Lixel Studio User Manual - V4.0.1.5

User Manual

V4.0.1.5

Volumet

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3D scanning services and scanner rental, Singapore.

Volumet runs reality-capture projects end to end — and rents the same equipment to teams who run their own. This document is the manufacturer's; we host it for our rental and project clients.

CAPTURE & DOCUMENTATION SERVICES

- **3D laser scanning** — reality capture of sites, buildings and interiors.
- **As-built documentation** — floor plans, elevations, sections, RCPs.
- **Scan-to-BIM** — point cloud to Revit at a specified LOD.
- **Drone & LiDAR aerial** — mapping, photogrammetry, inspection.
- **Digital twins & 3DGS** — virtual tours and Gaussian splat models.

EQUIPMENT RENTAL & SALES

- **XGRIDS Lixel K2** — flagship handheld SLAM LiDAR.
- **Lixel K1 · L2 Pro** — entry and long-range handheld.
- **PortalCam** — 3D Gaussian splatting camera.
- **Matterport Pro3** — virtual tours and digital twins.
- **Leica BLK360 G2 · RTC360** — tripod terrestrial scanning.
- **Trimble X12** — high-end survey-grade scanning.

> **About this document.** This is the LixelStudio user manual, published by XGRIDS and hosted by Volumet for our rental and project clients. Volumet is an independent rental and services provider and is not affiliated with, endorsed by, or an agent of the manufacturer. Specifications are the manufacturer's own and may change without notice.

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Catalogue

LixelStudio Software

LixelStudio is XGRIDS ’proprietary the 3D processing software for Lixel series handheld scanners, providing post-processing, point cloud viewing, editing, and industry applications with breakthrough 3D data productivity.

Core Modules

- **Project Processing:** Process Lixel scanner data including SLAM mapping, map fusion, and accuracy verification
- **Tools:** Point cloud post-processing (denoising, resampling, alignment, slicing)
- **Drawing:** Vector drawing from point cloud data, including AI auto-extraction and vector editing
- **Applications:** Volume calculation, mesh reconstruction, remote transmission

1. Version and Copyright

Version

Software version: LixelStudio V4.0.1.5

Release date: May 6, 2026

This manual covers Lixel Studio V4.0.1.5. Operations may differ in other versions.

Trademark

Copyright

Thank you for using LixelStudio software. We are delighted to provide you with data post-processing services for the Lixel series hardware. We welcome your comments and suggestions on improvements concerning our hardware, software, training, and documentation. For inquiries, please contact us via email at enterprise@xgrids.com. Thank you.

2. Software Installation

Download installer from xgrids.com.

2.1 Recommended System Configuration

Recommended Configuration

- **OS**: Windows 10/11 Professional or Home
- **CPU**: Intel i9 12th gen
- **GPU**: RTX 3070 or higher
- **Memory**: 64GB
- **Storage**: 1TB SSD

Minimum Configuration

- **CPU**: Intel i7 11th gen
- **GPU**: RTX 3060 or higher
- **Memory**: 64GB
- **Storage**: 1TB

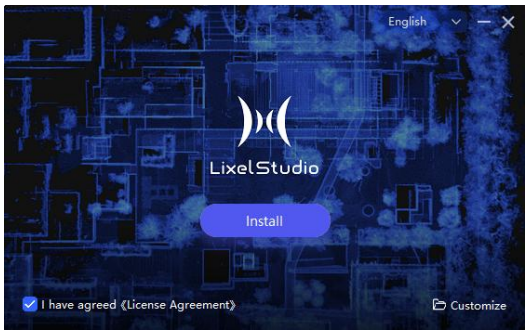
2.2 Installation Process

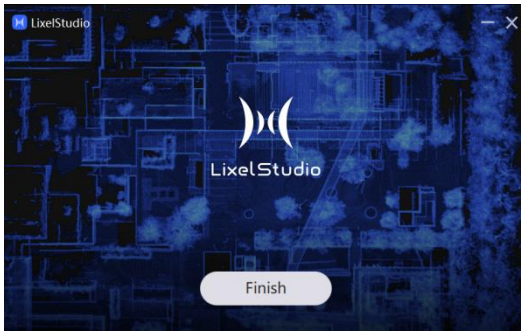
Double-click the application to begin installation. Follow the prompts step by step.

Run the installer and click **Quick Install**. The program will install to the default **C drive** path.

Alternatively, click **Custom** in the lower-right corner of the installation interface to select a different path and optionally check the box to **add a desktop shortcut**.

After installation is complete, click **Finish**. Double-click the desktop icon to open the software.





2.3 Authorization and Activation

The software supports two activation methods: **Online** or **Offline** Activation. Once

activated, all core software features will be available.

By default, you can use the basic features for **free** without activation. After launching the software, you may choose to activate it as needed to obtain access to additional feature permissions.

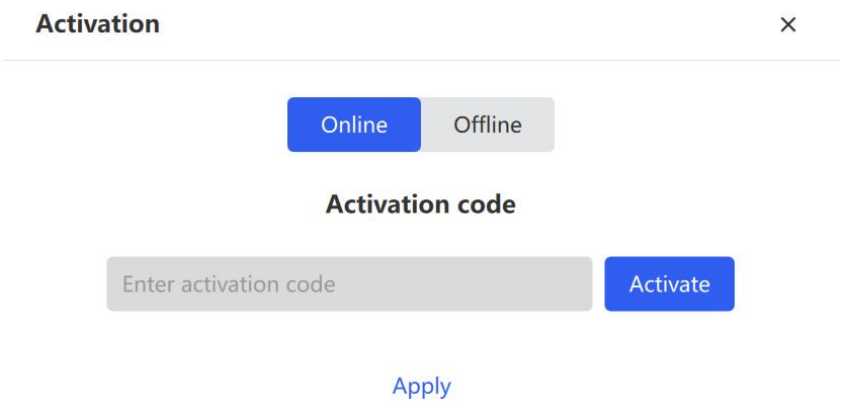
When opening the software, you may choose one of the following options:

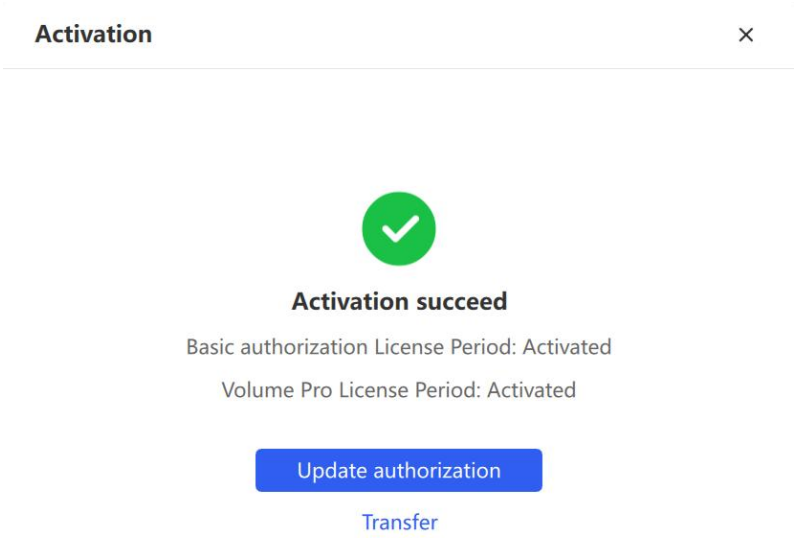
- **Online Activation:** Activate the software online if your computer has internet access.
- **Offline Activation:** Activate the software offline if your computer does not have internet access.
- **Free Version:** Use the basic features immediately without activation.

1. Online

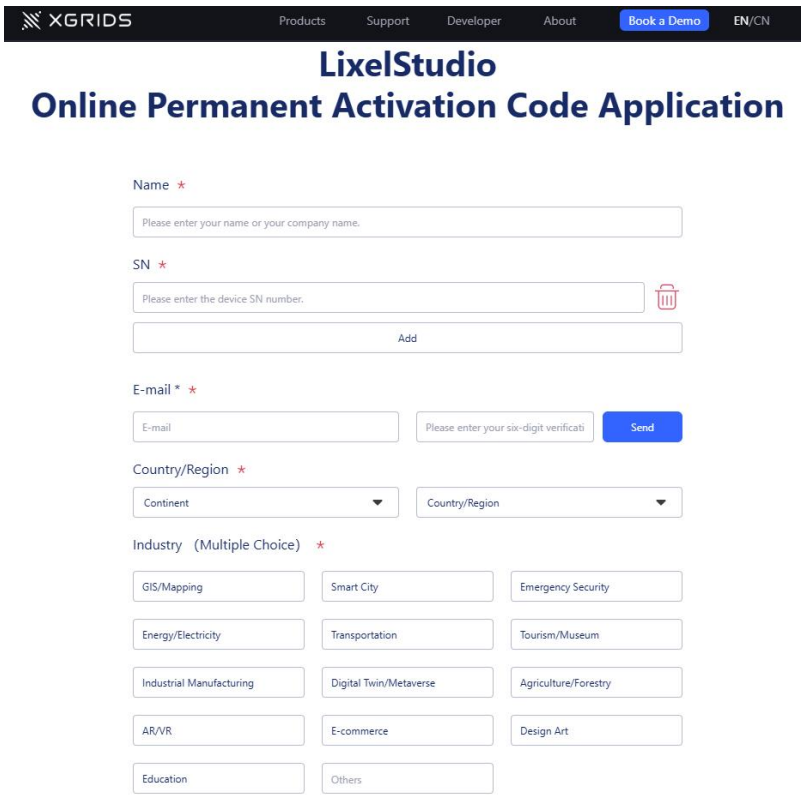
- **Activation:** Click **"Online"** > **"Reactivate."** Enter your activation code in the pop-up window and click **"Reactivate"** to enter the software.

- **Trial Users:** Get a trial code from your sales manager/distributor and use the **Activate** button.





- **XGRIDS Customers (Permanent Code):** Click **"Apply"** to visit the official application link. After submitting the required information, a permanent activation code will be sent to the application email.
    - *Note:* Each device receives 3 permanent codes (up to 50 devices per batch). Save your codes. If lost, reapply at **https://xgrids.com/activationrequest** using the correct SN and the original application email.

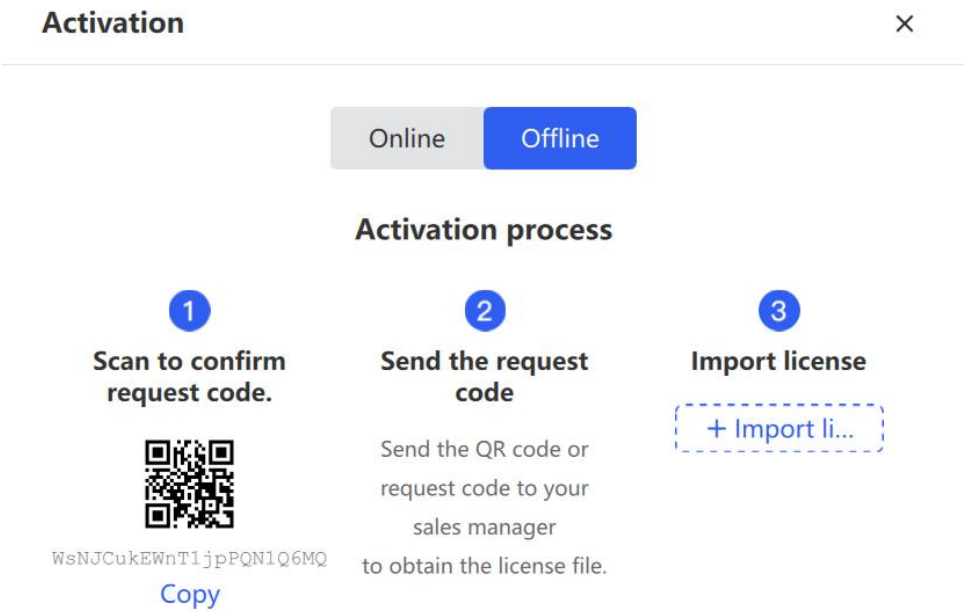


2. Offline

Click **"Offline."** The software will generate a **Request Code**.

Copy this Request Code completely and send it to your sales manager/distributor.

Upon receiving the **License File** from them, click **"Import License,"** select the file, and click **"Confirm"** to enter the software.



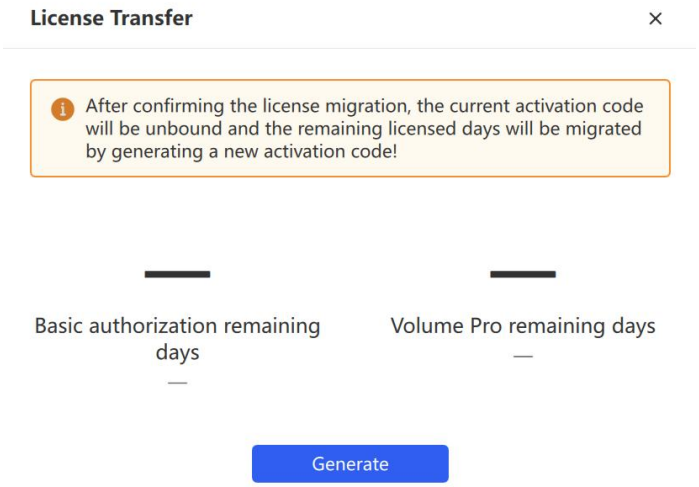
3. Migrate Out

Click **"Migrate Out"** to enter the permission migration page.

Confirming migration unbinds the current activation code and generates a new code based on the remaining authorization period.

Click **"Generate Activation Code"** to create and export a new code for binding to a different computer.

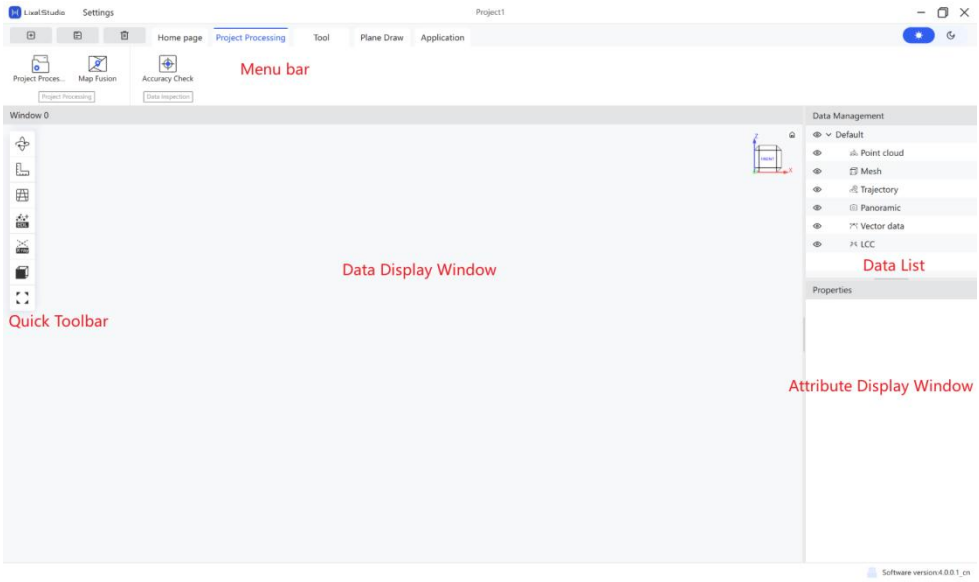
Confirm the new code has been copied or exported before closing the dialog. LixelStudio will close automatically once the dialog is closed.



3. Software Interface

3.1 Main Interface

Interface includes: Menu bar, Data list, Properties panel, Display window, and Quick toolbar.



Quick Toolbar

The quick operation bar includes: Rotation Type, Measurement Tools, Camera Mode, EDL View, Xray View, View Direction, Global View, Scale Bar, and Progress Bar.

3.1.1 Rotation Type

Double-click the left mouse button to set the rotation center. Rotation type buttons include Trackball and Turntable.

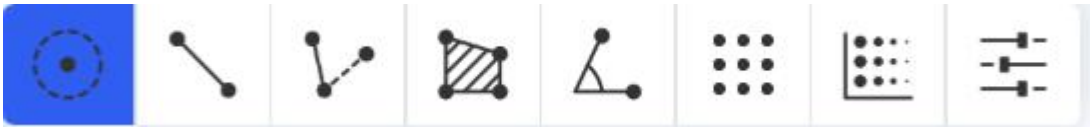
1) Trackball: Rotate the view from any angle.

2) Turntable: Lock the roll axis to prevent the point cloud from flipping during rotation.

3.1.2 Measurement Tools

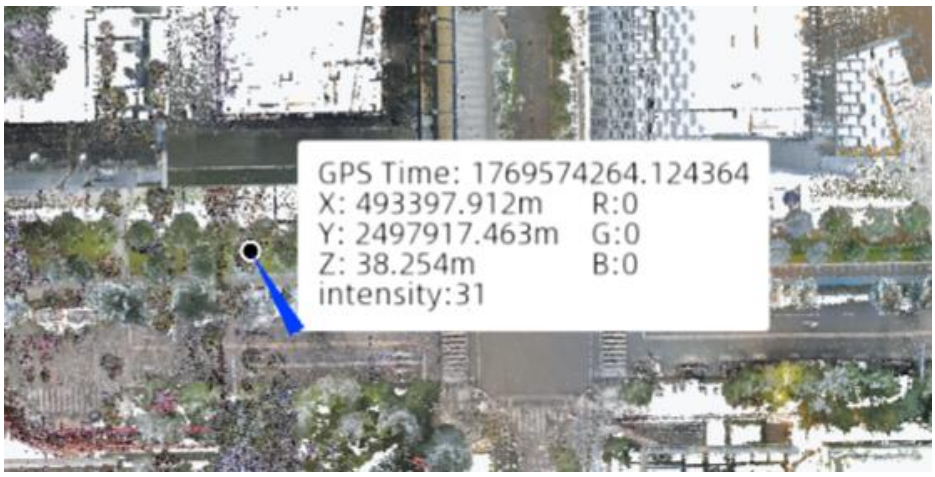
The measurement tool button includes: Point Measurement, Distance Measurement,

Polyline Measurement, Area Measurement, Angle Measurement, Multi-Point Measurement, Density Measurement, and Measurement Settings.



3.1.2.1 Point

Function: Pick a point on the point cloud and read its coordinates, RGB values, and intensity.

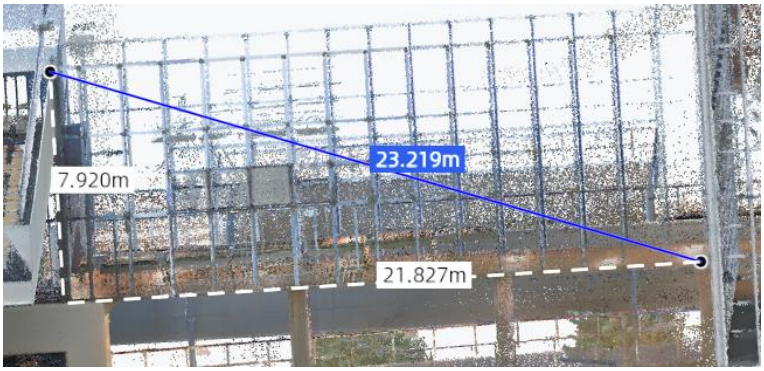


Steps:

1. Click **Point** in the measurement tools.
2. Left-click a point in the point cloud to read its information. The information box can be dragged.
3. Click the measurement tool button again to exit.

3.1.2.2 Distance

Function: Select two points in the scene to generate a measurement line and display the result. The blue value is the 3D straight-line distance between the two points; white values are the projected/component distances along each axis.

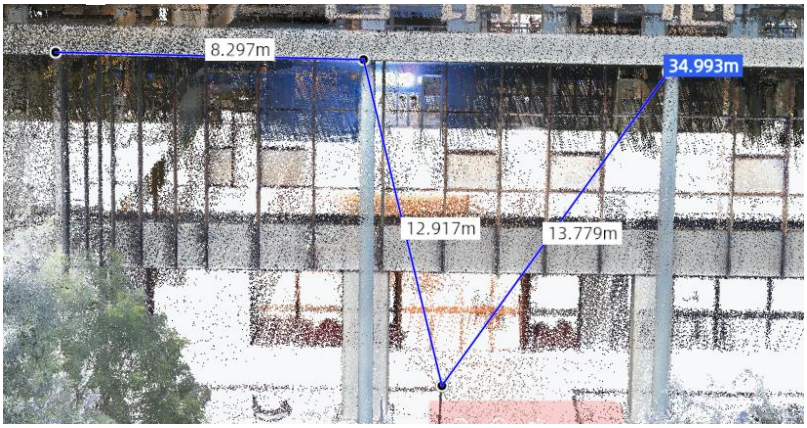


Steps:

1. Click **Distance** in the measurement tools.
2. Left-click two points in sequence. The software automatically generates the measurement line and displays the distance. After measurement, both points are draggable — results update in real time as points are moved.
3. Click the measurement tool button again to exit.

3.1.2.3 Polyline

Function: Select multiple points in sequence to generate a chain of measurement segments. After drawing, the blue value shows the total polyline length; hovering over a segment displays that segment's length. During selection, white dashed lines indicate the current measurement direction, and white values show component distances along each axis.

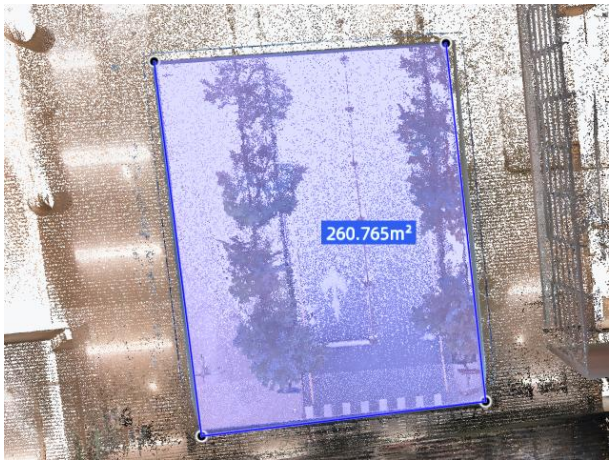


Steps：

1. Click **Polyline** in the measurement tools.
2. Left-click points in sequence. The software connects each point and displays results.
3. While drawing, white dashed lines display live component info; once finished, the blue value shows total length and hovering shows segment lengths. All points remain draggable, with results updating live.
4. To finish drawing: press **Enter** or **double-click** the left mouse button. Right-click to undo the last point.
5. Click the measurement tool button again to exit.

3.1.2.4 Projected area

Function: Draw a polygon on the point cloud and read the projected area inside it.

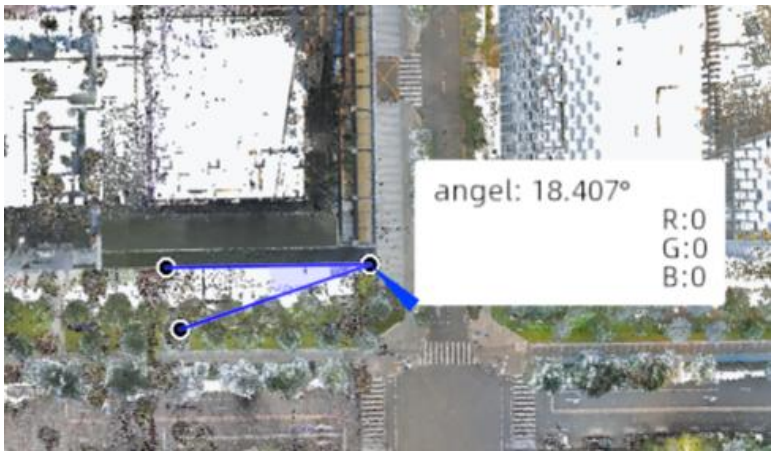


Steps:

1. Click Projected area in the measurement tools.
2. Left-click points in sequence to form a closed polygon.
3. Once closed, the blue value shows total area. Hovering inside the region shows white values for the corresponding edge lengths.
4. To finish drawing: press **Enter** or **double-click**. Right-click to undo the last point.
5. Click the measurement tool button again to exit.

3.1.2.5 **Angle**

Function: Measure the angle of an object in the point cloud. Click three points A, O, B in sequence to compute ∠AOB.



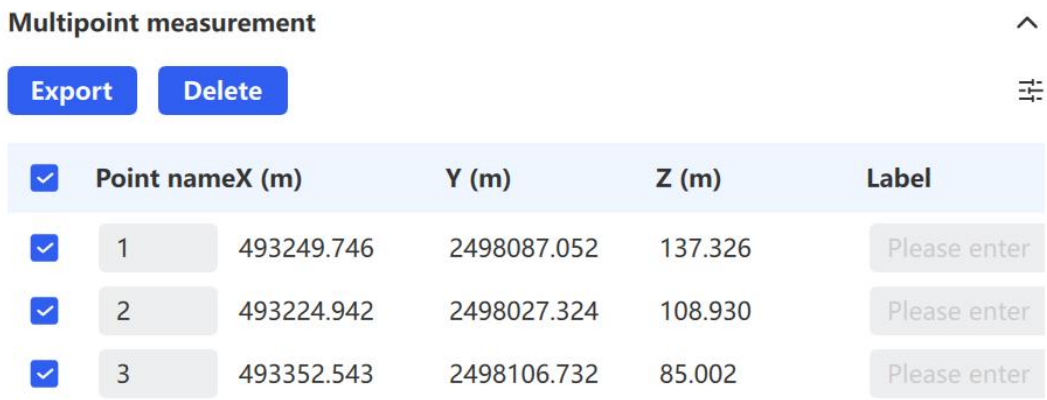
Steps:

1. Click **Angle** in the measurement tools.
2. Left-click three points in sequence. The software uses the previous point as the vertex, generates two measurement lines, and displays the angle. Segment lengths are shown live during drawing.
3. After measurement, all three points are draggable; results update in real time.

