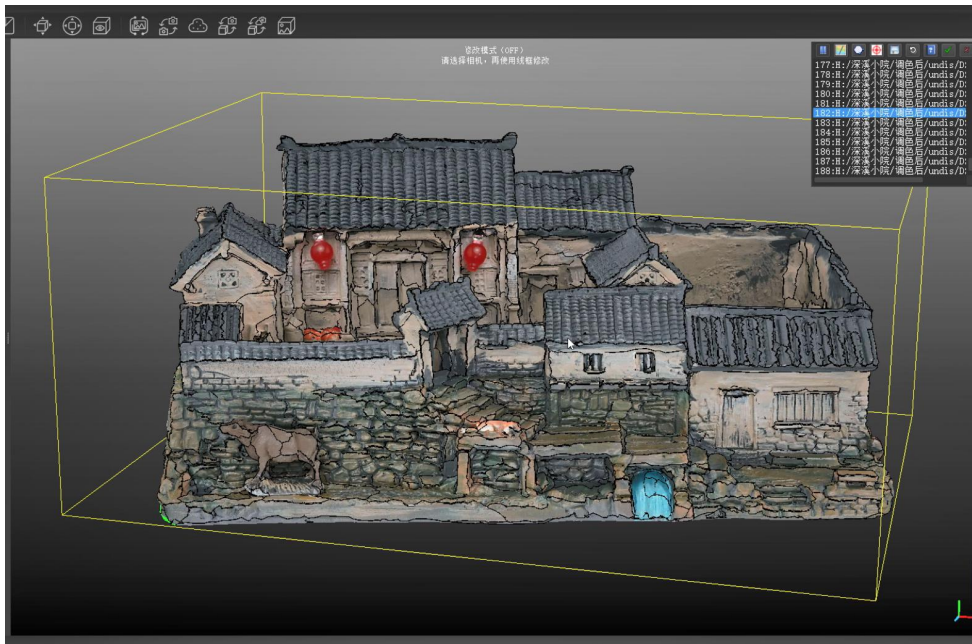
Using the matching algorithm of vertice and model to achieve millimeter-level mapping accuracy

High-precision registration of sparse vertices obtained by photo reconstruction and 3D scanned models, further reducing the mapping error between photos and models.



3.5 Smart Mapping

1. Intelligently identify wrong textures (facula area, out-of-focus/blur area, non-object area), and automatically eliminate reflective textures.
2. Each triangular mesh surface of the model can be associated with multiple multi-angle photos, automatically calculate and sort their texture quality, and automatically select high-quality textures with higher weights.
(Weighted statistics of many parameters such as sharpness, saturation, angle, etc.) For intelligent mapping, reducing the work of manual eliminating of faculae and out-of-focus blur areas.
3. After the mapping is successful, the texture seam lines are automatically generated, and the wrong textures that are not completely removed are edited in real-time, so as to realize the perfect texture fusion of multi-angle images in the 3D model.

