无穹创新
SKYLAND INNOVATION

MetaCam Studio

Data Post-Processing Software

User Manual

v1.7.2 2026.03

1. Software Overview

1.1 Introduction

MetaCam Studio is a desktop application designed by SkylandX for laser scanning workflows. It used to process, view, edit, and analyze scan result data, delivering comprehensive 3D data application support for SkylandX users.

MetaCam Studio mainly includes the following capabilities:

1. **Raw data processing:** supports post-processing of data from all SkylandX handheld scanning devices, including SLAM mapping, point cloud colorization, coordinate transformation, image undistortion, panoramic image export, etc.;
2. **Point cloud post-processing:** supports basic point cloud data editing such as viewing, measuring, clipping, registration, merging, etc.; furthermore, it also provides industry-specific features such as point cloud comparison, photo comparison, and plane extraction.

1.2 Download, Installation, Update, and Uninstallation

1.2.1 Download and Installation

1. MetaCam Studio requires Windows 10 or later version of operation system (64-bit).

Configuration	Basic Requirement
Central Processing Unit (CPU)	Intel® Core™ i5-9500 (or AMD equivalent performance processor) and above
Graphics Processing Unit (GPU)	NVIDIA GeForce RTX2060 or higher compute capability (RTX required)

Video Memory (VRAM)	4GB and above
Memory (RAM)	32GB and above
Hard Disk Drive (HDD)	100GB and above free space
Display Resolution (PX)	1920*1080 and above
Network Bandwidth (BW)	20M and above

Regardless of the graphics card configuration, please ensure that the driver on your computer is up to date.

To run some advanced functions smoothly in MetaCam Studio (such as data processing and plane extraction), a higher hardware configuration is required.

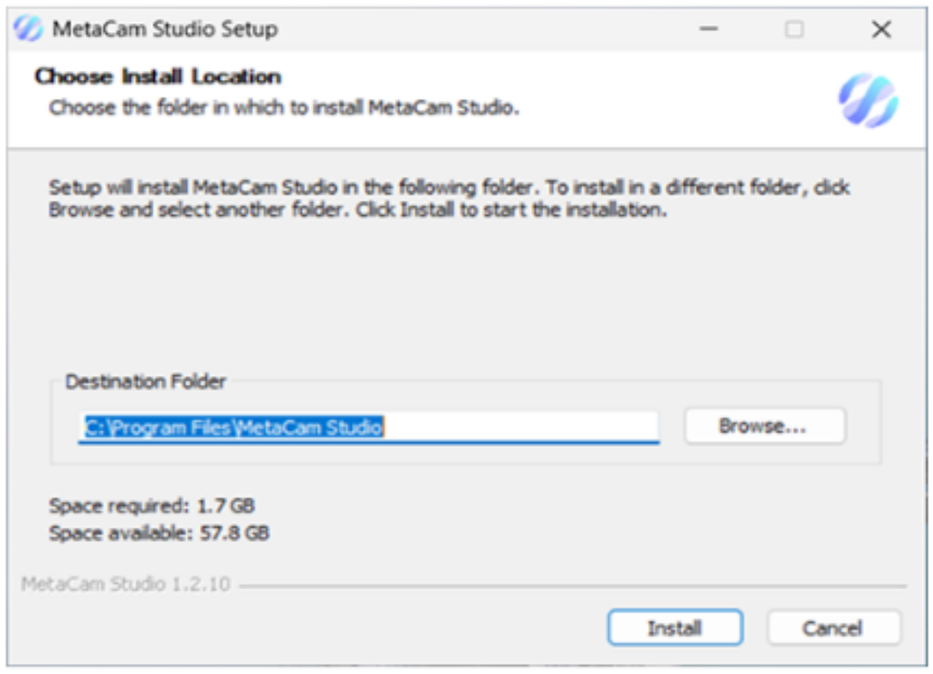
Configuration	**Recommended Requirement**
Central Processing Unit (CPU)	Intel® Core™ i7-10700H@2.90 GHz (or AMD equivalent performance processor) and above
Graphics Processing Unit (GPU)	NVIDIA GeForce RTX3070 or higher compute capability (RTX required)
Video Memory (VRAM)	6GB and above
Memory (RAM)	64GB and above
Hard Disk Drive (HDD)	200GB and above free space

Regardless of the graphics card configuration, please ensure that the driver on your computer is up to date.

2. Use a computer to access the download link provided by SkylandX to obtain the software installer "" and install https://skyland.3disfuture.cn/app-api/pntcld/app-version/latest/pc/skyland.

3. Select the installation path and wait for the software installation to be completed.

   Double-click the MetaCam Studio icon on your desktop to launch the software.



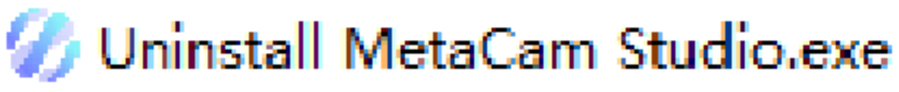
1.2.2 Software Update

When a new version of MetaCam Studio is available, a prompt will pop up when opening the software. You can confirm the update or skip it temporarily.

1.2.3 Software Uninstallation

1. Using the following path under Windows 11 as an example: Start - All Apps - MetaCam Studio, right-click and select Uninstall.

2. You can also double-click "Uninstall MetaCam Studio.exe" in the MetaCam Studio installation directory to uninstall.



1.3 Software Authorization

MetaCam Studio is a post-processing software independently developed by SkylandX. A valid software license is required for using. Currently, two licensing methods are adopted, "hardware dongle" and "cloud license", for core features.

Before licensing, please ensure you have obtained a hardware dongle or cloud license

account, and that the encryption driver has been installed.

1.3.1 Dongle Acquisition and Usage

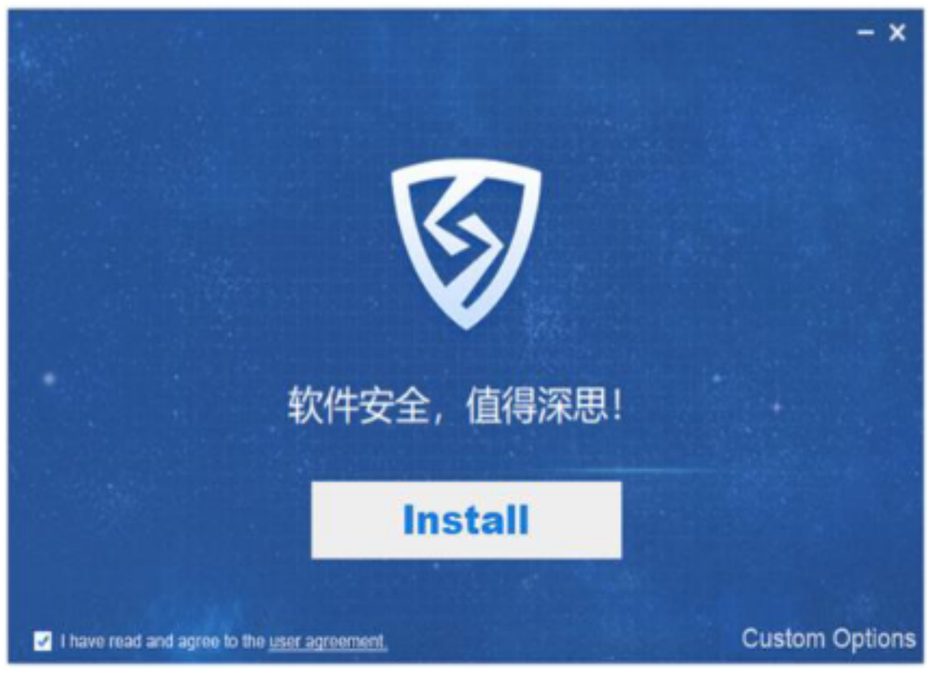
1. Each device package includes one hardware dongle.

2. The dongle supports one-to-many licensing. An authorized dongle can be used on different devices and will verify the license on each.

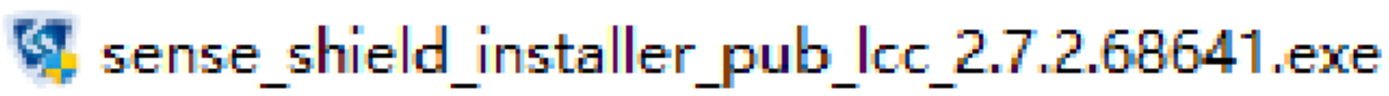
3. If additional hardware dongles are needed, please contact SkylandX after-sales personnel.

1.3.2 Encryption Driver Installation

1. After MetaCam Studio installation is completed, the encryption driver installation interface will pop up automatically. Confirm the installation path and wait for the driver installation to complete.



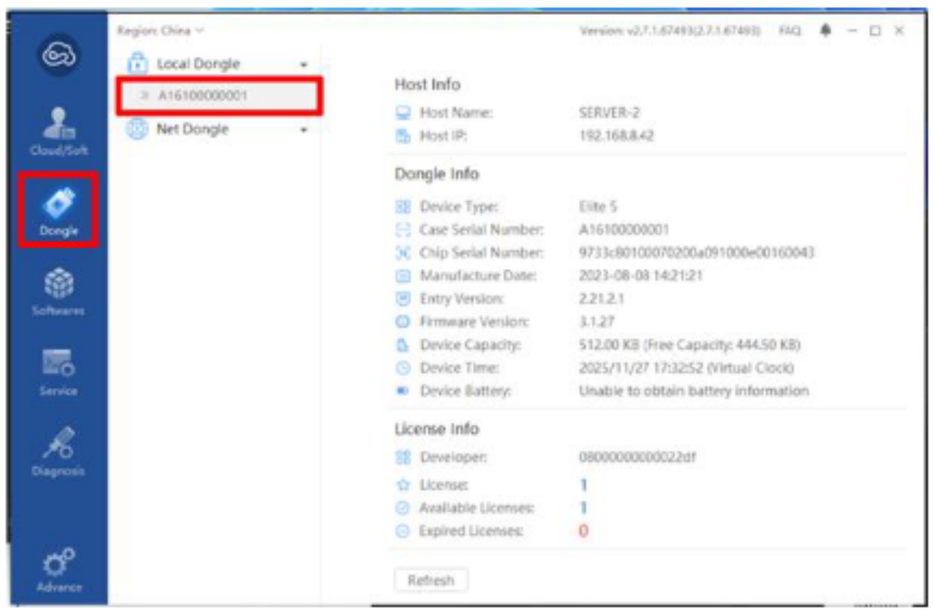
2. You can also double-click "sense_shield_installer_pub_xxxxxx.exe" in the MetaCam Studio installation directory to install.



1.3.3 Confirm License Application

1. After the driver installation is complete, click "Try Now" to open (or click the "  " icon in the taskbar):

2. If a hardware dongle is inserted, you can check the license information under "Hardware Lock - Local Dongle" in the interface.

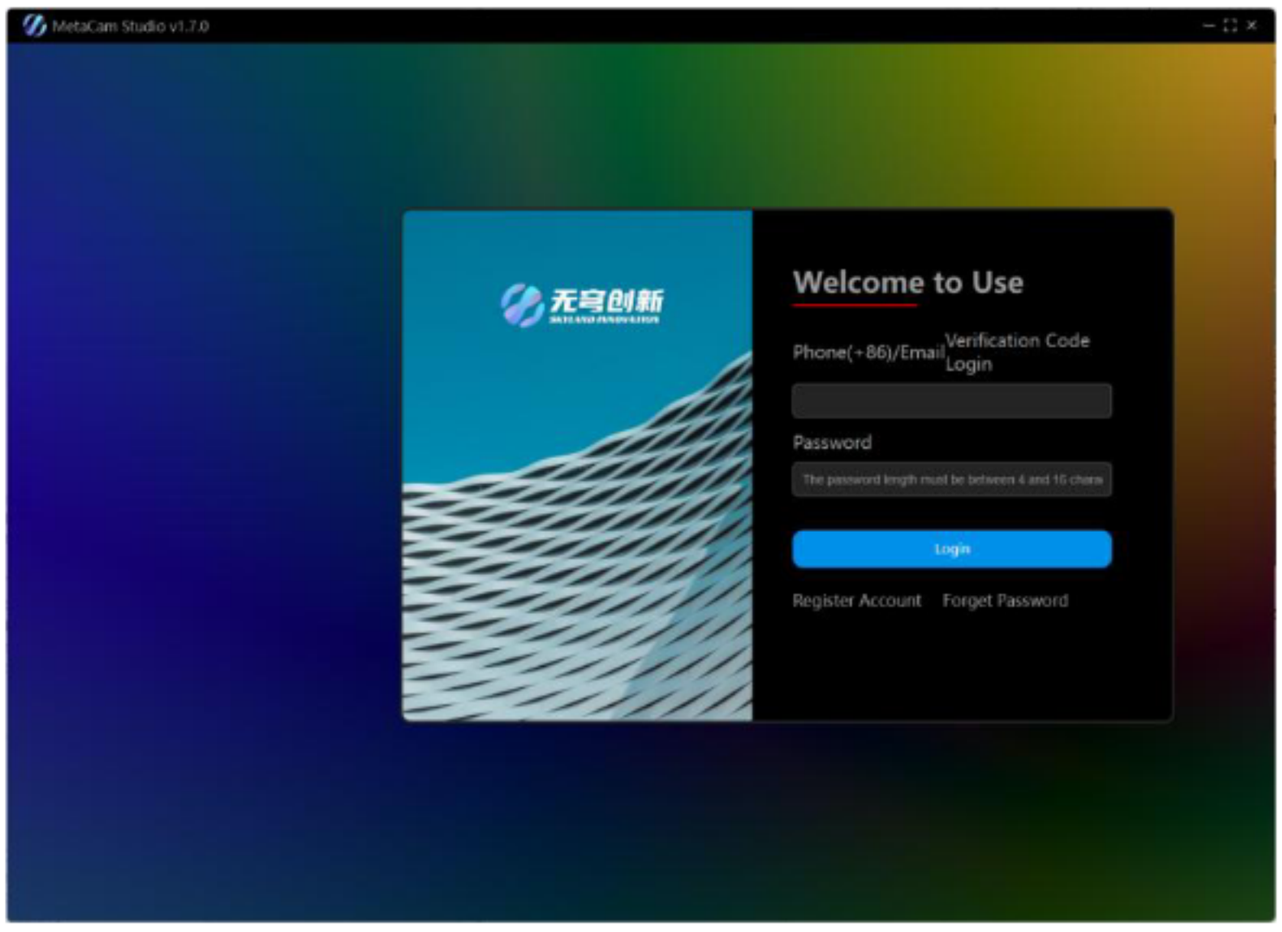


3. If you need to obtain a cloud license, you must first log in to your account (register if you don't have one), and contact SkylandX after-sales personnel to obtain authorization. After authorization, you can check the license information under "Cloud/Software Lock - Cloud Account" in the interface.

