



Trion Scanner Market segments



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Geospatial Team
22/07/2024



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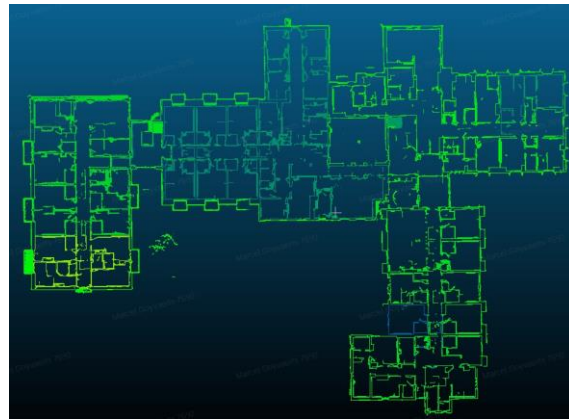
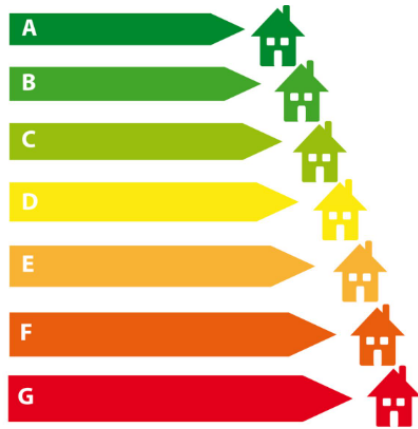
AEC Applications

- **Measured Building Surveys (2D / 3D)**
- **3D modelling and Visualisation**
- **BIM/(MEP)**
- **Construction verification**
- **Construction Progress Monitoring**
- **Building Conservation / Renovation**
- **Zero – Construction Site Surveys**
- **Construction finishing companies (spraying surfaces incl. layer thickness, painters, solar panels on sloping roofs, antennas on roofs, Pre-installed Sunshade)**
- **Heating Network Renovation**

Measured Building Surveys (2D/3D)



- m2 & m3 calculation for tax & energy label
- Italian case study: Bonus for **asset owner** when improving at least 2 energy classes (m2 & m3 required)



2D



3D

3D Modelling and Visualization



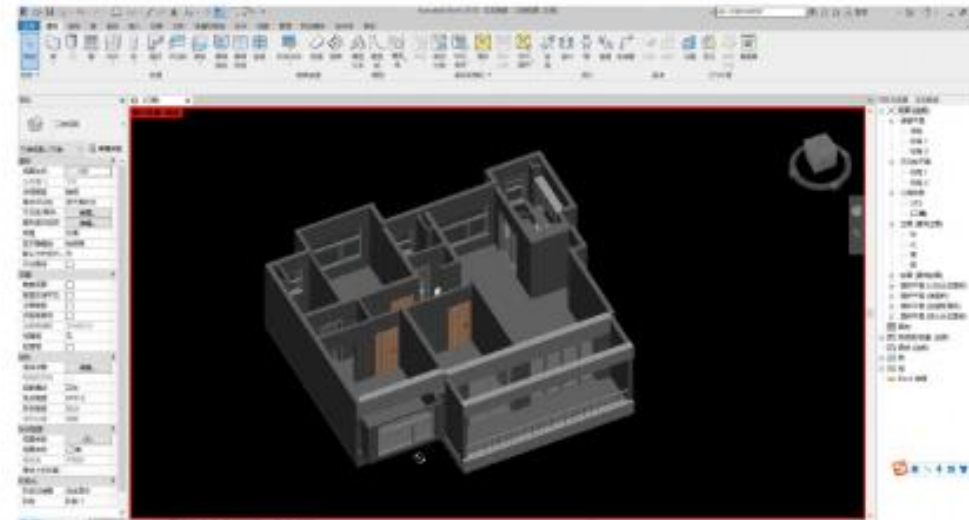
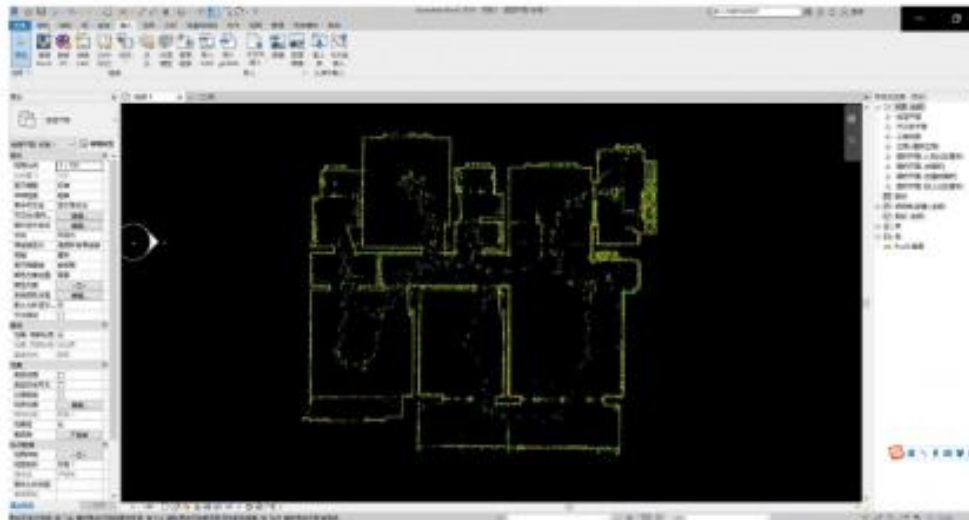
Data Collection

Data Processing

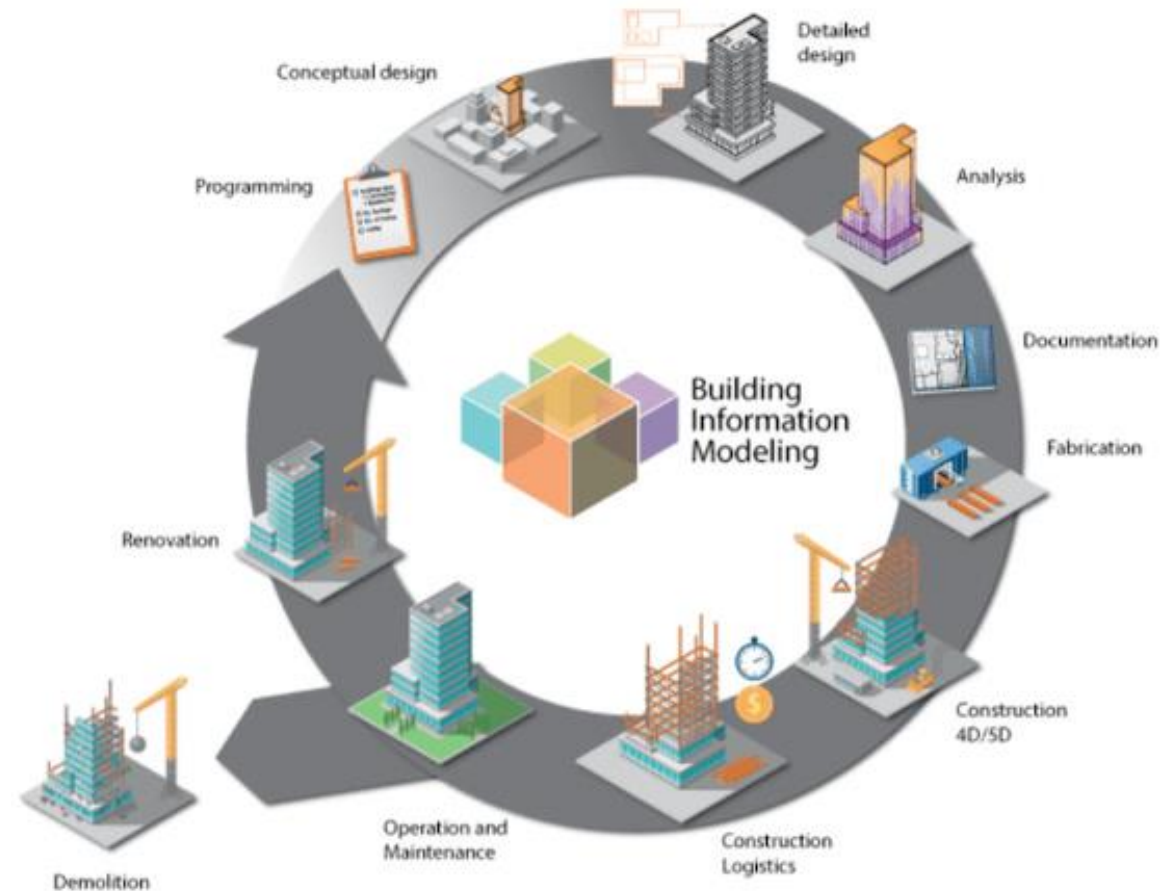
BIM Modeling

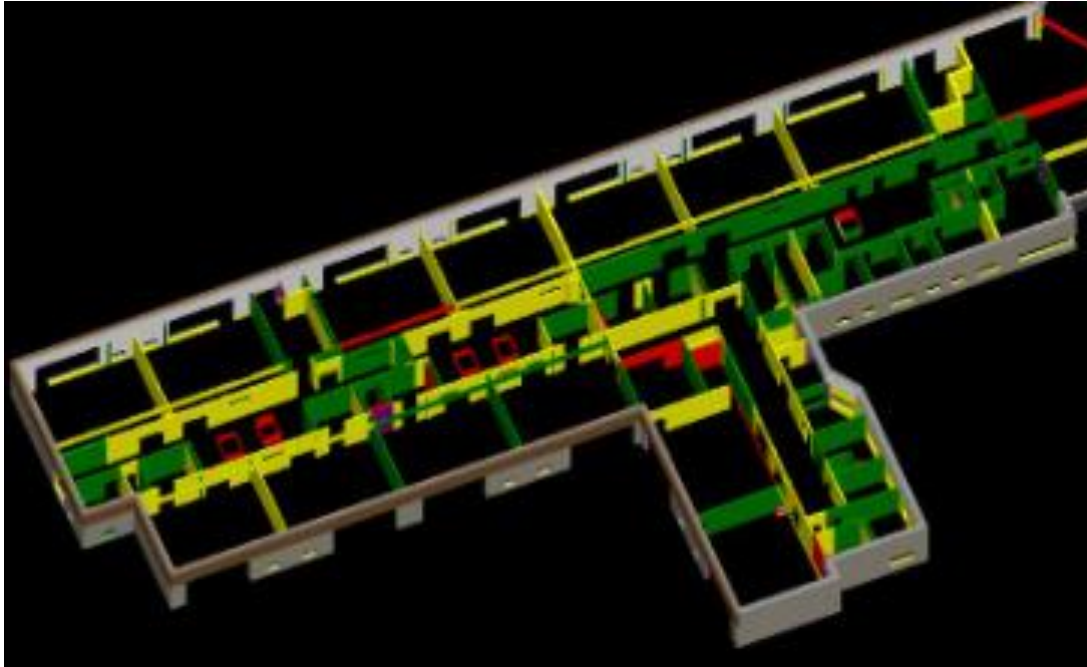
BIM Application

- **Action:** Use ReCap to convert a processed point cloud file into an “.rcp” format file, import the “.rcp” format file into BIM software, and create graphics primitives such as walls, beams, slabs and columns based on point cloud data.
- **Device/Software:** Autodesk Revit, 3DMAX, Bentley, etc.
- **Result:** BIM models



- Create 3D model to connect building information and locations
- Scanning can be used in many stages of the building life cycle to update and provide relevant 3D data
- Scanning method can be deployed in LOD range of 100-350



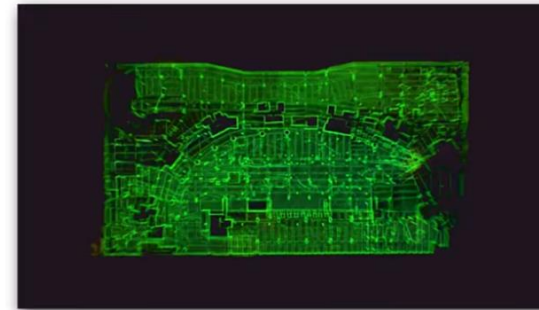


- Verification Position as-built vs design
- Tolerance indications:
 - Green : OK
 - Yellow : acceptable
 - Red : unacceptable > re-do
- Detect problems before it becomes a serious problem
- *(This application is not available yet)*