4. Right-click during drawing to undo the last point.
5. Click the measurement tool button again to exit.

3.1.2.6 Multi-Point

Function: Pick multiple points and read their coordinates, RGB values, and intensity. Supports recording, labeling, and exporting multiple points.



Steps:

1. Click **Multi-Point** in the measurement tools.
2. Left-click points in the cloud to read information.
3. (Optional) Customize the displayed columns: toggle Point Name, Coordinates, RGB, Intensity, GPS Time, and Label.
4. (Optional) Check the Label column to add a tag to a point. Double-click the input field to enter a value. English letters and numbers are currently supported.
5. (Optional) Click **Delete** to remove a point.
6. (Optional) Click **Export** to save selected points to `.txt` or `.csv`.
7. Click the measurement tool button again to exit.

3.1.2.7 Density

Function: Calculate the point cloud density of the selected target area.

Steps:

1. Click **Density** in the measurement tools.
2. Set the calculation range parameter — Length. By default, density is computed per square meter.
3. Left-click in the point cloud to read the density of that area.
4. Click the measurement tool button again to exit.

3.1.2.8 Measurement Settings

Function Description:

Supports custom display settings. Users can enable or disable auxiliary display functions such as **Magnifier** and **Grid Assist** as needed.

3.1.3 Camera Mode

Camera mode switches the viewing perspective.

Two modes are provided: Perspective and Orthographic.

Perspective View

Function: Mimics human-eye observation of 3D scenes — closer objects appear larger, farther objects smaller. More realistic.

Found in the quick operation bar under "Display."

Orthographic View

Function: Function: Object size in the point cloud does not change with viewing distance.

Found in the quick operation bar under "Display."

3.1.4 EDL Mode

Function: Apply EDL (Eye-Dome Lighting) to the active window's point cloud to enhance edge contours and surface features.

Operation: Click the **EDL Mode** button in the quick operation bar. EDL contour intensity can be adjusted in Settings → Preferences.

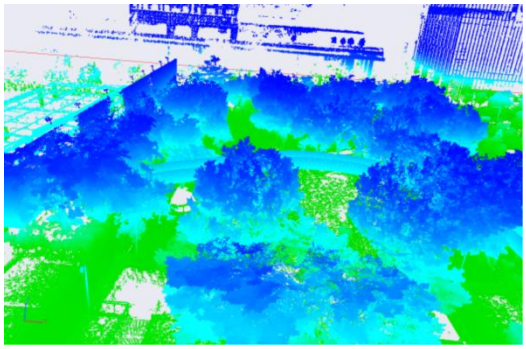
EDL Off

EDL On

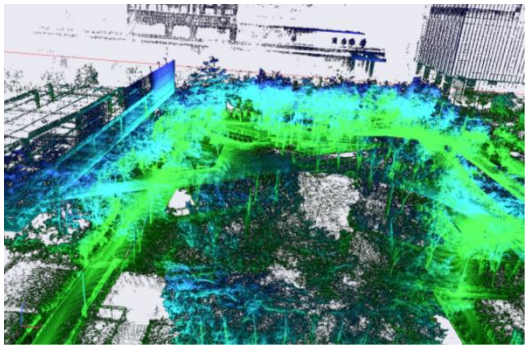
3.1.5 **Xray Mode**

Function: Apply Xray rendering to the active window's point cloud for a translucent effect that reveals internal structure.

Operation: Click the **Xray Mode** button in the quick operation bar. Xray exposure can be adjusted in Settings → Preferences.



Xray Off



Xray On

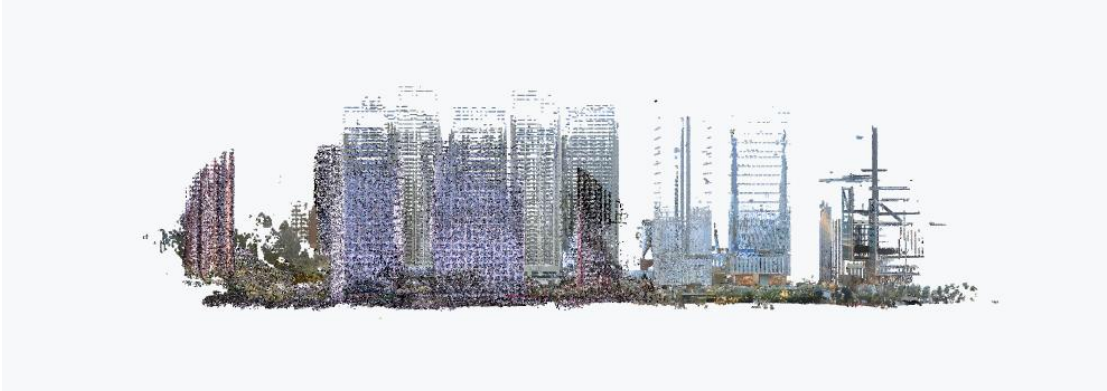
3.1.6 **View Direction**

Six standard views are provided: Front, Left, Top, Back, Right, Bottom. Each sets the camera along the corresponding axis.

3.1.6.1 Front View

Function: Sets the camera position to front view, viewing 3D data from -y to +y direction, with the plane being the x-z plane.

Operation: Click the Front View button.



3.1.6.2 Left View

Function: Sets the camera position to left view, viewing 3D data from -x to +x direction, with the plane being the y-z plane.

Operation: Click the Left View button.

3.1.6.3 Top View

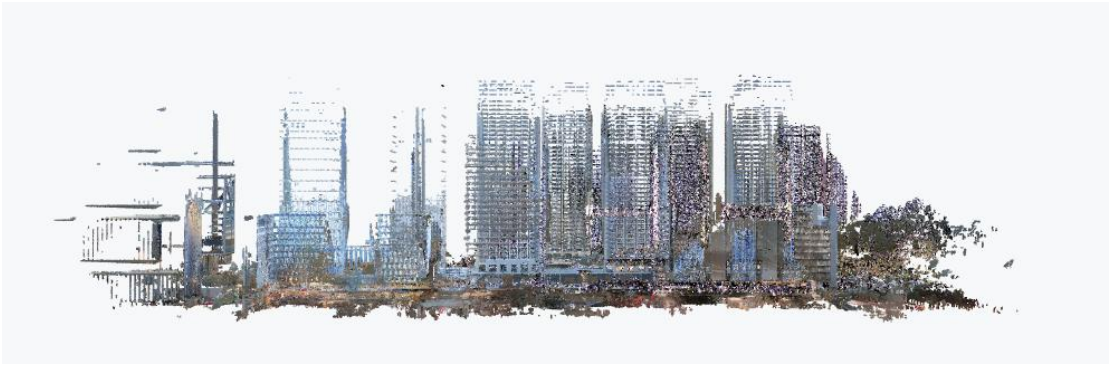
Function: Sets the camera position to top view, viewing 3D data from +z to -z direction, with the plane being the x-y plane.

Operation: Click the Top View button.

3.1.6.4 Back View

Function: Sets the camera position to back view, viewing 3D data from +y to -y direction, with the plane being the x-z plane.

Operation: Click the Back View button.



3.1.6.5 Right View

Function: Sets the camera position to right view, viewing 3D data from +x to -x direction, with the plane being the y-z plane.

Operation: Click the Right View button.

3.1.6.6 Bottom View

Function: Sets the camera position to bottom view, viewing 3D data from -z to +z direction, with the plane being the x-y plane.

Operation: Click the Bottom View button.

3.1.7 Global View

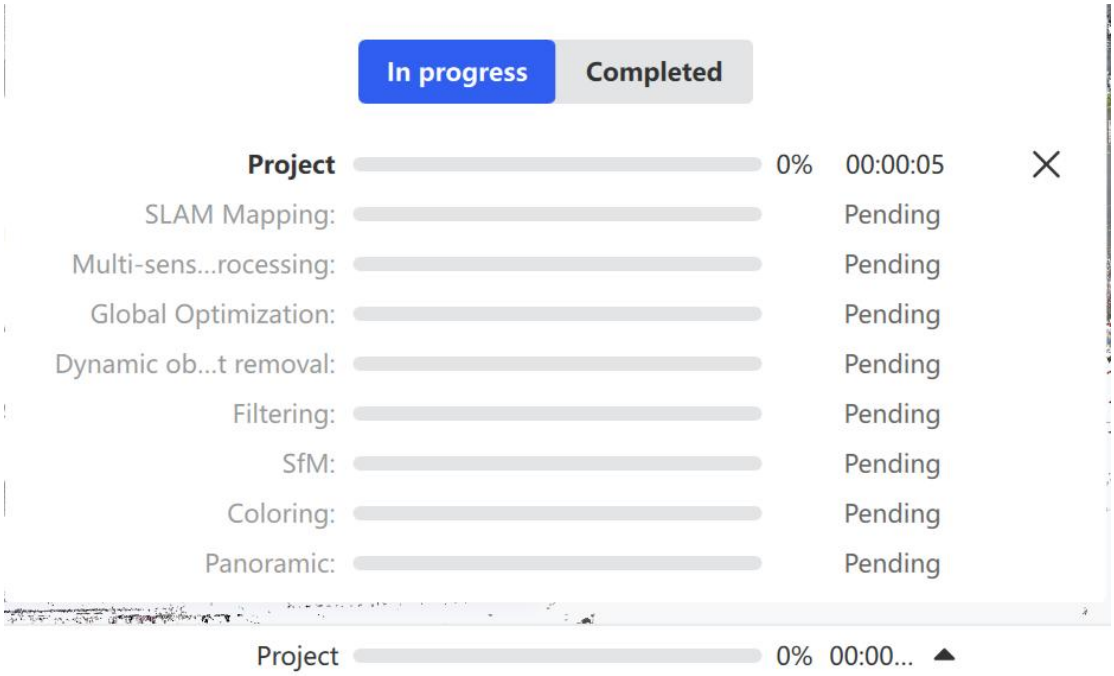
Function: Resets the view, returning the point cloud to its initial top-down orientation, centered in the window. Found in the quick operation bar under "Display."

3.1.8 Scale Bar

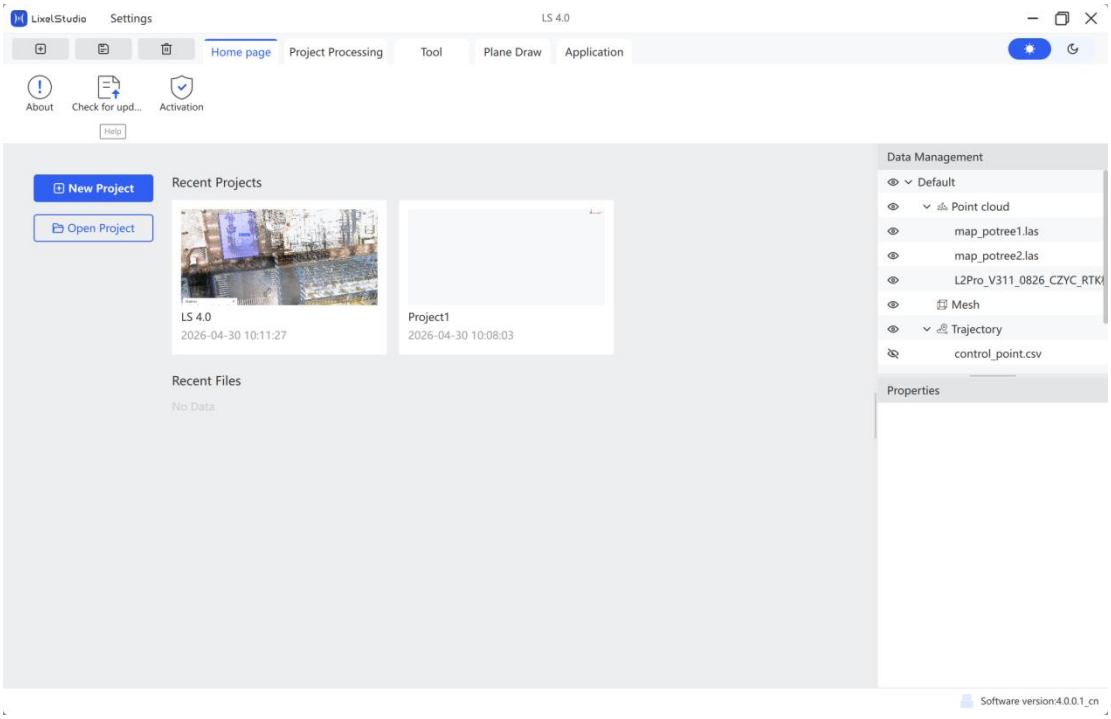
Function: The scale bar provides a visual reference for spatial distance in the current view. A line segment of fixed pixel length maps to a real-world physical distance, helping users establish accurate scale during planning or measurement.

3.1.9 Progress Bar

Function: The task progress panel is a transparent, real-time monitor for the digital workflow. It shows overall processing status alongside a breakdown of each technical stage, from raw data processing through final model output.



3.2 Home Page



The Home menu provides base functions including **About LixelStudio**, **Check for Updates**, **Help**, and **Authorization Activation**. The main view records and displays recently opened projects for quick access. It also offers **New Project**, **Open Project**, and project management options including **Open Project Path**, **Rename Project**, and **Remove Project**.

3.2.1 New Project

Function: LixelStudio 4.0 manages data using a project structure. Before entering the main interface, a project must be created.

Steps:

1. Click **New Project**.
2. Choose a project path, create a folder if needed, enter a file name, and confirm.

3.2.2 Open Project

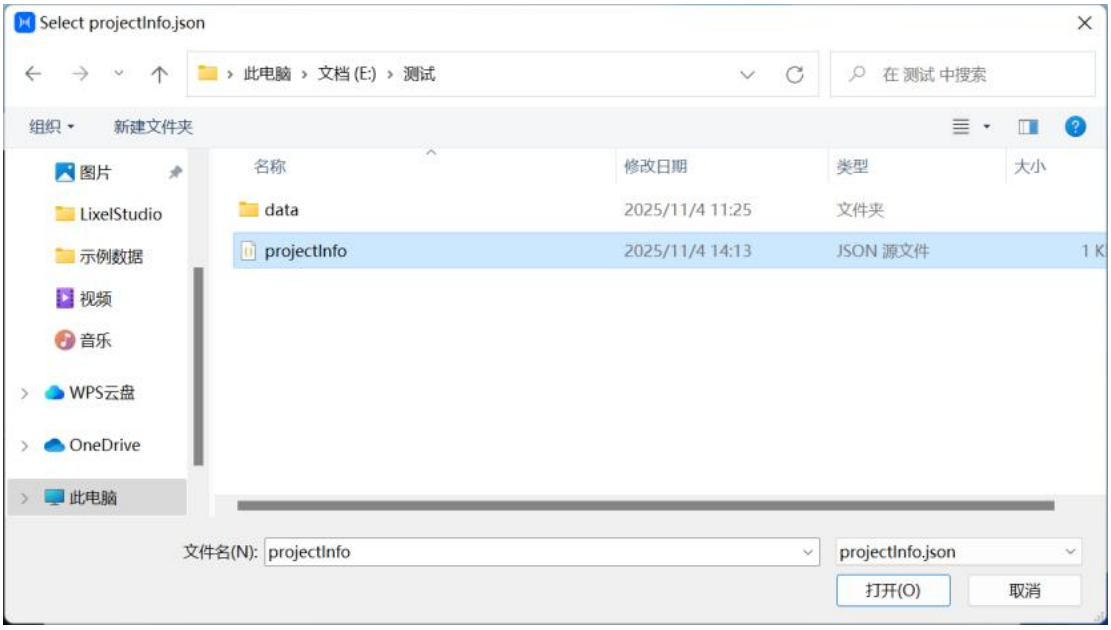
Function: Open an existing project file.

Steps:

1. Click **Open Project**.
2. Select an existing project and click Open.

Open Project Path

Function: Open the directory containing an existing project file.



3.2.3 Remove Project

Function: Removes the project from the LixelStudio startup project list. Project data remains on disk.

4. File Operations

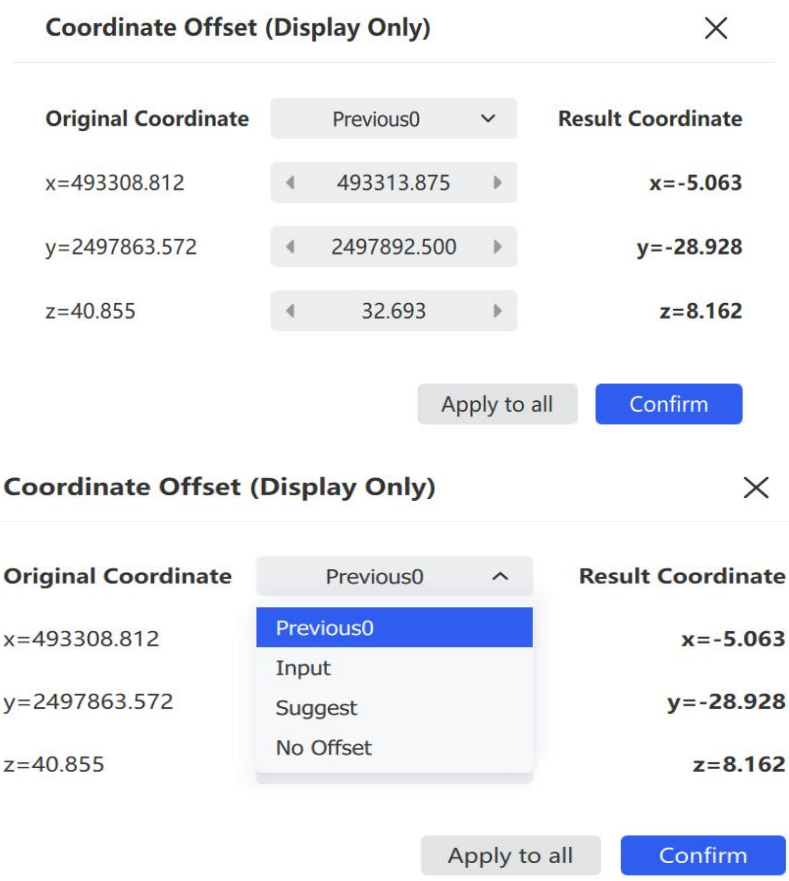
4.1 Import data

Supported Formats:

- **Point clouds:** `.las` (1.1–1.4), `.laz`, `.ply`, and `.e57`
- **Control points/trajectory:** `.csv` and `.txt`
- **Mesh:** `.ply`, `.obj`, and `.osgb`
- **CAD:** `.dxf`
- **Other:** `.lcc`

1. Import .las data

After selecting a `.las` file, the offset is used **only** to optimize point cloud rendering in the viewport and resolve render jitter under large coordinates. **It does not modify the original coordinate data in the point cloud file.**



Parameter settings

Option	Description
Previous (0/1/...)	Apply offset values from the most recent successful imports
Input	Activates manual edit mode
Suggested	The software quickly scans the LAS header and computes the bounding box center coordinate or the first point coordinate
No Offset	Forces the offset to 0

2. Import Control Points and Trajectory TXT/CSV Data

Steps:

1. After selecting a `.txt` or `.csv` file, choose the delimiter and whether to skip header rows in the dialog.
2. Click Confirm to import.

Import GCP/Trajectory

Unfolding Point File: C:/Users/xgrids/Desktop/LS PROJECT/Example/DATA/L2...

Delimiter: , Skip Lines: 0

GPS	Ignore	Label	Ignore	Y	Z
1761212454....	1	100	0_01	493257.5875...	2498003.520
1761212574....	2	100	0_02	493370.7810...	2498005.689
1761212639....	3	100	0_03	493368.1406...	2498046.724
1761212749....	4	100	0_04	493363.6432...	2498137.400
1761212844....	5	100	0_05	493434.0262...	2498138.060
1761212975....	6	100	0_06	493497.5707...	2498140.107
1761213059....	7	100	0_07	493503.5860...	2498067.540
1761213134....	8	100	0_08	493502.9345...	2498005.533
1761213263....	9	100	0_09	493370.7874...	2498005.691

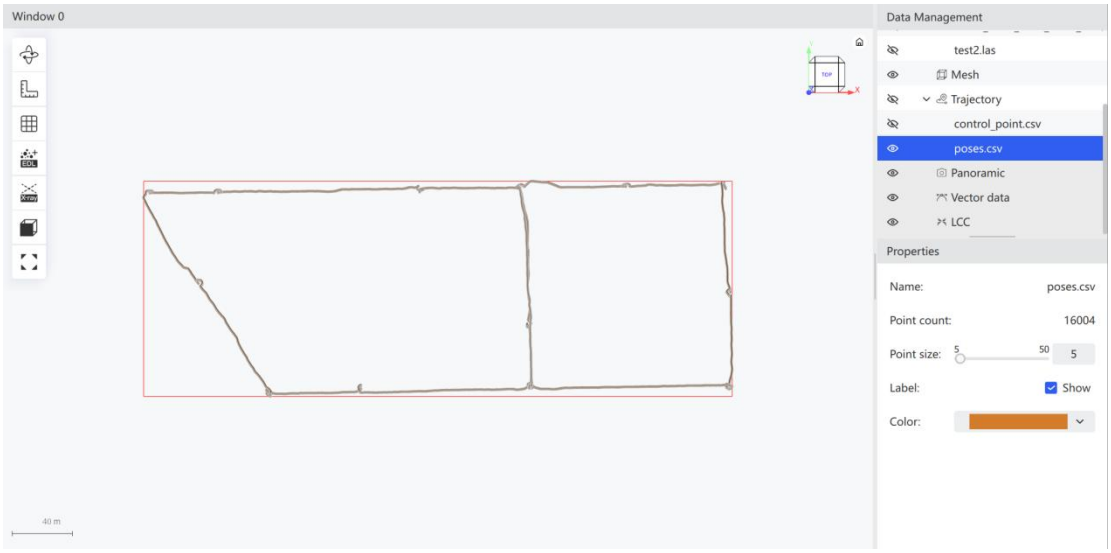
1 2

Total data: 13 items

OK

If the imported control points include label information, they are displayed in the data view with a special marker.

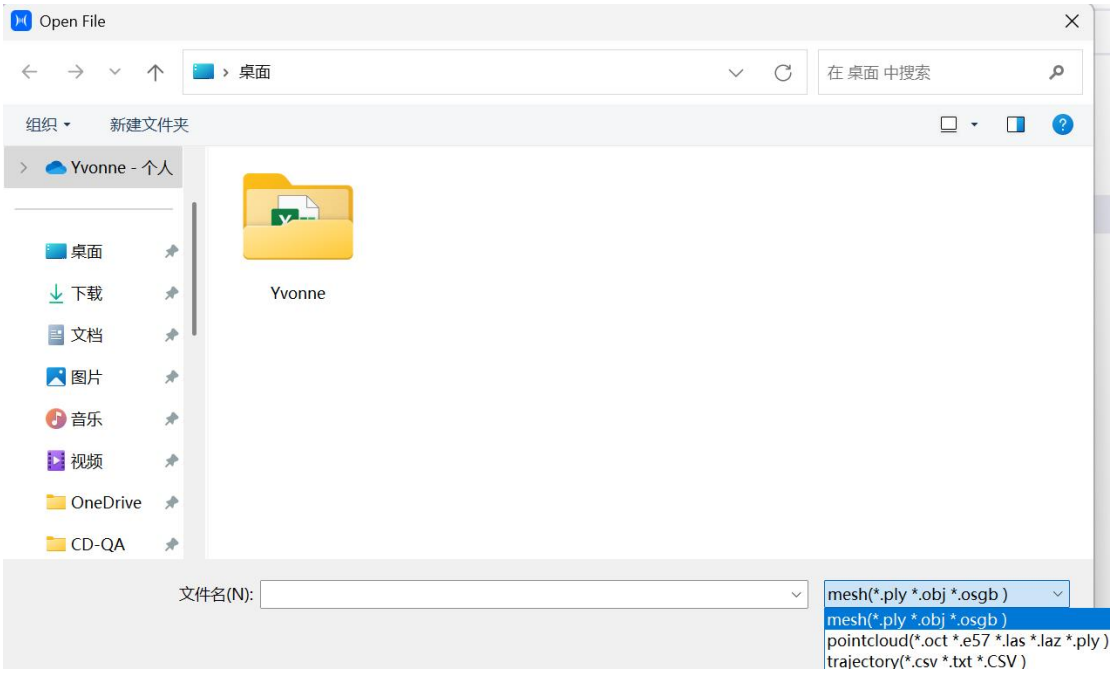
For standard trajectory data, the data is rendered in a point cloud–like style.



3. Import Mesh Model

Steps:

Select a `.ply`, `.obj`, or `.osgb` file.