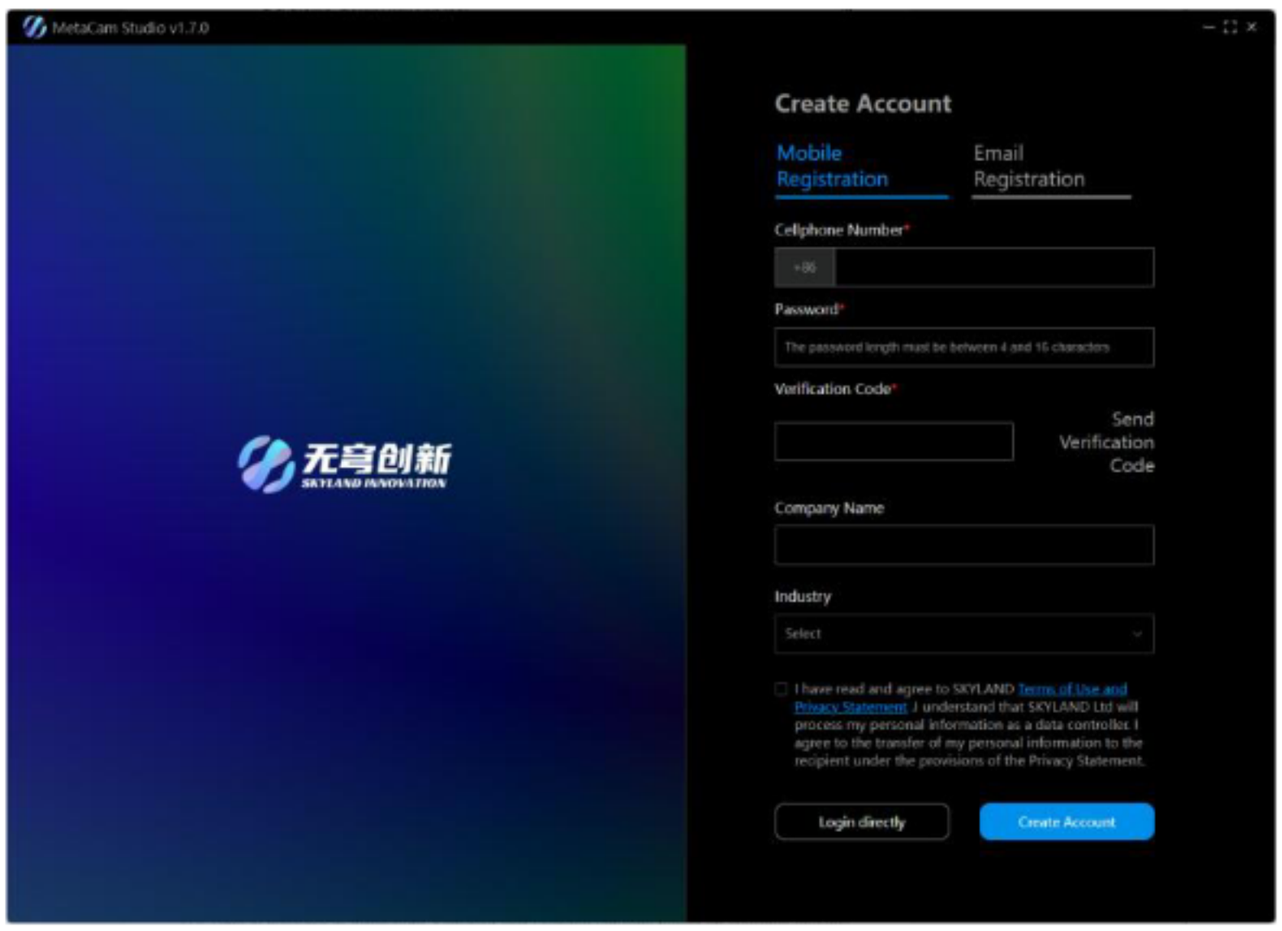
1.4 Interface Overview

1.4.1 Login Interface

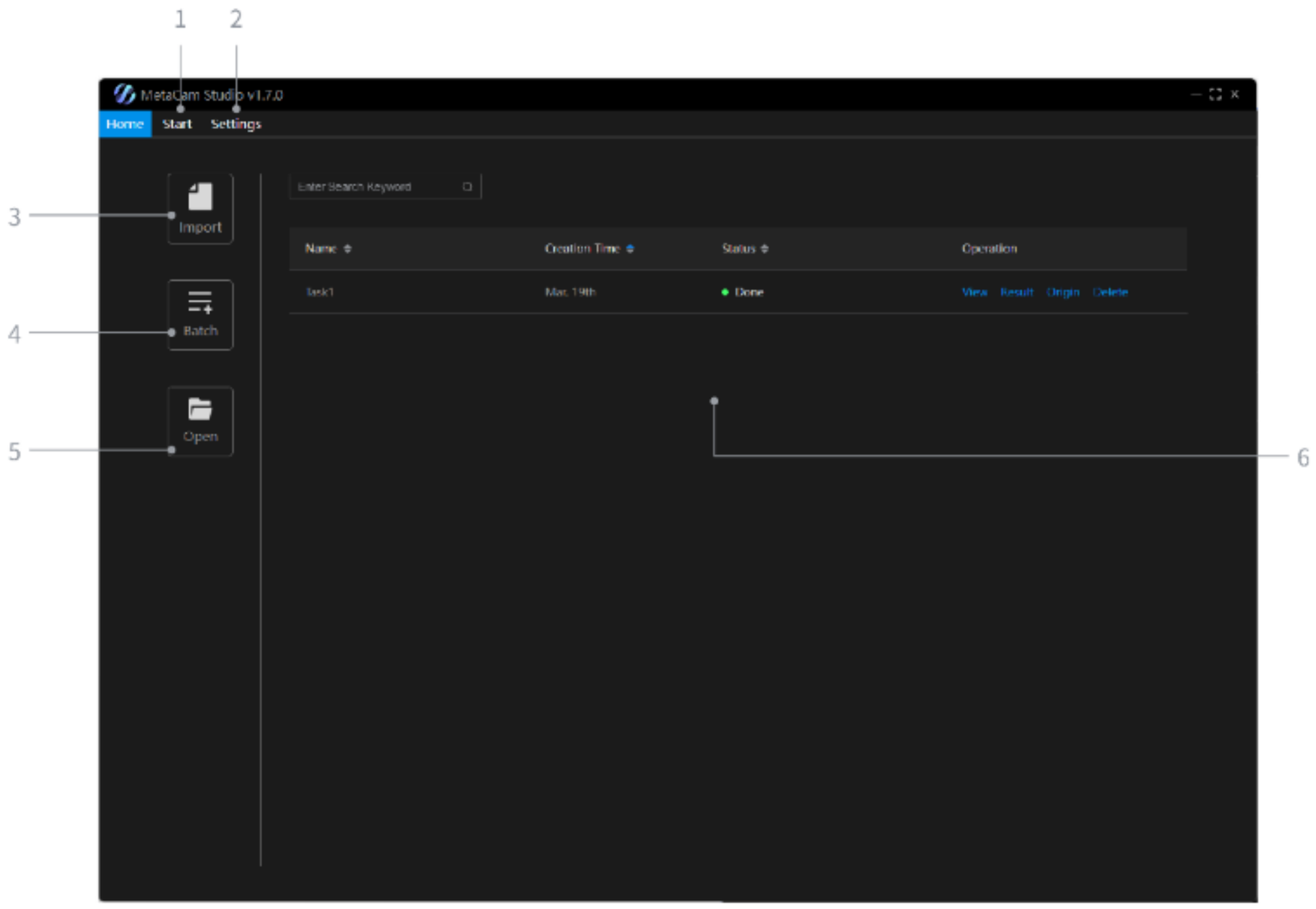
1. Upon your first launch, you will be prompted to log in with your SkylandX account to enter the main interface. Once logged in, MetaCam Studio will keep you signed in for future sessions until you manually log out.



2. If you do not have an account, please register one.



1.4.2 Home Page



1. Start

Click to switch to the start page to browse and edit data.

2. Settings

Click to switch to the settings menu for global configuration.

3. Import

Click to open the new task dialog, add a single task, and configure full parameters.

4. Batch

Click to open the batch processing dialog, add multiple tasks, and configure partial parameters.

5. Open

Click to open the file explorer dialog, select local point cloud files and add them to the start page.

6. Task Bar

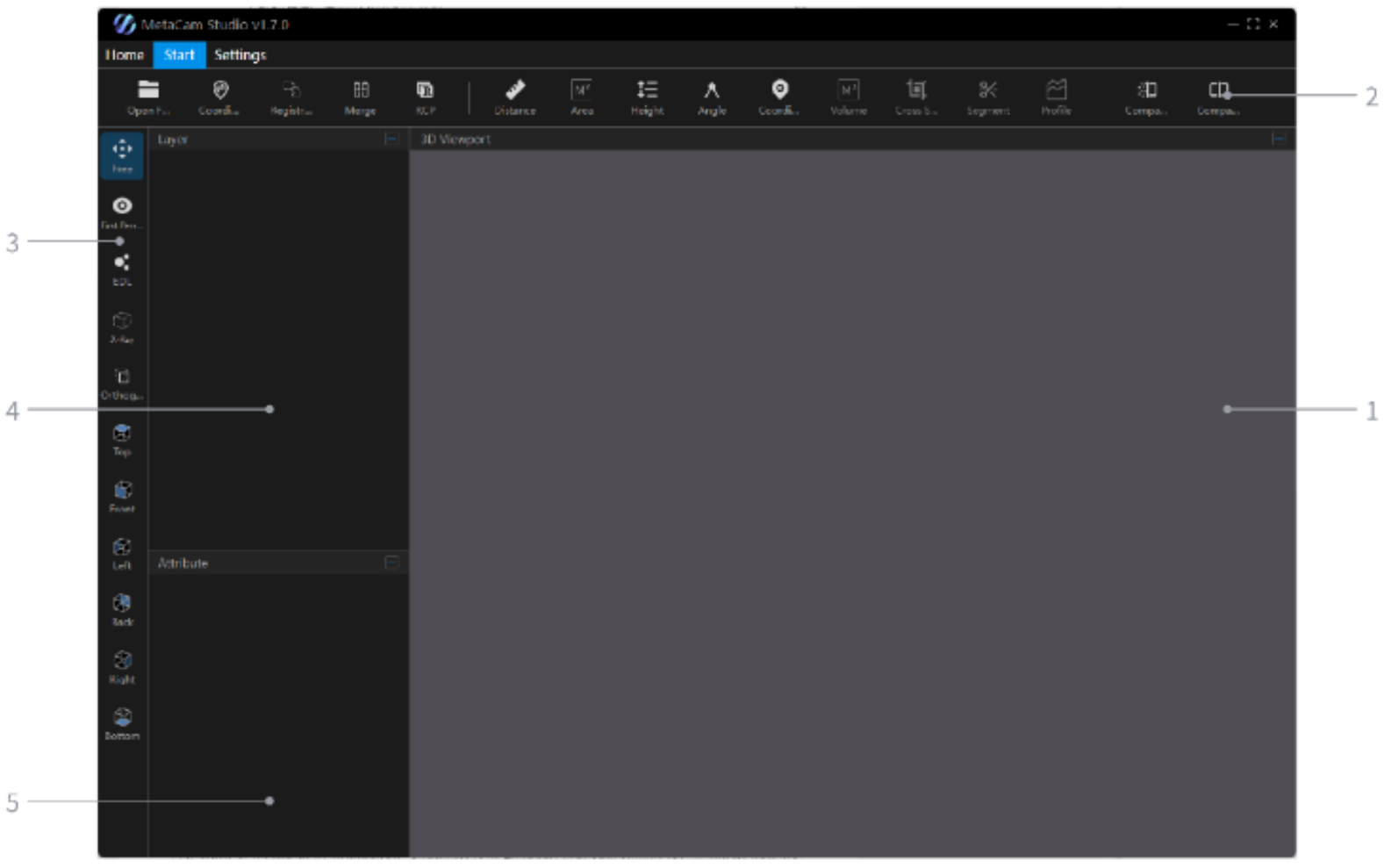
The task bar displays the status of submitted processing tasks and provides management functions. Click the corresponding tab to sort tasks by category.

Click the clickable elements to control the task status or browse and edit.

-  : Enter task keywords in the search box to search for tasks.
- **Name:** A task name is set when the task is created. When batch processing is used, the task name cannot be edited.
- **Creation Time:** The device time of the computer when the task is created.
- **Status:** For submitted tasks, the status bar displays the real-time processing status. The specific meanings are as follows:
  -  : Waiting for processing
  -  : Currently processing
  -  : Task processed successfully
  -  : Task processing failed
  -  : Processing failure error code and explanation
- **Stop:** Terminate the currently "processing" task

- **View:** Click to go to the start page and load the point cloud;
- **Result:** Click to open the task result directory folder;
- **Origin:** Click to open the task raw data directory folder;
- **Delete:** Click to delete the corresponding task record (the local files will not be deleted);

1.4.3 Start Page



1. 3D Viewport

The area for displaying spatial 3D data, with direct mouse interaction.

2. Menu Bar

The menu bar contains all editing/interaction tools for in-software data post-processing. Click to switch to or pop up the corresponding panel.

3. Quick Action Bar

Click quick actions to quickly switch display effects in the 3D viewport.

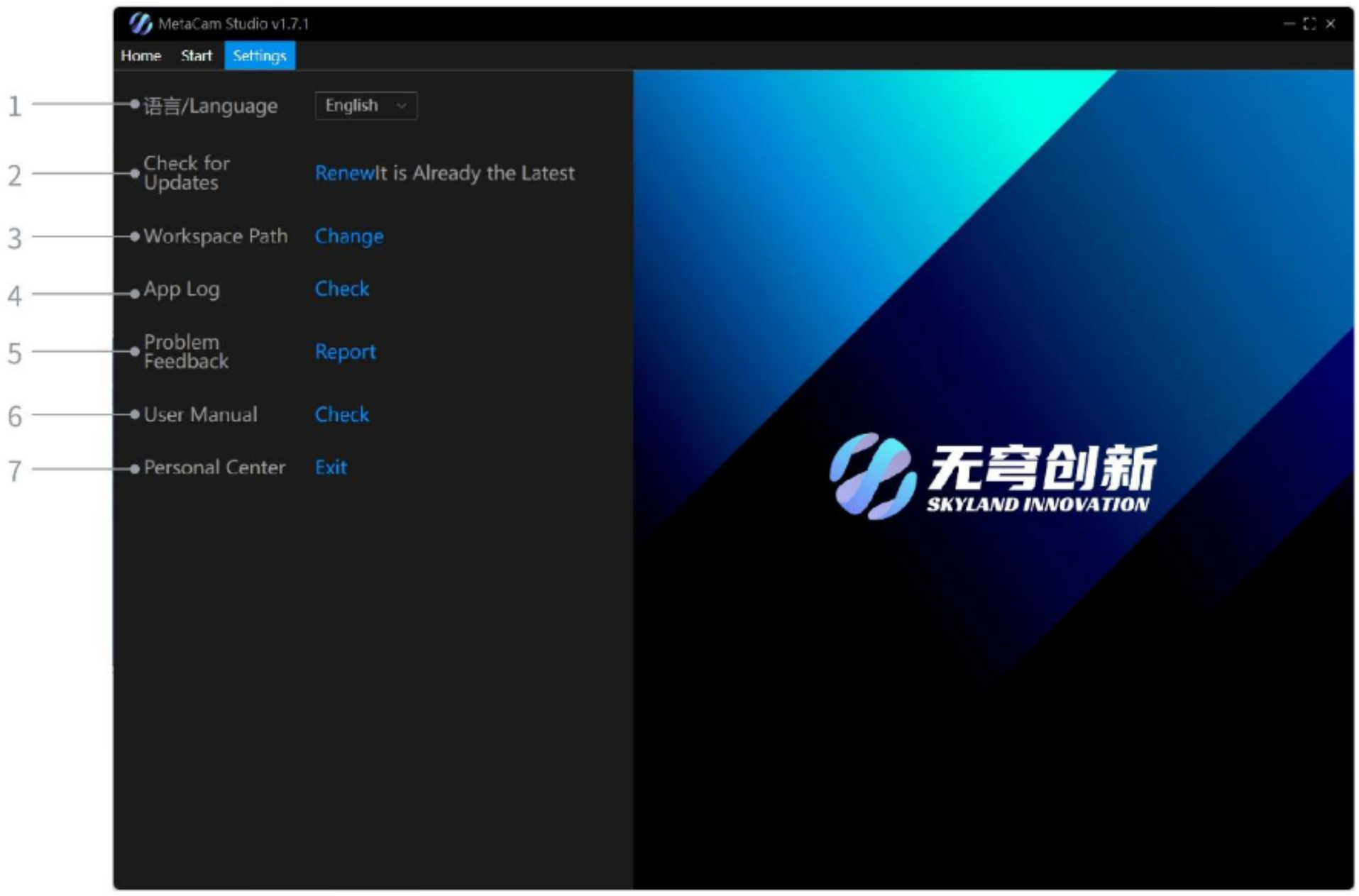
4. Layer Management

Manage the layer data loaded in the start page, supporting visibility toggling, quick actions, and right-click context menus.