Construction Progress Monitoring



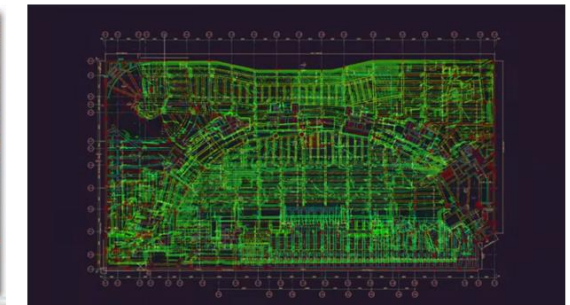
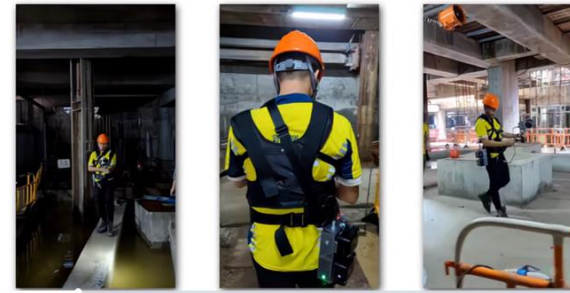
- Construction scan vs. design
- Today scan vs. last week scan
- Colours for:
 - New-built
 - Taken out (renovations)
 - Yet to be built
- *Valuable info for project managers*
- *Track progress & avoid delay claims*



Point cloud



Drawings



Point cloud and drawing overlay comparison

Building Conservation / Renovation



- new destiny for redundant old buildings in city centers
- façade scan for scaffold design
- Interior scan as reference for architect design
- Quick, Complete, Easy ,Cheap, Accurate enough



Drawing Comparison



3D Modeling



Old House Renovation

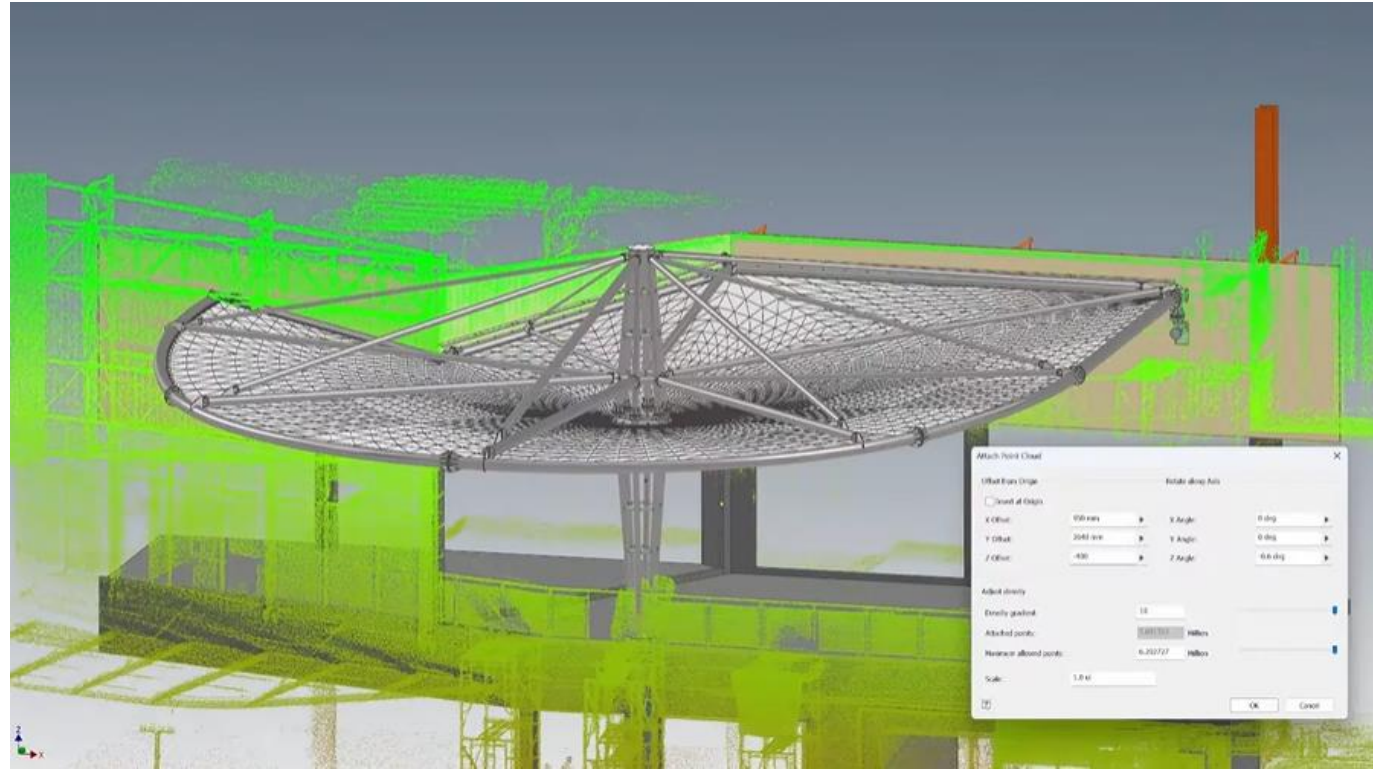
Construction Site Zero scans



- Zero reference 3D model for Architect design
- Zero model for 3D BIM building life cycle model
- Reference for foundation & initial groundworks



Pre-installed Sunshade



Scan the on-site environment to obtain real-size 3D point cloud data through S1, import the sunshade BIM model and integrate it with the point cloud model to simulate installation, confirm installation details in advance, and improve installation efficiency.

Heating Network Renovation 1



3 people; 4 working days (3 weeks if using a total station); Completed terrain survey of 25 square kilometers

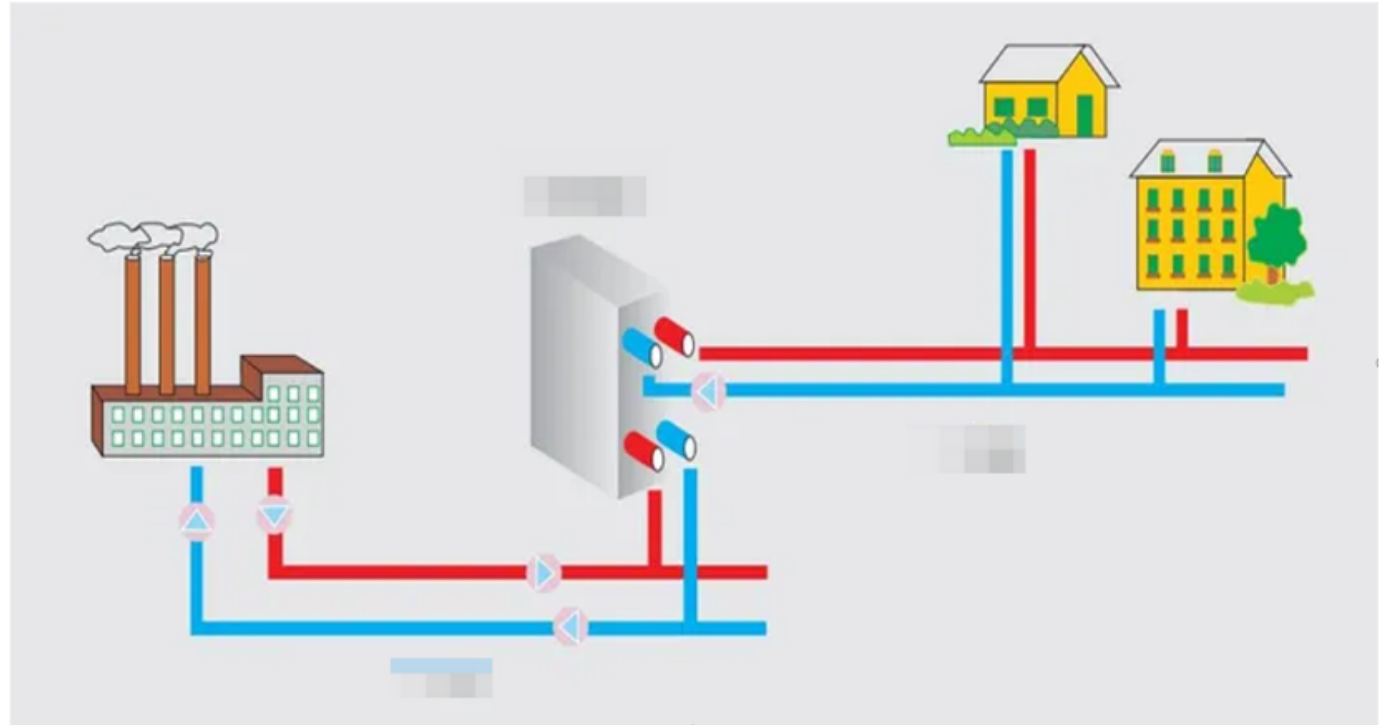
Rehabilitation of secondary thermal networks and staircase metering

Client: One of the largest service providers in the local energy, water, and public utilities sector

Location: Constanta, Romania

Goal: The goal of this project is to reduce thermal energy losses in secondary thermal networks. This initiative contributes to improving energy efficiency and ensuring a more sustainable district heating system for the residents of Constanta.

Scope: The project will rehabilitate approximately 25 km of thermal network, including 12 thermal points.



- The project involves the transformation of pipelines in the public domain, and the terrain survey will consider the certification of the public property location by the city hall. It is necessary to survey and inventory the environment within the scope, obtain on-site drawings, and conduct secondary network transformation design based on the drawings.
- **The focus of this project implementation plan is to conduct Data Acquisition of the on-site environment and output on-site CAD drawings.**

Heating Network Renovation 2



- Use a handheld 3D laser scanner to scan the scene, obtain point cloud data, and quickly draw and obtain on-site drawings based on on-site point cloud data.

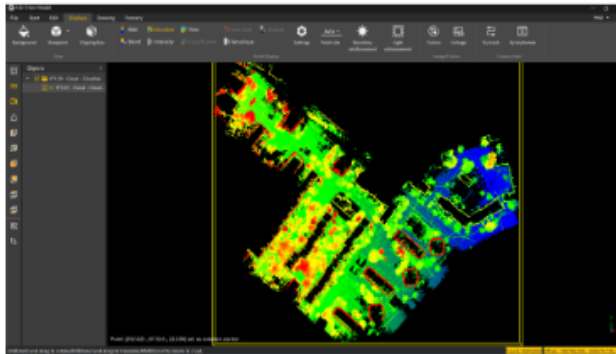
Field scanning

The handheld scanner FJD Trion S1 was used to scan the environment within the project scope and obtain on-site point cloud data.



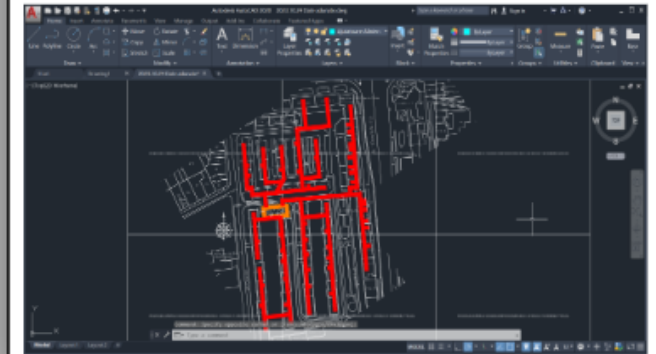
Data processing

Import the original data source into the point cloud processing software FJD Trion Model for data processing and obtain the result point cloud data.



Drawing

Draw a plan map within the project scope based on the achievement point cloud data, and submit the results to the thermal department for secondary network pipeline design.



This project is being implemented by the professional surveying company Control Survey Romania.