4.2 Open project

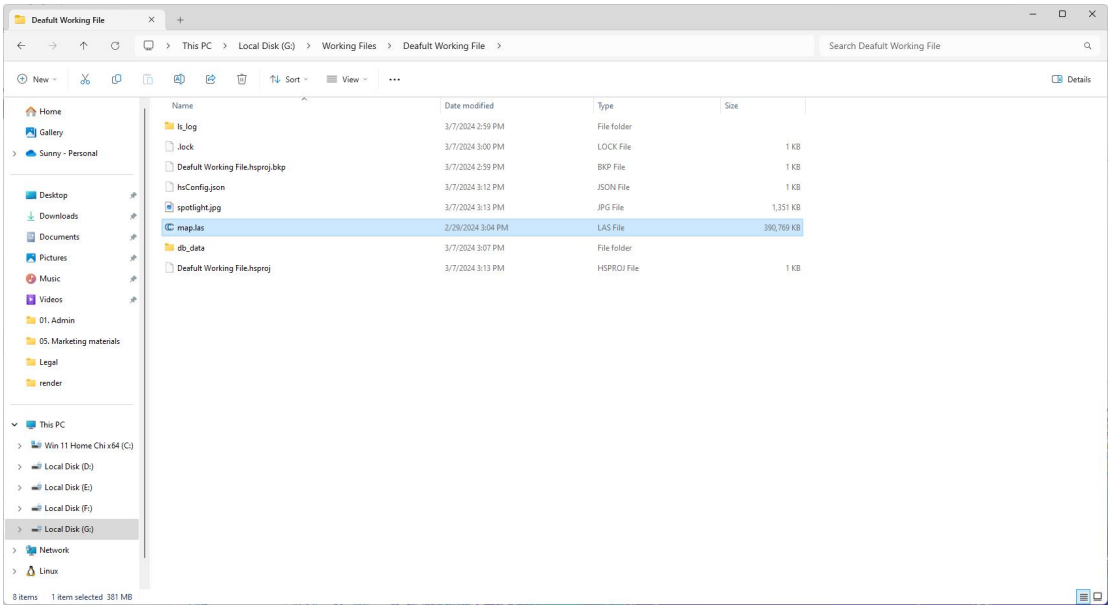
Same functionality as Project Interface.

4.3 Export data

Supported Formats: las, laz, ply, unstructured e57

Steps:

1. Select point cloud data
2. Choose export directory and filename
3. Select export format
4. Click **Export**



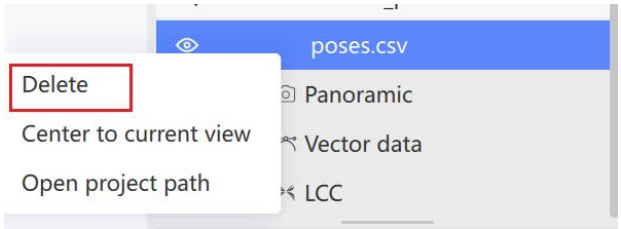
4.4 Save project

Click "Save" to save the files within the project.

4.5 Delete data

Steps:

1. Select single or multiple data files in data list
2. Click **Delete** or right-click → **Delete**
3. Confirm deletion



4.

5. Project Processing

5.1 Project Processing

Function: Project Processing post-processes raw data from XGRIDS handheld scanners (L2 Pro, K1, K2) to produce point cloud results.

Hover over "?" symbols for function notes and precautions

Supported Devices:

- **L2 Pro, K1:** Firmware v2.4.1 and above
- **L2 Pro, K1:** Firmware v1.4.0-2.4.0 → Use LixelStudio v3.3.1.2
- **Before v1.4.0:** Use LixelStudio v2.4.2 or earlier
- **L1:** v1.4.0+ → Use LixelStudio v2.5.2.1

5.1.1 Project Settings

Steps

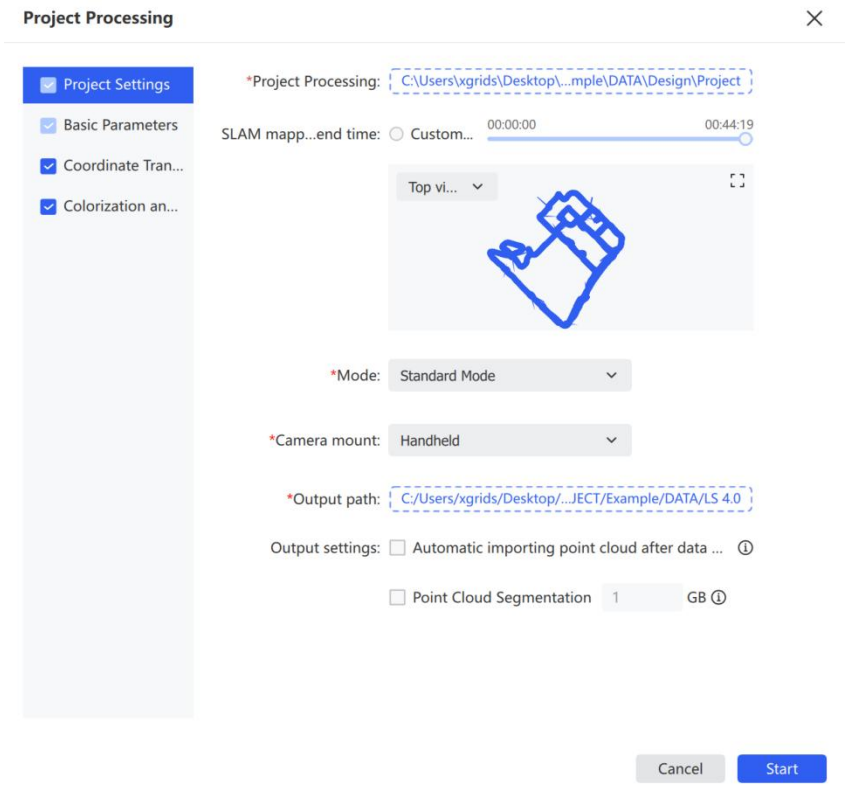
1. Click **File** and select the project data to process. The project path must be set to the project directory (the folder copied from the scanning device).

> **Note:** LixelStudio 4.0.1.5 Project Processing supports only XGRIDS handheld scanner data with firmware **2.4.1 or above**.
>
> - **Firmware 2.4.1 or higher:** LixelStudio 4.0.1.5
> - **Firmware 1.4.0 to 2.4.1:** LixelStudio 3.3.1.2
> - **Firmware older than 1.4.0:** LixelStudio 2.4.2 or earlier
>
> **L1 Devices**
>
> - **Firmware 1.4.0 or higher:** LixelStudio 2.5.2.1

2.

2. In **Project Processing**, confirm the imported data path.
3. Set the mapping time range as needed. To limit processing to a specific window, drag the timeline or choose a custom time range.
4. Choose a viewing angle in the preview area. Switch between Top, Front, and Left views to inspect data range and trajectory.
5. The preview supports zoom and pan for inspecting project details.
6. Choose the Mode that matches the project scene.
7. Choose the Carry Method that matches the capture device.
8. Set the output path for processing results.
9. Check **Auto-load project after processing** to load the project automatically when finished.

10. Check **Point Cloud Segmentation** and set the parameter to enable segmentation.



5.1.1.1 Parameter settings

Mode

Selects the project processing mode. Currently supports:

- **Standard** — General scenes
- **Robust** — Scenes requiring higher processing stability
- **Narrow Space** — Tight, structurally constrained environments
- **Vehicle** — Vehicle-mounted capture
- **Drone** — Drone capture

Mount Method

Selects the capture device's mount type.

Currently supports:

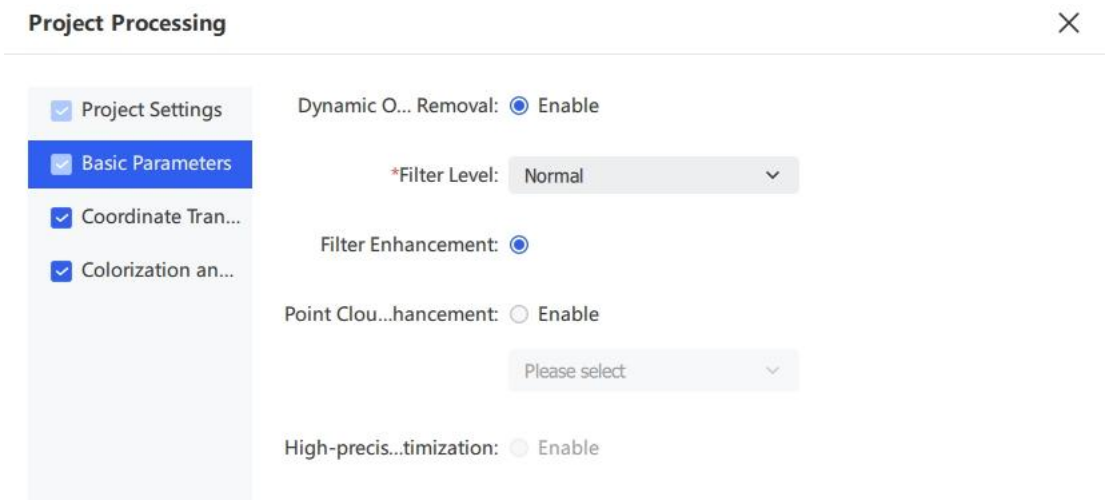
- Handheld
- Backpack
- Vehicle
- Drone

5.1.2 Basic Parameters

Function: Basic Parameters configures point cloud optimization options during processing — including dynamic object removal, filter enhancement, point cloud enhancement, and high-precision optimization — to improve the quality and usability of results.

Steps:

1. On the **Project Processing** page, select **Basic Parameters** in the left panel.
2. Adjust parameters as needed.



5.1.2.1 Parameter settings

5.1.2.1.1 Dynamic Object Removal

Removes dynamic objects (pedestrians, vehicles, etc.) captured during scanning to improve stability and cleanliness of results.

5.1.2.1.2 Filter Level

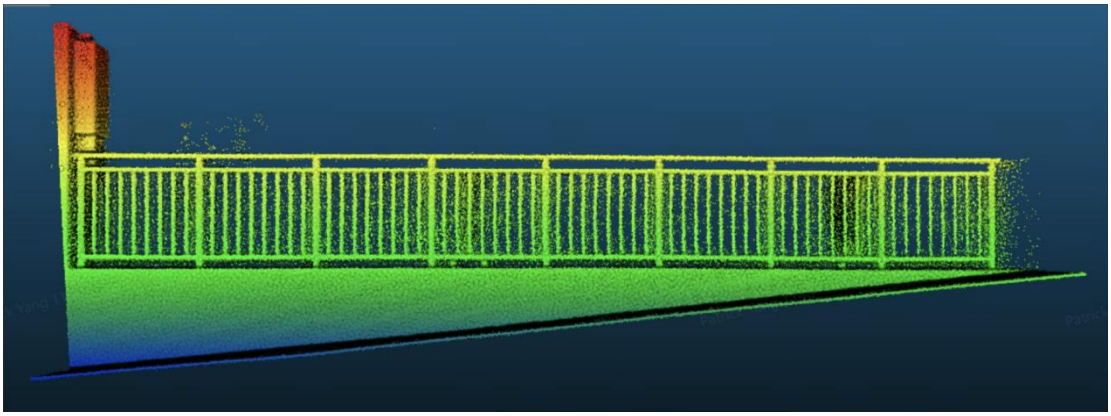
Sets the filter strength used during dynamic object removal and point cloud processing. Choose the level that matches the data quality requirements of the scene. A higher denoising level removes more noise but also more structure.

Function: Set noise removal intensity during filtering

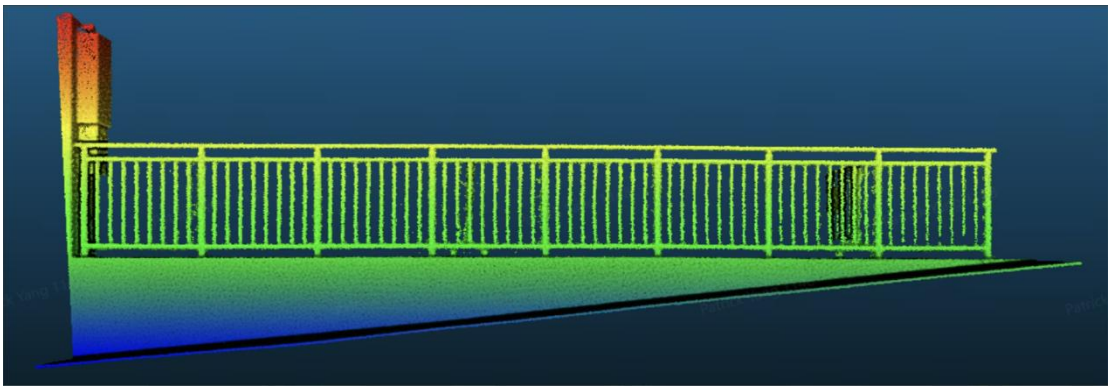
Levels:

- **Strong:** More denoising, may remove some structure
- **Normal:** Balanced denoising
- **Weak:** Less denoising, minimal structure damage

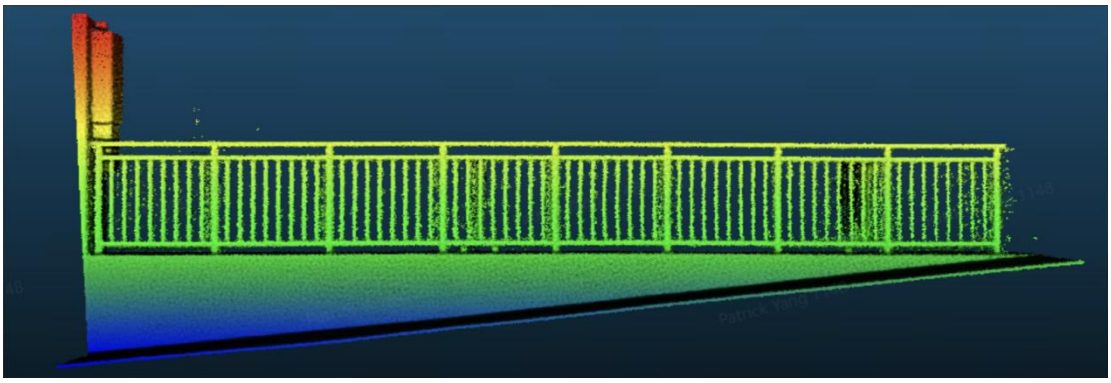
Examples: For high-density detailed scans (e.g., railings), use Normal or Weak. For low-density scans, Strong may remove too much detail.



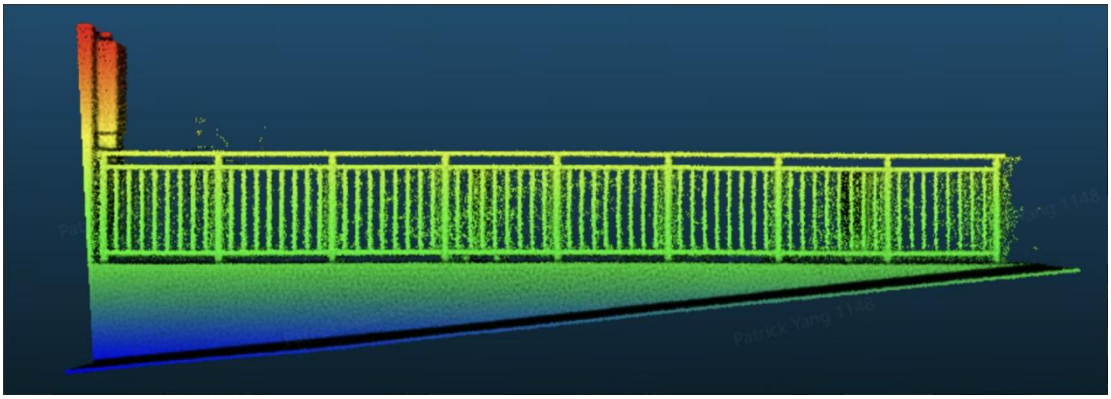
Original point cloud - high density, complete details captured during scan.



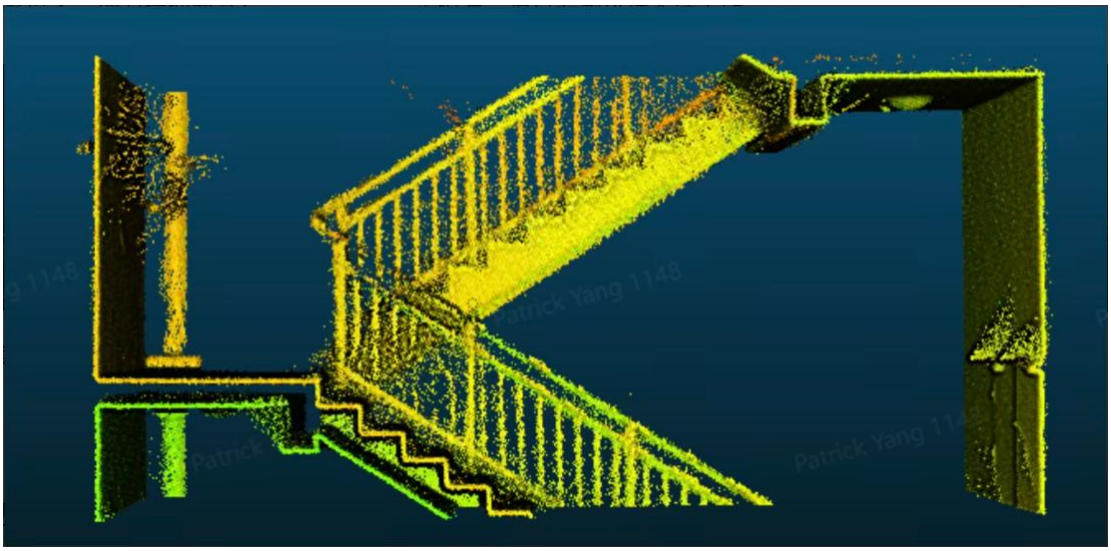
Filter: Strong. More denoising, some railing removed.



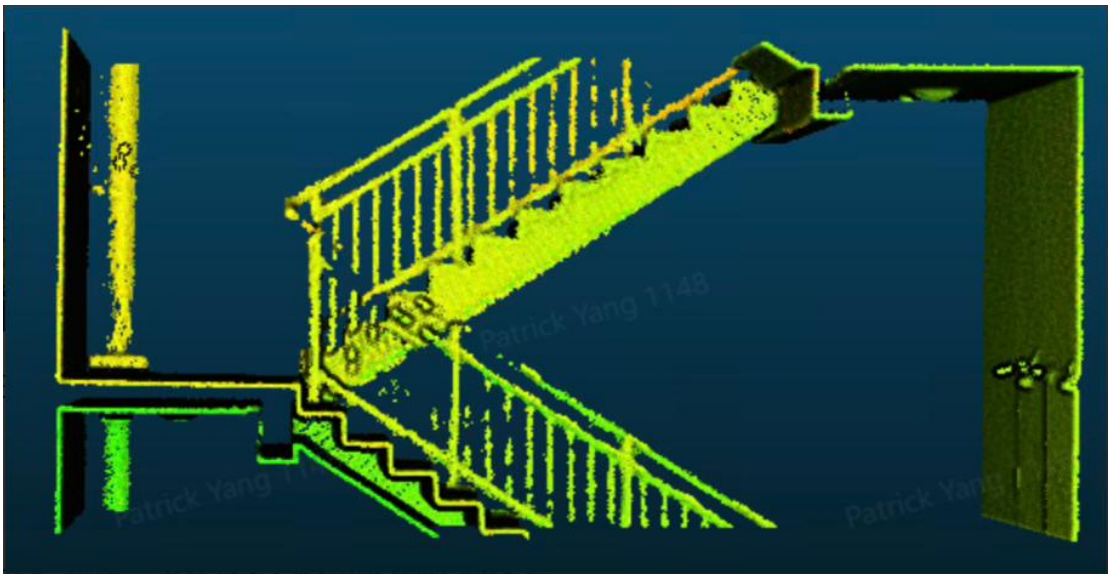
Filter: Normal. Balanced denoising and railings intact.



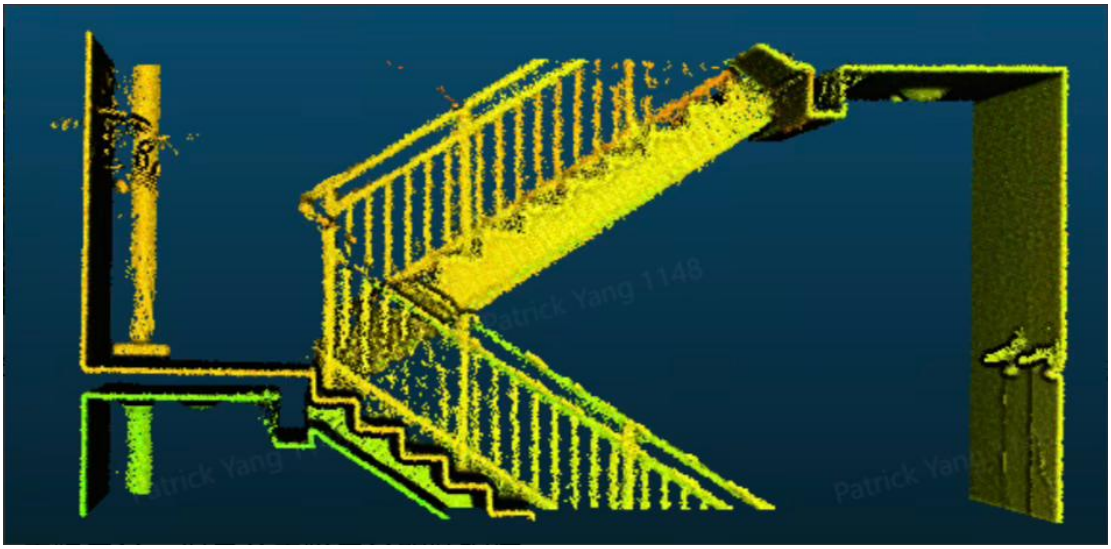
Filter: Weak. Less denoising, railings complete.



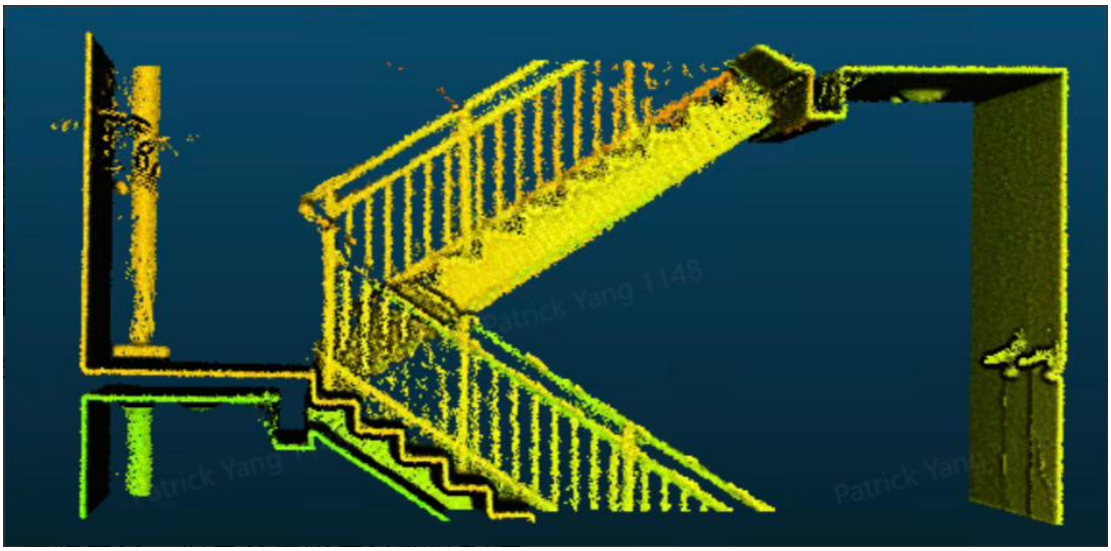
Original point cloud - low density, missing some details in the scan.



Filter: Strong. More denoising, some railing removed.



Filter: Normal. Some denoising, but more railings intact.



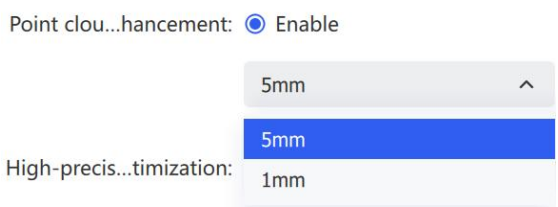
Filter: Weak. Minimal denoising, and minimal damage to railings.

Filter Enhancement Further strengthens filtering to reduce the impact of noise and outliers on results.

5.1.2.1.3 Point Cloud Enhancement

Function: Generate denser, more uniform point cloud (reduces processing efficiency)

Availability: L2 Pro (5mm and 1mm) and K1 (5mm only)



Modes:

- **5mm:** Point spacing = 5mm
- **1mm:** Point spacing = 1mm (128GB RAM and sufficient disk space)

5.1.2.1.4 High-Precision Optimization

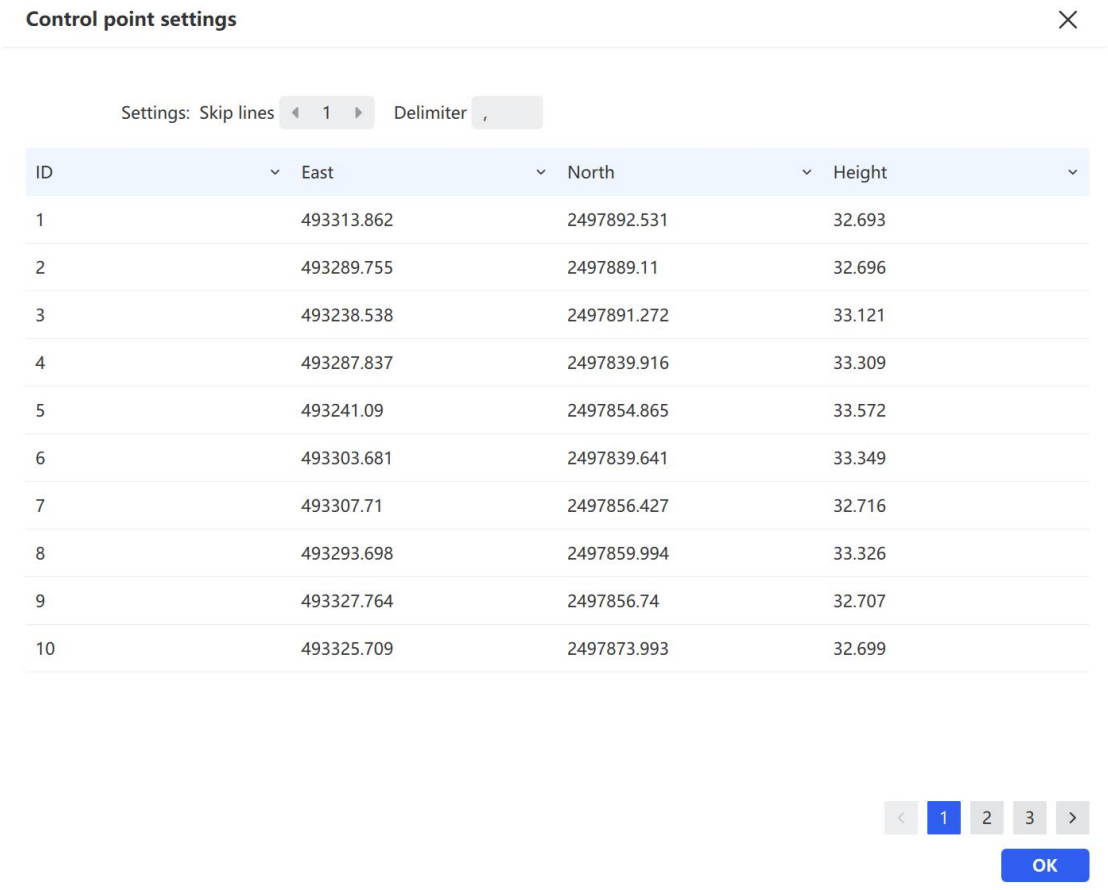
Further optimizes point cloud quality, improving overall display and detail clarity. **Mutually exclusive with Coordinate Transformation.**

5.1.3 Coordinate Transformation

Function: Convert scanned point clouds from the original coordinate system to a target coordinate system. Import a control point file, choose a GNSS data source, set the source and target systems, and complete transformation through control point matching. Both preset and custom coordinate systems are supported.