5. Attribute Panel

Displays the property information of the currently selected layer, and supports adjusting rendering effects.

1.4.4 Settings Page



1. Language

Switch the software language interface, currently supporting 10 languages: Simplified Chinese, Traditional Chinese, English, Russian, Spanish, Portuguese, French, Japanese, Korean, and Italian.

2. Check for Updates

Check the latest published version of MetaCam Studio and can select whether update or not if available.

3. Workspace Path

The default output workspace for software processing results, which can be manually changed.

4. App Log

Click to open the software runtime log for obtaining and providing feedback to technical support.

5. Problem Feedback

Open the problem feedback submission dialog to report software usage issues.

6. User Manuel

Prompt the official website user manual in web explorer to view software instructions/operating instructions and other information.

7. Personal Center

Click to log out and return to the login interface.

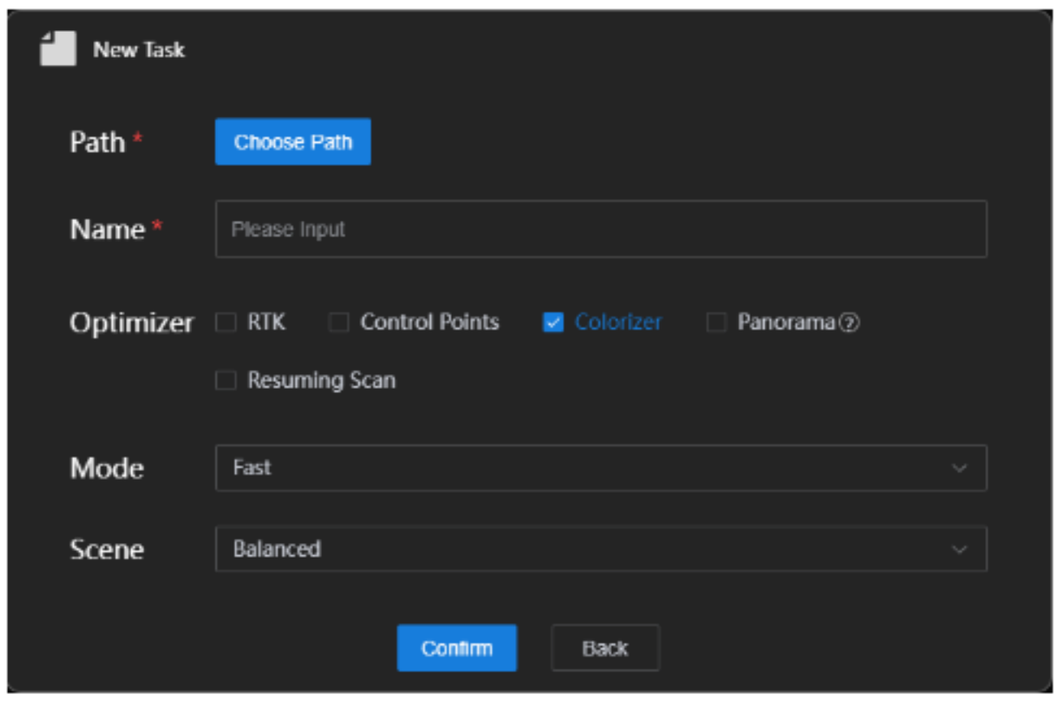
2. Home Page Functions

2.1 New Task

Users can create a new task to process data collected by SkylandX handheld laser scanners to obtain high-precision colorized point clouds, photos with positioning information, and collection trajectory data.

Steps

1. Click "Import", or drag and drop the raw data folder directly onto the home page to open the "New Task Dialog":



2. Confirm the raw data path to be processed and the new task name;

3. Select the necessary optimization parameters for data processing. Features including RTK Calibration, GCP Calibration, Point Cloud Colorization, Panorama, and Resume Scanning can be toggled on or off individually. You may select any combination of these options, including enabling all or none;

   a. **RTK:** If RTK was enabled during scanning and sufficient valid data was collected, check this option to perform RTK registration and output the point cloud in the target

coordinate system.

b. **Control Points:** If sufficient control point data was collected on-site using the positioning board, check this option to edit and apply these coordinates during processing. The resulting point cloud will be accurately calibrated to match these specific positions.

c. **Colorizer:** When checked, the output can include true-color point clouds and undistorted photos.

d. **Panorama:** When checked, the output can include 360° panoramic images stitched from multiple cameras.

   Note: This feature is only supported on certain device models. For details, please contact SkylandX after-sales personnel.

e. **Resuming Scan:** If resuming scan was enabled during collection and matching was successful, check this option to select the processed point cloud and trajectory from the previous collection. The result point cloud will be kept in the same coordinate system as the previous collection task.

   Note: This feature is only supported on certain device models. For details, please contact SkylandX after-sales personnel.

4. Select the desired processing mode, either Fast or High Quality;

   a. **Fast:** Accelerates processing speed, but with some reduction in processing quality; reflected in point cloud visual quality and colorization texture quality.

   b. **High Quality:** Outputs better quality result files, with relatively longer processing time.

5. Select the corresponding scene from the raw data collection, which can be set to Balanced, Open, or Narrow;

   a. **Balanced:** Used for common collection scenes processing. This mode has the highest processing success rate.

   b. **Open:** Used for collection scenes with a wide field of view, mostly ground, and lacking geometric features. If the environmental features during collection match description above and processing with "Balanced" mode fails, checking this parameter and

reprocessing is recommended.

c. **Narrow:** Used for collection scenes with a narrow field of view, mostly narrow corridors. If the environmental features during collection match description above and processing with "Balanced" mode fails, checking this parameter and reprocessing is recommended.

6. Click Confirm to return to the home page. A new processing task will be added to the task list. After processing is complete, the result files will be output to the software workspace by default.

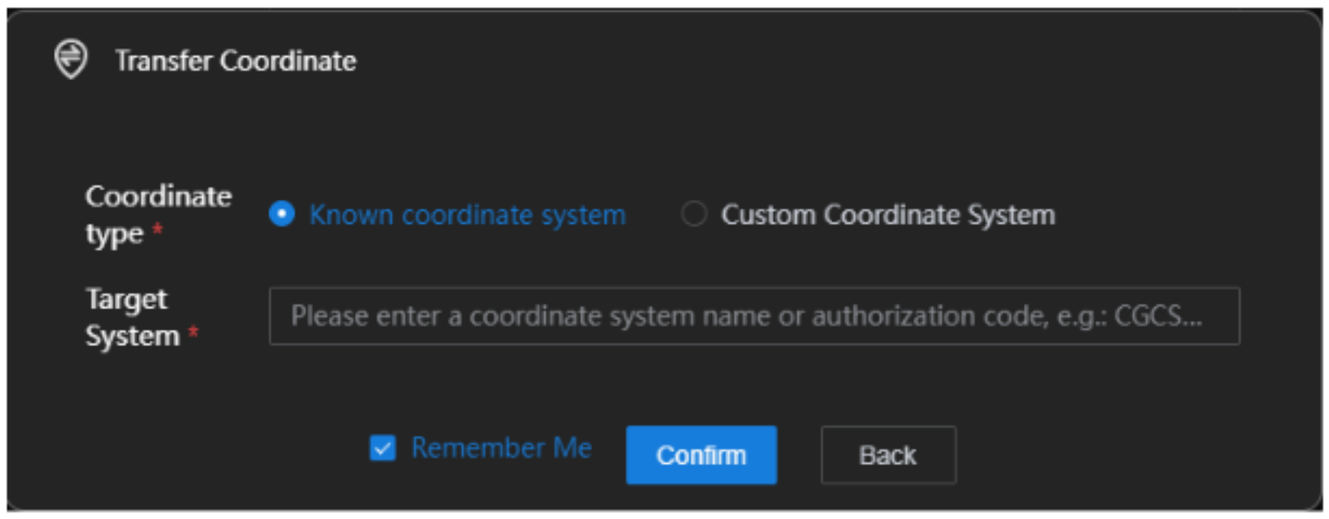
7. The software will estimate the resource usage required for the added task and provide dynamic prompts based on the remaining capacity of the current computer configuration. This prompt is for reference only.

2.1.1 Coordinate Transformation

If RTK or Control Points is checked, the window will display the coordinate transformation parameter section for confirming the coordinate system and control points used in the computation.

RTK Registration

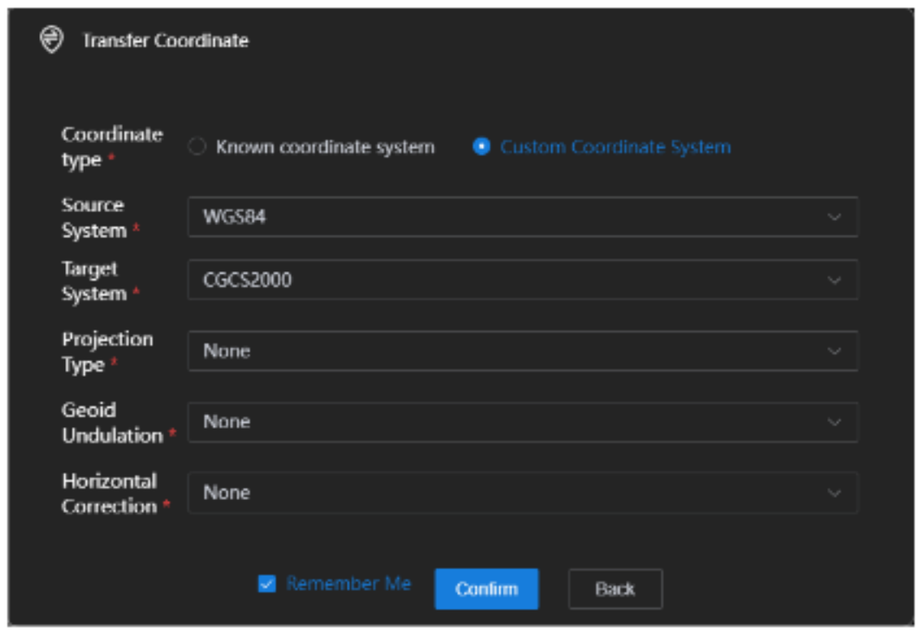
1. After checking "RTK", click RTK Registration to open the Transfer Coordinate dialog;



2. Select the desired target coordinate type. Currently, "Known Coordinate System" and "Custom Coordinate System" are supported;

   a. **Known Coordinate System:** Enter the target coordinate system, supporting keyword or EPSG code fuzzy search.

   b. **Custom Coordinate System:**



   i. **Source System:** Select the source ellipsoid for coordinate transformation, supporting custom ellipsoid parameters.

   ii. **Target System:** Select the target ellipsoid for coordinate transformation, supporting custom ellipsoid parameters. Some ellipsoid parameters have built-in parameter conversions; if using custom ellipsoid parameters, additional seven-parameter input is required.

   iii. **Projection Type:** Select the projection model from the target ellipsoid to the target coordinate system. Currently supports five options: None, UTM, Gauss-Krüger, Transverse Mercator, and Oblique Stereographic; after selection, projection parameters must be confirmed.

   iv. **Geoid Undulation:** Select the conversion method from ellipsoid height to orthometric height. Supports three options: None, Fixed Value, and Grid Files; grid file formats currently supported include: ggf, grd, isg.

   v. **Horizontal Correction:** Select the horizontal offset correction method for the target projected coordinate system. Supports three options: None, Fixed Value, and Grid Files; grid file formats currently supported include: grd.

3. "Remember Me" can be checked for subsequent task processing with the same parameters;

4. Click Confirm to complete RTK registration;

Control Point Verification

1. After checking "Control Points", the control point comparison panel will be displayed;

2. Manually edit or import control point coordinate data;

3. Supports real-time automatic checking of control point matching and fitting results, with a plan preview and detection results displayed;

4. Edit the rod height, with input values referring to the following scenarios:
   a. **Pure handle + base collection:** No height value needs to be recorded; the default height value of 0.00 is used during processing;
   b. **Pure handle + survey pole collection:** Record the survey pole scale height value during collection, and input "height value + 0.2m" during processing;

5. Based on the plan preview and detection result prompts, you can edit or delete control point data to improve calibration reliability.

2.2 Batch Processing

For users who need to process multiple tasks simultaneously, a batch processing feature is provided.

Steps

1. Click "Batch" to open the batch processing dialog;

2. Confirm the raw collection data paths to be processed, supporting multiple selection;

3. Select the necessary optimization parameters for data processing. Features including RTK, Colorizer, Panorama, and Resume Scanning can be toggled on or off individually. You may select any combination of these options, including enabling all or none;

    a. Batch processing does not support setting control point calibration.

    b. When Resume Scanning is enabled, all tasks will be processed sequentially by default.

4. After configuring the processing mode and scene, click Confirm to create processing tasks in batch.

5. The software will estimate the resource usage required for the added tasks and provide dynamic prompts based on the remaining capacity of the current computer configuration. This prompt is for reference only.

2.3 Open File

For adding local LAS format point cloud files to the current start page.

Steps

1. Click "Open File" to open the device file explorer;

2. Select the LAS format file(s) to add and click Confirm;

3. The start page will be returned. Wait for the processing progress bar to be completed. The corresponding point cloud layer will be added.

3. Start Page Functions

3.1 Layer Management

Layer Management displays the data currently loaded/generated on the start page in grouped layers. Groupable data types include: point cloud, measurement results, and clipping results.

Data Type	Format	Description
Point Cloud	las	LAS point cloud format, the primary rendering object in the 3D viewport
Measurement Results	-	Measurement objects generated from point cloud data, including: distance, area, height, angle, coordinates
Clipping Results	-	Cross-section views created from point cloud data

Visibility

Click the checkbox  on the left side of a layer to control its visibility in the 3D viewport.

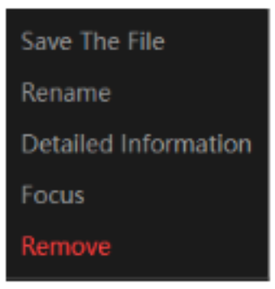
Quick Actions

Corresponding quick action commands are provided on the right side of each layer.

- **Remove:** Click "" on the right side of the layer to remove it from the start page. The local files will not be deleted.
- **Export Coordinates:** Click "" on the right side of the measurement layer group to batch export measurement results to a local CSV file.

Right-Click Context Menu

For checked point cloud layers, right-click to expand the operation menu.