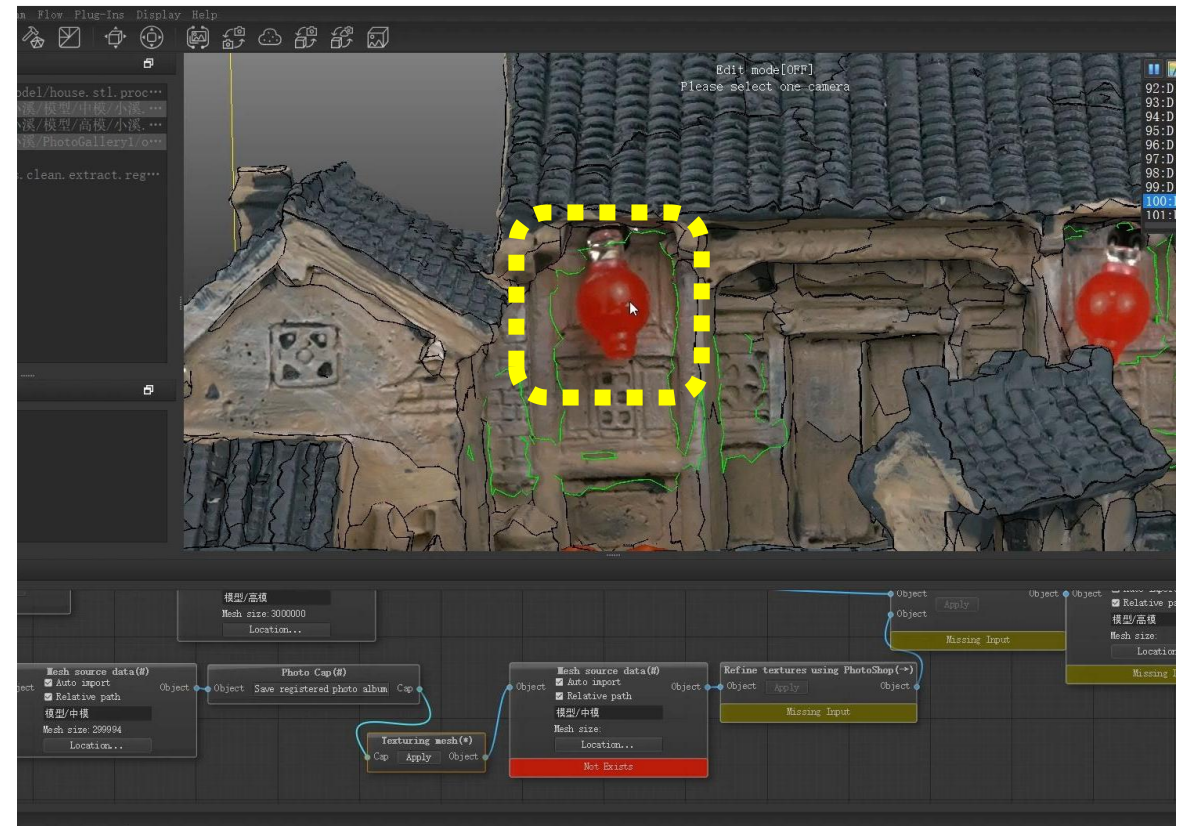
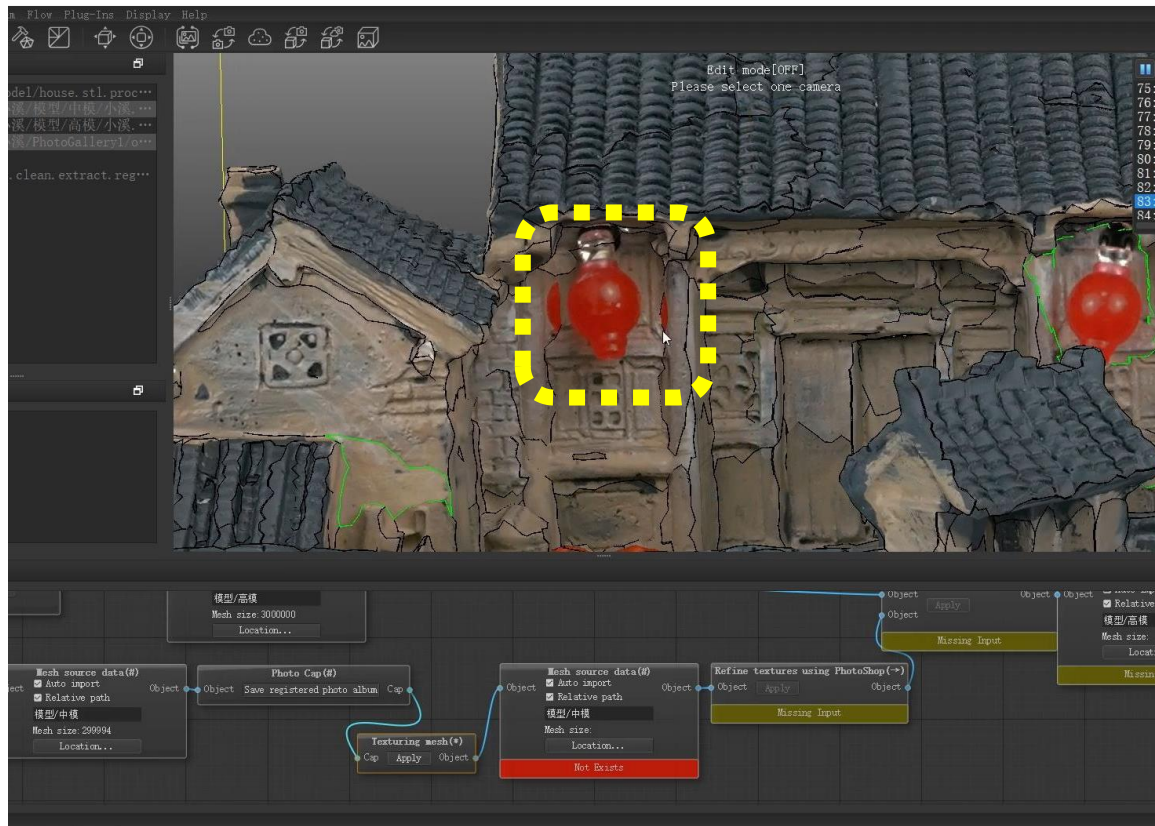