Real Estate applications

- **2D Floorplans**
- **Energy Labels** (3D volumes, window dimensions,..)
- **3D virtual Tours**
- **As Built vs. Design (<5%?)**

Heavily dependent on local regulations

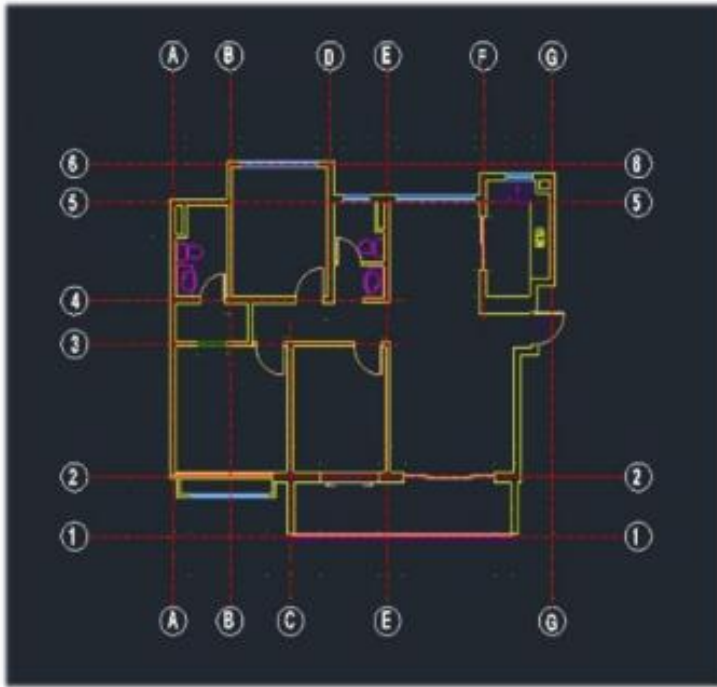


2D Floorplans

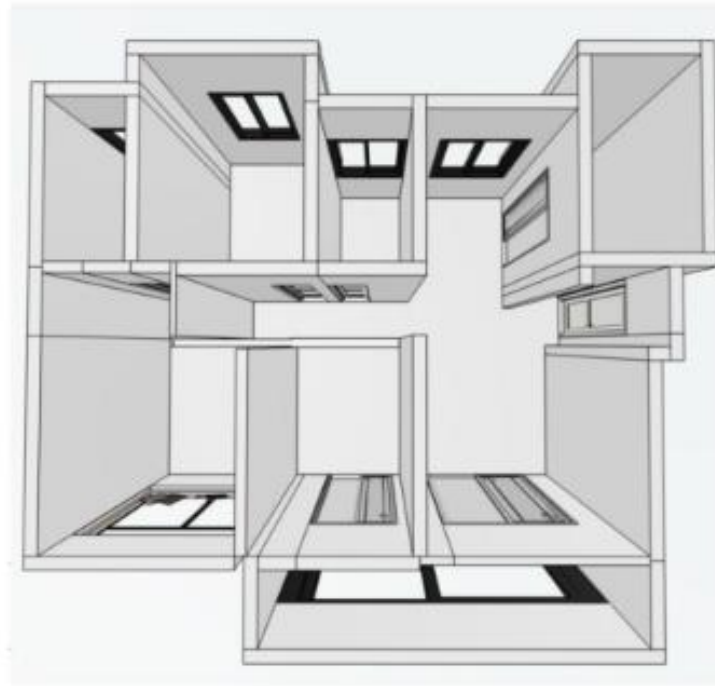


- Very informative for potential buyers
- Mandatory to provide in several countries when selling your house
- Complete dimensions and m2 (<5% accurate)
- Natural Disasters
 - *Homes incl. floorplan info sell faster*
 - *Scanning is much faster than manual, thus cl saving time and increased production*





CAD Drawing



BIM Model



Interior Design

Energy Labels



- 3D volumes and 2D window & rooftop dimensions needed
- Specialized energy advisers use scanners & developed software to automatically generate this energy label quickly and easily (like Brickscan)
- Mandatory report to provide when selling your home in several EU countries
- More and more requested for public buildings (schools, governmental)
- Energy labels have growing demand due to sustainability trend
- Accuracy of P1 and S1 scanners is sufficient



3D virtual Tours



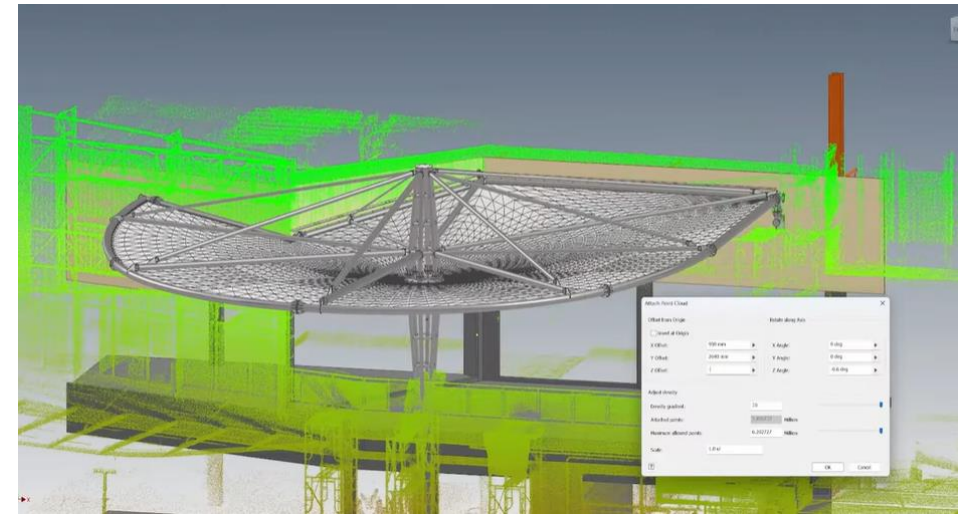
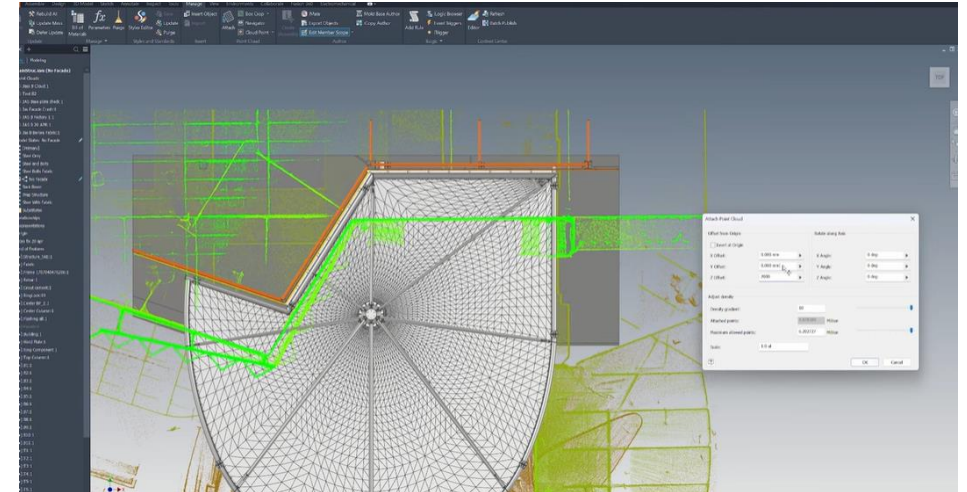
- Virtual home visit for prospect buyers
- Better selection of prospect buyers physical home visit
- Increased demand due to the above
- Virtual tour creation using P1 scanner incl. 360 cam during floorplan scanning creates cross selling of services
 - *3D Tour images creates better impression than floorplans & 2D image (in 201 version)*
 - *Cheap extra product with same scan*



As-Build vs. Design



- Verify the building has been constructed as designed
- Penalties for builders if not within specs (in some countries)





Facility Management applications

- **As-Built 2D/3D Documentation (a.o. BIM)**
- **Asset Inventory management**
- **Building Maintenance**
- **Building Renovation**
- **WIFI strength Mapping**
- **Volumes**
- **Safety Inspection**
- **Planning ...**
- **Digital twin remote Asset / building management**



Mining applications

- **Underground 3D tunnel mapping**
- **Mineral production mapping**
- **Stockpile and Production Volumes (indoor/outdoor)**
- **Convergence Analysis (Safety)**
- **Bulk carrier (ship) transport**
- **Berms / Slope Stability Monitoring**
- **Open Pit Blast planning**
- **Cavity (galleries) & ore pass monitoring**
- **Cave mapping (Speleology)**
- **.....**

Underground 3D tunnel mapping



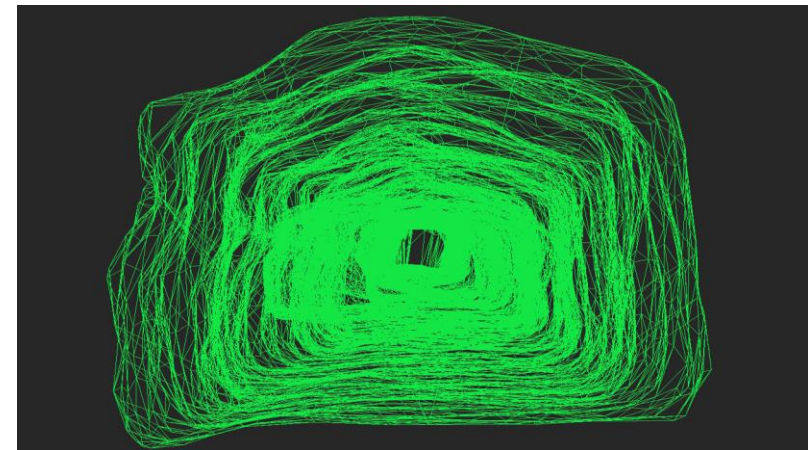
Project Requirements

Obtain the complete point cloud data of the underground mine through on-site measurement, and calculate the enclosed volume of a mine tunnel.

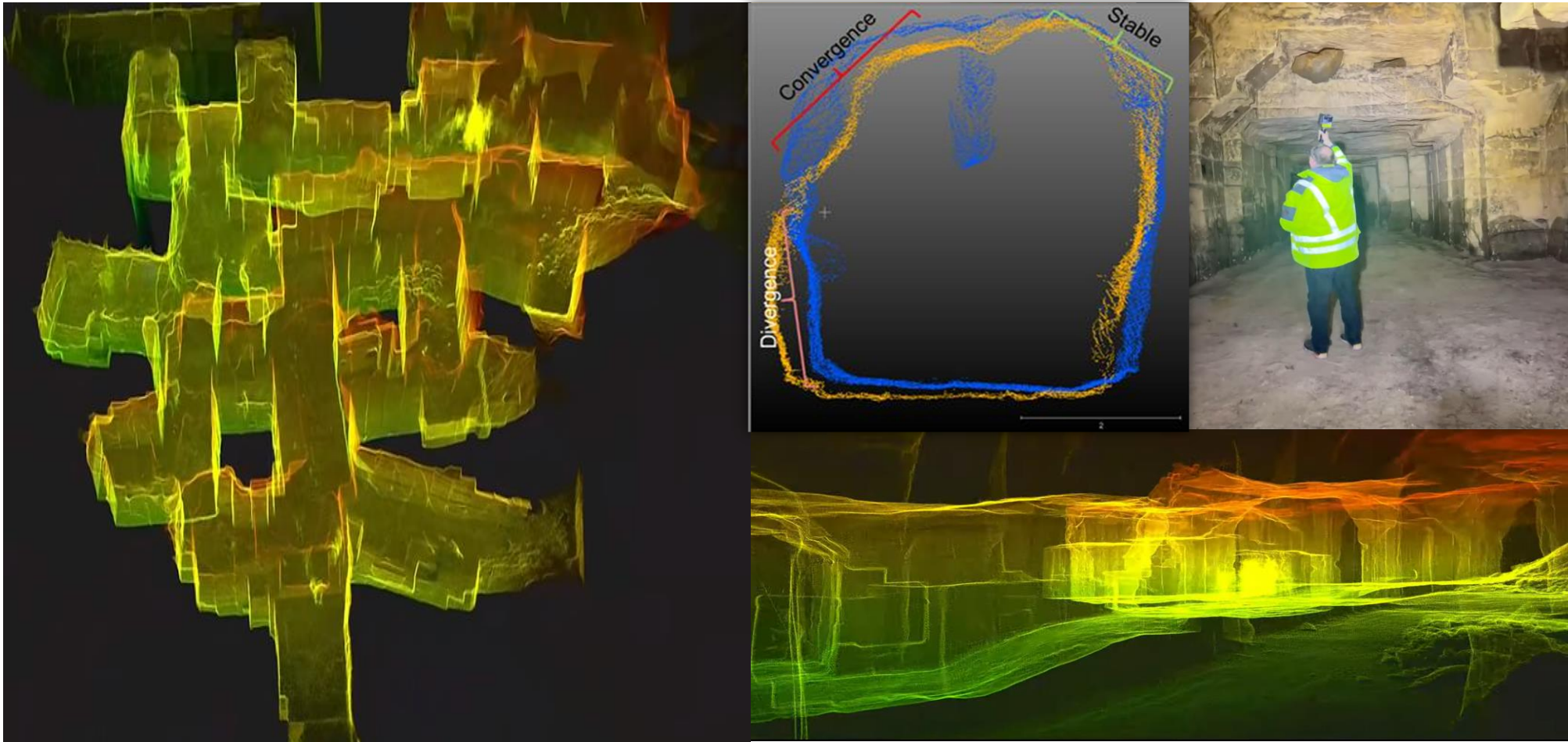
Project Implementation

Fieldwork: Used a handheld scanner/static scanner to scan the underground mine to obtain on-site 3D point cloud data.

Office: The FJD Trion Model was used to import and process data, resulting in a comprehensive point cloud of the mine tunnel. By triangulating this point cloud data, a closed surface was generated. With just a single click, detailed 3D data for digital mining and management could be calculated, facilitating the digital development of underground space and mines.