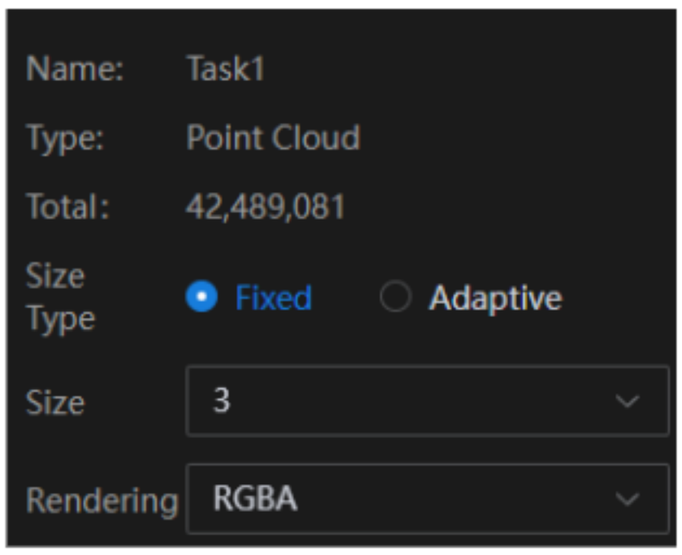


- **Save The File:** Save the current point cloud to the corresponding local path.
- **Rename:** Edit the current layer name. The local files will not be affected.
- **Detailed Information:** The property panel displays the current point cloud's property information.
- **Focus:** The 3D viewport quickly zooms to the overview perspective of the point cloud.
- **Remove:** Remove the layer from the start page. The local files will not be deleted.

3.2 Attribute Panel

The attribute panel displays different types of property information.

Point Cloud Properties

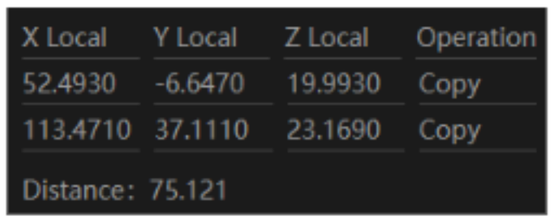


- **Name:** The current point cloud layer name.
- **Type:** Display "Point Cloud" by default.
- **Total:** The total number of points in the current point cloud.
- **Size Type:** If set to "Fixed", configure "Point Size" and "Rendering" below; if set to "Adaptive", "Point Size" will not be displayed and will not take effect; only "Rendering" can be configured.
- **Size:** Adjust the display size of each point in the point cloud within the range of 1 to 10.

The file size and the actual size of the points will not be affected.

- **Rendering:** "True Color" renders colors using the RGB field of the point cloud layer; "Elevation" renders colors using the Z value of the point cloud layer; "Intensity" renders colors using the Intensity field of the point cloud layer.

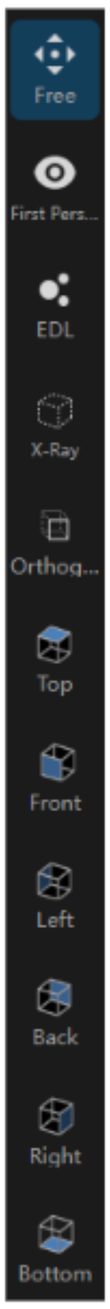
Measurement Result Properties



- **Measurement Coordinates:** The coordinate point information of the measured point, supporting click-to-copy.
- **Distance/Height/Angle/Area:** The measured result values.

3.3 Quick Action Bar

Click quick action items to switch the rendering mode or camera position in the 3D viewport.



- **Free**  **:** Switch the mouse interaction mode in the viewport to free mode.
  - **Left-click and hold:** Rotate the 3D viewport content centered on the current mouse/camera position.
  - **Right-click and hold:** Pan the 3D viewport content.
  - **Scroll wheel:** Zoom the 3D viewport content.
- **First Person**  **:** Switch the mouse interaction mode in the viewport to first-person mode. Only effective when the display mode is "Perspective".
  - **WSAD/↑↓←→:** Move the viewport view forward/backward/left/right at the current Z height.
  - **Left-click and hold:** Swing the viewport view.
  - **Right-click and hold:** Pan the 3D viewport content.
  - **Scroll wheel:** Adjust the keyboard movement speed.
- **EDL**  **:** Eye-Dome Lighting, a visual enhancement technique that simulates lighting effects to enhance the depth perception and contour clarity of point clouds, making model details more prominent.
- **X-Ray**  **:** Simulates X-ray transmission effects for convenient viewing of the model's internal structure.
- **Orthographic**  **:** Based on parallel projection with parallel lines of sight, the 3D viewport content has consistent sizing, suitable for measurement.
- **Perspective**  **:** Default display mode based on central projection, the 3D viewport content appears larger when closer and smaller when farther, providing a sense of depth.
- **Top View**  **:** Switch the camera direction from +z to -z.
- **Front View**  **:** Switch the camera direction from -y to +y.

- **Left View**  **:** Switch the camera direction from -x to +x.
- **Back View**  **:** Switch the camera direction from +y to -y.
- **Right View**  **:** Switch the camera direction from +x to -x.
- **Bottom View**  **:** Switch the camera direction from -z to +z.

3.4 Menu Bar

3.4.1 Open File

Add local LAS format point cloud files to the current start page.

Steps

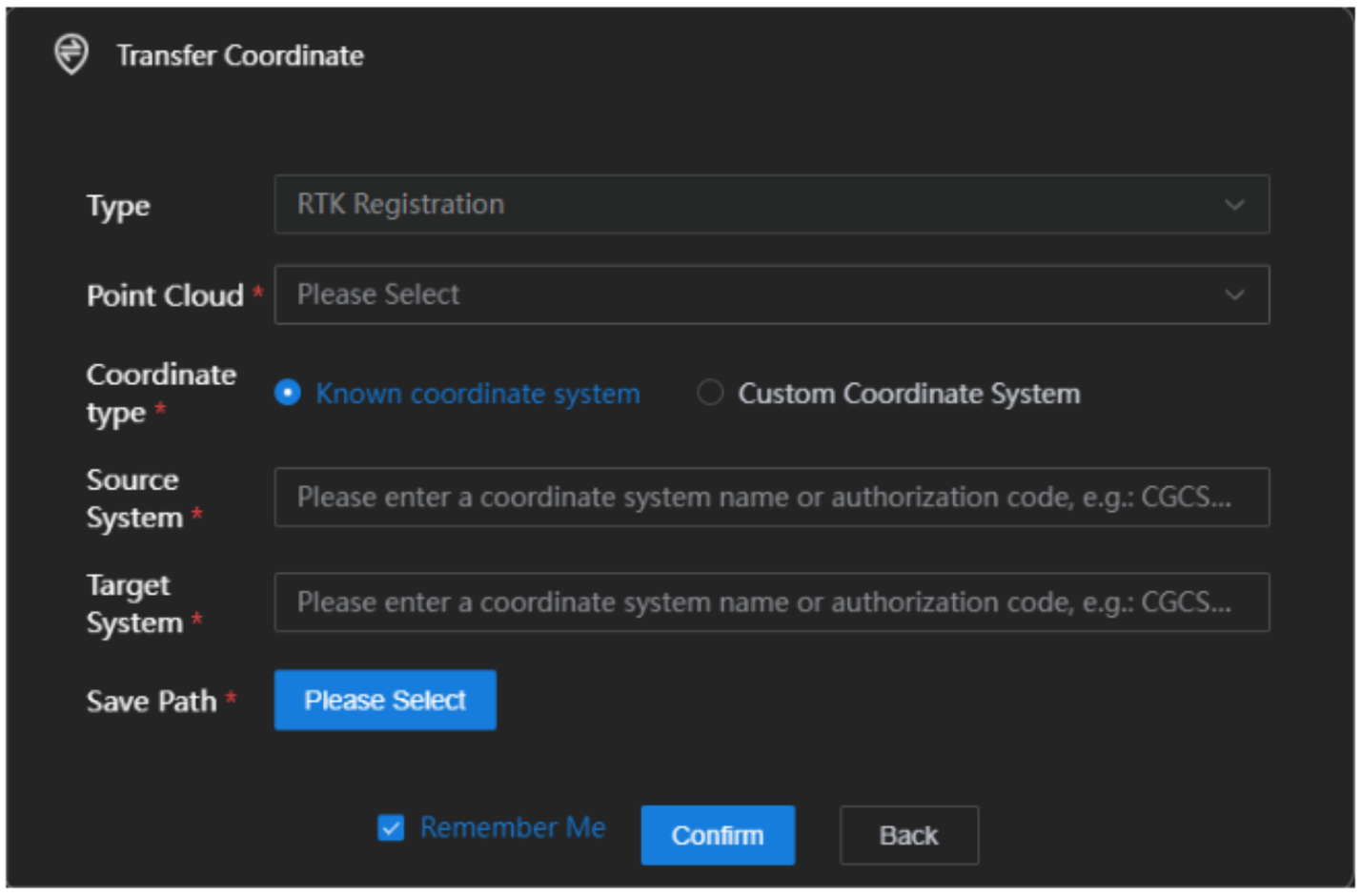
1. Click the tool icon to open the device file explorer;
2. Select the LAS format file(s) to add and click Confirm;
3. Wait for the processing progress bar to be completed. The corresponding point cloud layer will be added.

3.4.2 Transfer Coordinate

For RTK-calibrated and processed point clouds, transform coordinates from the source system to the target system. The target coordinate system is typically the world coordinate system, i.e., the coordinate system obtained through RTK module positioning.

Steps

1. Click the tool icon to open the transfer coordinate dialog;



2. Set the transformation type. Currently only "RTK Registration" is supported;

3. Select the point cloud file(s) to be transformed. You can select point clouds in the directory tree that support coordinate transformation, or add from local files which have output RTK positioning information;

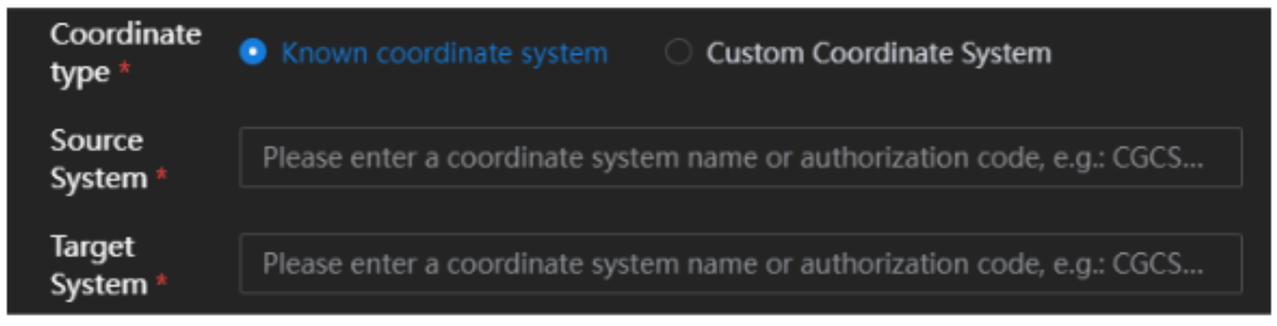
4. Select the desired target coordinate type. Currently, "Known Coordinate System" and "Custom Coordinate System" are supported;

5. Confirm the save path for the point cloud after coordinate transformation. You can check "Remember Me" for future use of this function;

6. Click Confirm to begin coordinate transformation;

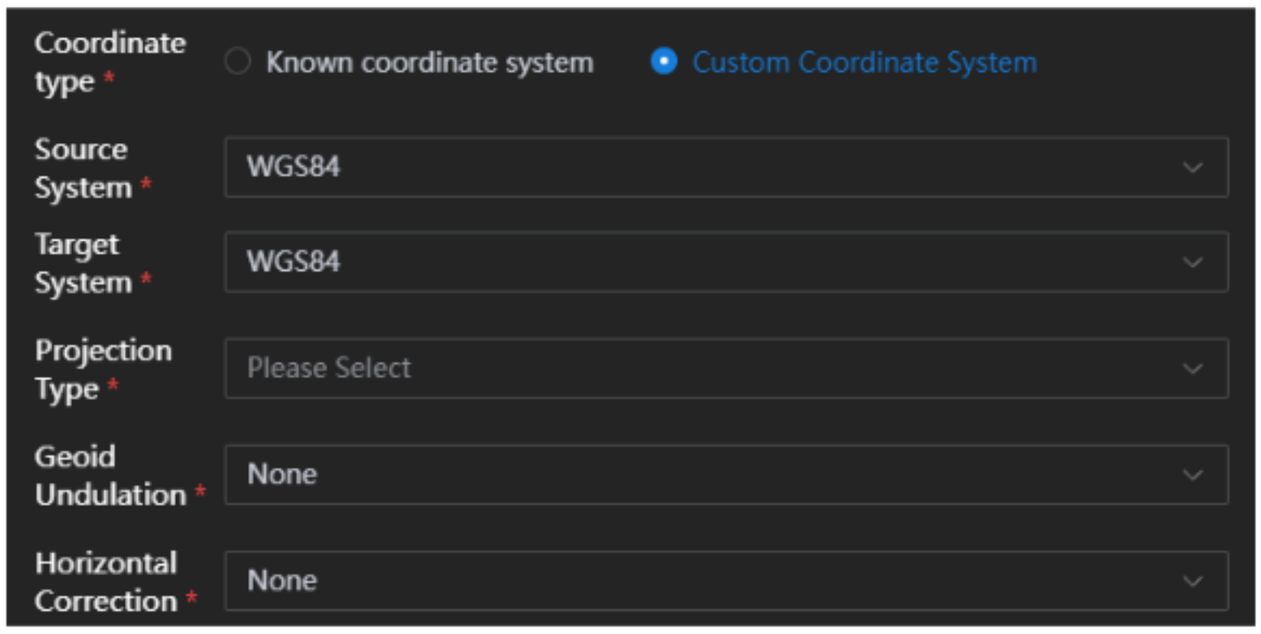
7. Wait for the processing progress bar to be completed. After coordinate transformation is finished, you can choose to add the result to the start page for browsing.

Known Coordinate System



- **Source System:** Enter the source coordinate system of the point cloud to be transformed, supporting keyword or EPSG code fuzzy search.
- **Target System:** Enter the target coordinate system, supporting keyword or EPSG code fuzzy search.

Custom Coordinate System



- **Source System:** Select the source ellipsoid for coordinate transformation, supporting custom ellipsoid parameters.
- **Target System:** Select the target ellipsoid for coordinate transformation, supporting custom ellipsoid parameters. Some ellipsoid parameters have built-in parameter conversions; if using custom ellipsoid parameters, additional seven-parameter input is required.
- **Projection Type:** Select the projection model from the target ellipsoid to the target coordinate system. Currently supports five options: None, UTM, Gauss-Krüger, Transverse

Mercator, and Oblique Stereographic; after selection, projection parameters must be confirmed.