Steps

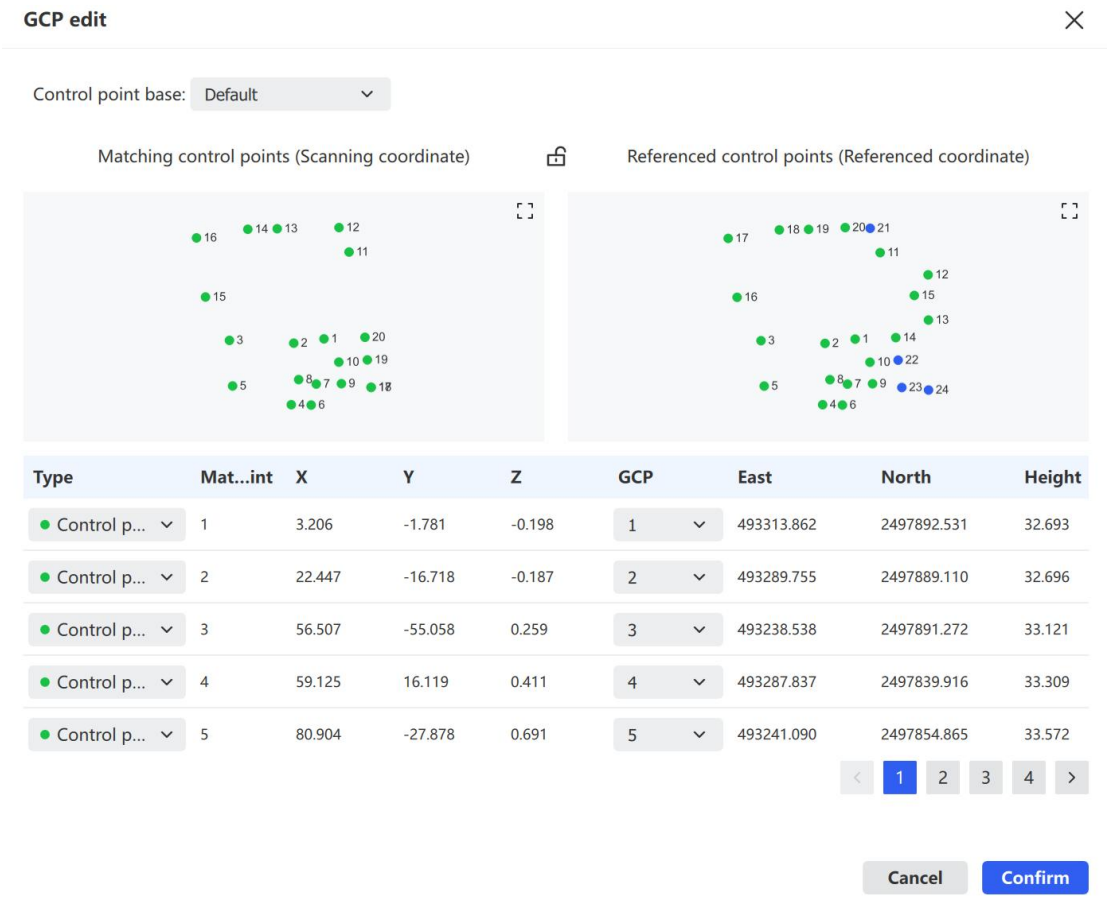
1. On the **Project Processing** page, select **Coordinate Transformation** in the left panel.
2. Import a **control point file**. Configure **Skip Rows** and **Delimiter** as needed. Check **GNSS** to use GNSS data.



3. Choose the GNSS data source — automatic detection from the **RTK module**, or

a **GNSS file**.

4. To match scanned control points with local references, click **Edit GCP**.
5. In the GCP editor, the left panel shows scanned control points and the right panel shows local reference points. Use the list at the bottom to assign correspondences.



6. Click **Confirm** to save matches.

5.1.3.1 RTK Module

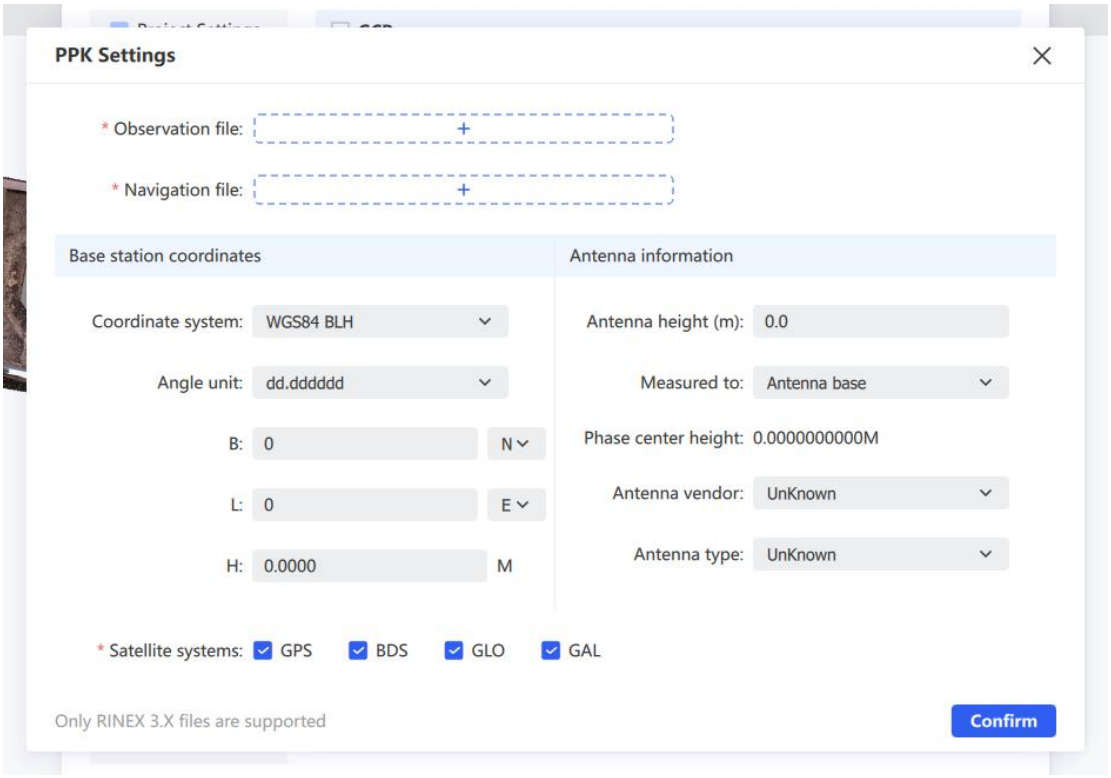
Set **Horizontal Accuracy**, **Satellite Count**, and **Maximum Tilt**, and choose the **RTK Mount** type (Default or Custom).

5.1.3.2 PPK Module

Uses PPK results to enable PPK-SLAM optimization and coordinate transformation when trajectory data is valid. RINEX 3.0 and above only.

Steps

1. For data captured in PPK mode, the GNSS module auto-selects PPK during post-processing. Click **PPK Settings**.



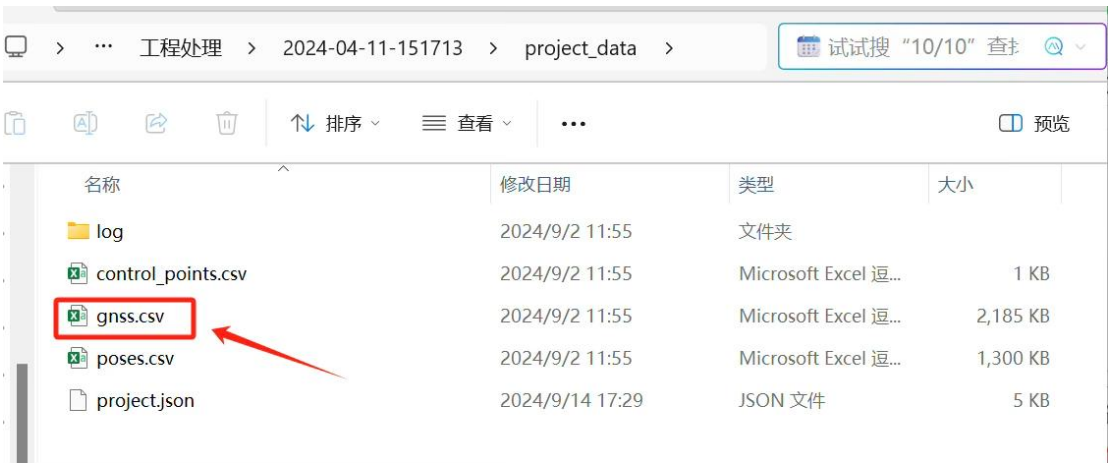
2. Load the **Observation File** (`.xx0`) and **Navigation Files** (`.xxP`, `.XXG`, `.XXC`, `.XXL`, `.XXN`, `.NVA`). Multiple files can be loaded.
3. Adjust base station info as needed.
4. Select satellite systems (at least one).
5. Click **Calculate**. On success, the trajectory displays and PPK-SLAM optimization plus coordinate transformation can proceed.

GNSS File

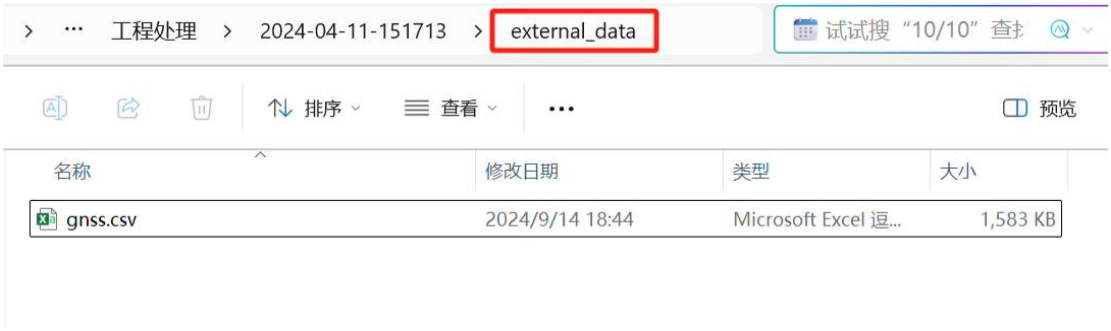
Use third-party software to transform coordinates to a target local system.

Steps

1. Copy `gnss.csv` from the project's device records.

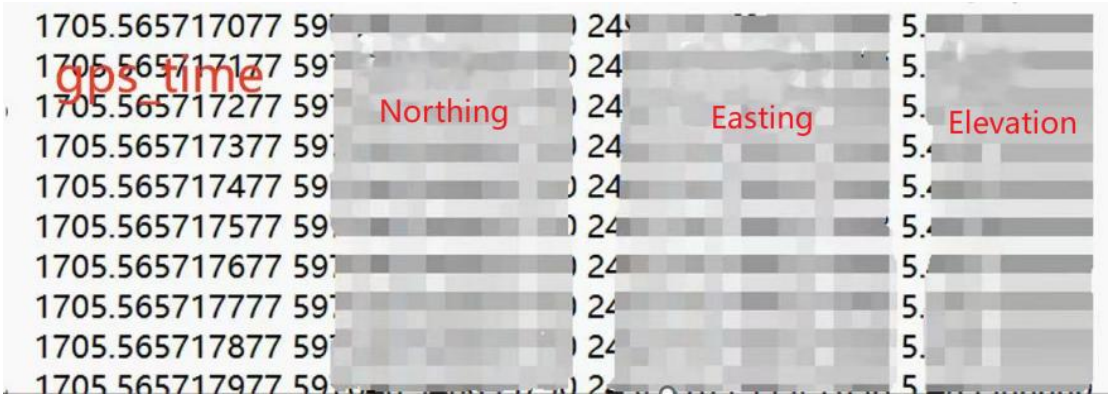


2. Transform it in third-party software, then save the result back to the project's `external_data` folder.

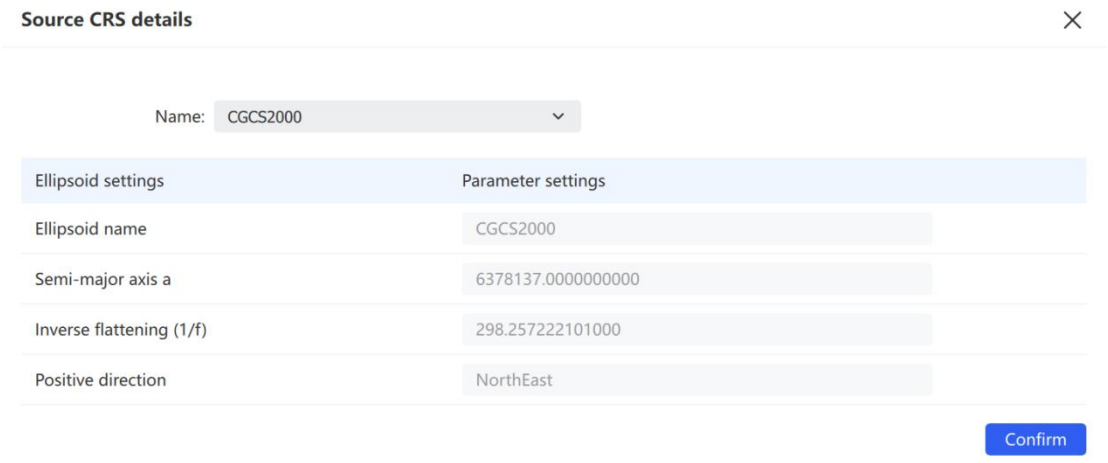


3. Check **GNSS** and select **GNSS File**. The software reads from `external_data` and applies the file.

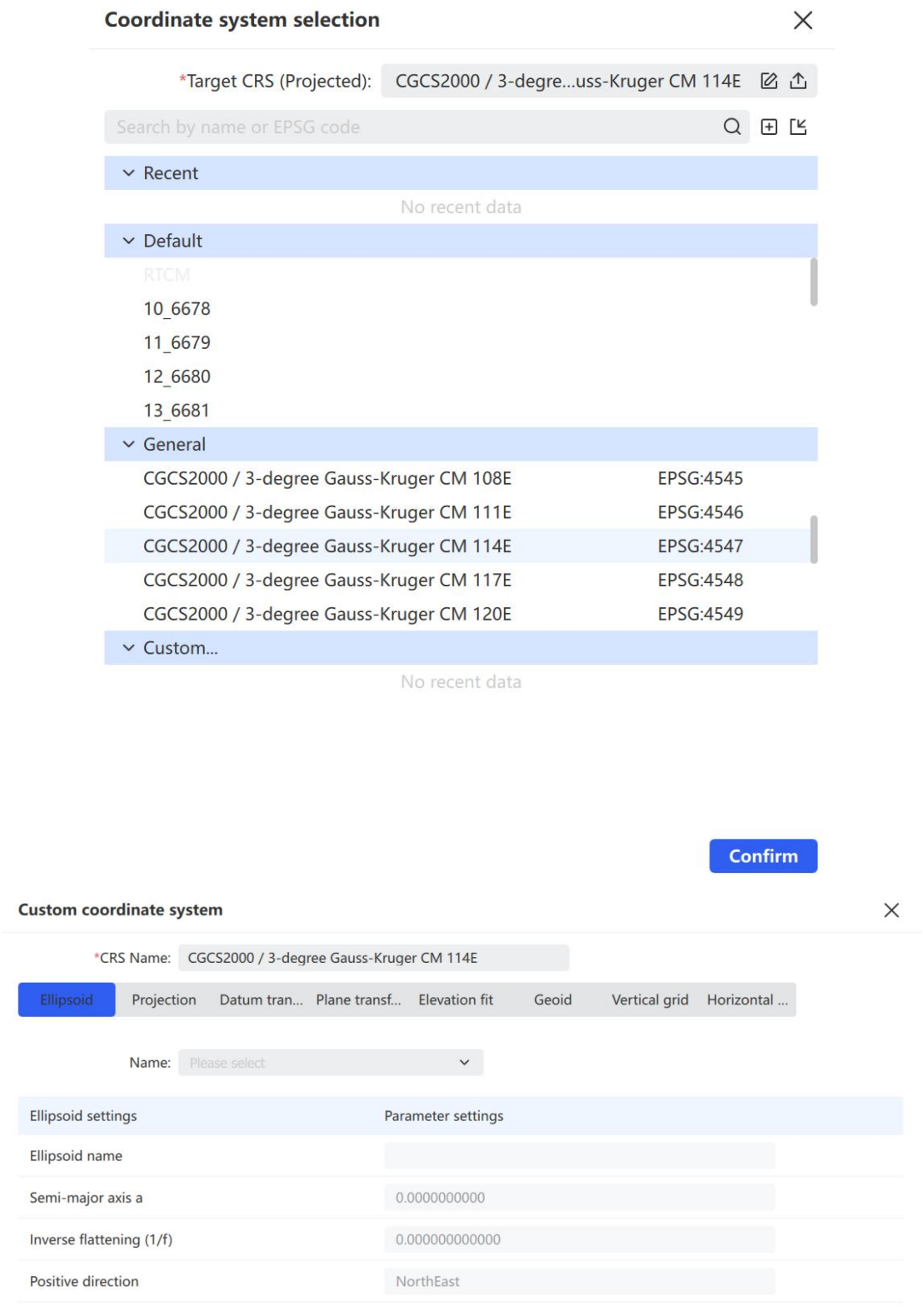
Required format: `gps_time  Northing  Easting  Elevation`.



4. Review the **Source Coordinate System** (click **Details** for parameters).



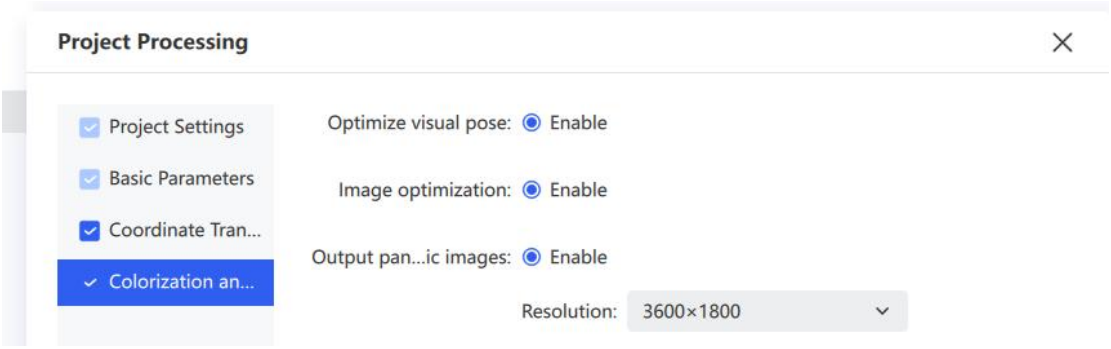
5. Click **Target Coordinate System** to open the selector. Choose a preset, or click **+** to define a custom system (ellipsoid, projection, datum transformation, plane transformation, elevation fitting, geoid, vertical grid, horizontal grid).



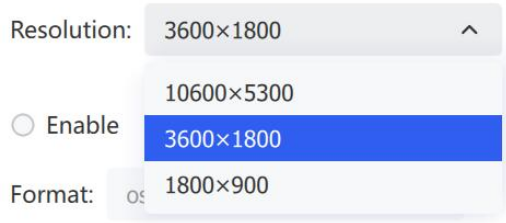
6. To apply elevation anomaly correction, check **Elevation Anomaly** and enter a value.
7. Click **Start** to run the transformation, or **Cancel** to discard.

5.1.4 Coloring and Mesh

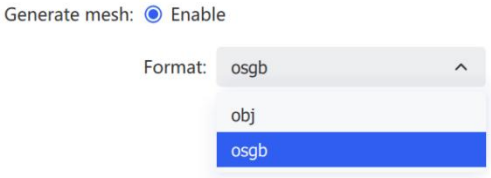
Function: Configures visual output of project processing results.



- **Optimize Visual Pose** — Improves coloring quality in texture-rich areas.
- **Image Optimization** — Improves coloring quality in low-light scenes.
- **Output Panoramic Images** — Outputs panoramas alongside results.
- **Resolution** — Sets panorama resolution.



- **Generate Mesh** — Generates a mesh model. Supports `.obj` and `.osgb`.



5.2 Map Fusion

Function: Stitches and fuses multiple point cloud datasets into a single map.

Connection requirements for successful fusion:

- Adjacent projects must **overlap by at least 15m** (15–30m recommended). Plan overlaps in feature-rich scenes; avoid open areas, long corridors, and smooth tunnels.
- **For RTK-based fusion:** RTK data must be valid for every project.
- **For relative/absolute control point–based fusion:** adjacent maps must share at least one control point with a matching name in the overlap region. Control point names must not duplicate across projects.

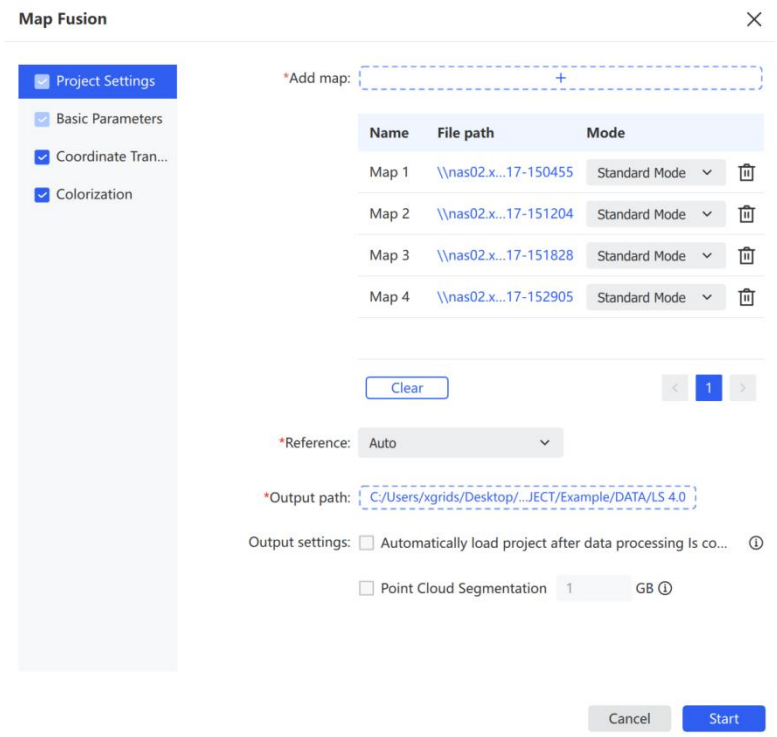
Limitations:

- Up to 10 maps per fusion. Each capture session must be under 20 minutes.
- Successfully fused maps are saved as sub-maps in a separate result folder.
- Fusion supports only data from the same device type.
- Use the standard XGRIDS metal control point base when placing control points.

Coordinate transformation requirement: All maps must have valid connections (relative control points or continuous scan), and at least 3 absolute control points must exist across all maps (not collinear).

5.2.1 Project Settings

1. Click **Add Map** to import maps for fusion.
2. The list displays each map's **Point Name**, **File Path**, and **Mode**.
3. Adjust per-map processing in the **Mode** dropdown.
4. Click the trash icon to remove a single map; click **Clear** to remove all.
5. Set the **Base Map** — choose **Auto** or designate one.
6. Set the **Output Path**.
7. Optionally check **Auto-load project after processing** and **Point Cloud Segmentation**.

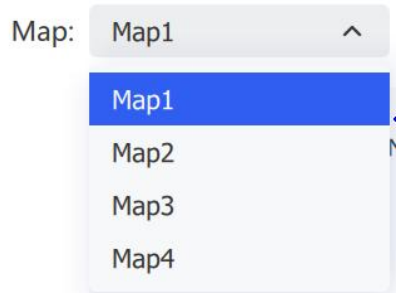


5.2.2 Basic Parameters

Same as Project Processing.