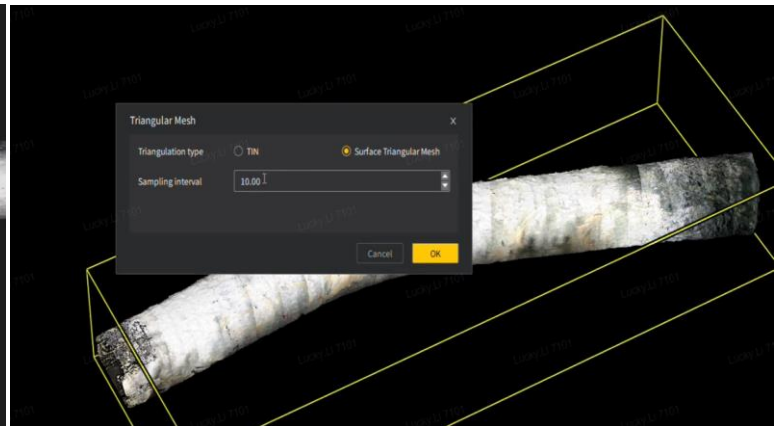
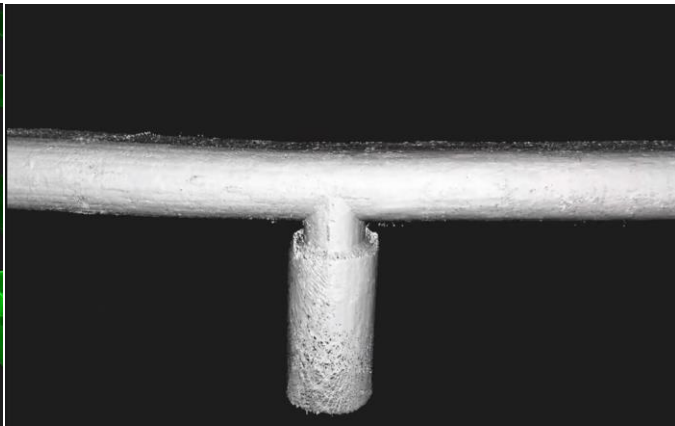
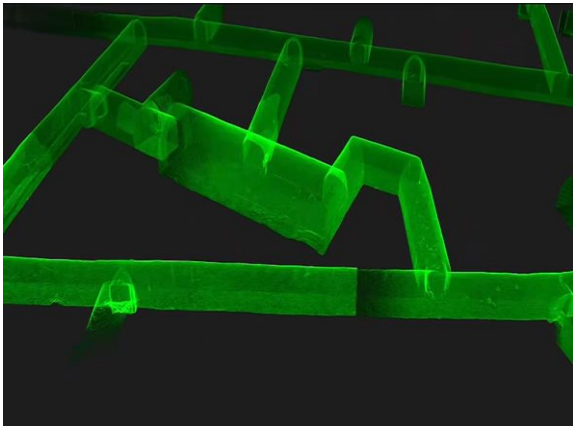
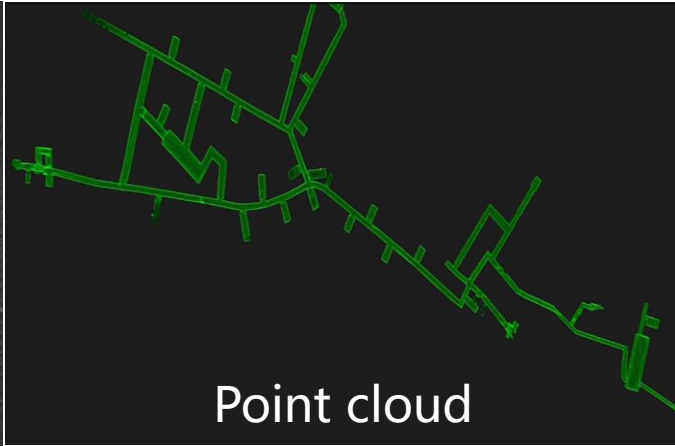
Convergence Analysis (Safety)



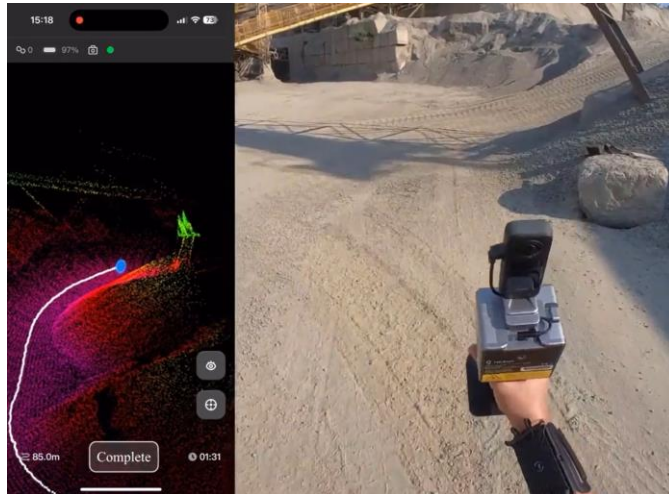
Use FJD Trion P1 to scan underground tunnels, quickly obtain underground 3D space info, and assist in underground space transformation.

https://www.linkedin.com/posts/fjdynamicsglobal_fjd-trion-p1-for-mine-surveying-activity-7140342679443300352-G2jm/?utm_source=share&utm_medium=member_android

Underground mine/civil air defense tunnel survey



Using the FJD Trion S1 3D laser scanner for mine channel scanning, the point cloud data obtained can clearly see the boundary of the underground tunnel. Based on the point cloud, the mine channel mesh model is automatically generated, providing real data support for the later tunnel reuse and design.

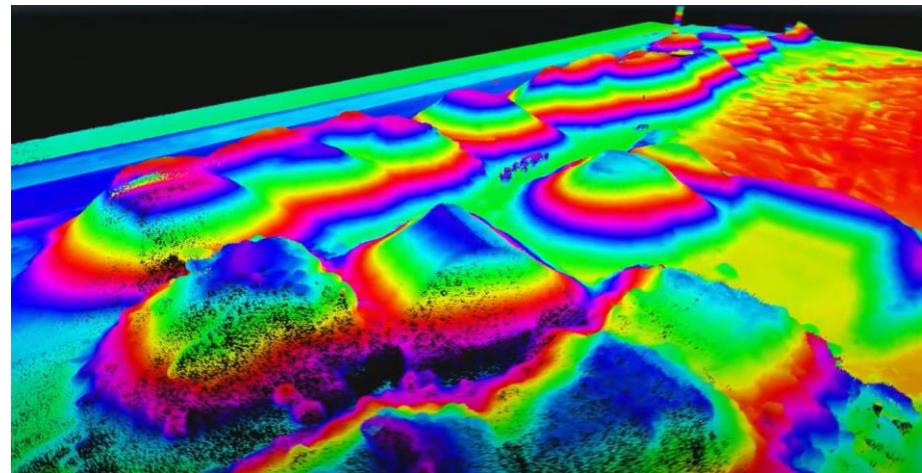


Irregular pile

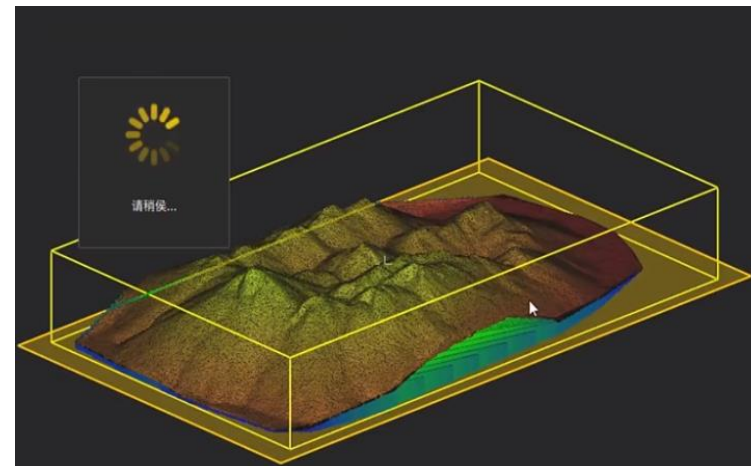
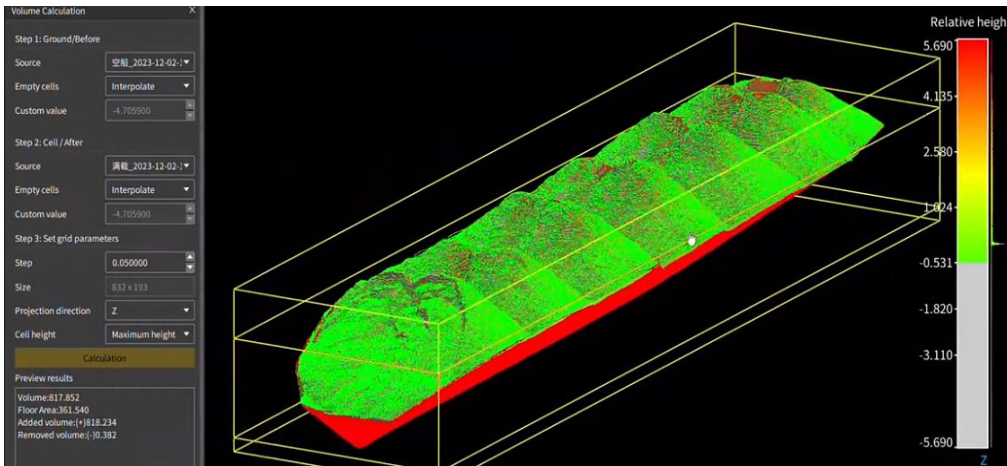
Use FJD Trion P1 to scan irregular piles such as coal piles, obtain point cloud data, quickly and automatically calculate the volume of the pile, which is efficient, accurate, and safe.

Stock monitoring and measurement

Monitoring your stocks is important throughout the supply chain. We can provide continuous monitoring or periodic spot inspections where we keep an eye on the movement and condition of your commodities.



Sand carrier mineral measurement



The FJD Trion S1 3D laser scanner is used to accurately measure the sand material, ensuring accurate calculation of the volume and mass of sand material on the sand transport ship, providing reliable data for subsequent transportation and sales. At the same time, the data archive of the sand transport ship is integrated for Data Analysis, business optimization, and daily management.

Berms / Slope Stability Monitoring



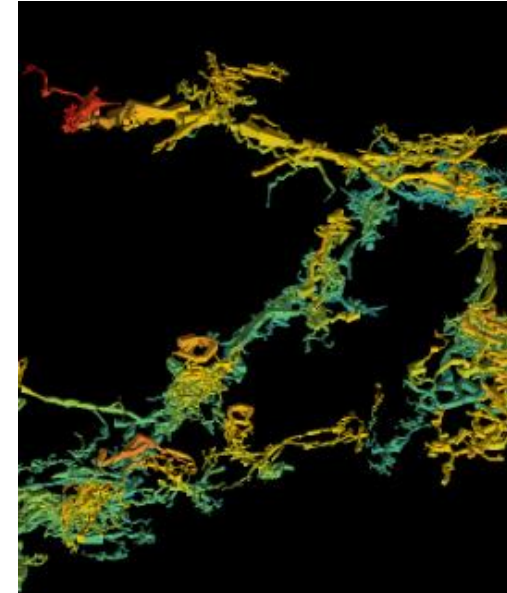
Cavity (galleries) & ore pass monitoring



Cave mapping



- 3D Mapping for scientific purpose (speleology)
- Understanding complex 3D spaces
- Visualizing caves for tourism purpose
- Safety inspection



Security applications

- **Accidents registration & reconstruction**
 - Reduce traffic jams (€€)
- **Crime Scene Mapping**
- **Site Survey**
- **Public Building Mapping**
 - Public information (where to find ...)
 - First Responders(how to get in / out, emergency)
 - Insurance companies (no insurance w/o digital twin)
- **Military mapping**
- **Safety**
- **Natural disaster mapping**
 - Wildfires/landslides

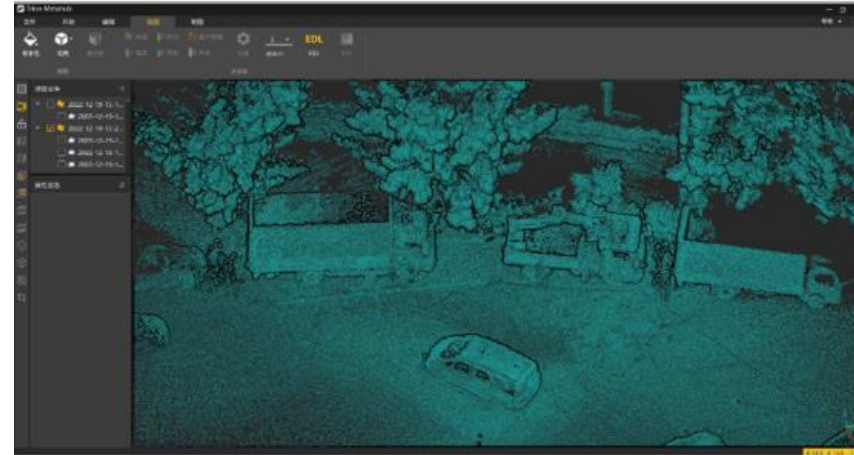
Accidents Registration/Site Survey



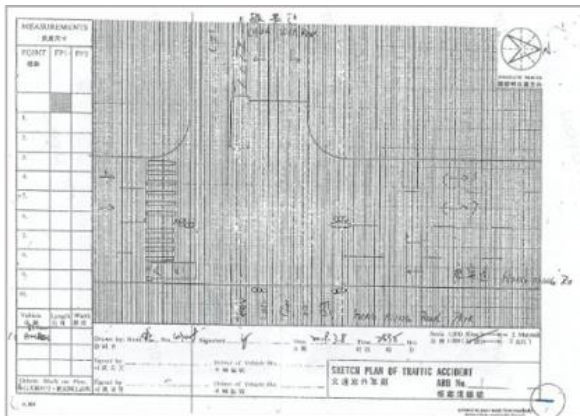
- Traffic accident registration
- Natural Disasters
- Evidence collection and record keeping