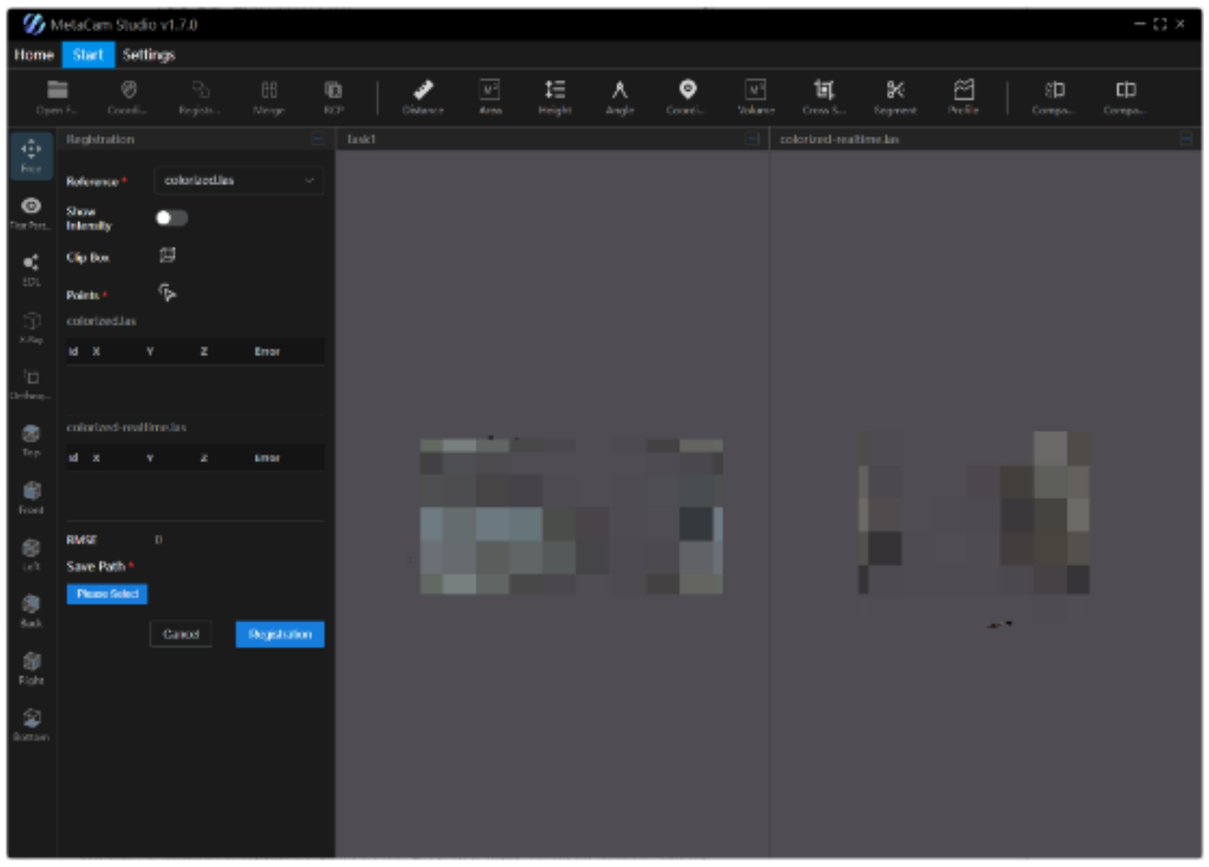
- **Geoid Undulation:** Select the conversion method from ellipsoid height to orthometric height. Supports three options: None, Fixed Value, and Grid Files; grid file formats currently supported include: ggf, grd, isg.
- **Horizontal Correction:** Select the horizontal offset correction method for the target projected coordinate system. Supports three options: None, Fixed Value, and Grid Files; grid file formats currently supported include: grd.

3.4.3 Registration

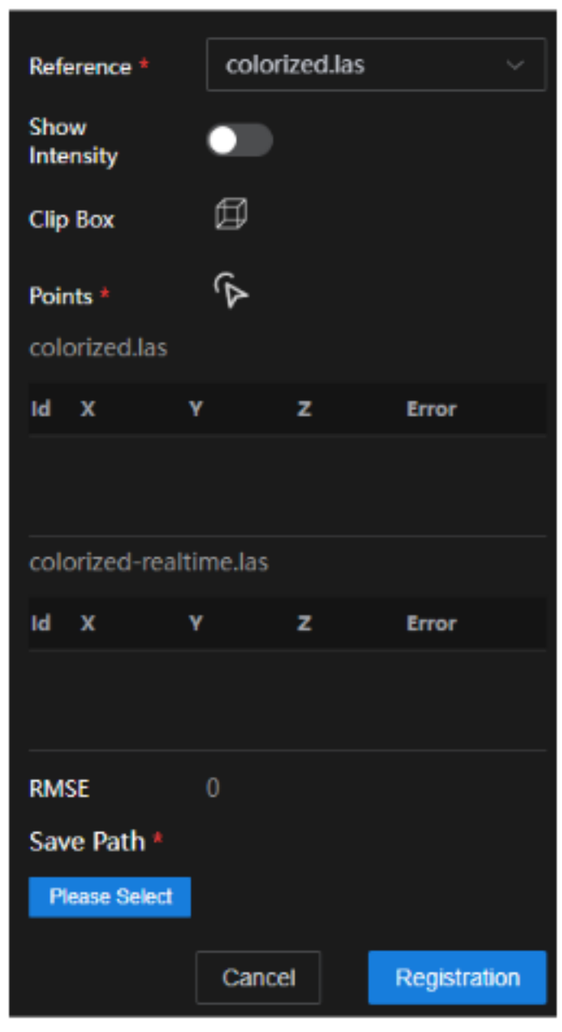
For two sets of point cloud data of the same scene with overlapping areas, perform registration and merging through feature point matching to obtain a complete point cloud.

Steps

1. Click the tool icon to open the point cloud registration dialog;
2. Select the two sets of point cloud data to be registered, supporting addition from local files;
3. Confirm the selection to enter the registration interface;
4. After completing the registration operations, click Registration and wait for the processing progress bar to complete. The registration result will be added to the start page by default.



Registration Interface



- **Reference:** Set the point cloud used as the registration reference. After registration, the non-reference point cloud will be transformed to the reference point cloud's coordinate system.
- **Show Intensity:** When enabled, all point clouds in the 3D viewport will be rendered in intensity mode.
- **Clip Box:** When enabled, the visible range of the point cloud can be adjusted in the 3D viewport for convenient selection of corresponding points.
- **Points:** Click to identify corresponding point pairs in the left and right 3D viewports. The corresponding coordinates will be added to the point pair table.

- **Point Pair Table:** Records the coordinates of corresponding points in the two sets of point cloud and the real-time fitted registration error.
- **RMSE:** Displays the real-time root mean square error (RMSE) of the registration in the point pair table. A smaller value indicates higher relative registration accuracy.
- **Save Path:** Confirm the save path for the point cloud result after registration.

3.4.4 Merge

Merge two sets of point clouds into one output.

Steps

1. Click the tool icon to open the point cloud merging dialog;

2. Select multiple sets of point cloud data to be merged, supporting addition from local files;

3. Set the save location and click Confirm. Wait for the processing progress bar to be completed. The merge result will be added to the start page by default.

3.4.5 RCP

Convert local point cloud files to the RCP point cloud format supported by Autodesk software.

Steps

1. Click the tool icon to open the RCP conversion dialog;

2. Import local point cloud files, supporting multiple files import;

3. Select the save path for the converted file;

4. Click Confirm and wait for the processing progress bar to be completed.

3.4.6 Distance

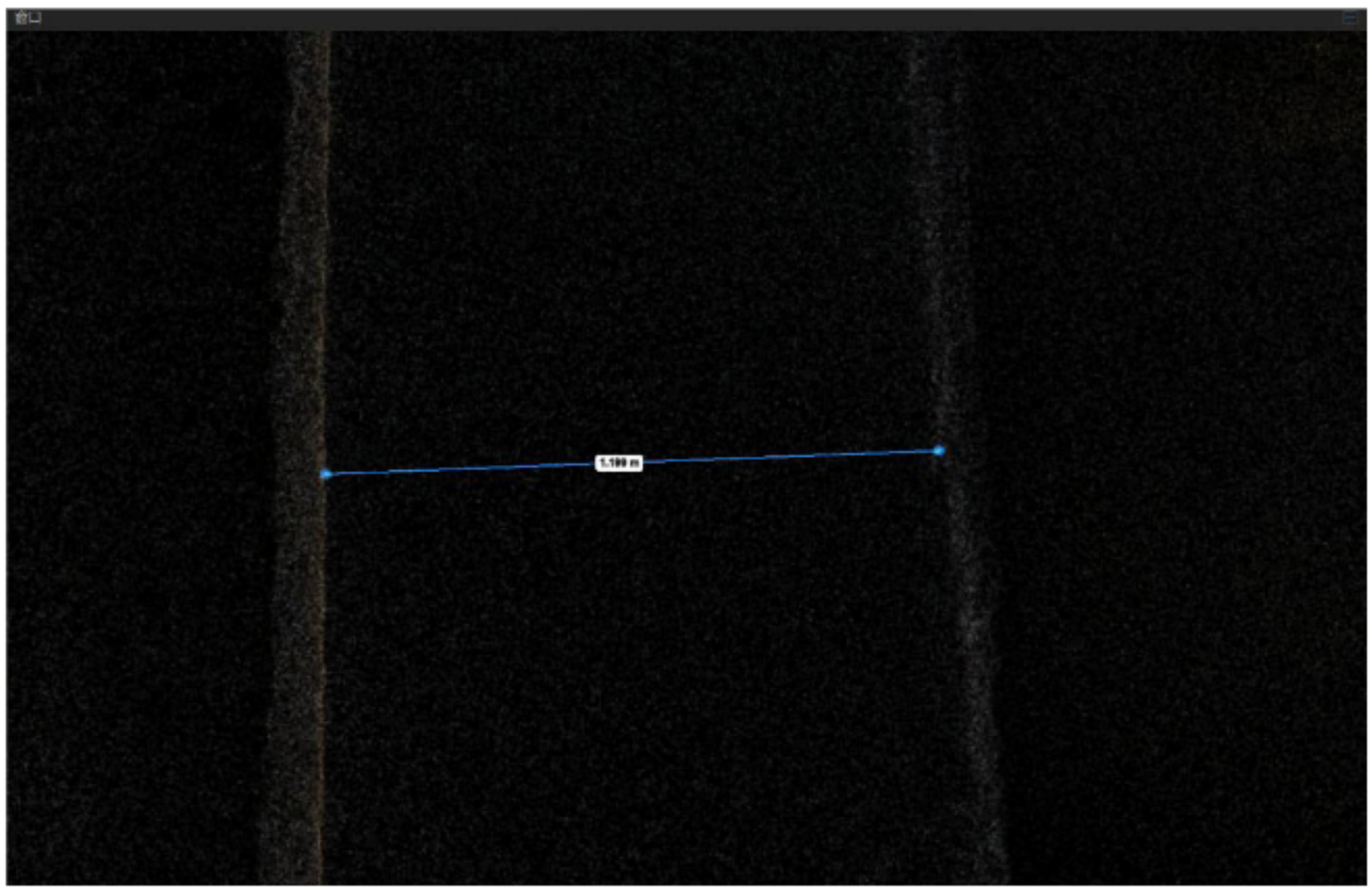
Measure the distance between any two points or the total length of a multi-point polyline in point cloud data.

Steps

1. Click the tool icon to create a distance measurement layer;

2. Continuously left-click in the 3D viewport to confirm the point positions to be measured, then right-click to complete the measurement;

3. For completed measurements, you can drag measurement nodes to update the measurement positions;



3.4.7 Area

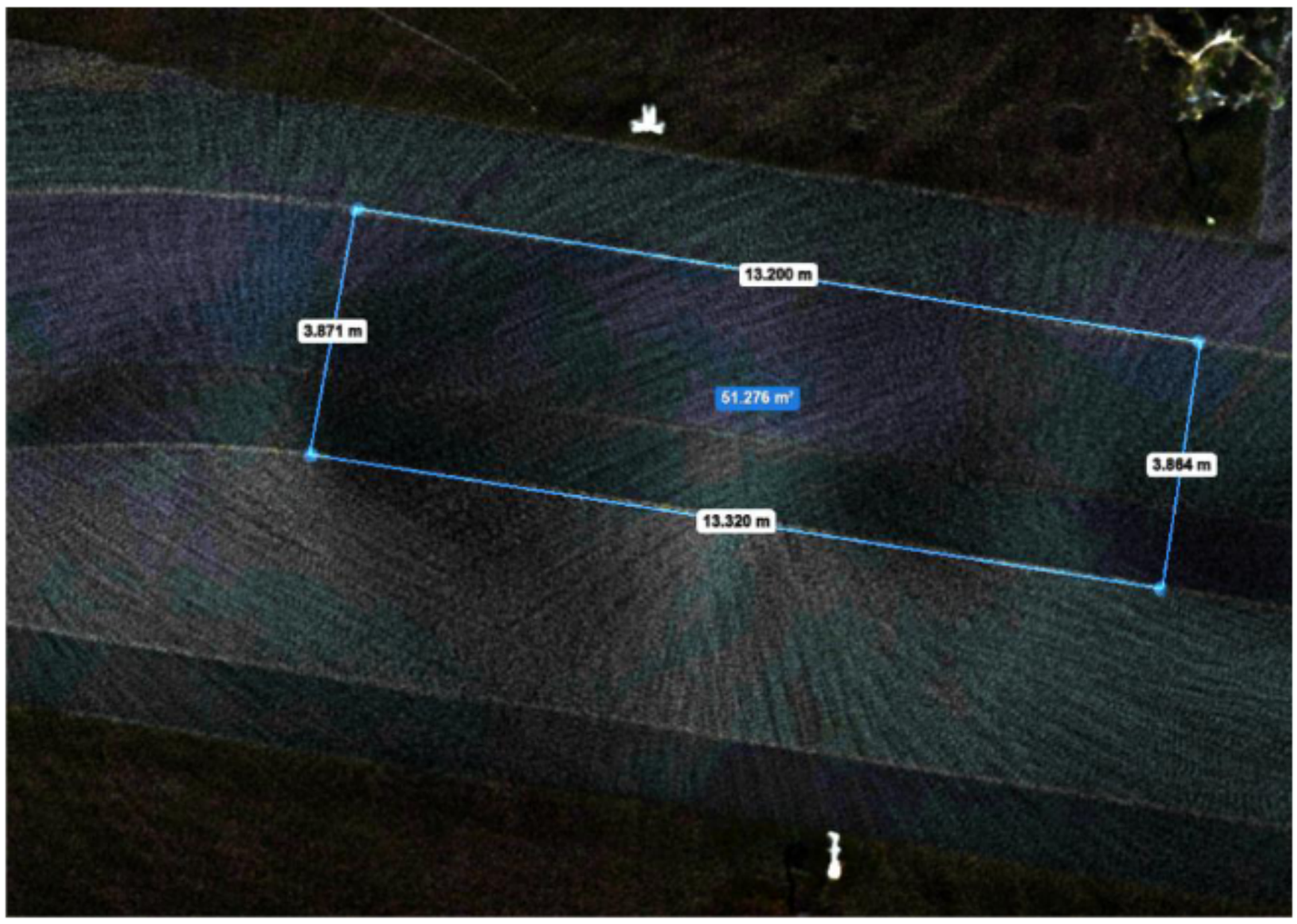
Measure the polygon area of a multi-point fitted plane in point cloud data.