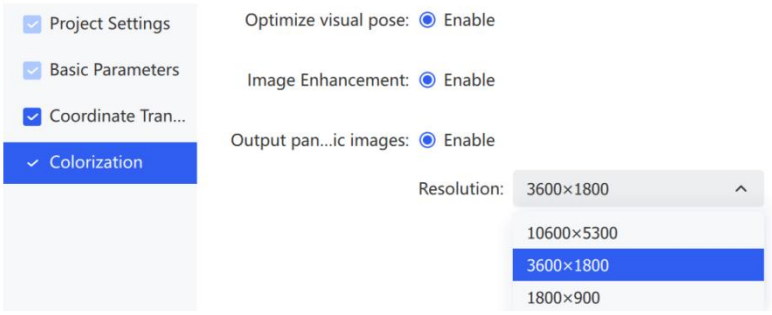
5.2.3 Coordinate Transformation

Same as Project Processing. Switch between maps to review.



5.2.4 Coloring

Same as Project Processing.

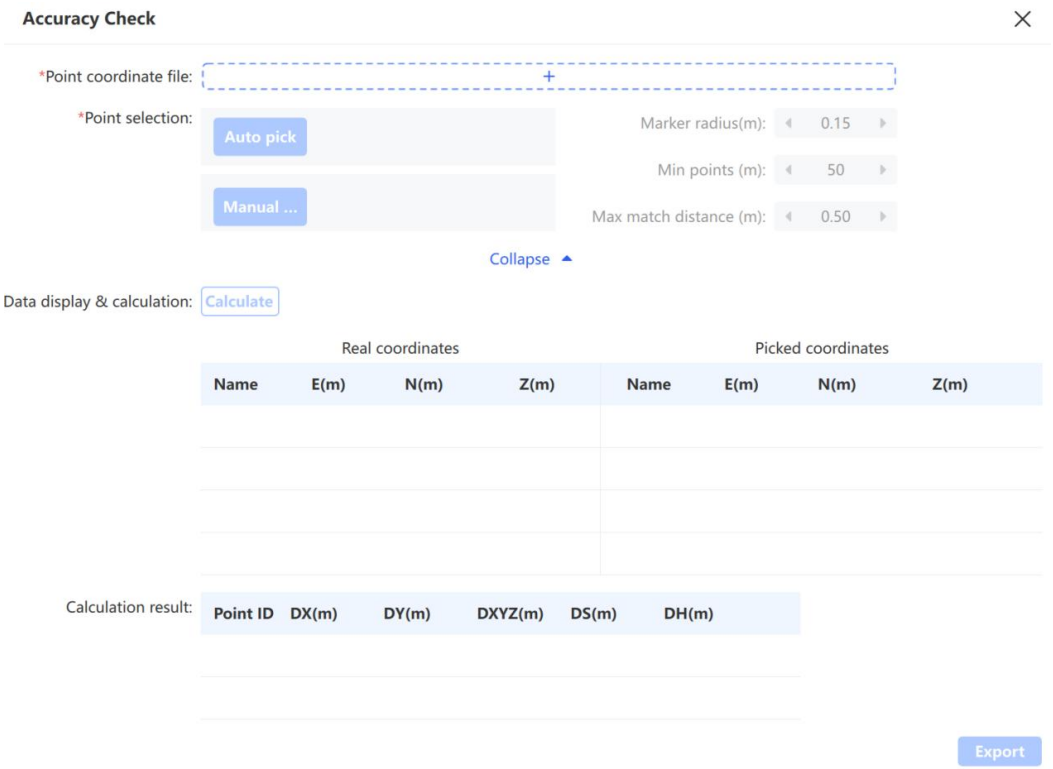


5.3 Accuracy Check

Function: Verify scanned data accuracy by comparing checkpoint coordinates after transformation

Steps:

1. **Select Data**
    - Select point cloud requiring verification
    - Click **Project Processing → Accuracy Check**



2. **Select Checkpoints**
    - Automatically or manually select checkpoints
3. **Verify Selection**
    - Check automatically selected points
    - Press **Esc** to exit if correct
4. **Calculate**
    - Click **Calculate** button

Parameter Settings

Point Coordinate File

- Select checkpoint true value coordinate file
- Format: .txt or .csv
- Structure: `Point Name, Easting, Northing, Ellipsoidal Height` OR `Point Name, Y, X, Ellipsoidal Height`

Automatic Point Selection

Requirements: XGRIDS reflective targets placed on checkpoints during acquisition

Parameters:

Parameter	Description	Default	Range
Target Radius	XGRIDS standard circular reflective target radius	0.15m	0.1-1m
Target Points	Minimum points for automatic extraction	50	50-200
Maximum Matching Distance	Search range between target center and true value	0.5m	0.01-1m

Tip: Pause at target during scanning to ensure sufficient target points

Manual Point Selection

Steps:

1. Left-click checkpoint positions in point cloud (green label appears)
2. To replace point: Reselect near that point → Click **Yes**
3. Press **Esc** after completing selection (minimum 3 points)
4. Click **Confirm** to exit

Check

Function: Automatic verification of selected data vs. checkpoints

Calculate

Function: Calculate coordinate differences

Results:

- Coordinate differences for each point pair
- Planar error (max, min, avg)
- Elevation error (max, min, avg)
- Mean square errors for plane and elevation

Export

Function: Export accuracy check report

Default Location: "Report" folder in software project folder

其域创新 XGRIDS

Accuracy checking report

Unit:meter

Point index	DX	DY	DS	DZ
10	-0.031	0.036	0.048	0.004
12	-0.007	0.005	0.009	0.006
13	-0.008	0.009	0.012	0.017
3	-0.026	-0.000	0.026	0.039
4	-0.028	0.007	0.029	0.041
6	-0.010	0.006	0.012	0.009
7	0.001	-0.006	0.006	0.019
9	-0.007	0.018	0.020	0.023

Min Ds: 0.006
Max Ds: 0.048
Avg Ds: 0.020
Error on plane: 0.024

Min elevation: 0.004
Max elevation: 0.041
Avg elevation: 0.020
Error on elevation: 0.024

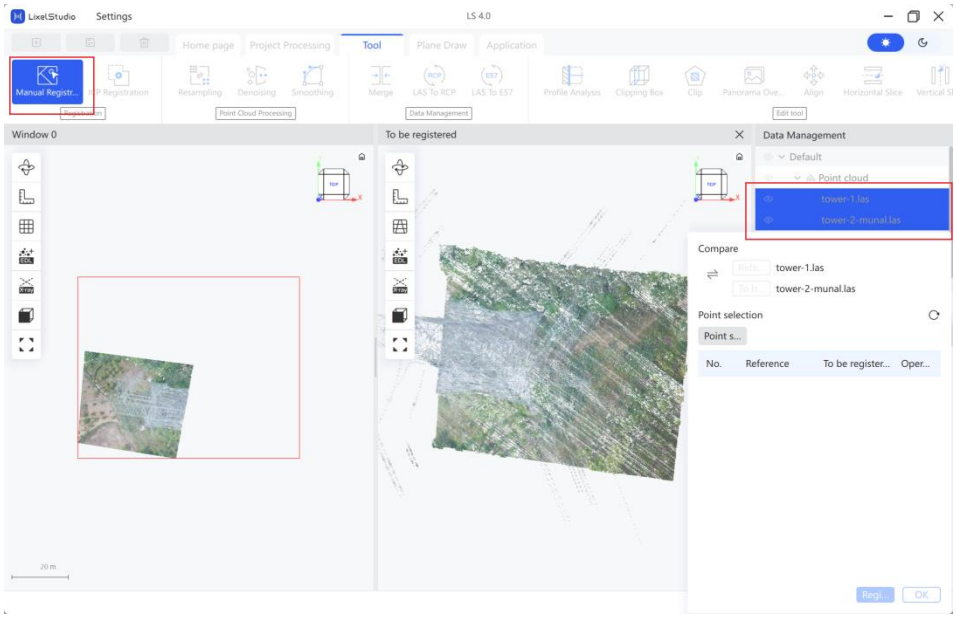
6. Tools

6.1 Manual Registration

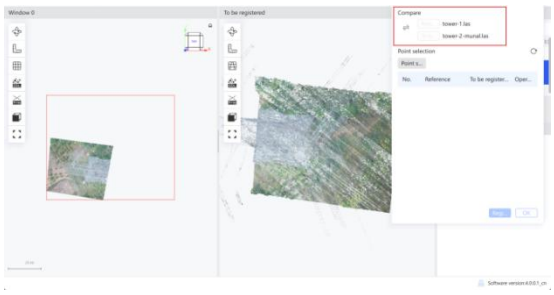
Function: Register different point clouds by selecting corresponding points

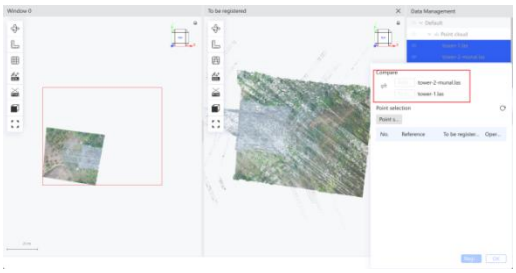
Steps:

1. Select two point clouds in data list
2. Click **Registration**



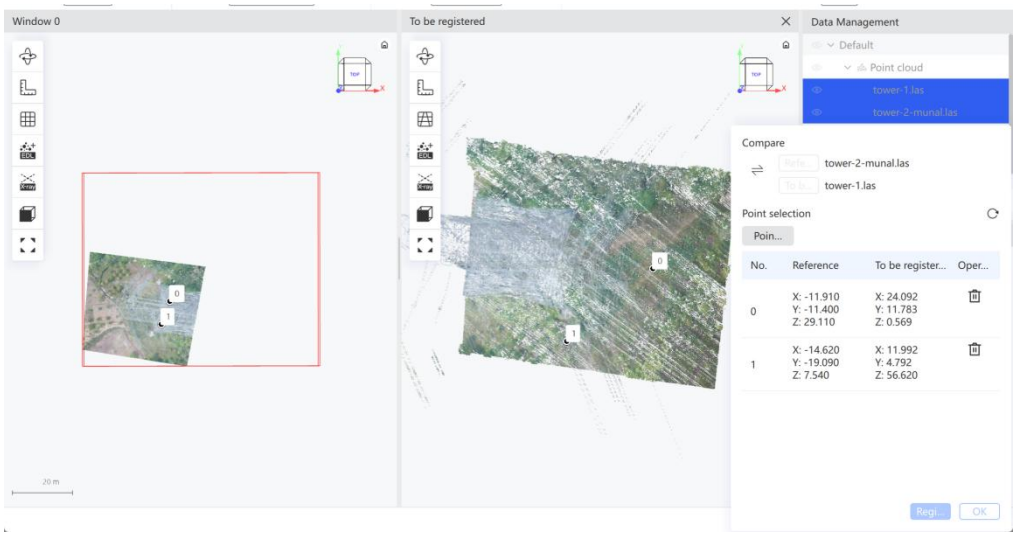
3. *Optional:* Click arrow to swap reference/target relationship





4.

4. Click **+** to add corresponding points



5. Select 3+ corresponding connection points in each window

Important: Choose feature points from regular terrain. Avoid points on same plane

or line.

6. Click **Register** (view RMSE after completion)
7. *Optional:* Click **Reset** if unsatisfied, then reselect
8. Click **Confirm**

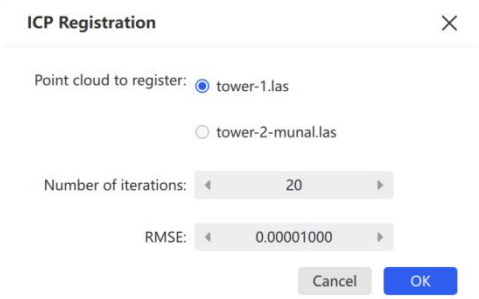
Result: New registered point cloud generates in data list, both point clouds import to single window

6.2 ICP Registration

Function: Improve registration accuracy for approximately aligned point clouds

Steps:

1. Select two point clouds in data list



2. Click **ICP Registration**
3. Set parameters:
    - **Maximum Iterations:** Default 20 (range: 1-100)
    - **RMSE:** Default 1e-9 (range: 1e-4 to 1e-10)
    - **Voxel Radius:** Processing resolution parameter
4. Click **Confirm**

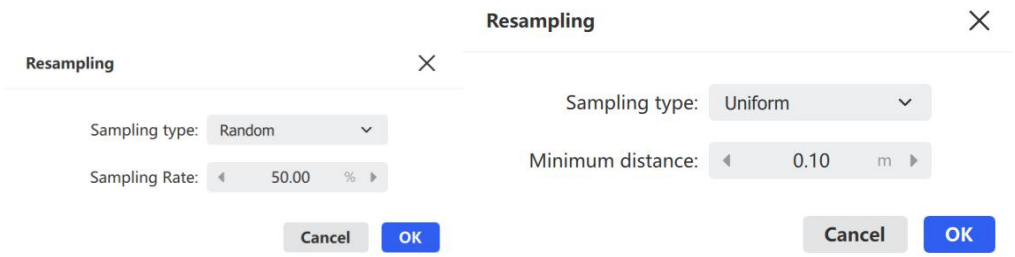
Result: New registered point cloud generates, both import to single window

6.3 Resampling

Function: Reduce point count in point cloud data

Steps:

1. Set sampling type and parameters



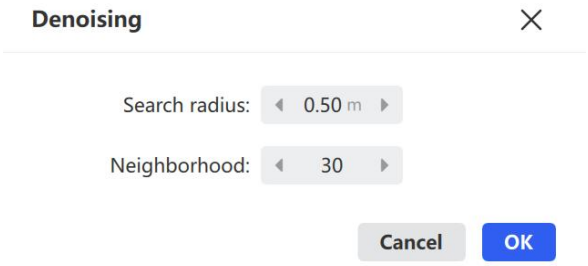
2. Click **Confirm**

Sampling Types:

Type	Description	Parameters
Random	Sample by rate (default)	Percentage 0-100% Result points = original × rate
Uniform	Sample by minimum spacing	3D distance between points Larger value = fewer points

6.4 Denoising

Function: Filter noise points using neighborhood analysis



Steps:

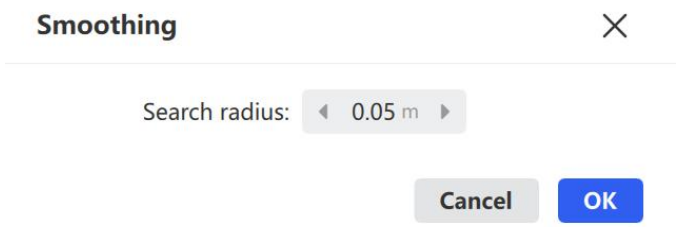
1. Set parameters:
    - **Neighborhood Points:** Number of adjacent points to analyze per point
    - **Standard Deviation Multiple:** Noise detection sensitivity (smaller = more points considered noise)
2. Click **Confirm**

Tip: For sparse point clouds, increase neighborhood point value

Result: Auto-imported denoised point cloud (export via File menu)

6.5 Smoothing

Function: Smooth points on surfaces using neighborhood radius algorithm



Steps:

1. Set **Neighborhood Radius** (larger radius = smoother result)
2. Click **Confirm**

Tip: Use default parameters for structured point cloud data

Result: Auto-imported smoothed point cloud (export via File menu)

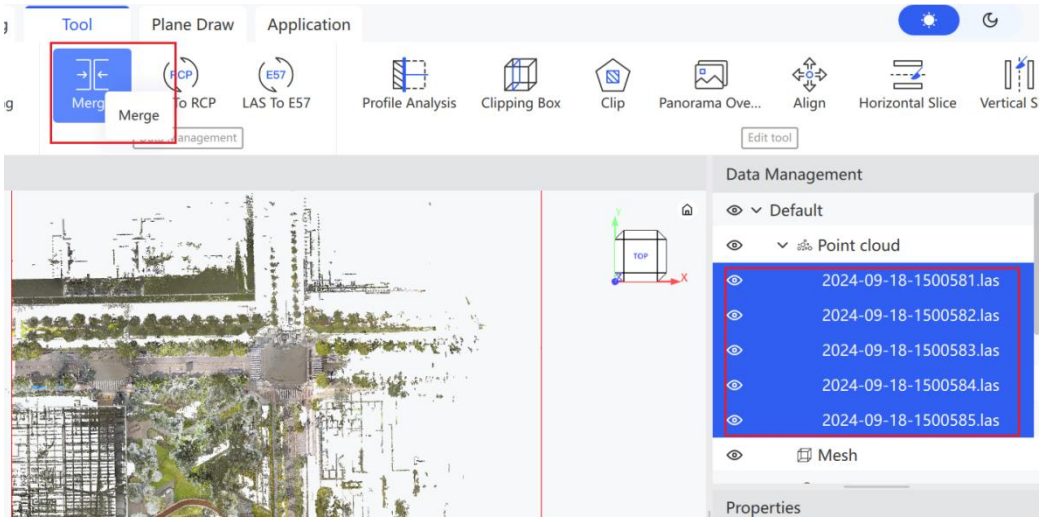
6.6 Merge

Function: Combine multiple point clouds into one

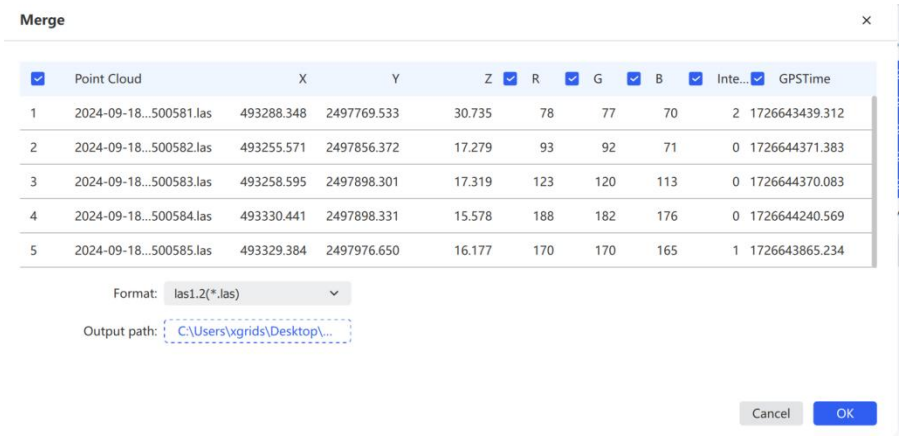
Supported: LAS versions 1.1-1.4

Steps:

1. Select multiple point clouds in data layer
2. Click **Merge** (or right-click → **Merge**)



3. Confirm attributes to merge (default: all fields)



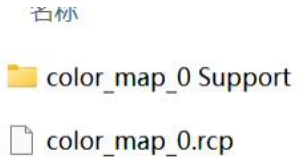
4. *Optional:* Uncheck specific fields to exclude

6.7 LAS to RCP

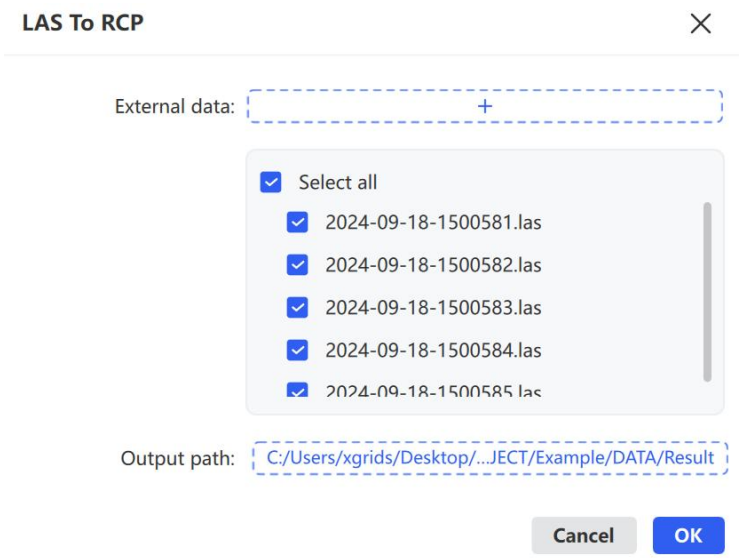
Function: Convert up to 10 LAS files to RCP format (for AutoCAD and Recap 2020+)

Steps:

1. *Optional:* Click **Import External Data** to select additional LAS files



2. Choose output path
3. Click **Confirm**



Result:

- .rcp data index
- Corresponding data folder

⚠ **Important:** Copy both files together when transferring

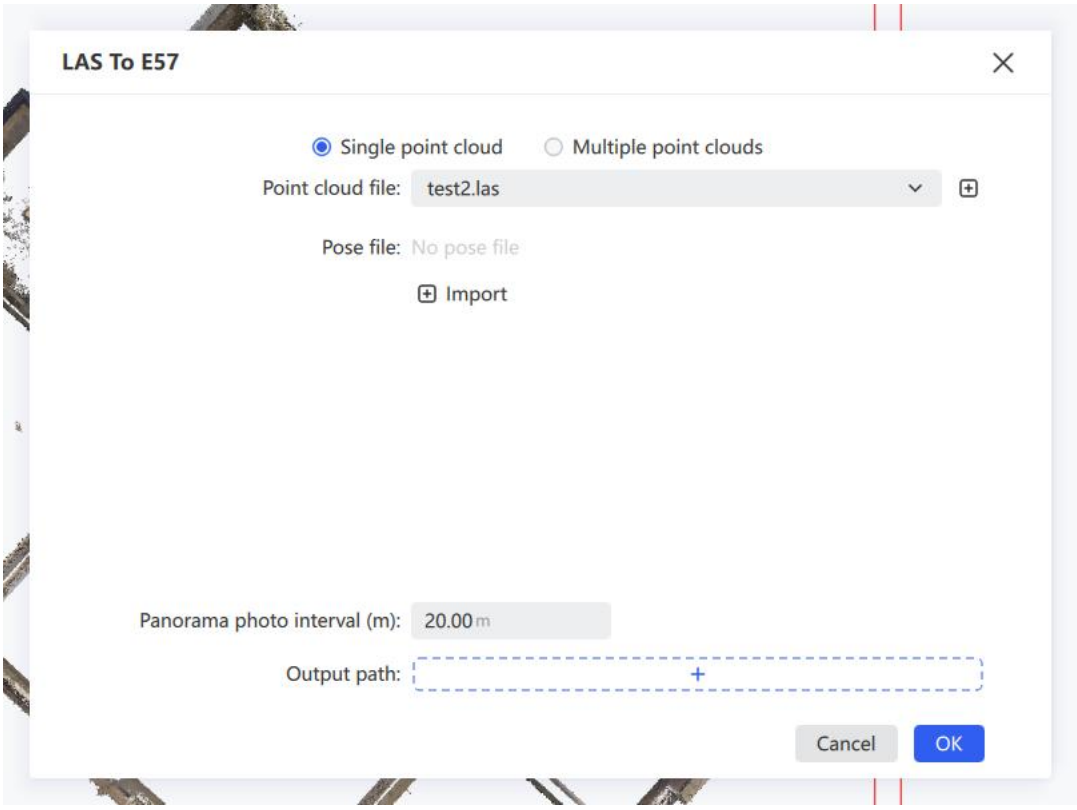
6.8 LAS to E57

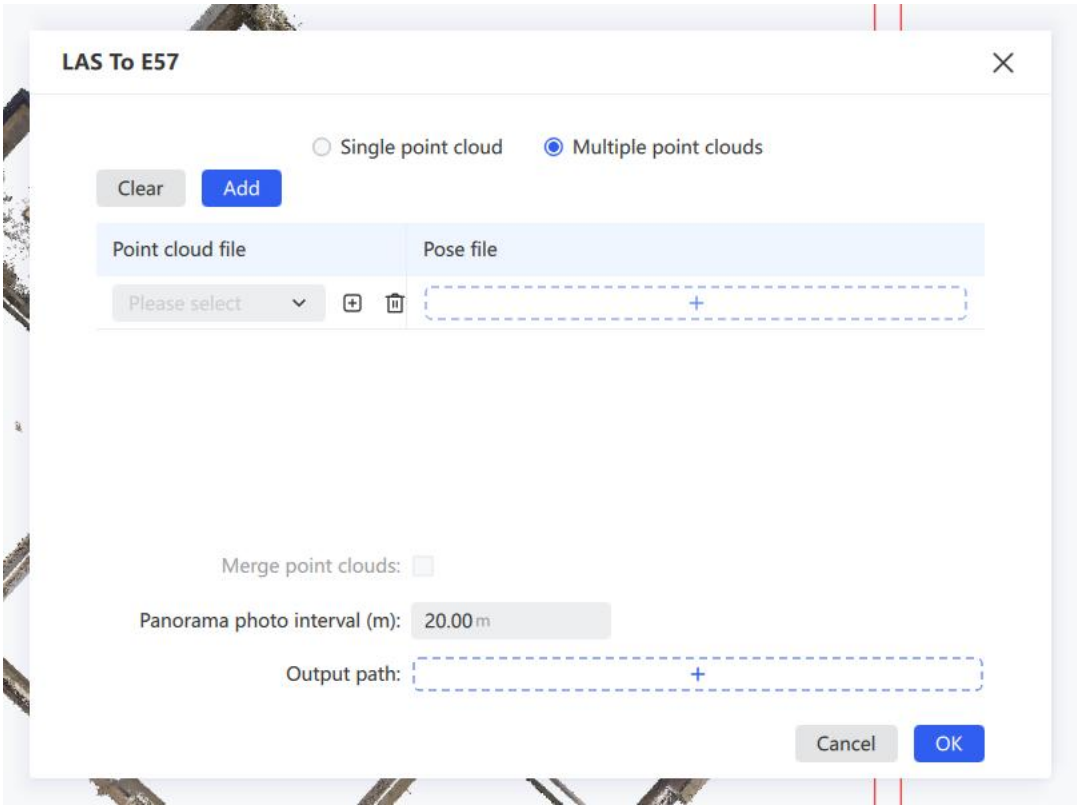
Function: Convert `.las` point cloud data to structured `.e57`.