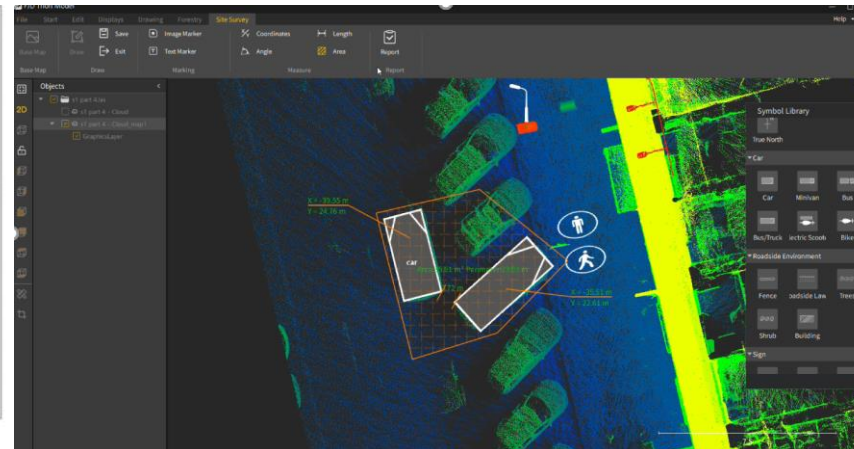
On-site data scanning



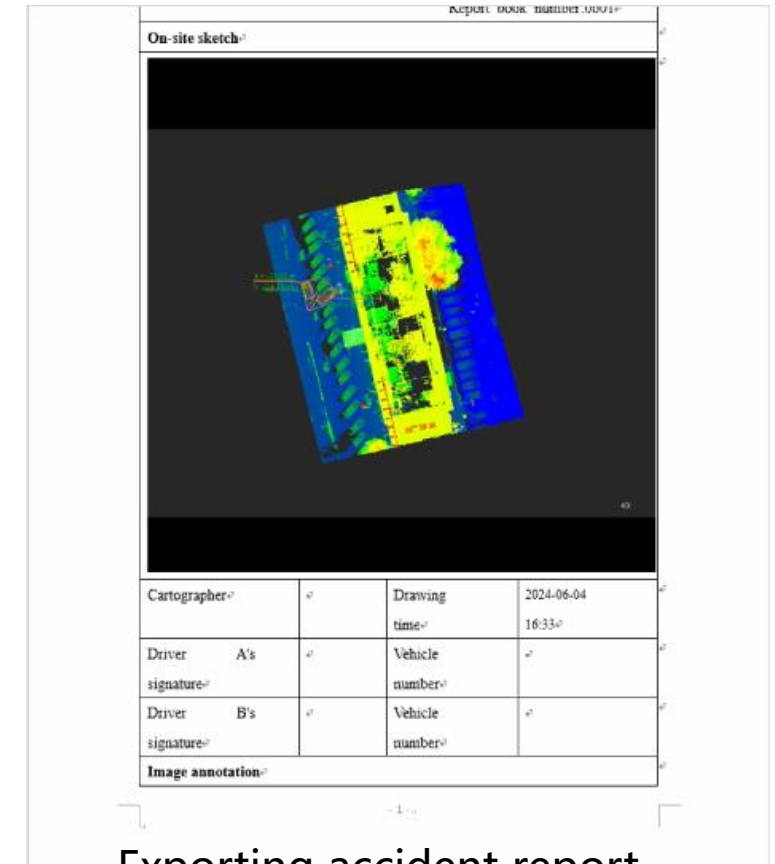
Point cloud data processing



Sketching of the accident



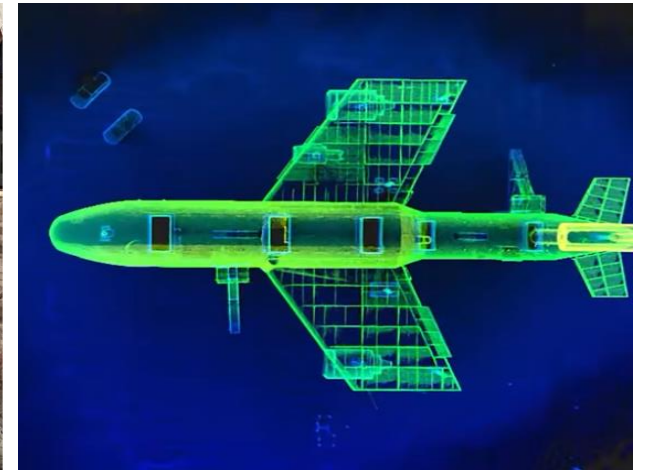
On-site object marking



Exporting accident report

Traffic control departments still use traditional manual drawing methods to draw traffic accident scenes: manual visual inspection, tape measurement, manual drawing, photogrammetry, etc., which have many defects.

Public safety/fire protection



Using FJD Trion S1 backpack mode + camera to scan the post-disaster scene, restore and analyze the fire accident, quickly obtain post-disaster point cloud data, archive the first on-site physical evidence, and conduct accident analysis and review.

Crime Scene Mapping

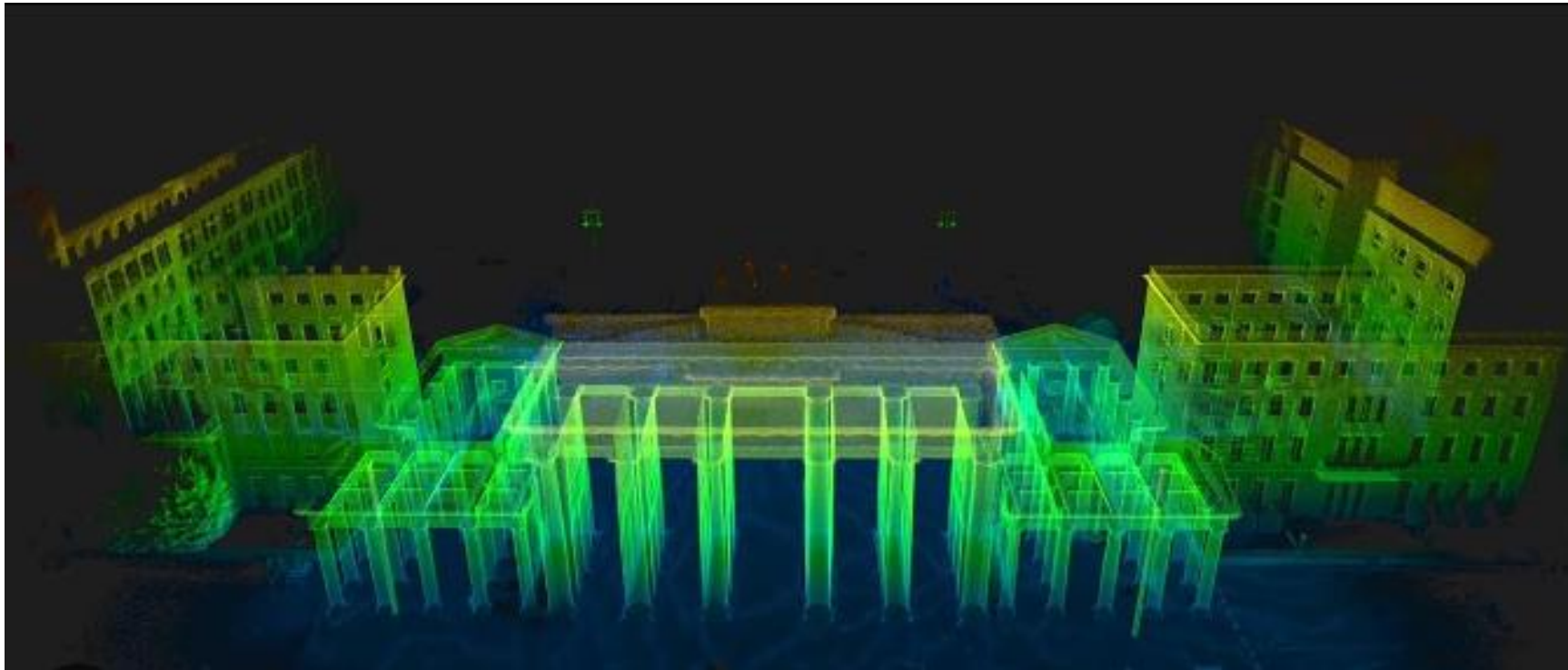


- Crime reconstruction
- Entrance / escape route investigation
- Evidence documentation for legal purposes

Some applications need sub-cm accuracy thus not suitable for P1 & S1 scanners



- It's a regulation in more and more countries to create **digital twins** of all public buildings



Military Mapping



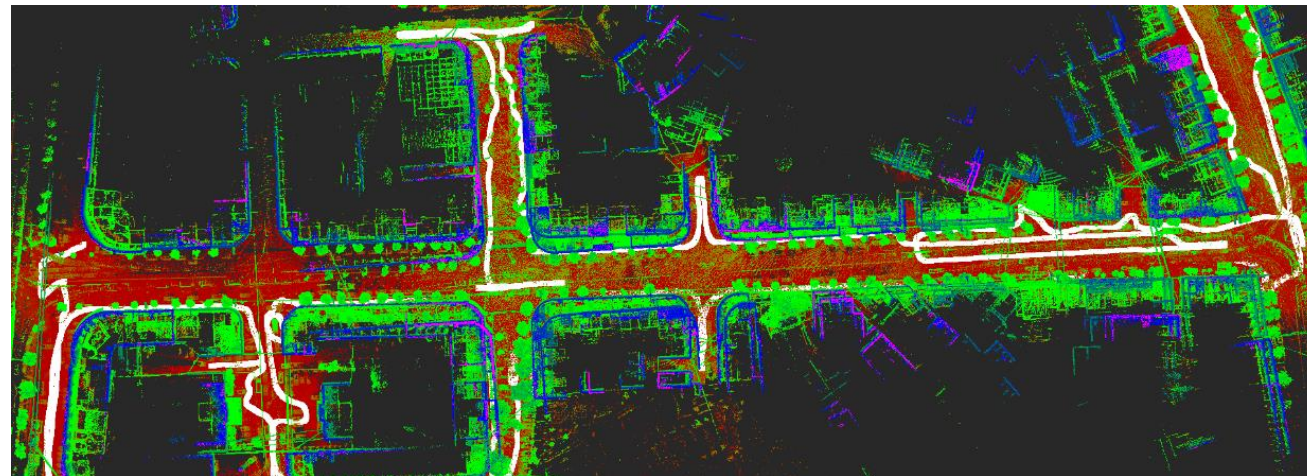
- Underground tunnel mapping
- War damage registration
- Enemy territory mapping
- Understanding unknown spaces



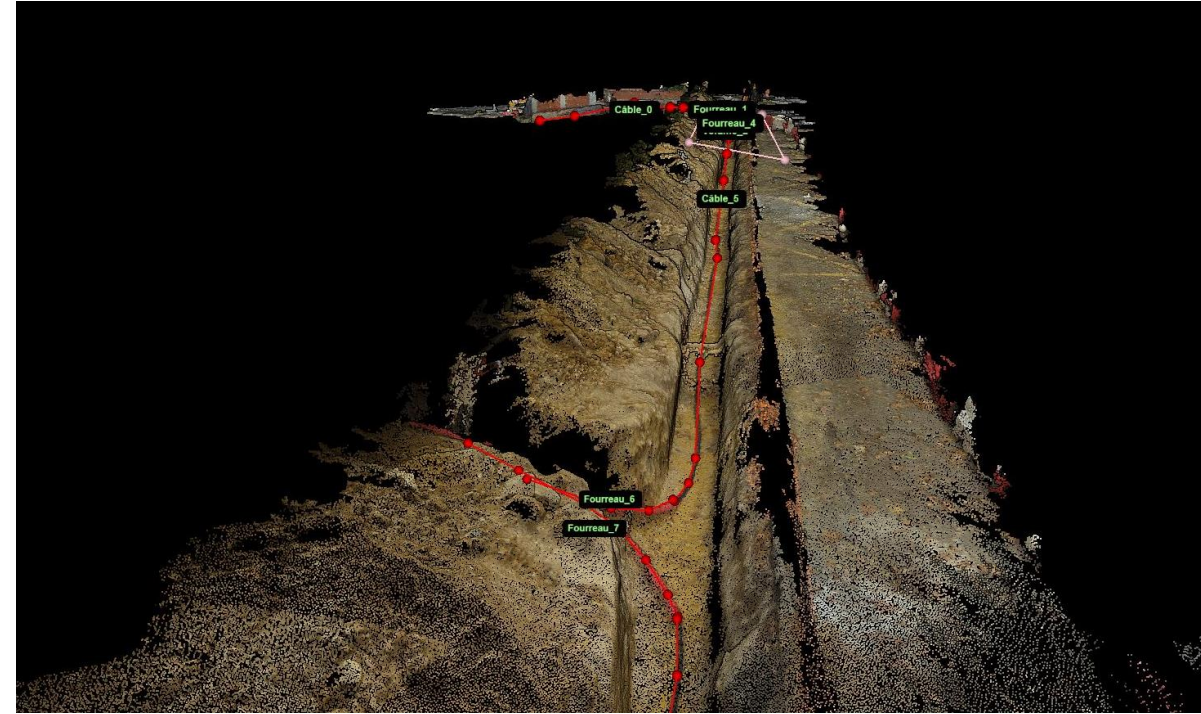
Surveying applications

- **2D/3D Topographic Surveys**
- **Urban Street Mapping**
- **3D Infrastructure**
- **2D Cadastral Surveys**
- **Cable / Piping registration**
- **Powerline Surveys (S1?)**
- **Powermast / Telecom mast surveys**
- **Heritage / Archaeologic Surveys**
- **Substations**