Steps

1. Click the tool icon to create an area measurement layer;

2. Continuously left-click in the 3D viewport to confirm the point positions to be measured, then right-click to complete the measurement;

3. For completed measurements, you can drag measurement nodes to update the measurement positions;



3.4.8 Height

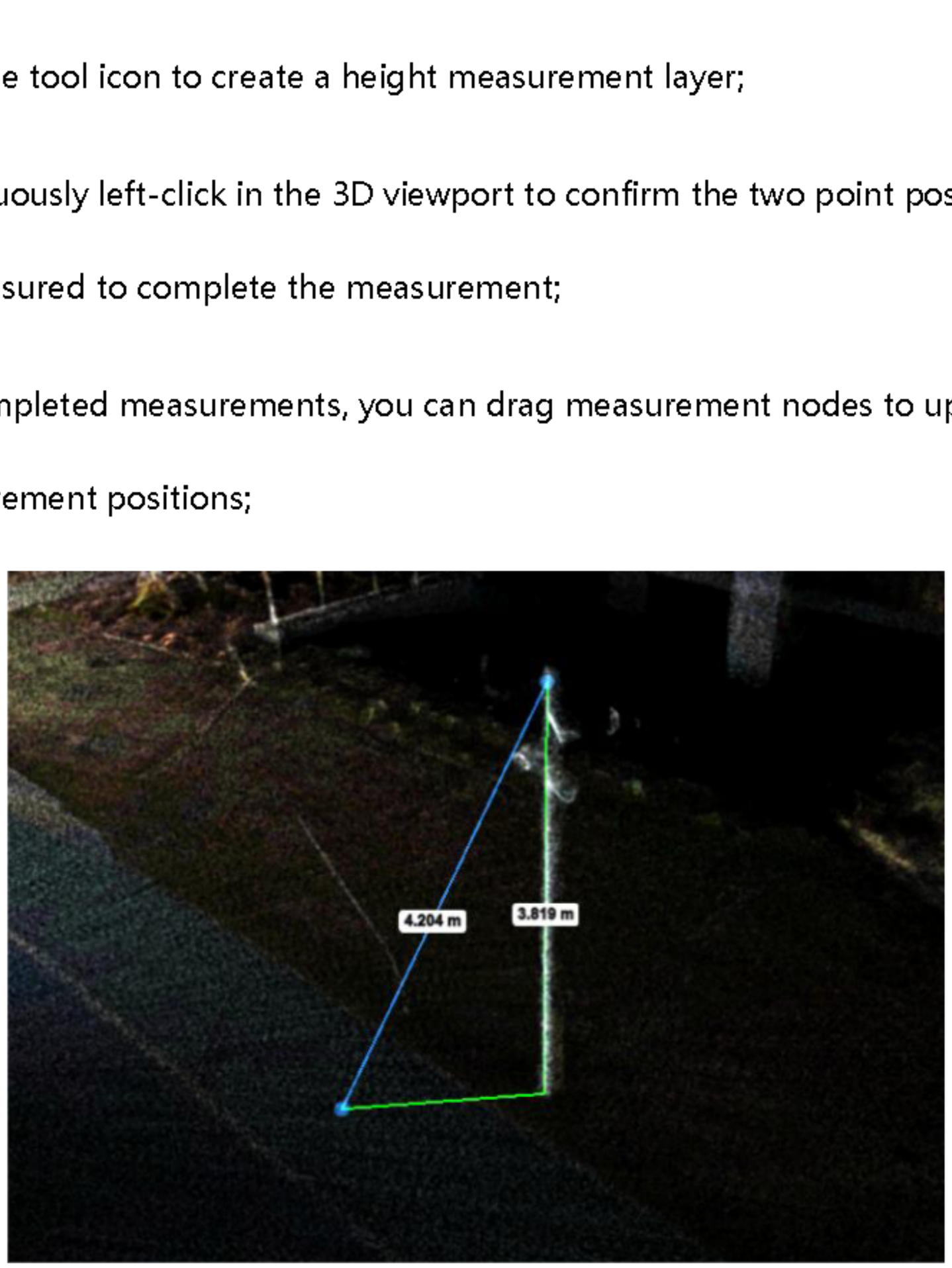
Measure the height difference between two points in point cloud data.

Steps

1. Click the tool icon to create a height measurement layer;

2. Continuously left-click in the 3D viewport to confirm the two point positions to be measured to complete the measurement;

3. For completed measurements, you can drag measurement nodes to update the measurement positions;



3.4.9 Angle

Measure the angle of a triangle in point cloud data.

Steps

1. Click the tool icon to create an angle measurement layer;

2. Left-click in the 3D viewport to confirm the three point’ s positions to be measured to complete the measurement;

3. For completed measurements, you can drag measurement nodes to update the measurement positions;

3.4.10 Coordinates

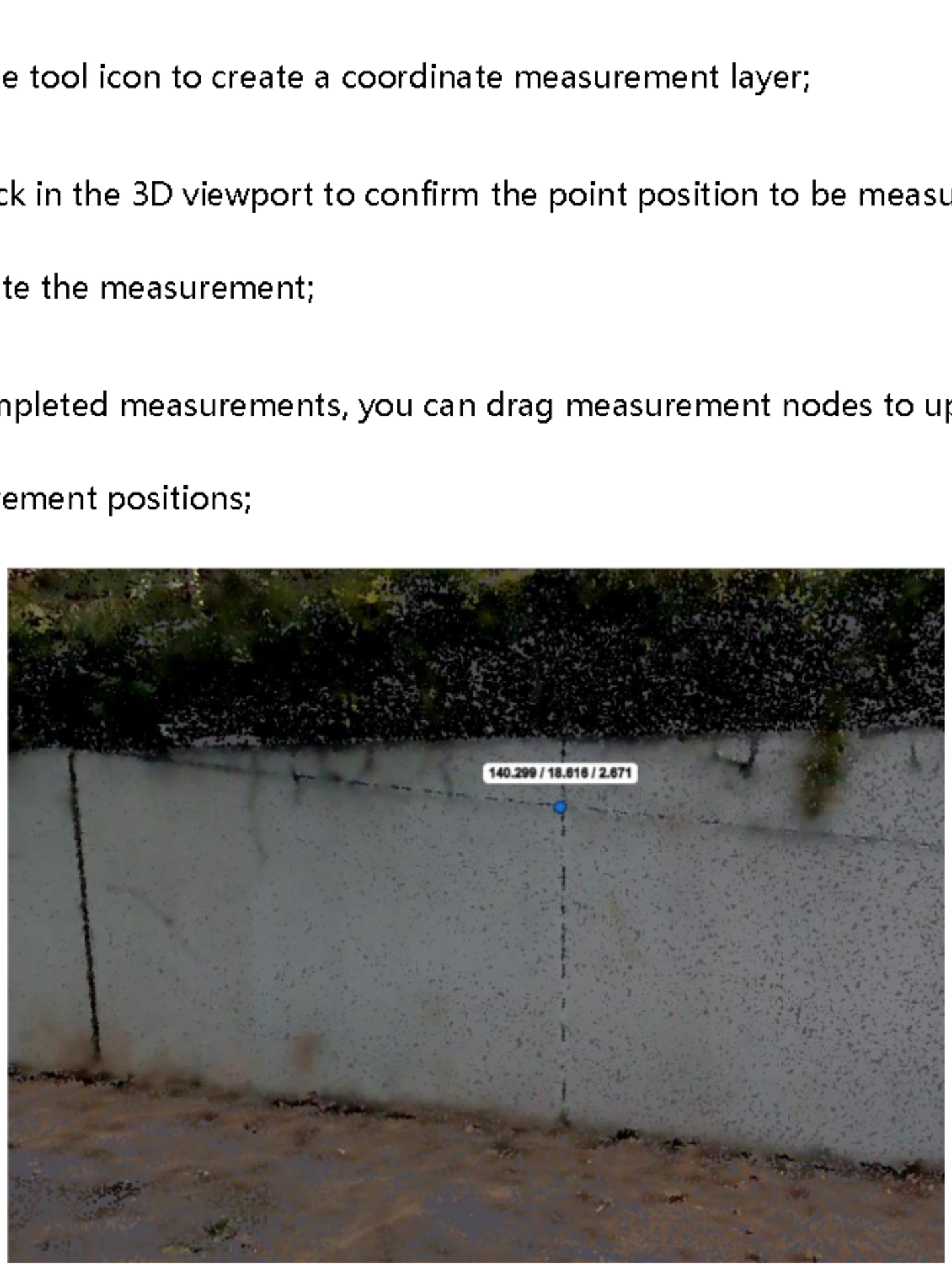
Measure the coordinates of any point in point cloud data.

Steps

1. Click the tool icon to create a coordinate measurement layer;

2. Left-click in the 3D viewport to confirm the point position to be measured to complete the measurement;

3. For completed measurements, you can drag measurement nodes to update the measurement positions;

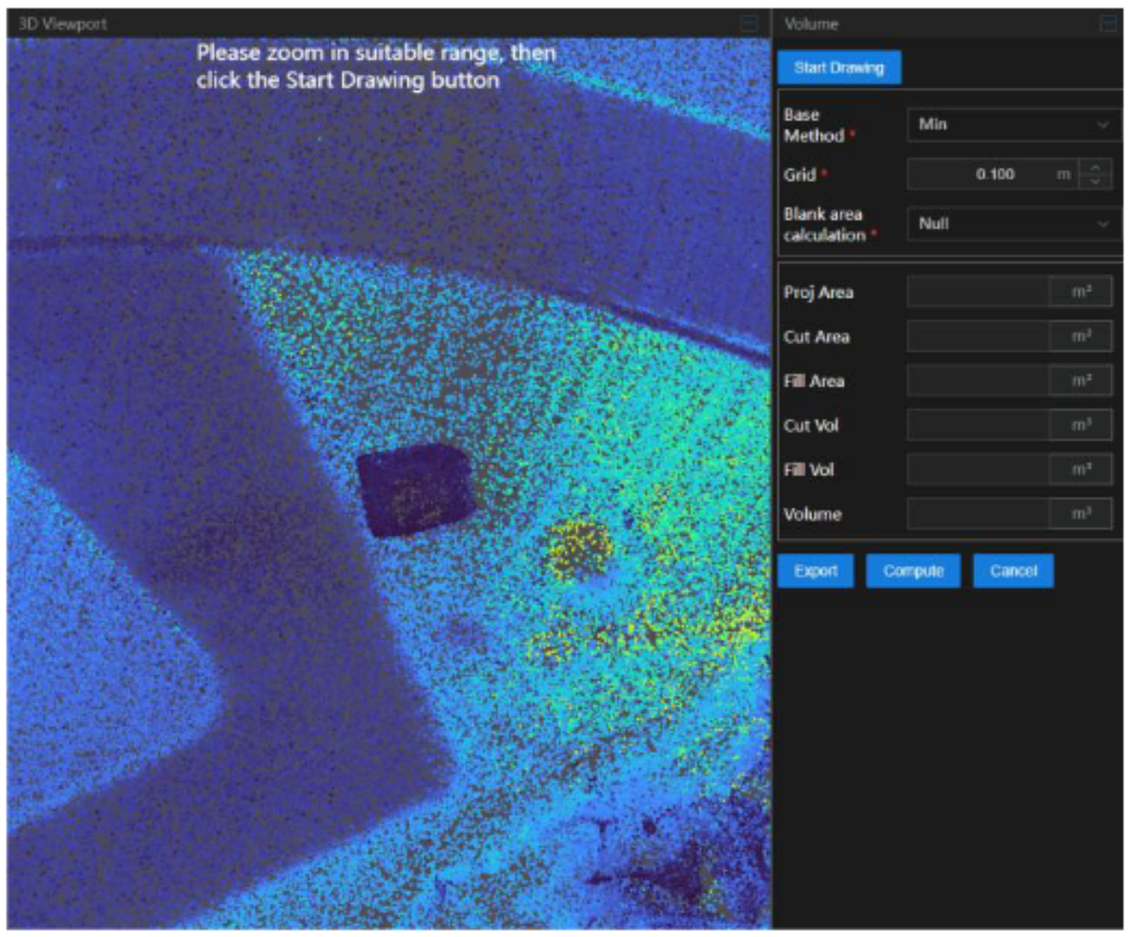


3.4.11 Volume

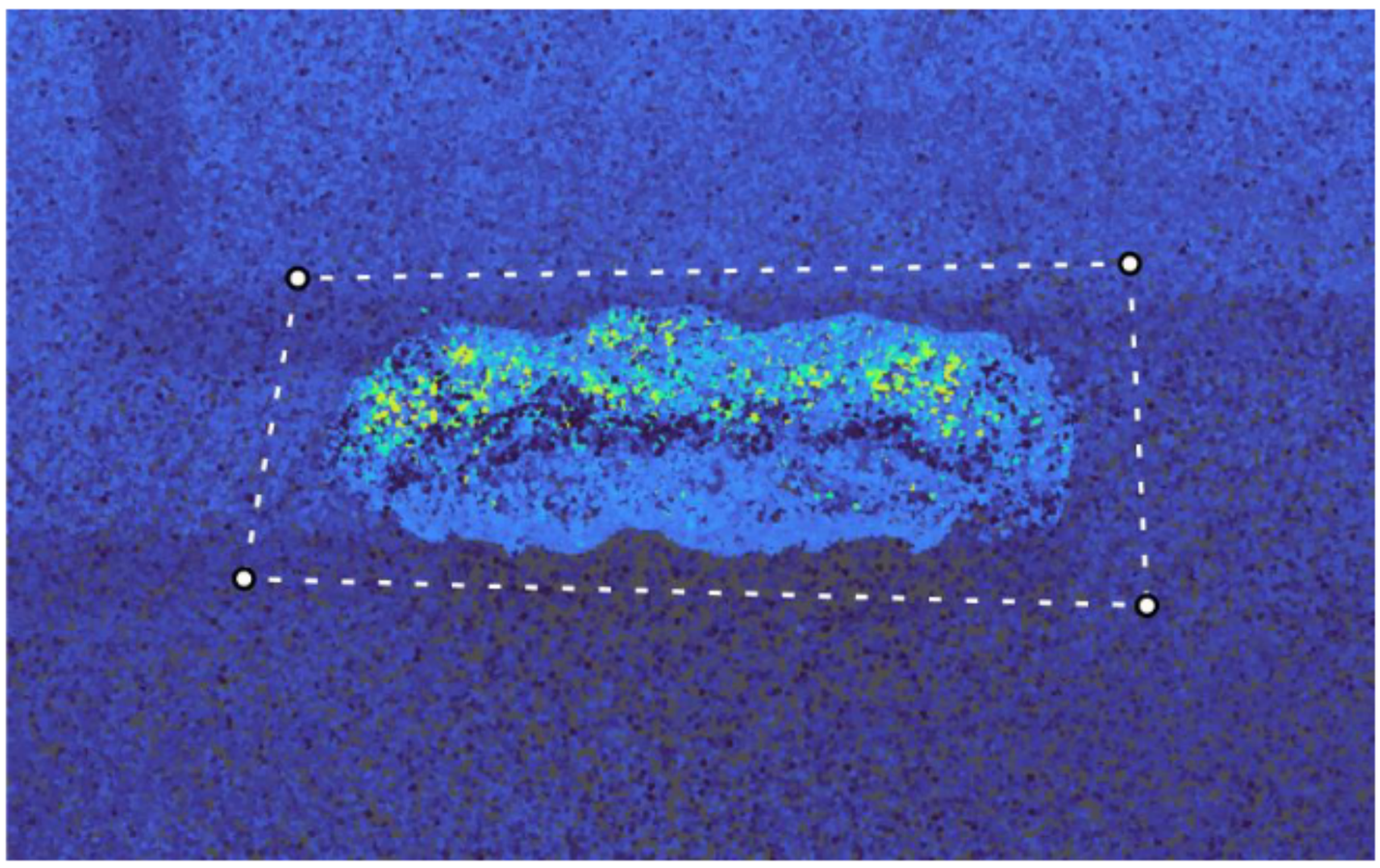
Measure the point cloud volume within a projected plane range in point cloud data.