Note: The point cloud must already be colorized with panoramic images output, otherwise the conversion will fail.

Steps

1. Select the point cloud in the data list, then click **LAS to e57**.
2. Select the pose file for the colorized point cloud. **If absolute coordinates are present, select `pose_no_offset.csv`.** Set the panorama output interval.
3. Click **Confirm** to start.





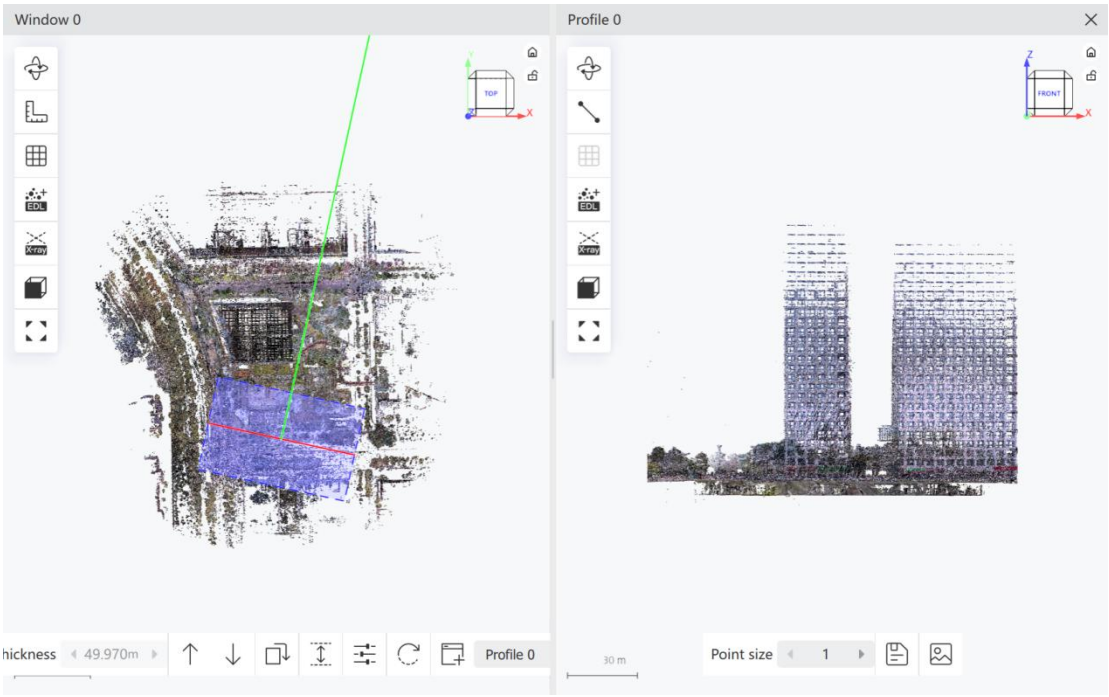
6.9 Profile Analysis

Function Description:

After selecting any rectangular area in the point cloud data, the data within the selected area will be displayed in a separate window. Distance measurement is also supported for the selected data.

Operation Steps:

1. Select the point cloud data you want to view, then click **Section**.



2. In the main point cloud display window on the right, click and drag the mouse to select the point cloud data to be sectioned and viewed. A toolbar is provided at the bottom of the window for adjustments. For the sectioned data, the software provides corresponding viewing and measurement functions, including rotation mode, measurement toolbar, camera mode, EDL view, X-ray view, view direction, global view, and more.

Parameters:

- **Thickness:** Select this option to enable the thickness parameter, and set the section thickness using the numeric input box. The larger the thickness value, the wider the point cloud range included for display and processing.
- **Move Up:** Moves the current section upward along the Y-axis to adjust the section position.
- **Move Down:** Moves the current section downward along the Y-axis to adjust the section position.
- **Rotate:** Rotates the current section clockwise to adjust the cutting direction and angle.
- **Extend:** Extends the current section along the X-axis, making it easier to view the point cloud distribution over a larger range.
- **Settings:** Opens the section parameter settings panel, where the display mode and auxiliary functions can be customized.

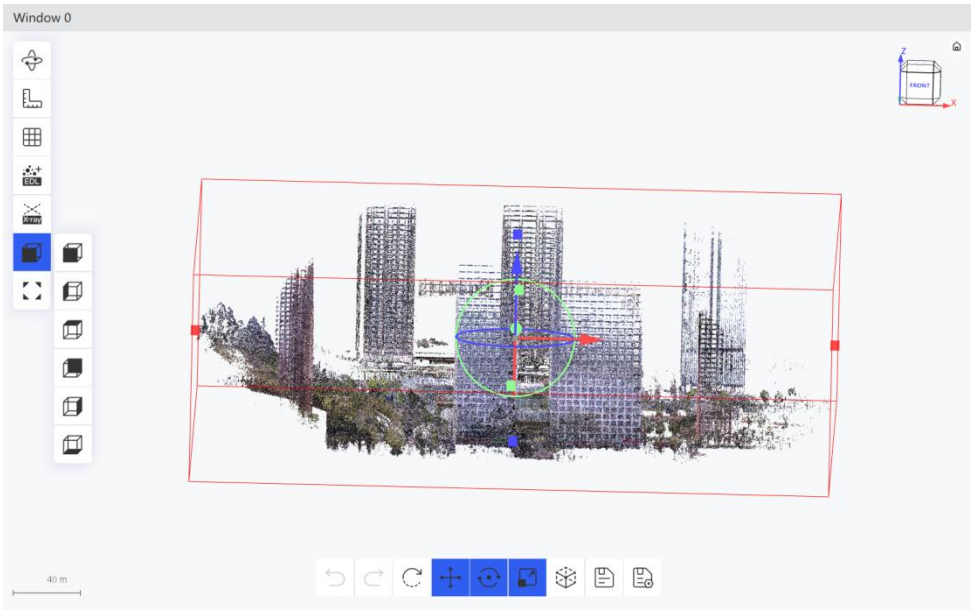
- **Reset:** Restores the current section parameters to their initial state.
- **New Section:** Creates a new section window for further section analysis.
- **Point Size:** Adjusts the display size of the point cloud in the section window. A larger value makes the points appear larger.
- **Save Point Cloud:** Exports and saves the point cloud data within the current section range.
- **Save Image:** Saves the current section window display as an image file.

6.10 Clipping Box

Function: Crop point cloud data using a clipping box.

Steps:

1. Select point cloud data, Click Clipping Box



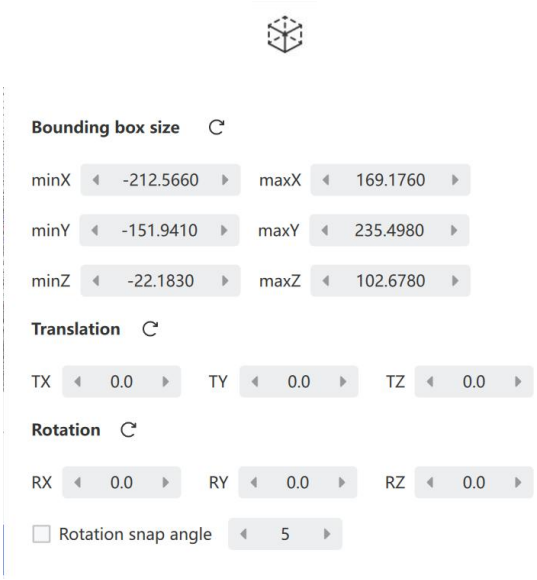
2. Adjust clipping box
3. Click **Close** to exit

Controls:

- **Undo / Redo / Reset** — Step back, step forward, or restore the initial state.

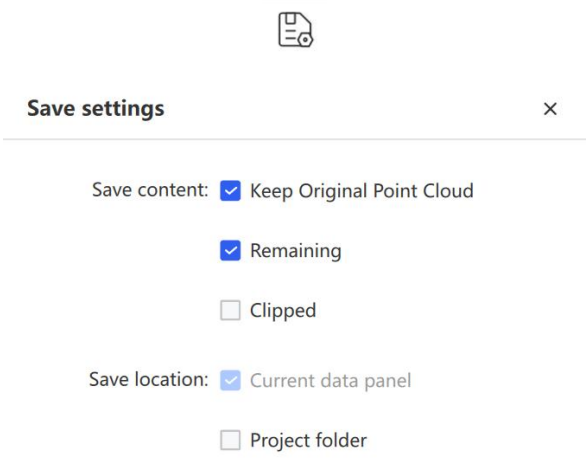
- **Translate / Rotate / Scale** — Move the box, rotate it, or move individual planes.

- **Show Info Panel** — Open the panel for precise box dimensions, translation, and rotation values.



- **Save** — Display the cropped result as a new point cloud.

- **Save Settings** — Configure save content and location.



6.11 Clipping

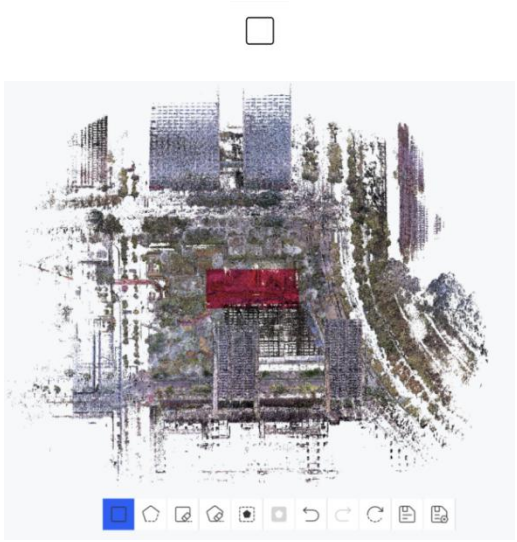
Function: Crop a portion of the point cloud.

Steps:

1. Select data requiring clipping
2. Click **Clipping**

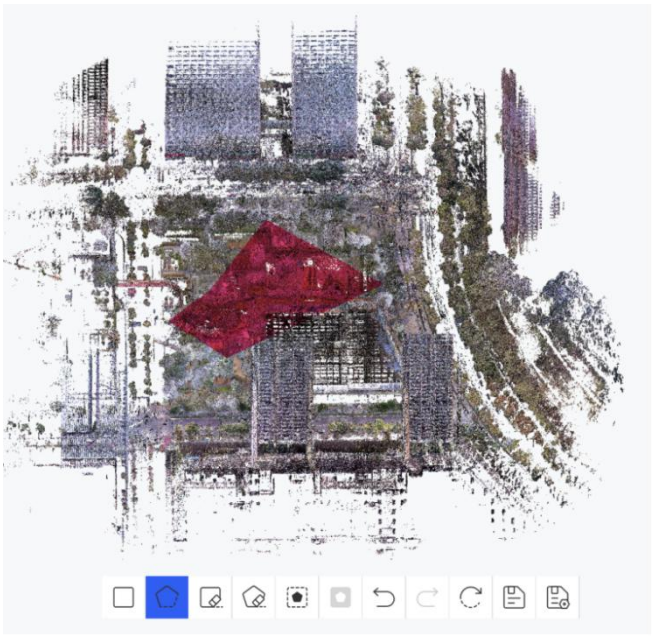
Settings

Rectangle Select



1. Left-click to select rectangle vertex
2. Double-click to complete selection

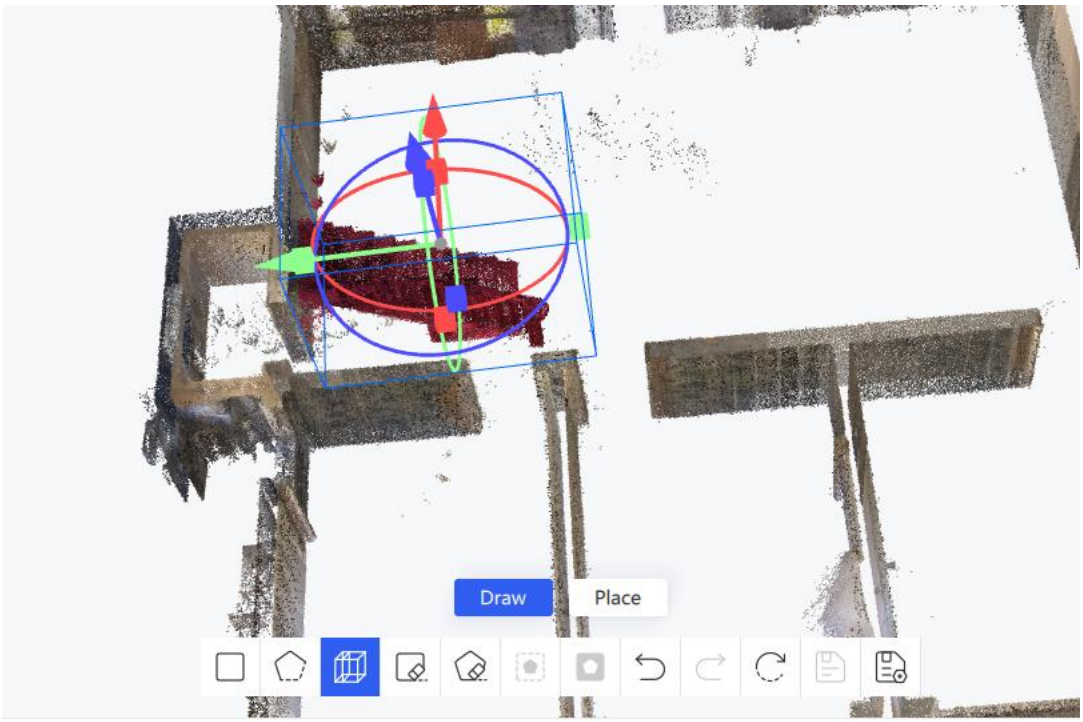
Polygon Select

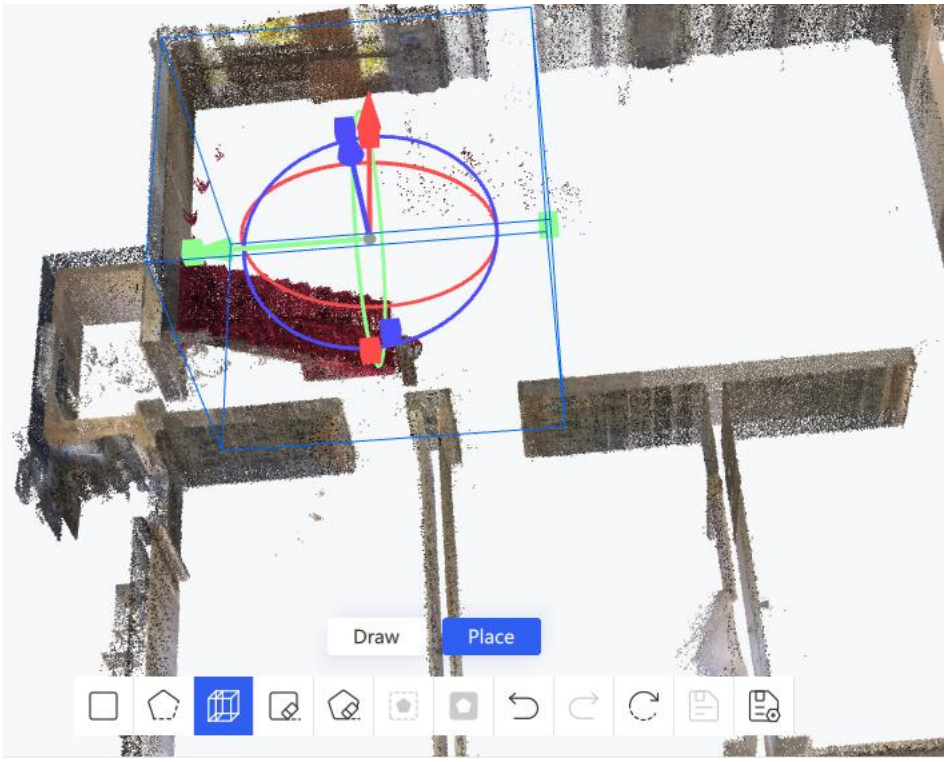


1. Left-click to select polygon vertices
2. *Optional:* Right-click to cancel last vertex
3. Double-click to complete selection

Box Select

Select Draw or Place mode.





Draw:

1. Left-click to set the starting point of the box.
2. Optional: Right-click to cancel the last vertex.
3. Left-click again to set the horizontal dimensions of the box.
4. Left-click again to set the box height.
5. Optional: Drag the handles to adjust box position and size.
6. Press Enter to confirm the selection.

Place:

1. Left-click to place the box.
2. Optional: Drag the handles to adjust box position and size.
3. Press Enter to confirm the selection.

Rectangle Delete

Cancel selected areas through rectangular area (same operation as Rectangle Selection)

Polygon Delete

Cancel selected areas through polygonal area (same operation as Polygon Selection)

Crop Inside

Keep selected point cloud data, delete unselected areas

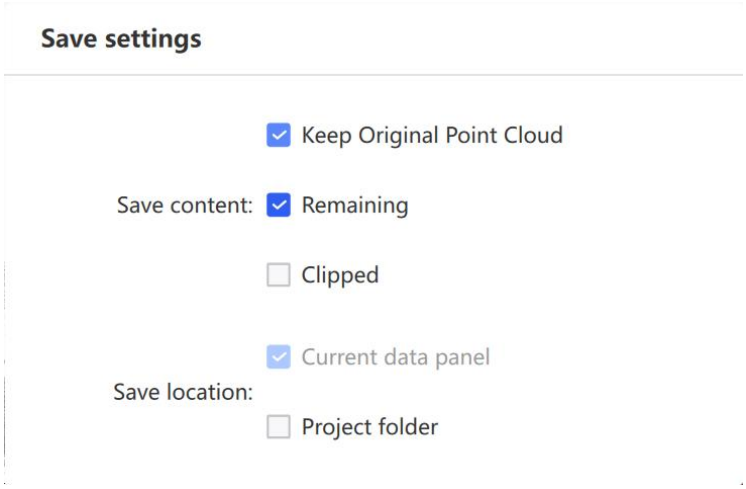
Crop Outside

Keep unselected areas, delete selected point cloud data

Undo / Redo / Reset / Save — Same as 3D Crop.

Save Settings — Configure save content and location:

- Content: Keep original / Remaining portion / Cropped portion
- Location: Current data list / Project path



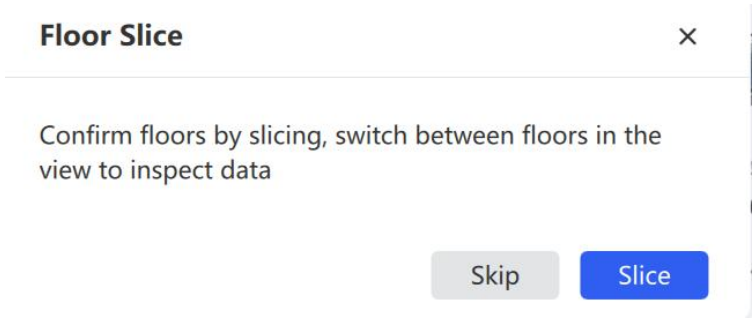
6.12 Panorama Overlay

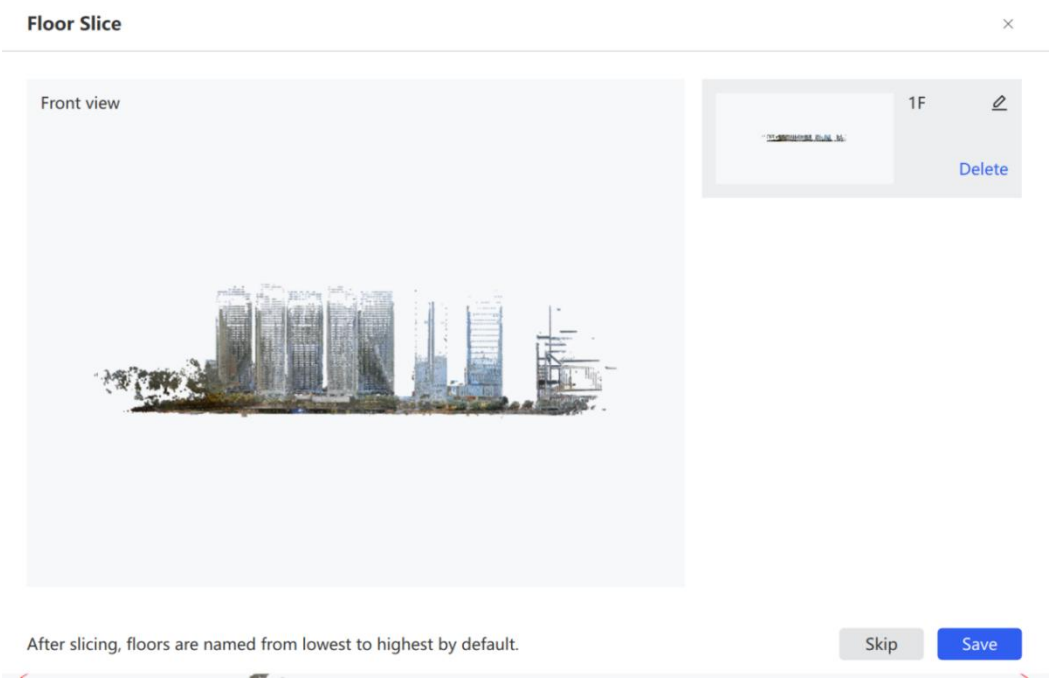
Function: Overlay a panorama-colored point cloud with its panoramic imagery for browsing and measurement.

Requirements: Processed data with Panoramic Image folder

Steps:

1. Select point cloud data
2. Click **Panorama Overlay**
3. *Optional:* Perform floor slicing:

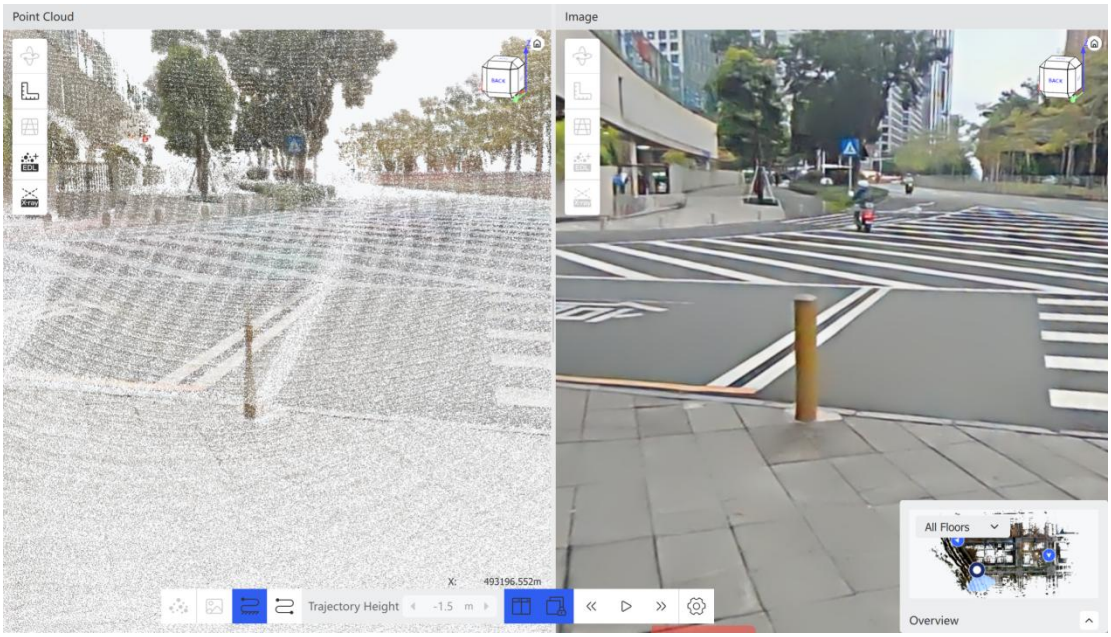




- Left-click to select start position
- Left-click again to confirm end position
- Slice results auto-save and display on right
- Click **Save** to complete all floors
- Click **Cancel** to skip slicing

4. Enter panorama overlay view

Interface Layout:



- **Left window:** Point cloud + panoramic overlay
- **Right window:** Top-down view + trajectory

Toolbar Controls:

Point Cloud

Toggle point cloud display (default: on)

Panorama Image

Toggle panoramic photo display (default: on)

Fit Trajectory to Ground

Toggle global trajectory display, automatically fits to ground by subtracting height by 1.5m

Original Trajectory Position

Trajectory height (default: 0m), manual adjustments are reflected in the window

Split-screen

Point cloud left, panorama right.

Lock View Direction

Sync rotation across both windows.

Previous Frame

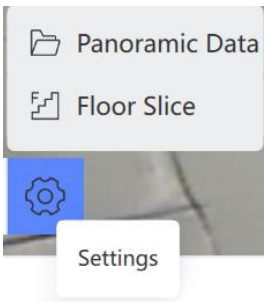
Display previous trajectory point

Play

Auto-play frame by frame along trajectory

Next Frame

Display next trajectory point



Panorama Data — Reselect panorama data.

Floor Slicing — Re-run slicing.