2D/3D Topographic Surveys



Open trench utility networks surveys

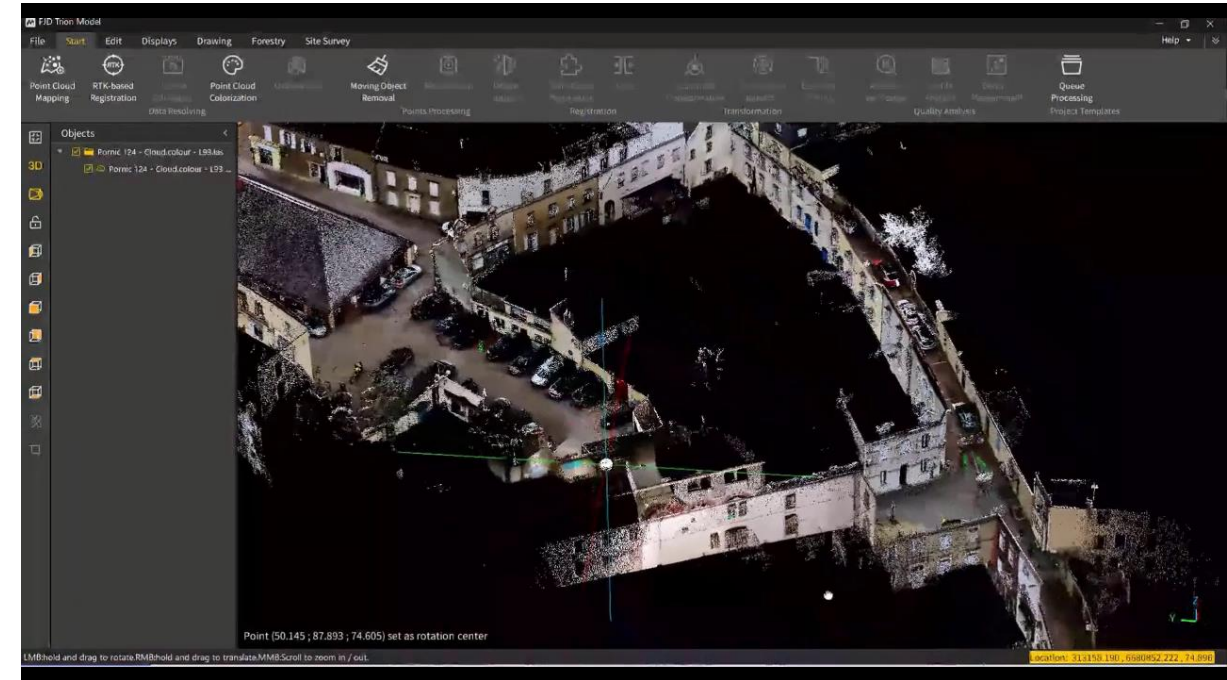


Plan drawing on the point cloud

Main arguments

- Operational in all circumstances, even in white zones and urban canyons
- 360° vision of the site environment
- Fast, easy and safe surveying

The future of total station

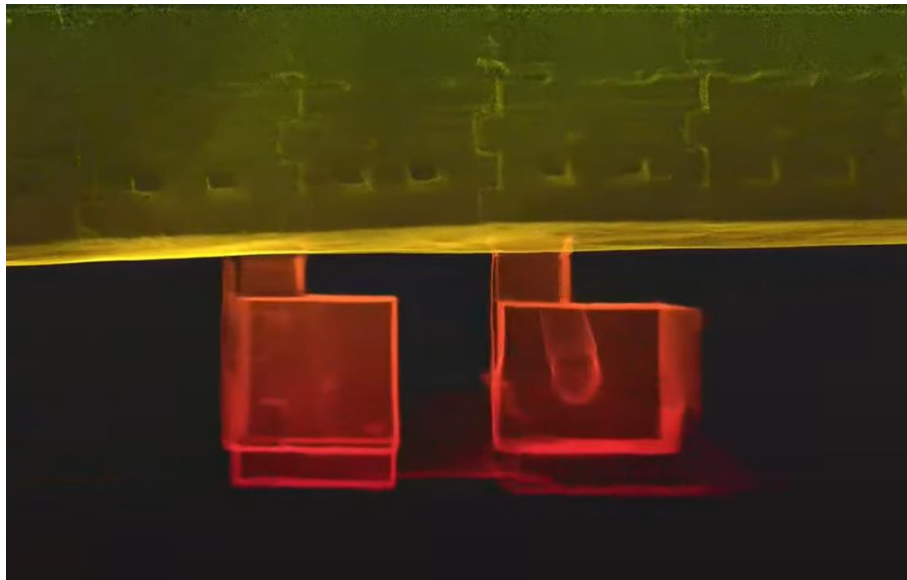


The 3D point cloud of a city center

Main arguments

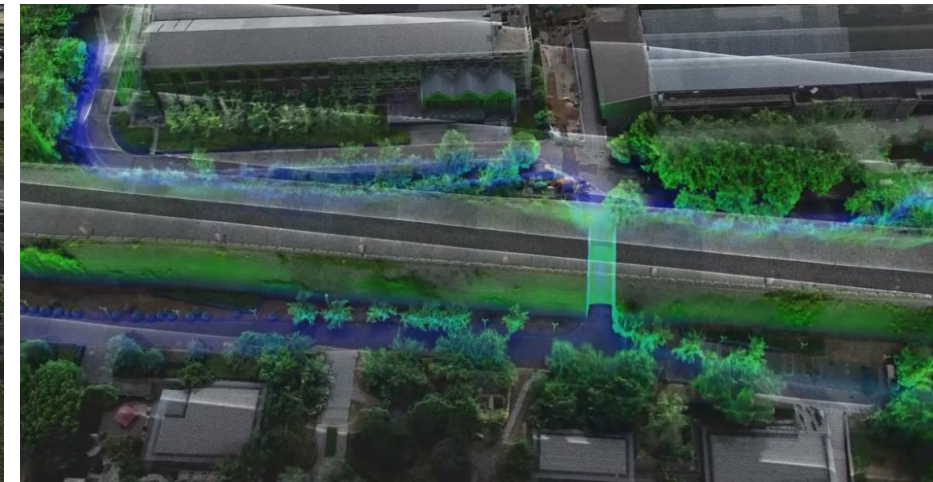
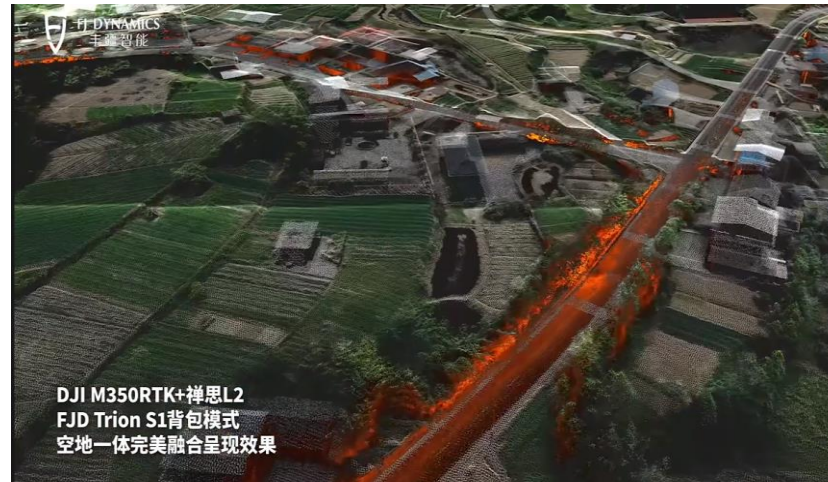
- Easy to survey
- Comprehensive 360° view of the street body
- Relative accuracy of 1cm

Underground tube well



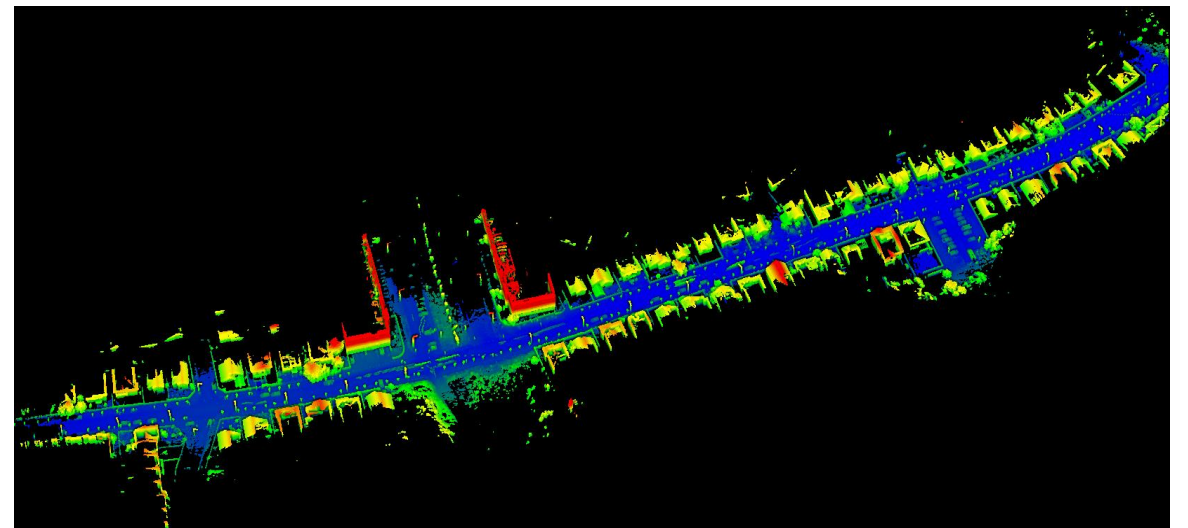
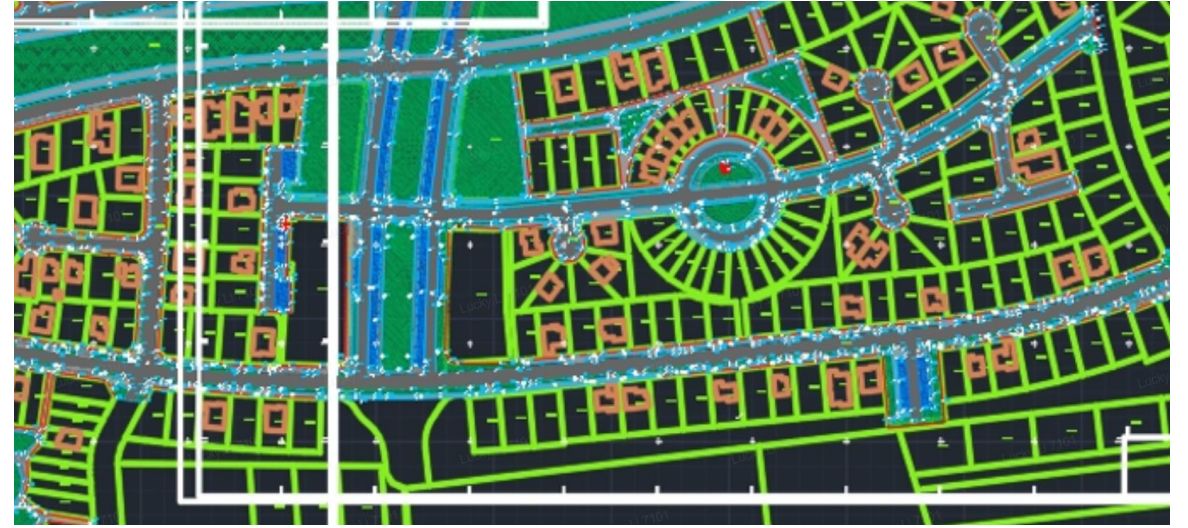
Use the FJD Trion P1 extension rod mode to scan urban underground wells, avoid the risk of personnel entering them, and complete Data Acquisition more quickly and safely.