3.6 Real-time Seam Line Editing

Visualization, real-time editing and refinement:

For maps that are not completely matched or local maps with reflections, out-of-focus blurred photos, etc., you can use the seam line editing tool to make precise real-time refinement.

The time to recalculate the texture can be controlled to within 1 second.



Before VS After

3.8 One-click Color Leveling and Feathering

The intelligent fusion processing of mappings ensures that the effect is natural and has uniformity in color:

1. Using the Poisson Blending algorithm to complete the color calculation;
2. Feather processing for the texture of the seam line area.



Before VS After

3.9 Specifications

iReal 3D Smart Mapping Software - Specifications	
Data format	720° digital 3D model
Output format	*.obj, *.ply, *.fbx, *.stl, *.off and other universal 3D formats
Resolution of texture	16384*16384, 8192*8192, 4096*4096
Mapping error	$\leq 0.08 + 0.02 * D / 300$ mm (“D” represents the largest size of the item, the unit is mm)
Average chromatic aberration	(CIEDE2000) ≤ 5
Image spot	(Foreign object mapping, light spot, lens contamination, etc.) $\leq 0.01\%$
Color uniformity	After multiple photos are mapped, uniform light and color to ensure that the overall color of the utensils is consistent
Mapping edge	Mapping edges blend naturally and seamlessly
Mapping accuracy	≤ 0.1 mm

iReal 3D Mapping Software ensures mapping for high precision 3D mapping through three steps/strategies:

Step/strategy 1: Relative orientation, which is the process of calculating the relative position of a photo to a photo. This process uses the feature points of the photo for matching and null triple parity and is able to obtain a relative accuracy error of less than 1 pixel as long as the photo overlap is guaranteed to be sufficient to satisfy the photogrammetry method.

Step/Strategy 2: Absolute orientation, which is an inverse process to recover the mapping relationship between the 3D model and the relatively oriented photo set. After using a single photo to match the representational structure of the model, the accurate mapping relationship between the whole photo set and the model can be recovered according to the internal and external orientation relationship parameters of other photos.

Step/strategy 3: Fine alignment, using the matching of the feature point cloud (sparse or dense) with the model to further enhance the mapping relationship between the optimized photo set and the model.

4. Materials for Customers

4.1 Software Self-learning & Download

The screenshot shows the iReal 3D website. The main banner displays the product name 'iReal 3D Mapping Software' and a tagline 'Customized high-precision color 3D digital solution'. Below this are two buttons: 'Download Now' and 'Tutorial'. The navigation menu at the top includes 'Home > 3D Products > iReal 3D Mapping Software', 'Intro', 'Work Flow', 'Algorithm', 'Specifications', 'Price', and 'Cases'. A sidebar on the right contains five sections, each with a 'Download Now' button: 'Software', 'Photo Shooting Tips', 'Patterned Pad', 'Test data', and 'Introduction'. A chatbot icon is visible in the bottom right corner of the banner area.

This is an intelligent, semi-automatic software that allows users to easily complete software tests by self-learning (watching video tutorials) and combining test data (notes).

For software introduction, software usage tutorial (video), test data (corresponding to the tutorial), and photo tutorial, please click into:

iReal 3D official website (<https://www.ireal3dscan.com/>) - 3D products - iReal 3D Mapping Software

Note: The software can be tried directly after download, and no license is required.

The trial version of the mapping output only supports 4k (maximum resolution: 4096*4096), and there is a limit on the usage period; after purchasing the official version, you will get permanent access, and the maximum output of mapping can be up to 16K.