6.13 Align

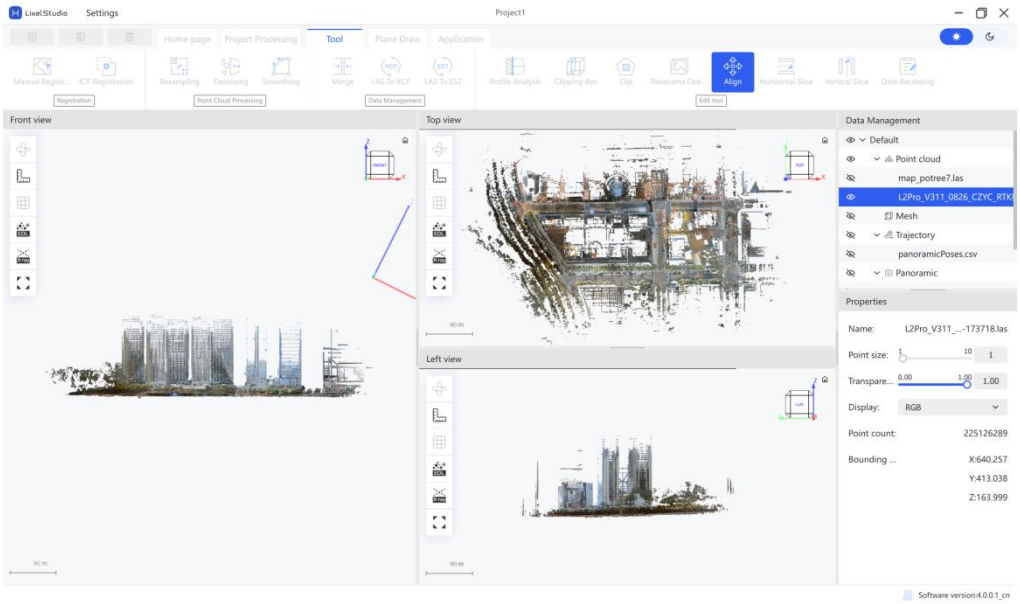
Function Description:

This function is mainly used to adjust the posture of point cloud data. After selecting a coordinate axis, the point cloud data can be rotated so that it aligns with the required direction.

Operation Steps:

1. Select the point cloud data to be oriented, then click the **Orientation** button on

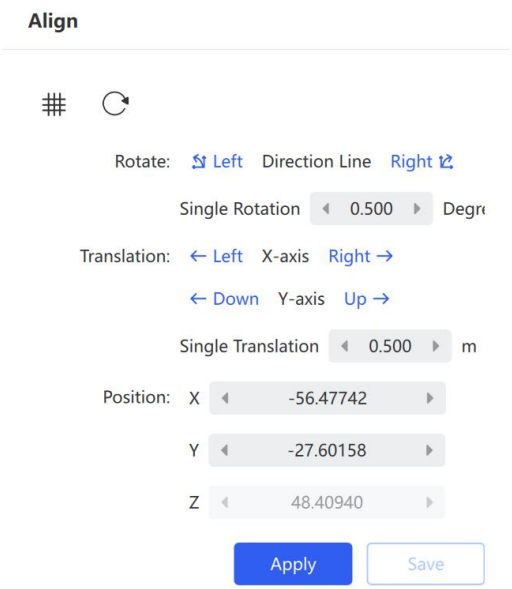
the menu bar.



2. Optional: Perform vertical orientation. In the front view or left view, first left-click to select the center point. To cancel the selected point, right-click the mouse. After confirming the coordinate axis direction, click again to confirm.
3. Optional: To fine-tune the selected coordinate axis, make adjustments in the orientation adjustment floating window on the left.
4. Click **Apply** to orient the point cloud.
5. Optional: Perform horizontal orientation. Adjust the point cloud in the top view and repeat the steps above.
6. Click **Save** to save the oriented point cloud as a new point cloud.

Note: Point cloud orientation will change the point cloud coordinates.

Parameter Settings:



Grid: Shows or hides the orientation auxiliary grid, making it easier to determine the direction and positional relationship.

Reset: Restores the point cloud to its initial state.

Rotate: Adjusts the angle of the current orientation direction line. Click **Left** or **Right** to fine-tune the angle according to the specified single rotation angle, thereby correcting the point cloud orientation.

Translate: Adjusts the position of the point cloud after orientation. The point cloud can be moved along the X-axis and Y-axis. The movement distance each time is controlled by the **Single Translation** parameter.

Position X / Y / Z: Precisely sets the coordinate position of the point cloud after orientation.

6.14 Horizontal Slice

Function Description:

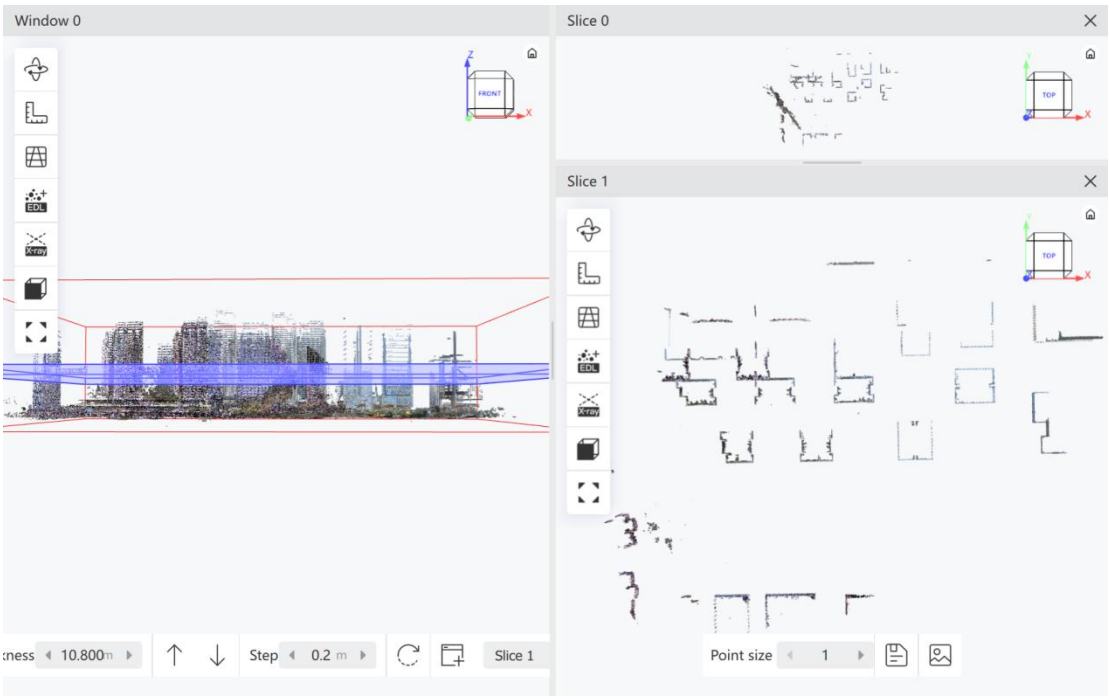
Horizontal slicing is used to section and display point cloud data along the horizontal direction. The system generates the slice result based on the horizontal plane where the selected point is located. By default, the camera position of the main view remains consistent with that of the slice view. The view containing the currently active slice window is treated as the main window, and the slice-related toolbar is provided in the main window.

Steps:

1. Select the point cloud data to be sliced, then click **Horizontal Slice** to enter this function.
2. In the main window, left-click to select a point. The system will generate the slice result based on the horizontal plane where the selected point is located.
3. After the slice is generated, you can adjust the current slice thickness using the **Thickness** parameter. **Shift + mouse wheel** is also supported.
4. You can click the **Move Up** or **Move Down** button to move the current slice according to the set step length. **Ctrl + mouse wheel** is also supported.
5. To continuously browse slices at different positions, set the **Step Length** value, then use the **Move Up** or **Move Down** button to automatically switch slices according to the specified step length.
6. To restore the initial state, click **Reset**.
7. To continue generating a new slice, click **New Slice** to view the result in a new slice window.
8. To switch the currently active slice, select the corresponding slice window from the drop-down list. The view containing the active slice window will become the main window and display the toolbar.
9. To save the result, click **Save Point Cloud** to export the current slice result, or

click **Save Image** to save the current slice view as an image.

10. To exit this function, click the slice function again or close the slice window.



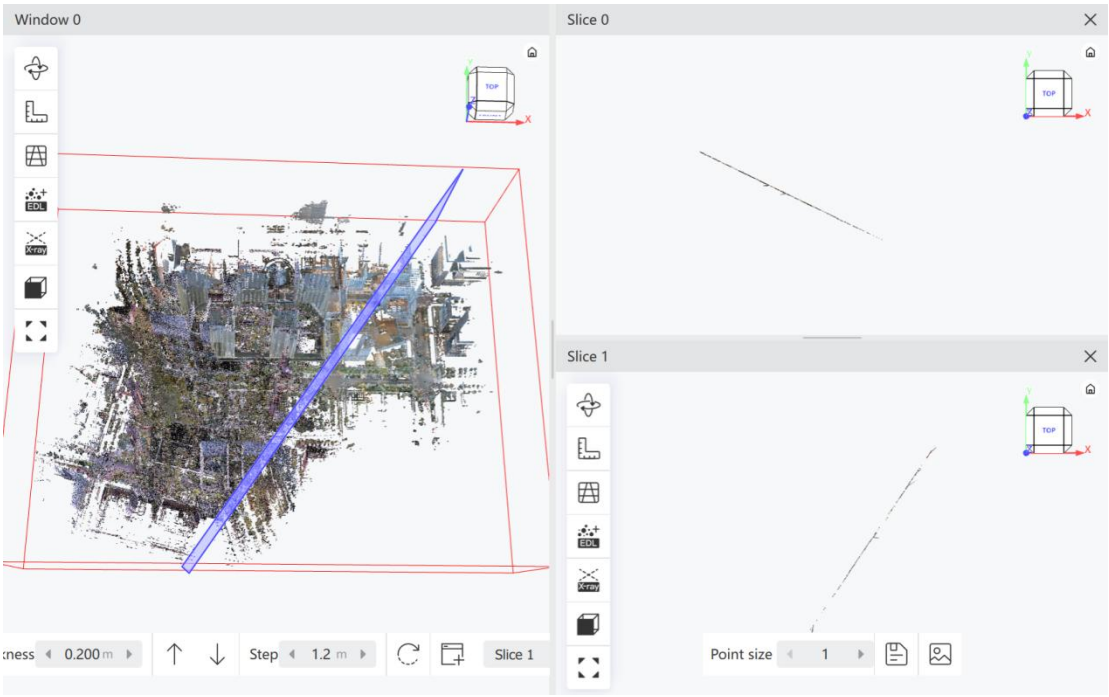
6.15 Align Vertical Slice

Function Description:

Vertical slicing is used to section and display point cloud data along the vertical direction. In the main window, the user first specifies a starting point, then dynamically adjusts the slice direction by moving the mouse. The system updates the slice preview in real time. After the direction is confirmed, click again to generate the vertical slice result. The view containing the currently active slice window is treated as the main window, and the slice-related toolbar is provided in the main window.

Steps:

1. Select the point cloud data to be sliced, then click **Vertical Slice** to enter this function.
2. In the main window, left-click to select a point. As you move the mouse, the slice will rotate in real time following the mouse direction.
3. After confirming the vertical slice direction, left-click again to generate the slice result and select the current section plane.



Other operations are the same as **Horizontal Slice**.

Parameter :

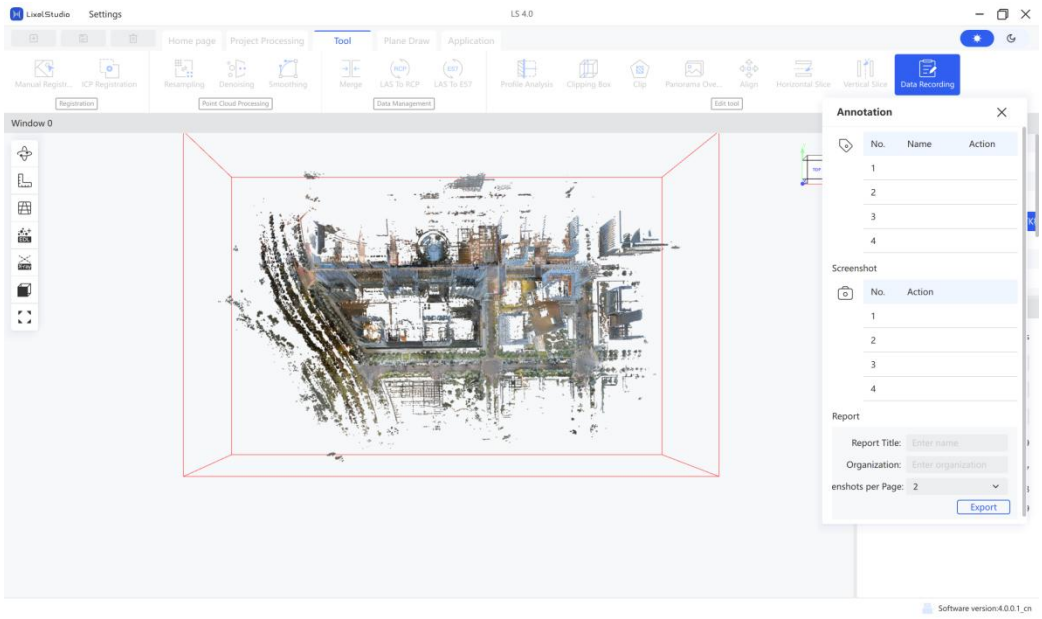
Same as **Horizontal Slice**.

6.16 Data Recording

Function: Perform measurements/annotations and capture screenshots with report generation

Steps:

1. Select point cloud
2. Click **Data Recording**



3. **Add Annotations:**
   - Click annotation button

   - Left-click in point cloud window
   - Input box appears for annotation text
   - Press **Enter** to confirm

⚠ **Note:** English and numbers only

4. **Manage Annotations** *(Optional)*
   - Click icon to show/hide annotations

   - Click icon to delete annotations

5. **Measurements and Screenshots:**
   - Perform point cloud measurements
   - Click screenshot button to capture current window

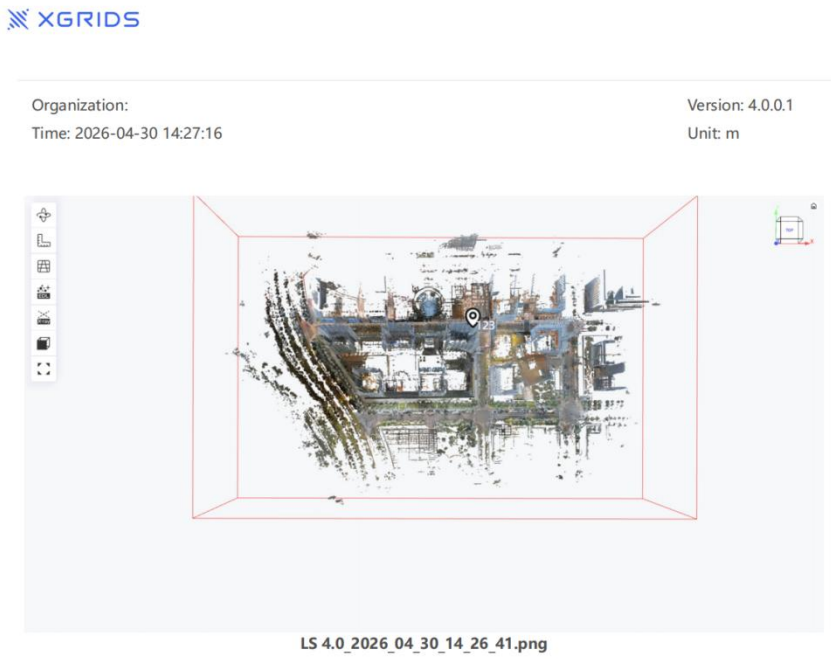
     

6. **View Screenshots** *(Optional)* Click icon to open screenshot folder

7. **Configure Report:**
    - Enter report name and organization name (company)
    - Set number of screenshots per page
8. **Export** Click **Export** to generate report

Results:

- Screenshot folder (all screenshot files)
- Annotation.csv (annotation coordinate information)
- Report file (complete report document)



7. 2D Drawing

7.1 Draw

Function: Enter 2D drawing mode

Steps:

1. Select point cloud
2. Click **Drawing**

Toolbar:

Button		Function
Previous Step (Undo)		Undo most recent drawing
Next Step (Redo)		Redo most recent undo
Polygon Selection		Draw polygon to select vectors
Midpoint		Snap to vector midpoint when drawing
Endpoint		Snap to vector endpoint when drawing
Intersection		Snap to intersection or extended intersection
Perpendicular Point		Snap to perpendicular foot from previous point
Graphic Point		Snap to any point on vector
Center Point		Snap to center of circles, arcs, quadrilaterals

Orthogonal Drawing		Control vertical/horizontal drawing
Polar Tracking		Auto-display fixed angles when drawing

7.2 Save

Function: Save drawing results to dxf

7.3 Export

Function: Export drawing result dxf to selected directory

7.4 Exit

Function: Exit drawing state

7.5 AI-Extract

Function: Automatically fit and extract 2D vector contours from point clouds

Steps:

1. Click **AI-Extract**

2. Set parameters:
    - **Ground Sampling Distance:** Physical distance per pixel
    - **Point Cloud Simplification**: Voxel edge length for downsampling
    - **Snap to 90°:** *(When checked)* Vectors satisfy "Manhattan World assumption" with only parallel/perpendicular relationships
    - **Min. Points per Segment:** Number of points each vector must contain
    - **Max. Extension Length:** Maximum distance for vectors to find intersections

3. Click **Confirm**

7.6 Line

Function: Draw line with two points

Steps:

1. Click **Line**

2. Left-click to specify starting point
3. Left-click to specify ending point

7.7 Polyline

Function: Multiple connected points form polyline

Steps:

1. Click **Polyline**

2. Left-click to specify starting point
3. Left-click to specify next endpoints
4. Right-click to end

7.8 Arc

Function: Draw arc with three points

Steps:

1. Click **Arc**

2. Left-click to specify starting point
3. Left-click to specify second point and ending point in sequence

7.9 Three-Point Rectangle

Function: Draw rectangle through three points (first two determine one side, third determines opposite side position)

Steps:

1. Click **Three-Point Rectangle**

2. Left-click to specify first point
3. Left-click to specify second point
4. Left-click to specify third point

7.10 Two-Point Rectangle

Function: Draw rectangle through two diagonal points

Steps:

1. Click **Two-Point Rectangle**

2. Left-click to specify first point
3. Left-click to specify second point

7.11 Three-Point Circle

Function: Determine circle position and size through three points on circle

Steps:

1. Click **Three-Point Circle**

2. Left-click to specify first point
3. Left-click to specify second point
4. Left-click to specify third point

7.12 Two-Point Circle

Function: Determine circle position and size through diameter

Steps:

1. Click **Two-Point Circle**

2. Left-click to specify first point (one end of diameter)
3. Left-click to specify second point (other end of diameter)

7.13 Center Circle

Function: Draw circle by specifying center and radius

Steps:

1. Click **Center Circle**

2. Left-click to specify center position
3. Left-click to specify point on circle to determine radius

7.14 Extend

Function: Extend target linear entity to reference entity boundary

Steps:

1. Click **Extend**

2. Specify target linear entity to extend

7.15 Break

Function: Break linear entity at specified point on line

Steps:

1. Click **Break**

2. Specify point on linear entity where you want to break

7.16 Merge

Function: Merge two linear entities with connected vertices into one

Steps:

1. Click **Merge**

2. Specify first linear entity to merge
3. Specify second linear entity connected to first entity's vertices

7.17 Trim

Function: Trim specified edge of selected linear entity

Behavior:

- Specified edge disappears
- If trim object has one line segment, it will be deleted
- When trim edge intersects other linear entities, precisely terminates entities on trim edge boundary

Steps:

1. Click **Trim**

2. Specify trim edge

7.18 Intersect

Function: Connect a linear entity with another linear entity

Steps:

1. Click **Intersect**

2. Left-click to specify first linear entity
3. Left-click to specify second linear entity

7.19 Clone

Function: Clone selected entities and move to specified positions

Process: Copied entities move based on distance and direction between base point and second point

Steps:

1. Click **Clone** (or select entities first)

2. Specify entities to clone, press **Enter** (skip if pre-selected)
3. Specify base point of operation objects
4. Specify second point (copied entities move to new position)

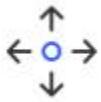
7.20 Move

Function: Move selected entities to new position

Process: Objects move based on distance and direction between base point and second point

Steps:

1. Click **Move** (or select entities first)



2. Specify entities to move, press **Enter** (skip if pre-selected)
3. Specify base point of operation objects
4. Specify second point (objects move to new position)

7.21 Delete

Function: Delete specified entities

Steps:

1. Select entities to delete

2. Click **Delete**

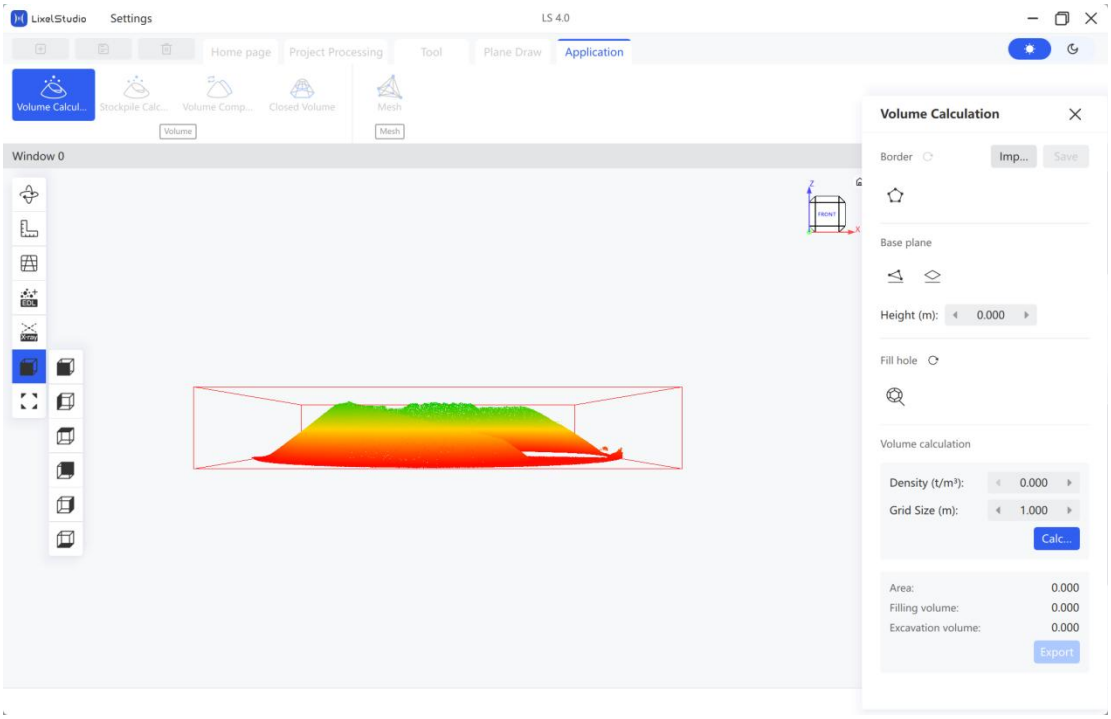
8. Applications

8.1 Volume Calculation

Function: Measure and calculate stockpile volumes from point cloud data.