Trion S1 + DJI M350 Empty Land Integration, Village Survey

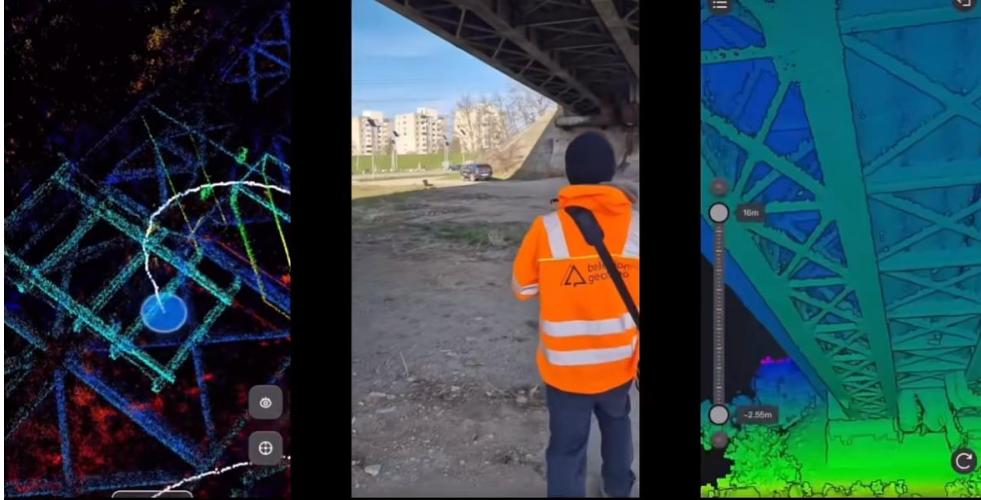


The drone collects aerial data, while the S1 collects ground data. In the Trion Model, the air-ground data is integrated to output complete point cloud data, which helps with village and urban surveys.

- **Scanning narrow site streets in urban areas**
 - without GPS coverage
 - not accessible by
 - Complementary to car mobile mapper
 - International federation of pedestrians

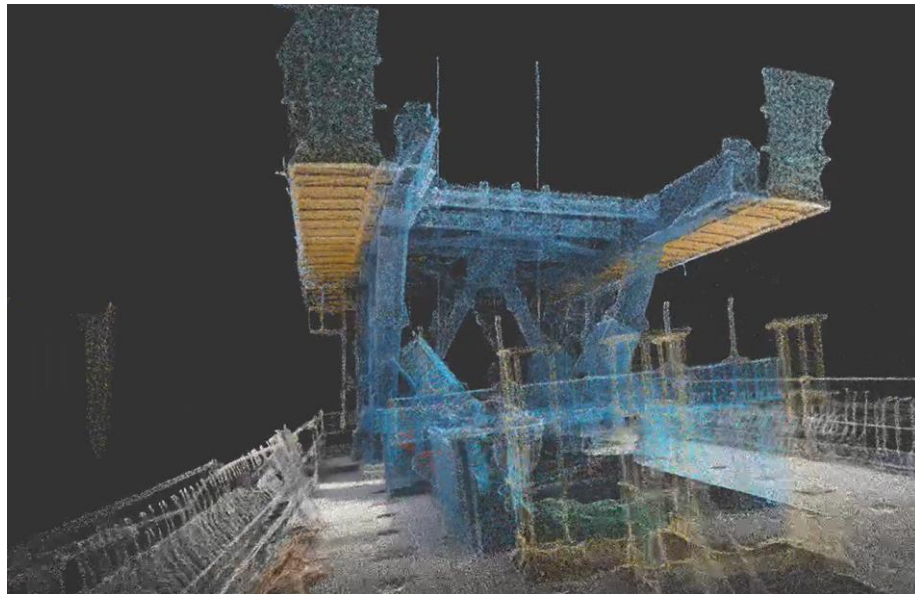
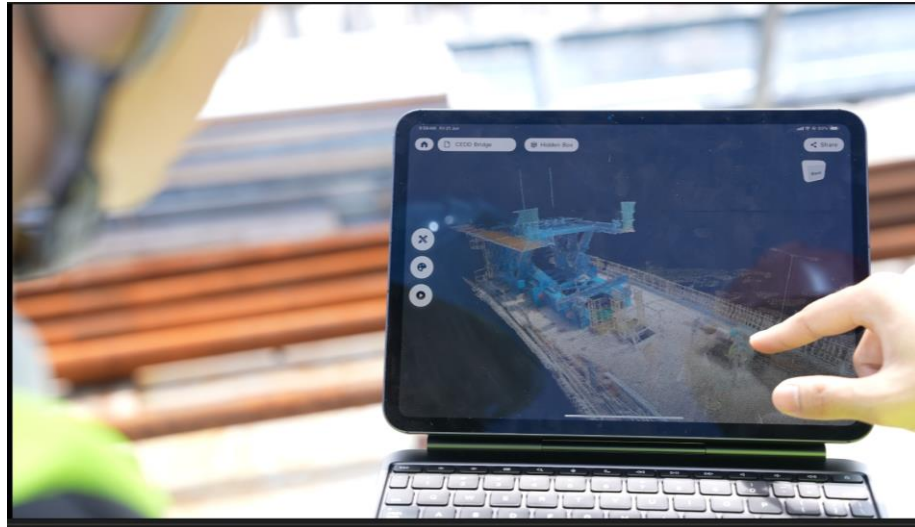


Road/Bridge renovation



Quickly scan the 3D color point cloud data of the road within the range, draw CAD drawings based on the point cloud data, and carry out transformation planning.

Bridge Pre-Installation



Bridge pre-installation

Use FJD Trion P1 to scan the bridge and surrounding environment, obtain high-precision point cloud data, simulate bridge installation in 3D point cloud scene, and help installation engineers obtain efficient and safe installation solutions.

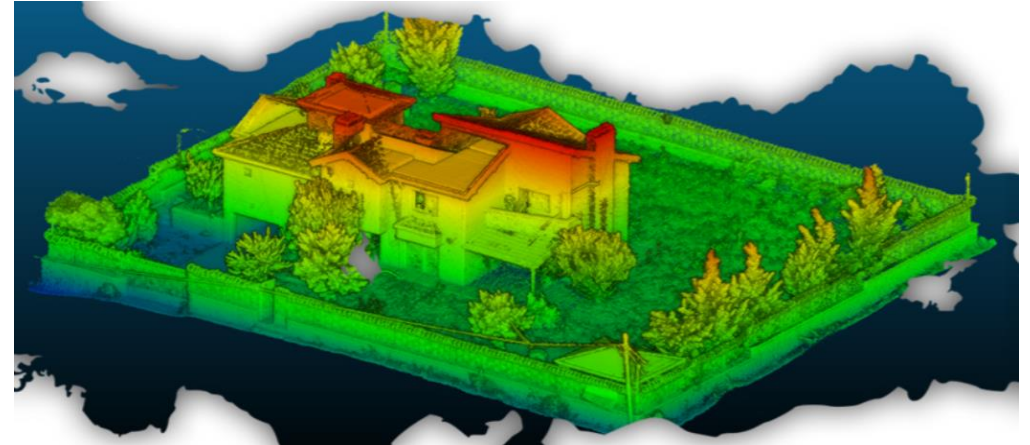
2D cadastral Surveys



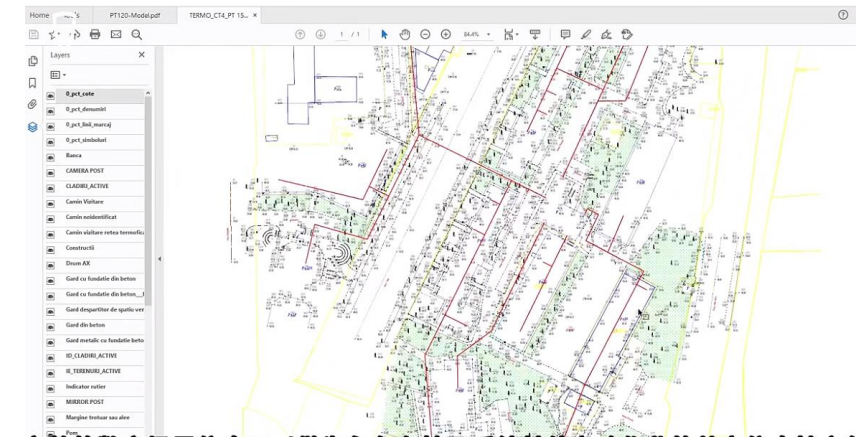
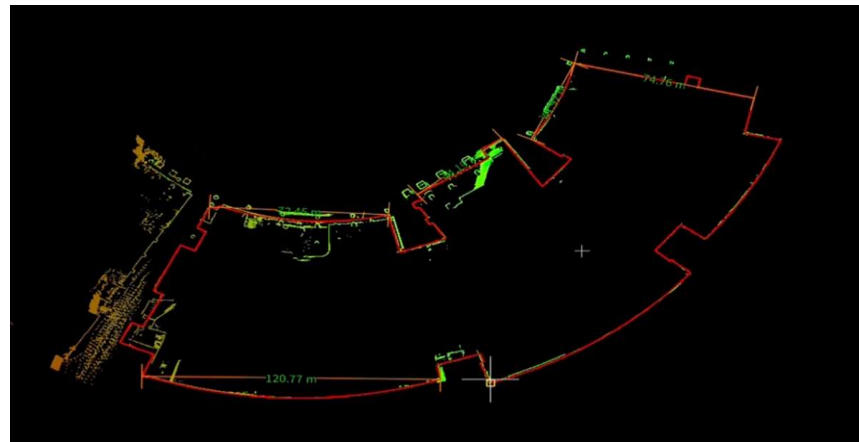
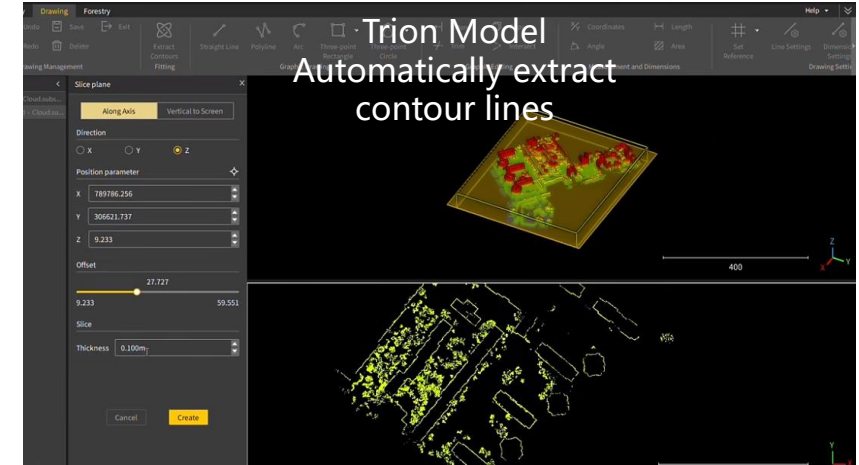
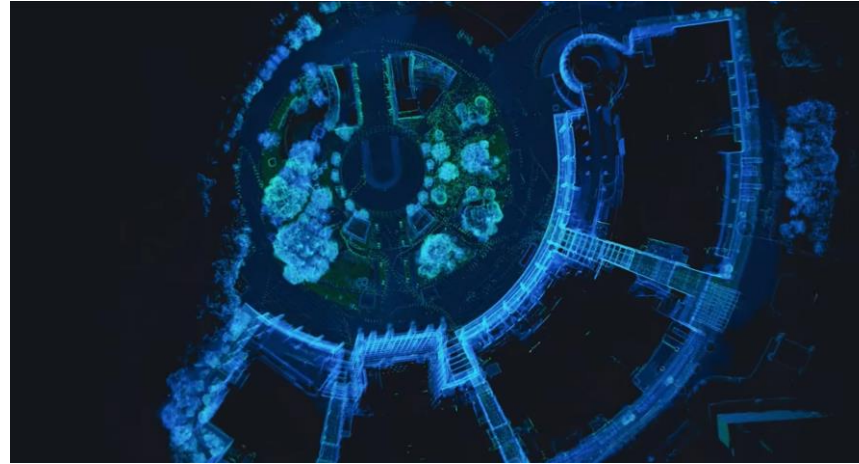
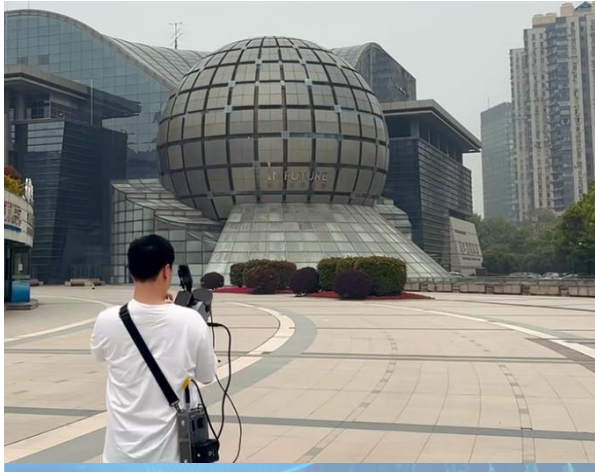
Turkish case study