Steps

1. Click the tool button to open the volume measurement panel;



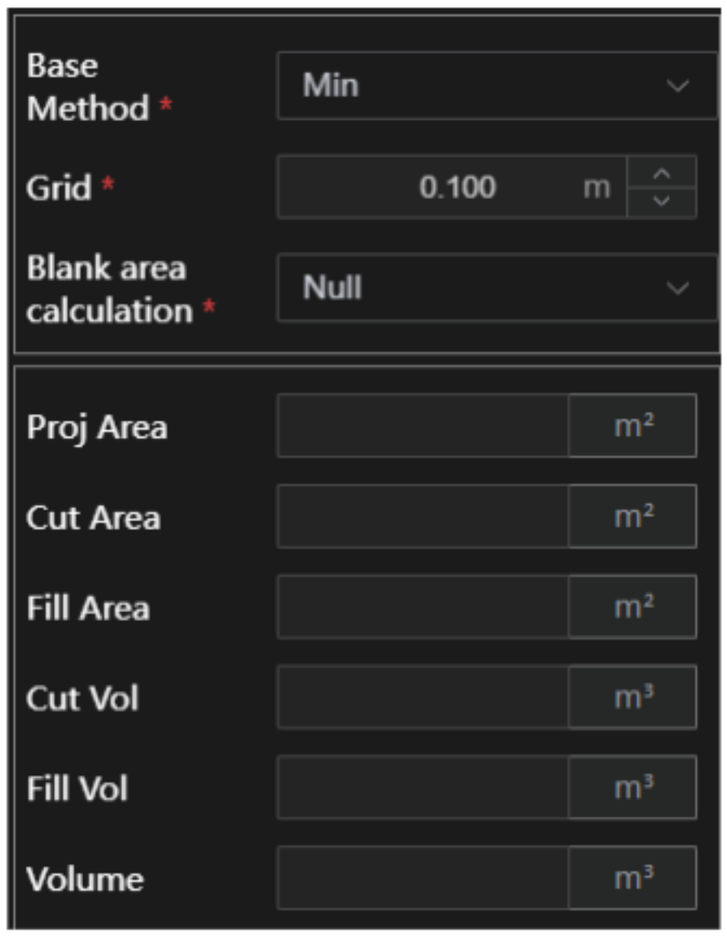
2. Click Start Drawing to create the plane range to be measured in the scene. Left-click to add nodes, right-click to complete drawing;



3. Confirm the volume calculation method and parameters, then click Compute to complete the volume calculation;

4. Click Export to export a volume measurement PDF report.

Volume Calculation Methods



- **Base Method:** The base elevation input method includes "Min" (Minimum) and "Custom". When Min is selected, the elevation of the point with the smallest Z value in the selected range is used as the base value. When Custom is selected, a custom base elevation can be set.
- **Grid:** The grid size for sampling during volume calculation. Default is 0.1m.
- **Blank Area Calculation:** For blank areas in the constructed grid, you can select "Null" to exclude them from volume calculation, or select "Interpolation" to fit Z values based on surrounding grids.
- **Proj (Projected) Area:** The planar area of the selected range.
- **Cut Area:** The grid surface area above the base elevation range.
- **Fill Area:** The grid surface area below the base elevation range.
- **Cut Vol:** The absolute value of the point cloud volume above the base range.
- **Fill Vol:** The absolute value of the point cloud volume below the base range.
- **Volume:** The volume value of cut minus fill.

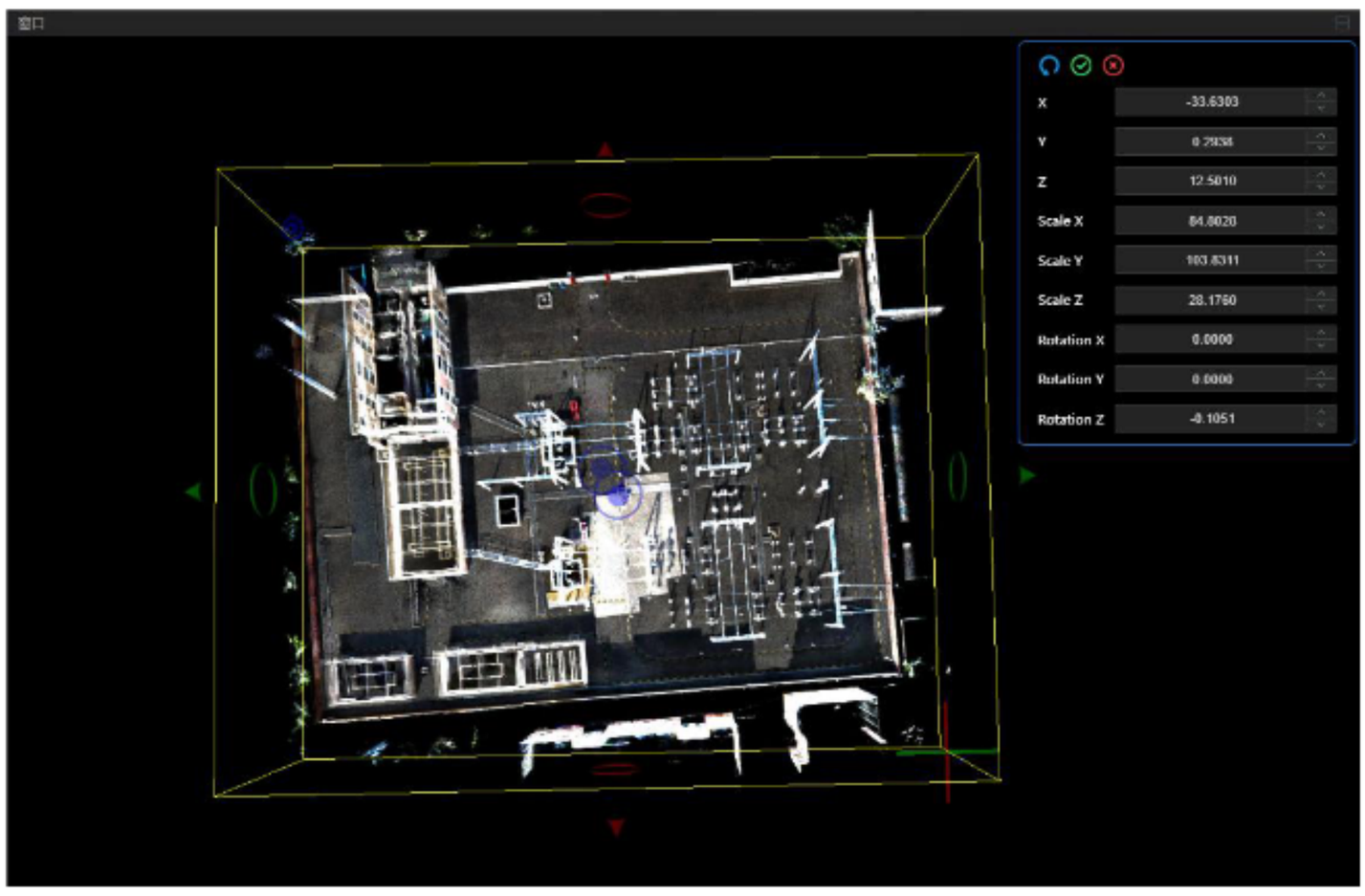
3.4.12 Cross Section

Use a 3D clip box to control the display range of point clouds in the 3D viewport,

supporting saving the clipping result.

Steps

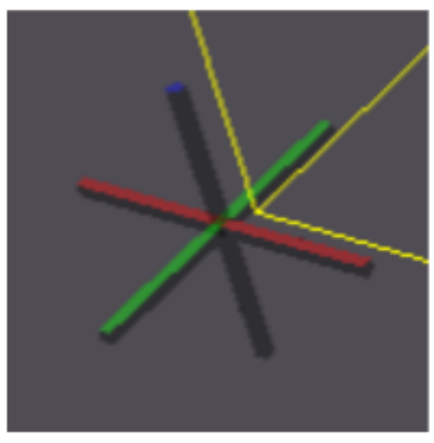
1. Click the tool icon to display the bounding box range of all currently visible point clouds;



2. Adjust the point cloud display range by dragging, stretching, rotating icons, or using clip box parameters;

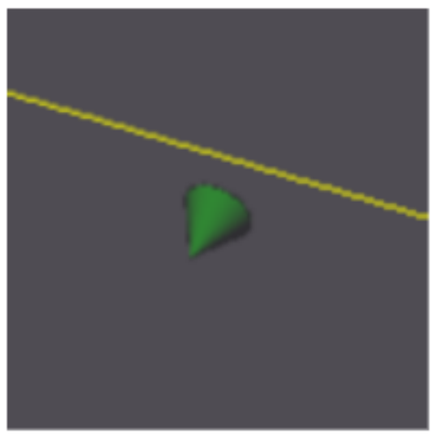
3. Confirm the clipping and wait for the processing progress bar to complete. The clipping result will be added to the start page.

Drag, Rotate, and Stretch Operations



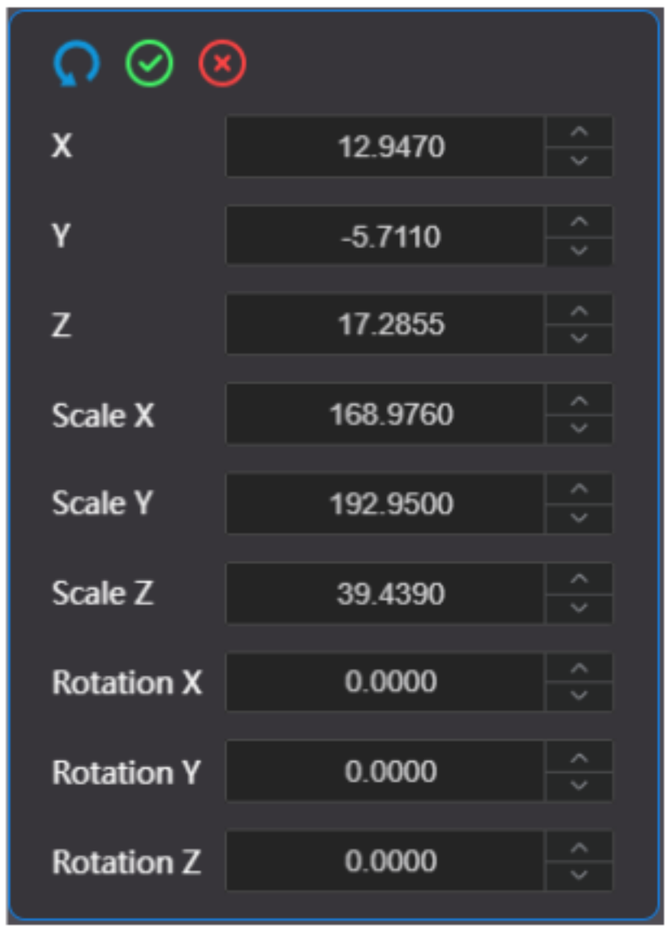
- **Drag:** Move the clip box along the three axes.

- **Rotate:** Rotate the clip box around its center based on the current coordinate axes.



- **Stretch:** Stretch the clip box edges along the current arrow direction.

Clip Box Parameters



- **Reset:** Restore the clip box to its default range.
- **Export:** Execute the clipping at the current range.
- **Cancel:** Exit the Cross Section function.
- **X, Y, Z:** The center position of the current clip box.
- **Scale X / Scale Y / Scale Z:** The range of the clip box along the three axes.

- **Rotation X / Rotation Y / Rotation Z:** The rotation angles of the clip box around the three axes.

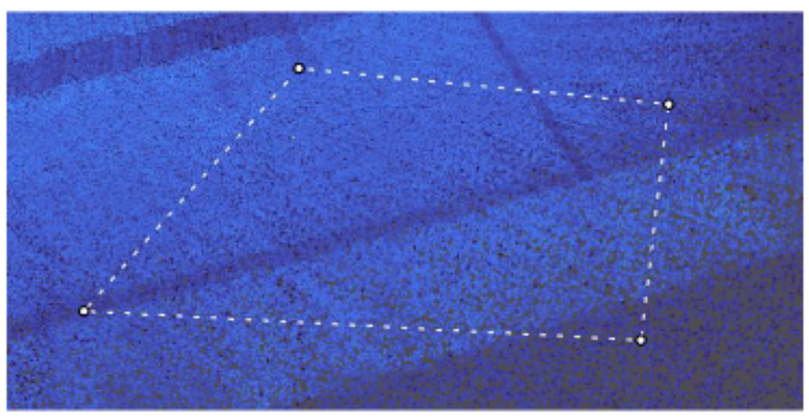
3.4.13 Segment

Crop point clouds by manually drawing a range.

Steps

1. Click the tool icon to open the crop toolbar;

2. Draw the crop range. Left-click to add nodes, right-click to complete drawing;



3. Confirm the crop method, verify the result, and click Confirm to execute the crop.

Crop Toolbar

- **Reset:** Clear the currently drawn range or crop preview and restart drawing the crop range.
- **Inside:** After confirming the range, click to keep only the point cloud within the range.
- **Outside:** After confirming the range, click to keep only the point cloud outside the range.
- **Export:** Finalize the cropping effect and add it to the Start page.
- **Cancel:** Cancel the crop and exit the tool.

3.4.14 Profile

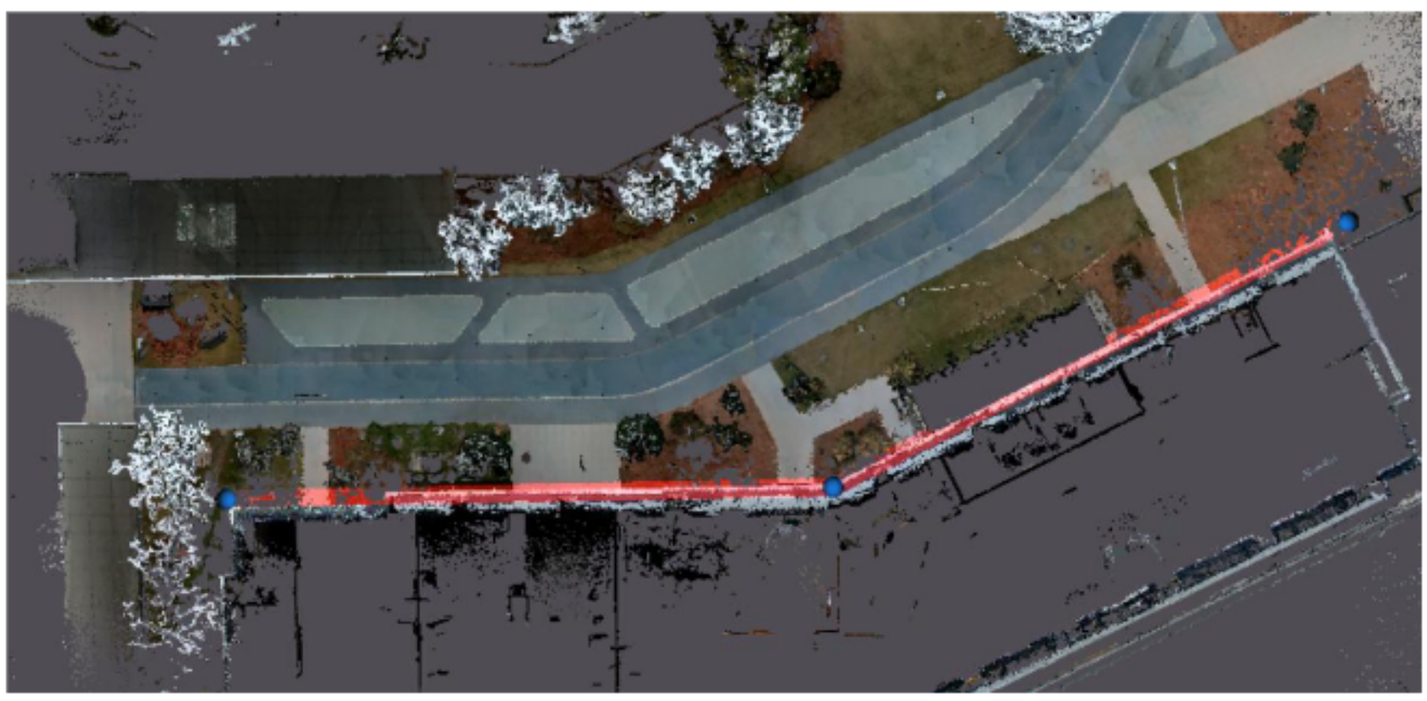
Create vertical or horizontal cross-section views in the current 3D viewport for analysis or export.