Steps:

1. Select point cloud
2. Click **Volume Calculation**



3. **Draw Border:**
   - Click **Draw Border**

   - Left-click to select boundary points in point cloud
   - Right-click to end
   - Auto-selects stockpile range
   - Click save button to save border
4. **Select Base Plane:**
   a. **Method 1: Three-Point Plane**
   - Click point selection button below base plane
   - Click three points around heap to draw base plane

   a. **Method 2: Horizontal Plane**
   - Enter base plane height in popup
   - Auto-generates base plane in model
5. **Fill Holes:**
   - Click **Fill Holes**

- Left-click to select points, right-click to end
- Click reset button to reset filling results if needed

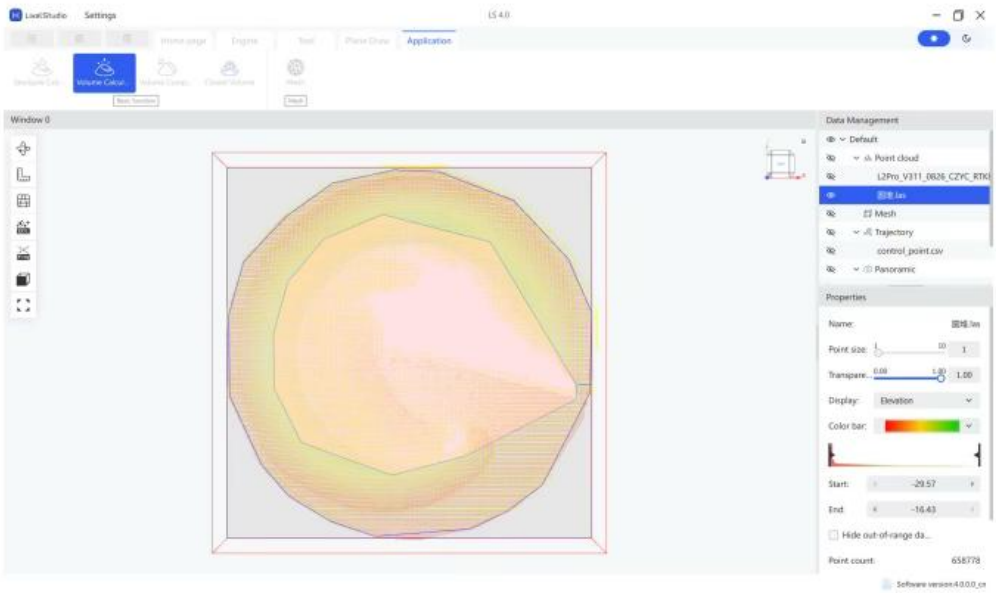
6. **Set Mesh Parameters:**
   - **Mesh Density:** Size of point cloud mesh grid

Tip: Generally use default parameters

7. **Calculate:**
   - Click **Calculate**
   - View results (filling volume, excavation volume)
8. **Export Report:**

Volume Calculation Report

Name	Volume.las	Time	2026-04-23 15:01:39	area:	4296.000
Cut	20158.648	Fill	0.000	Volume	20158.648
Density (t/m³):	0.200	Weight (t)	4031.730		
Length:	77.813	Width	78.250	Height (m):	13.139



- Click **Export Report**
- Select save path and filename

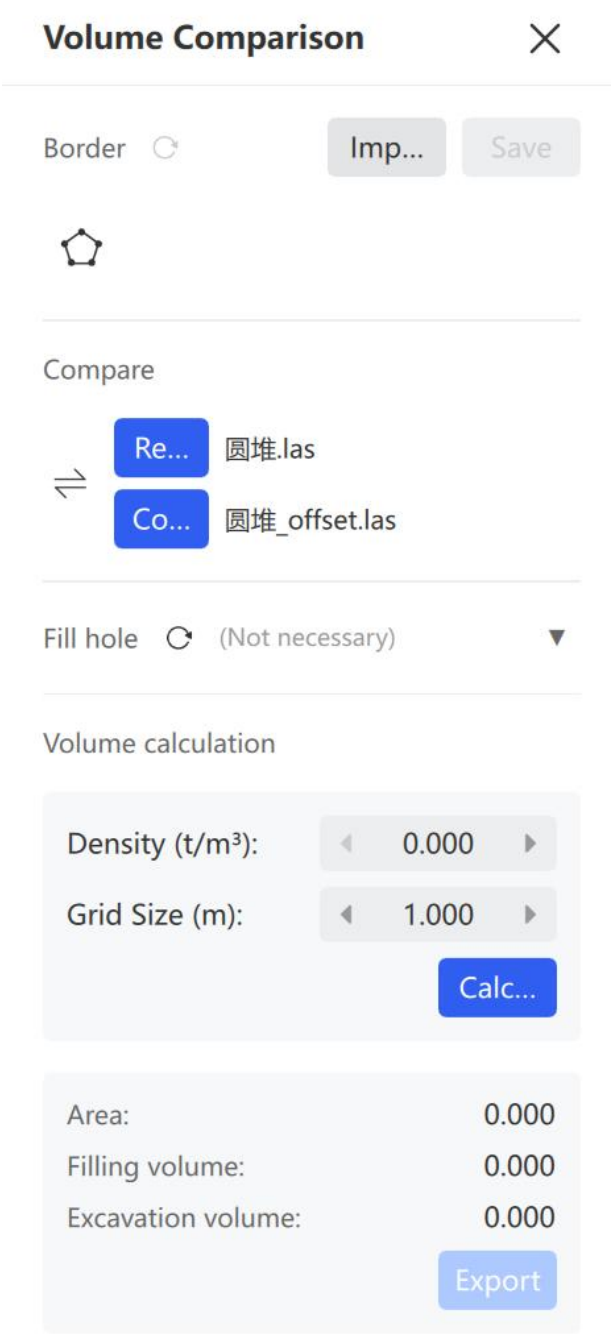
8.2 Volume Comparison

Function: Compare two periods of stockpile data

⚠ **Requirement:** Two periods of point cloud must maintain consistent base plane (registration recommended)

Steps:

1. Select point clouds
2. Click **Volume Comparison**



3. **Draw Border:**
   - Click **Draw Border**

   - Left-click to select boundary, right-click to end
   - Click save button to save border

4. **Confirm Base and Change:**
    - Identify which dataset is base and which is change
    - Click **Switch** to adjust if needed

5. **Fill Holes** *(Optional)*
    - Click on point cloud requiring hole filling
    - Perform hole filling operations
6. **Set Mesh Parameters:**
    - **Mesh Density:** Size of point cloud mesh grid
    - **Tip:** Generally use default parameters
7. **Calculate:**
    - Click **Calculate**
    - View comparison results
8. **Export Report:**
    - Click **Export Report**
    - Select save path and filename

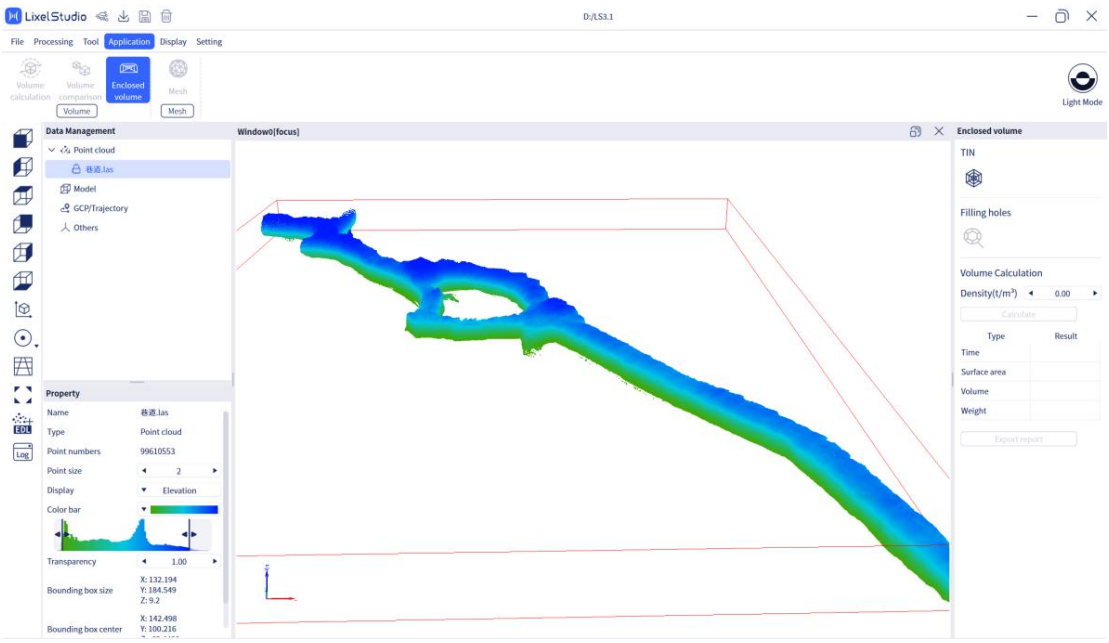
8.3 Enclosed Volume Calculation

Function: Calculate volumes of enclosed areas (mine tunnels, cabins)

Best Practice: Denoise and downsample point cloud first to ensure data contains only calculation area

Steps:

1. Select point cloud
2. Click **Enclosed Volume**



3. **Create Mesh:**
    - Click **Mesh**

    - Wait for TIN (Triangulated Irregular Network) construction
4. **Fill Holes:**
    - Click **Fill Holes**

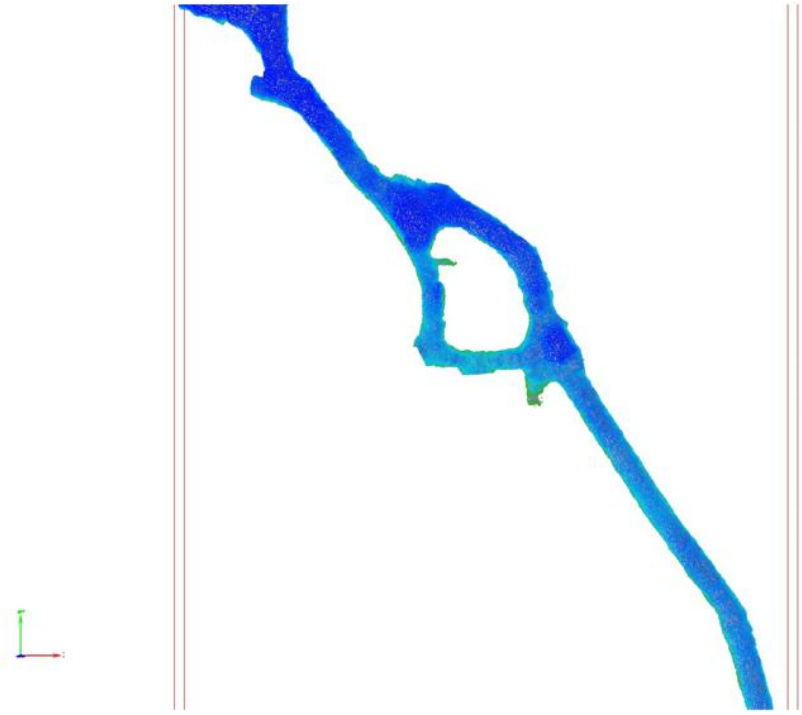
    - Software auto-fills mesh holes to obtain complete enclosed model
5. **Modify Density** *(Optional)* Adjust if weight calculation not needed
6. **Calculate:**
    - Click **Calculate**
    - Select XXX_tinflXXXX.ply file
    - View volume and surface area data
7. **Export Report:**
    - Click **Export Report**

XGRIDS

Enclosed Area Volume Calculation Report

Software version:3.2.0.0

Name	巷道	Time	2025-03-18 15:38:04
Surface area	9388.822m²	Volume	7039.536m³
Weight	0.000t		



- Select save path and filename

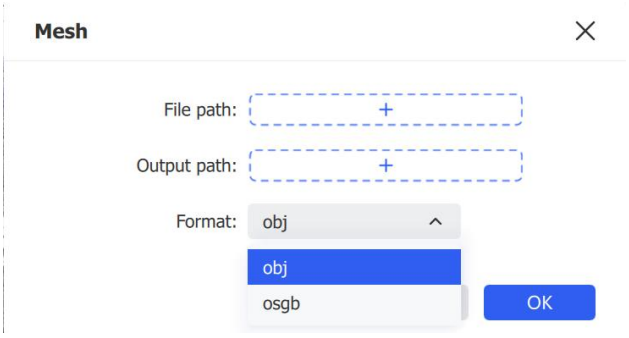
8. **Exit:** Click **Enclosed Volume** in menu to exit

8.4 Mesh

Function: One-click textured 3D mesh generation from L1/L2 laser point clouds with external panoramic camera data, and from K1/K2/L2 Pro point clouds with onboard panoramic camera data.

Steps:

1. Click **Mesh**
2. Input scanned result data folder (after panoramic coloring)



3. Choose the export path and format (`.obj` or `.osgb`)
4. Software generates textured 3D model

Notes:

- This version supports K1, K2, and L2 Pro result data with onboard colorization and panoramic photo output.
- Only processes post-processed `.las` results under 50 GB.

8.5 Remote Streaming

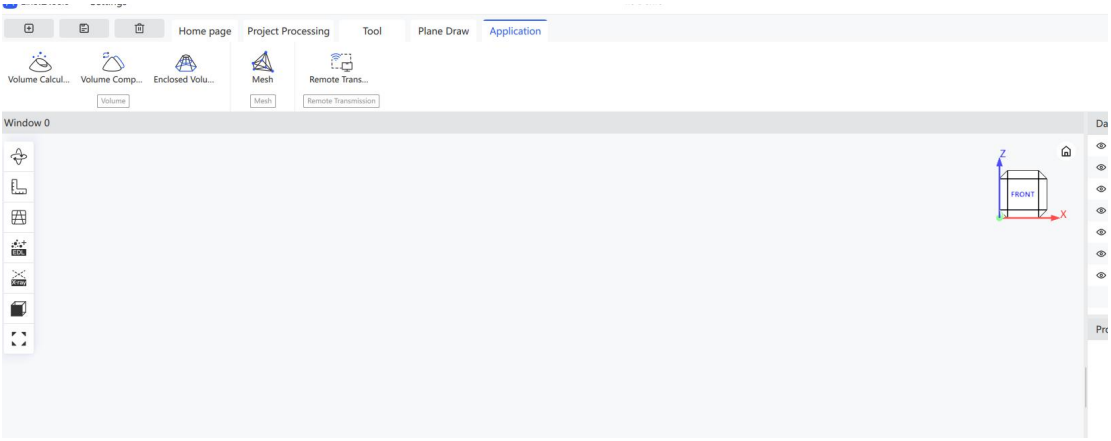
Function: Streams handheld device capture data to LixelStudio in real time over a mobile network. Use it to monitor operators and equipment remotely, start and stop scanning remotely, and generate data live. Real-time discrete data from the device can be stored as structured data for post-processing.

Notes:

- Remote Streaming supports K1 and L2 Pro devices running firmware 3.0 or later only.

Steps:

1. Go to Applications >  Remote Streaming in the menu bar.
2. Select a connection method.
3. Click a device to open the live view.

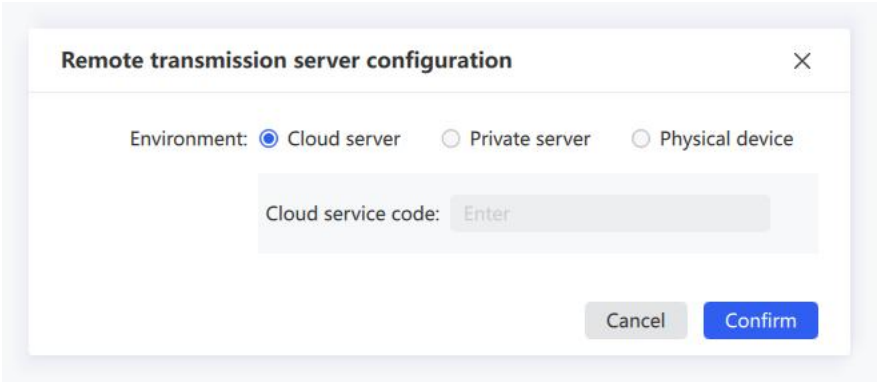


Settings:

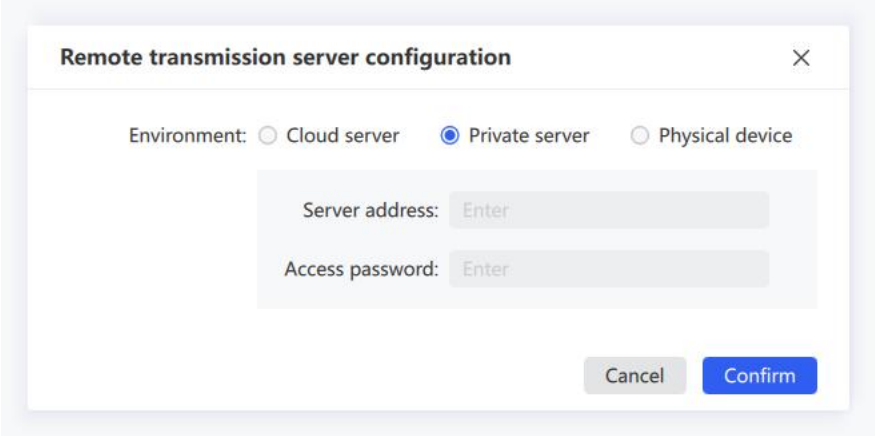
- **Cloud Service Code** — An XGRIDS-hosted cloud service. Registration and a service code are required. Users sharing a service code can see every cloud-connected device under that code. Contact your sales representative to obtain a code. No server setup is needed: data transfer, storage, and forwarding all run on the XGRIDS cloud.

Steps:

1. In the mobile app, set the network transfer type to XGRIDS Cloud and enter the service code. See the K1 and L2 Pro user manuals for details.
2. In LixelStudio, select Cloud Service Code, enter the same code used in the app, and click Confirm. Matching devices appear in the device list.
3. Click the device. Once it starts recording, the live view is available.



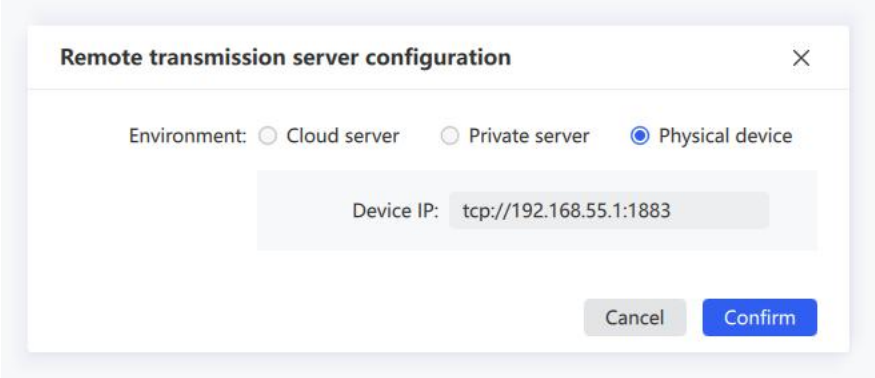
- **Private Server** — Connects through a private server address and access key. Contact technical support for private server deployment and access key generation. The interface for private server connections is shown below.



- **Direct Device** — Connects to the device directly over USB or Wi-Fi.

Steps:

1. Over USB, enter tcp://192.168.55.1:1883 as the IP address.
2. Over Wi-Fi, connect the computer to the same phone hotspot the device is connected to.
3. Open Bridge Mode in the app to view the current IP address, then enter that address in LixelStudio. The live view opens if the settings are correct.



- **Start Scan** — Starts scanning on the connected device remotely.
- **Stop Scan** — Stops scanning on the connected device remotely.
- **Reconnect** — Re-establishes the connection after a network interruption.
- **Properties** — Sets point size, render mode (elevation, intensity, time, single color), and opacity for the live point cloud.
- **Navigation Mode** — Switches between free navigation and trajectory-following navigation.

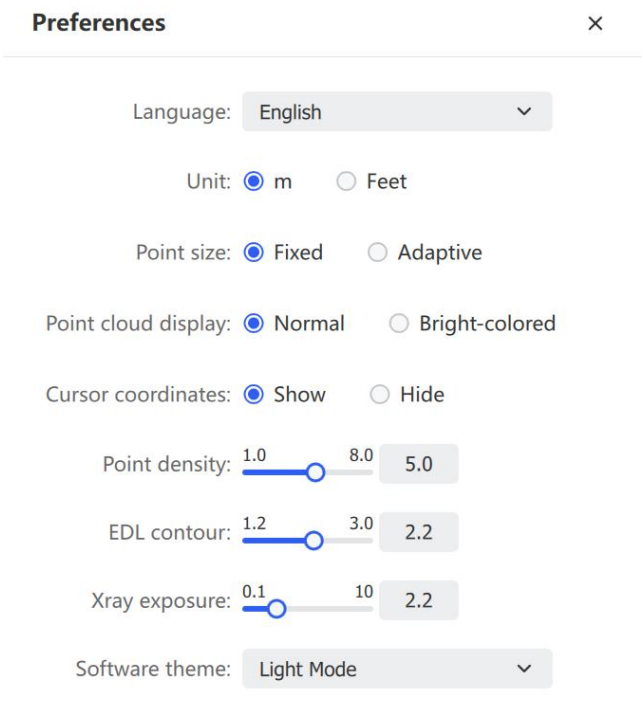
- **Pause / Resume** — Pauses or resumes point cloud streaming. Point cloud data captured while paused is not saved in LixelStudio.
- **Save** — Saves the streamed point cloud.
- **Close** — Exits Remote Streaming.

9. Settings

Includes General, Rendering Display, Authorization Activation, Update, About, and User+, which is our Improvement Program.

9.1 Preferences

Configures the base interaction environment, units, and point cloud rendering.



- **Language** — Simplified Chinese, Traditional Chinese, English, Italian, German. *Restart required.*
- **Unit** — Meter or Foot. Measurement values and the scale bar update accordingly.
- **Point Size**
  - **Fixed** — Constant pixel size regardless of zoom.
  - **Adaptive** — Scales with viewing distance.

- **Point Cloud Display**
  - **Normal** — Standard color rendering.
  - **Vivid** — Higher saturation and contrast for distinguishing subtle features.
- **Point Density** — Slider controls displayed thinning ratio.
- **EDL Contour** — Eye-Dome Lighting strength; higher values enhance edge shading.
- **Xray Exposure** — Adjusts Xray transparency and exposure gain.
- **Software Theme** — Light Mode or Dark Mode.

9.2 Help and Support

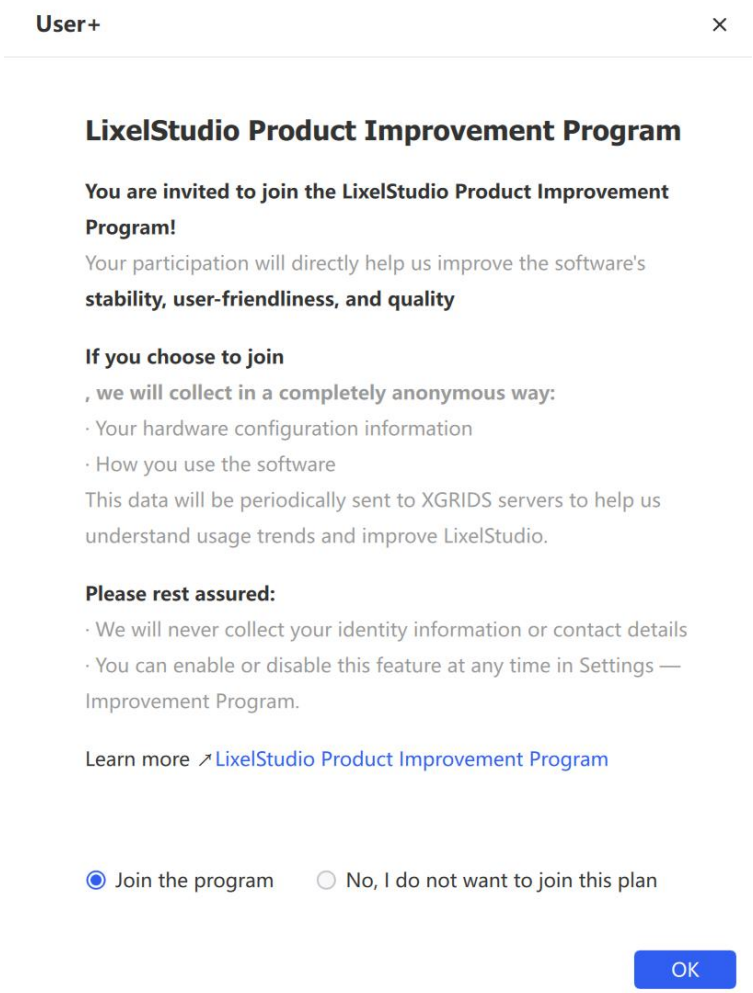
Access Improvement Program, Open Log Path, Check for Updates, and About LixelStudio.

9.2.1 Improvement Program

Function: Collect information about software usage and encountered problems

Purpose: Help identify user behavior patterns for product planning and improvement

Participation: Voluntary

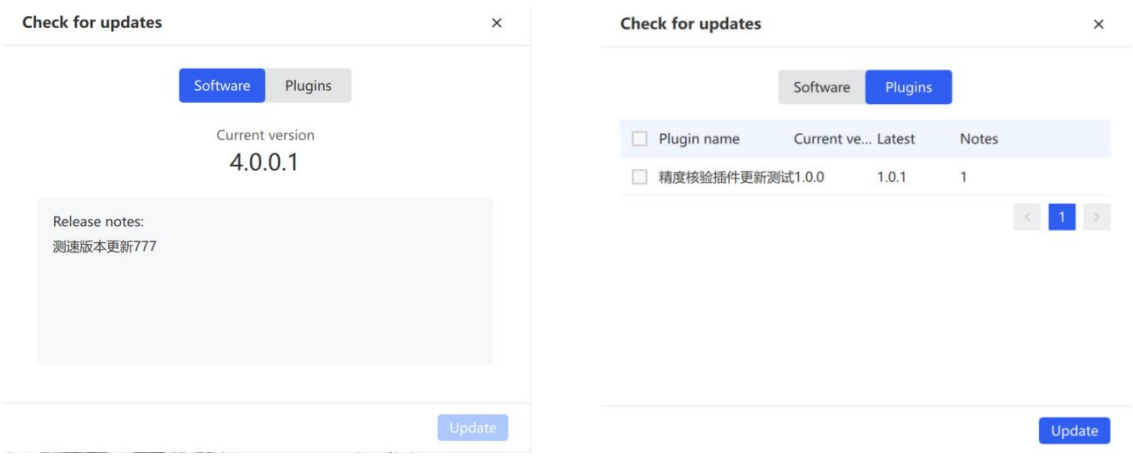


9.2.2 Open Log Path

Locates the system log files generated during software operation. These files record startup status, task execution, error messages, and crash causes — the core reference for troubleshooting and technical support.

9.2.3 Check for Updates

Manages the lifecycle of the software and its plugins.



9.2.4 About LixelStudio

Displays the current version number. Click the available links to open Version Notes, Privacy Policy, and Terms of Service.

10. Device Connection

10.1 Switch to USB Mode

Function: Connect XGRIDS handheld scanning device

Steps:

1. **Connect Device:**
   - Turn on XGRIDS handheld scanner
   - Connect to computer via USB cable

    - Wait ~30 seconds until USB button lights up
2. **View Device Info:**
    - Click USB button
    - View current device firmware and storage capacity
3. **Open USB Drive Mode:**
    - Click "USB Drive" button (lower right corner)
    - Device USB mode opens
    - Device data folder auto-opens

Note: Each USB mode switch disconnects/reconnects device. Wait for a few seconds.

10.2 Device Firmware Upgrade

Function: Upgrade firmware for all XGRIDS handheld scanner series

Requirements:

- Device directly connected to PC via USB
- Device battery >60%

Steps

1. Power on the device and connect it via USB.
2. Click the **Device** button in the lower-right, then click **Update**.
3. Click the field under Firmware Path and select the firmware file.
4. Click **Start**.

The installation takes about 30 minutes. The device will switch USB mode on and off during the installation; this is normal.

Important: Do not cancel the update or unplug the USB cable before the process completes.