4.2 Software & Hardware Preparation

High-precision, High-definition Color 3D Modeling Solution					
Step	No.	Device/Software	Recommended Model	Function	Note
3D scan	1	3D scanner	KSCAN-Magic 3D laser scanner	Obtain high-precision 3D models	Or TrackScan series
	2	Mobile workstation	DELL Mobile Precision 7560	3D scanning and data processing	
SLR camera	3	SLR camera + tripod	Sony Alpha 7RIII A7RM3A Full-frame Microless (Pixel 4240w) + regular lens + macro lens	Obtain multi-angle HD photos	Or EOS 5DSR 5060w pixels
	4	Soft light set	Three fill lights + one ceiling light stand + one softbox	Ensure that medium-sized objects receive even light when shooting	With the ring fill light, it can meet the shooting requirements of more size items
	5	Color check	X-Rite Color Checker classic	Guaranteed low chromatic aberration in the photos taken	
	6	Automatic turntable	360-degree automatic turntable (programmable)	Link with the camera to automatically take pictures	
	7	Patterned pad	Customized (The standard patterned pad patterns we provide can be printed on A3/A4 paper)	Improve the efficiency and accuracy of post-photo positioning calculation	
Data post-processing and smart mapping	8	3D post-processing software	Blender	Local refinement of 3D scanned models	Add-on Geomagic Wrap
	9	Smart mapping software	iReal 3D mapping software	Semi-automatic smart mapping	
	10	Photo editing software	Photoshop	Refine local maps	
	11	Color grading software	3D LUT Creator	Batch automatic color correction of captured pictures	
	12	Image texture and map generator	Marmoset Toolbag	Bake the texture of the middle model to the high model to generate high-precision, high-definition color 3D models	

4.3 Photo Shooting Preparation



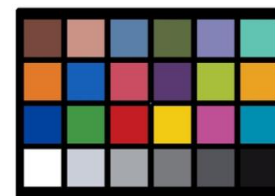
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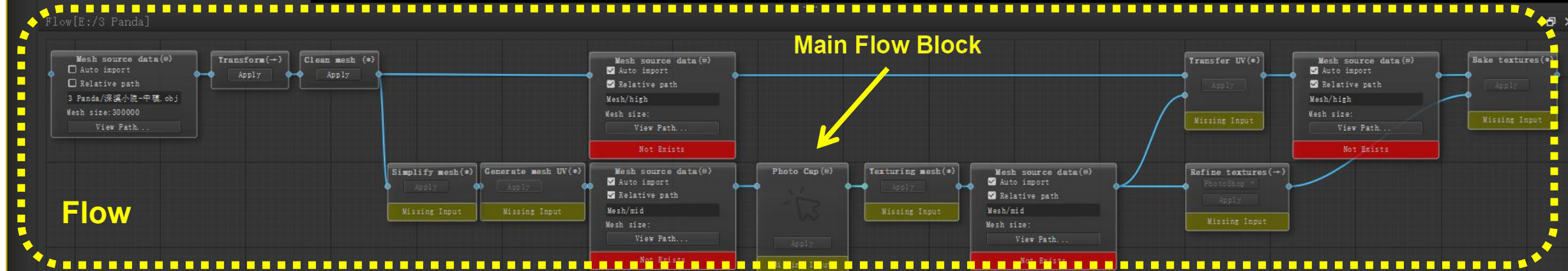
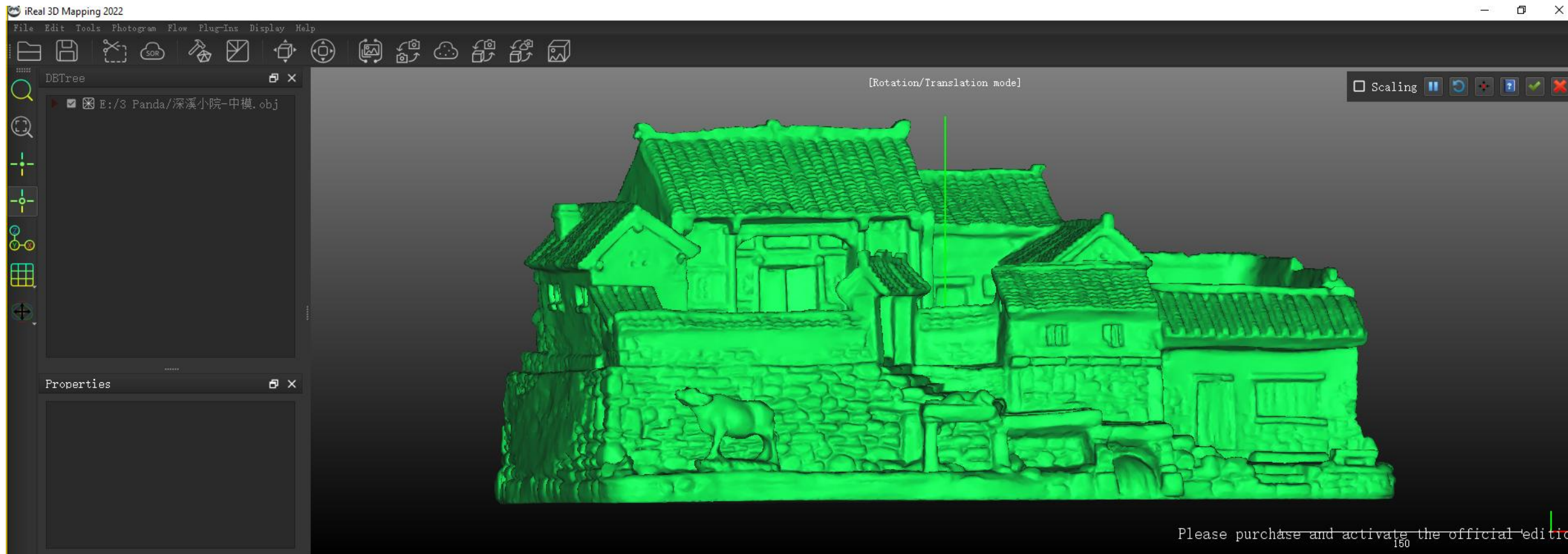
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6