Steps

1. Click the tool icon to create a profile layer and open the cross-section window;

2. Select the sectioning direction and parameters;

3. Draw the cross-section path in the 3D viewport. Left-click to add nodes, right-click to complete drawing;



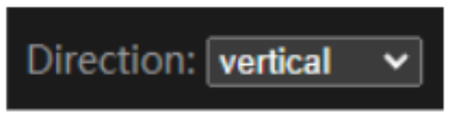
4. After completing the drawing, the cross-section view can be viewed in the cross-section window.

5. For completed cross-sections, you can drag the cross-section path nodes to update the cross-section view, or adjust parameters to change the cross-section

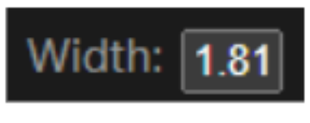
position.

6. Supports exporting the cross-section view as a local file. Supported formats: DXF(2D), DXF(3D), CSV(2D), LAS(3D); 2D is the flattened view, 3D is the original coordinate view.

Sectioning Direction and Parameters

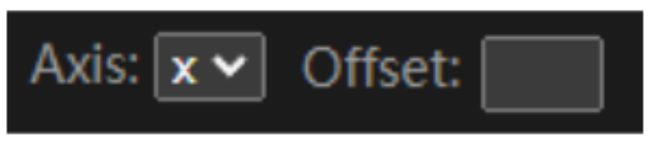


- **Direction:** Choose either Vertical or Horizontal for the sectioning direction. In Vertical mode, the system connects points in order and unfolds the Z-axis point cloud onto a plane. In Horizontal mode, the Y-axis point cloud is projected onto the plane.



- **Width:** The thickness of the point cloud at the cross-section position, in meters. Default is 1.

Cross-Section Adjustment Tools



- **Axis (Offset Direction), Offset:** Translate the cross-section path nodes by a fixed direction and fixed offset distance. After input, refresh the current cross-section view.

- **Rotation Angle, Direction:** Rotates nodes around the Z-axis based on the node center of the section path using a fixed angle and direction. Clicking the direction button refreshes the current section view.

- **Translation:** Translates the node center of the section path within the XOY plane. It uses the section width as the distance and moves perpendicular to the line between the start

and end nodes. The section view refreshes upon execution.

3.4.15 Compare Point Cloud

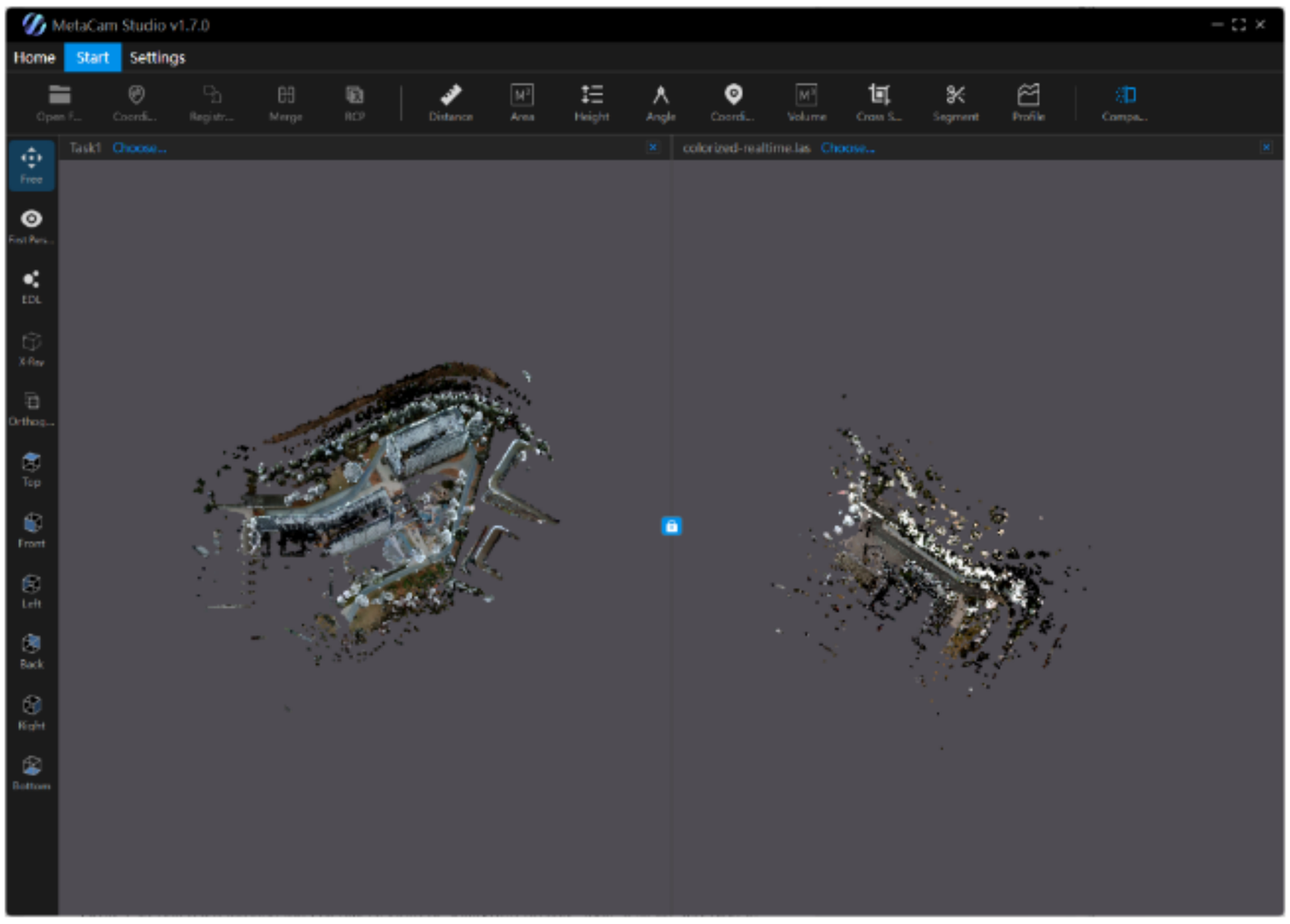
Use a left-right viewport layout to quickly compare and browse two sets of point clouds.

Steps

1. Click the tool icon to open the point cloud comparison dialog;

2. Select the two sets of point clouds to be compared in Window 1 and Window 2, supporting addition from local files;

3. Click OK to enter the point cloud comparison view;



4. Click the window interlock icon "  " to enable or disable synchronized navigation between dual viewports;

5. Click the close icon "  " in the upper right corner of either window to exit the point cloud comparison function.

3.4.16 Compare Photo

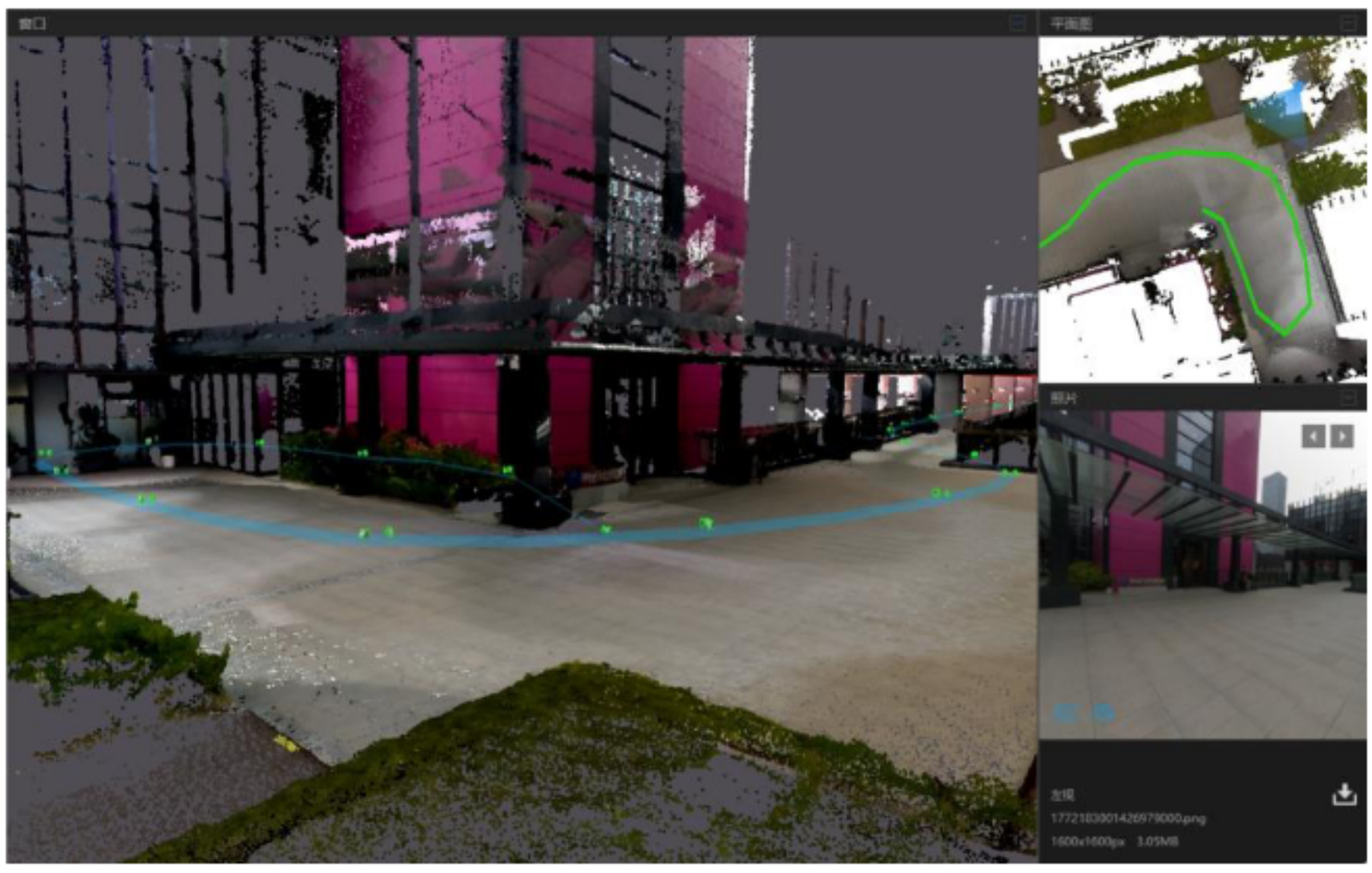
Use a three-viewport layout to display the point cloud, site plan, collection trajectory, and captured photos from the same set of collection data in a linked manner.

Note: This feature only supports data from the SkylandX handheld laser scanners with point cloud colorization enabled.

Steps

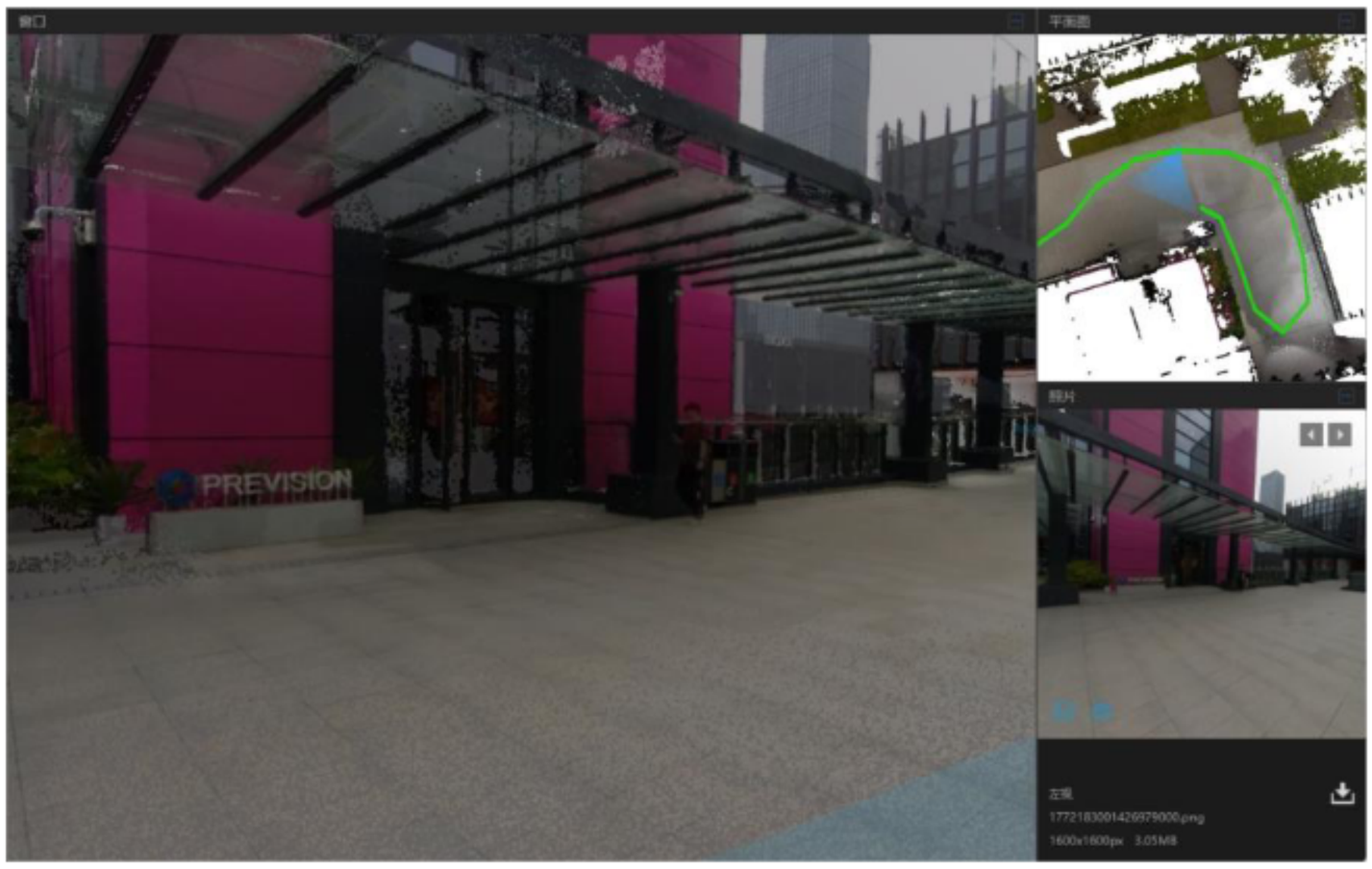
1. Select the point cloud layer;

2. Click the tool icon to open the photo comparison layout;



3. Select a photo in the 3D viewport or the picture window to switch to the original camera pose. In this view, the point cloud and photo textures are perfectly

aligned;



4. Click the exit icon "" to exit the photo comparison function