4.4 Software Interface



5. Comparison of Color 3D Modeling Technologies

5. Color 3D Modeling Comparison

True Color 3D Modeling Technologies Comparison		
Compared Item	Laser 3D Scan + iReal 3D Mapping Software	Photo Modeling
Overview - Laser 3D Scan + iReal 3D Mapping Software	<p>1. Main advantages:</p> <p>①Good adaptability of items: it can meet the needs of making color 3D models of most items.</p> <p>②Simple to use: easy to get started after self-learning; low requirements for technical personnel skills and experience; low labor costs (no need to be a senior engineer).</p> <p>③High-efficiency production: Most steps can be processed intelligently and automatically, and texture production and texture refinement can be completed within 30 minutes (regular model).</p> <p>④One-stop processing: When the local texture needs to be refined, there is no need to use multiple professional and complex third-party software. The engineer can use seam line editing, single photo map replacement, one-click color leveling, Photoshop plug-in refinement, and other intelligent functions in the iReal 3D mapping software.</p> <p>⑤High-quality color textures: This solution can produce high-precision (in models and textures), high-accuracy, and true-color 3D models, which are most suitable for customers with high requirements (such as industries of cultural relic protection, digital collections, etc.): 1:1 restoration of every real texture on the item is required.</p> <p>2. Main disadvantages: The cost of supporting software and hardware in the early stage is relatively high (however, the cost of post-production and supporting personnel is low, the production efficiency is high, and it can meet the requirements of color modeling for various items).</p>	
Overview - Photo Modeling	<p>1. Main advantages:</p> <p>①Complete photo modeling and low ancillary cost.</p> <p>②For customers who do not have requirements for 3D model accuracy and texture accuracy, this method is more advantageous:</p> <p>For matte items with rich and non-repeating textures and without complex structures (no hollows, deep holes, etc.), the advantages of this method are the most obvious.</p> <p>2. Main disadvantages:</p> <p>①Low adaptability of items: For items with few textures/high reflection, thin-walled parts, etc., photo modeling may fail/issues may occur in local modeling.</p> <p>②High requirements for operators: Operators need to have skills in SLR cameras, post-processing, local map refinement, and other professional third-party software.</p> <p>③High production cost: High-definition photo modeling requires more high-pixel photos, high-configured workstations, and longer computing time (the shortest takes 2-3 hours). When the local map needs to be refined, the operation is cumbersome and time-consuming.</p>	

Extra Reading:


<https://www.ireal3dscan.com/news/color-3d-modeling-solutions-comparison/>

Digitize Everything to Create a 3D Future!

Scantech

To Be a World-leading Brand of 3D Digitization

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