Building facades positions need to be added to the cadastral drawing. This regulation gives a strong boost to local survey companies

- *Geo-referenced mobile Scanning is the fastest and easiest method*
- *No need for the surveyor to enter the parcel (and avoid aggressive dogs...)*



Large-scale park topographic map drawing



Quickly scan the 3D point cloud of the park, draw CAD drawings based on the point cloud, and facilitate the re-planning and management of the park, such as the renovation of urban heating pipelines

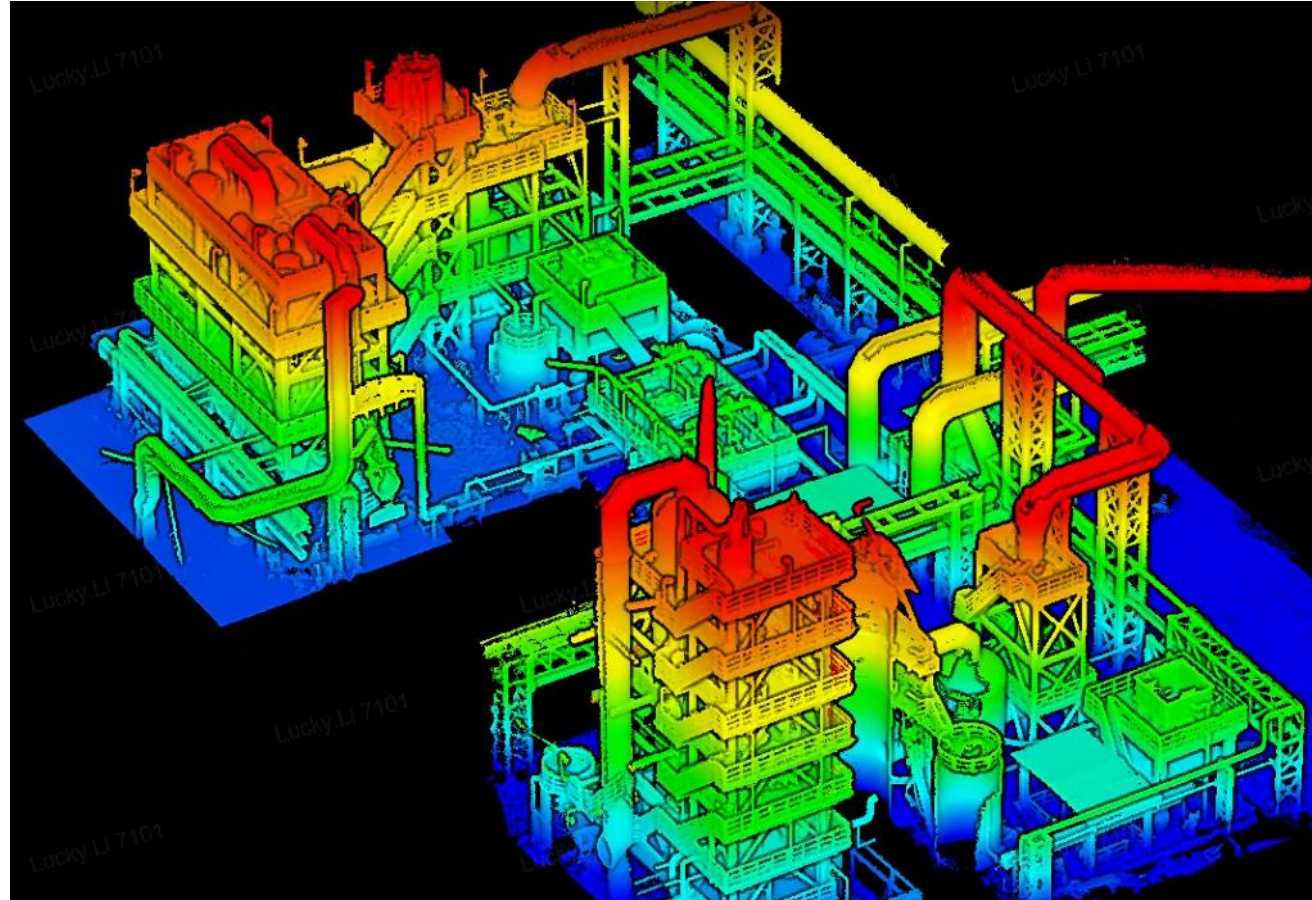
Cable / Pipe laying registration



- Registration of underground cables and pipe 3D locations
- Reduced interruption of digging activities by surveyors
- Especially useful for geo-referenced longer trenches



Industrial plant

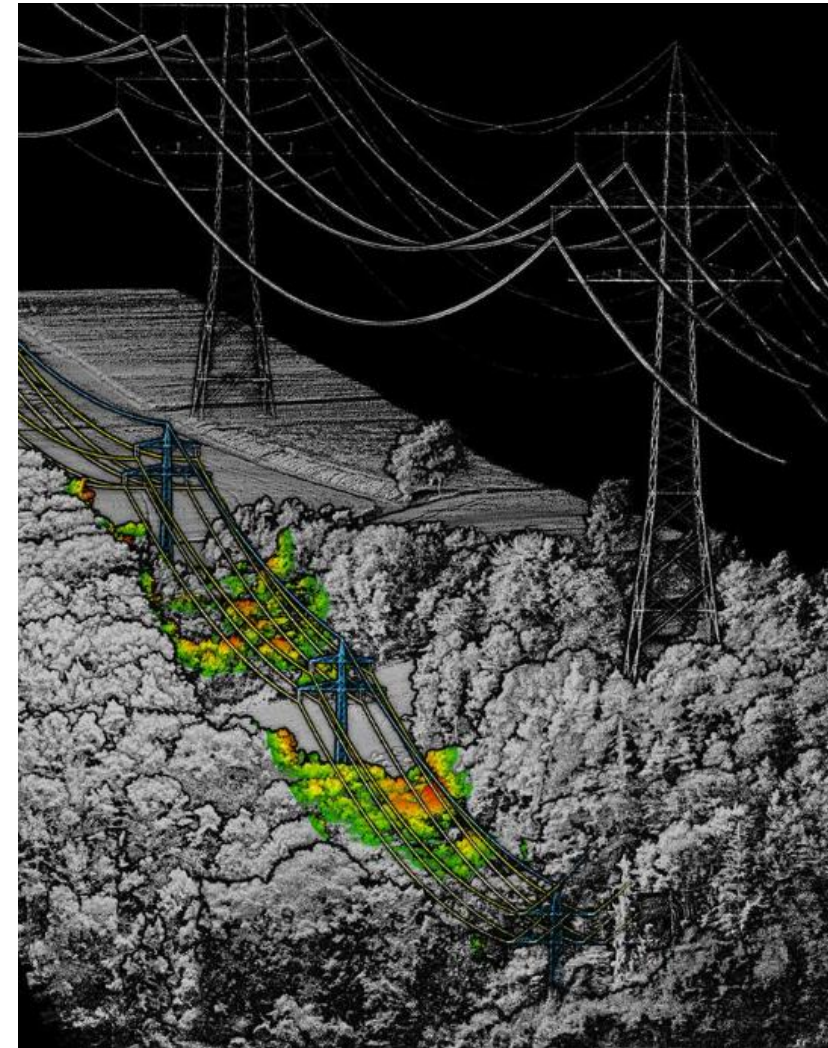


Use FJD Trion P1 to scan chemical plants with numerous pipelines and complex equipment, quickly obtain high-precision point cloud of the factory area, and help enterprises build digital factory platforms.

Powerline Surveys



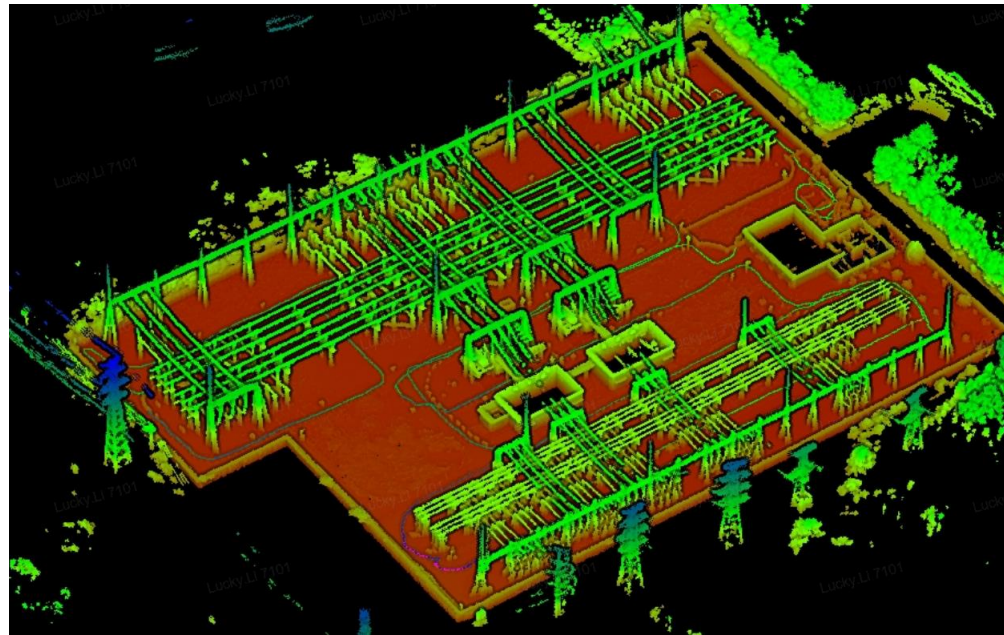
- **Check wind effects / max swing**
- **Avoid trees falling on lines**
- **Powerline vegetation map**
- **Vegetation clearance**
- **Avoid wildfires**



Powermast / Telecom mast surveys



- Digital twins registration for maintenance
- Check space to install more antennas
 - *difficult to scan details from the ground when higher than 40-50m*
 - *Drone scanning not always allowed*



3D Modeling of Substation 1



A substation about 40000m²

- Constructing a digital twin platform, based on a realistic geographic information model for unmanned aerial vehicle inspection route planning, unifies management and efficient operation of substations within the given regional area.

Demand

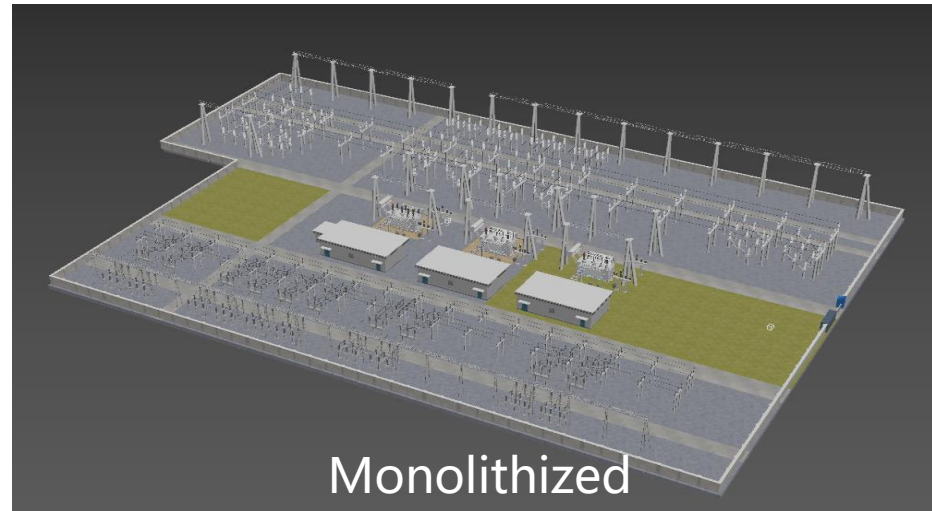
- Data Collection: Backpack scanner FJD Trion S1 equipped with RTK and panoramic camera
- Data Processing: Data processing software FJD Trion Model, obtaining true geographic coordinates and colored point cloud data
- 3D Modeling: 3DMAX 2024, single-object modeling based on point cloud data

Task



Case materials are all anonymized, and the use of them is prohibited for any illegal copying.

3D Modeling of Substation 2



By scanning the point cloud data obtained, using 3DMAX modeling software to create a monolithic model, constructing a digital twin platform for substations, planning drone inspection routes based on real geographic information models, and unifying the management of substations within the region for efficient operation.

3D Modeling of Substation 3

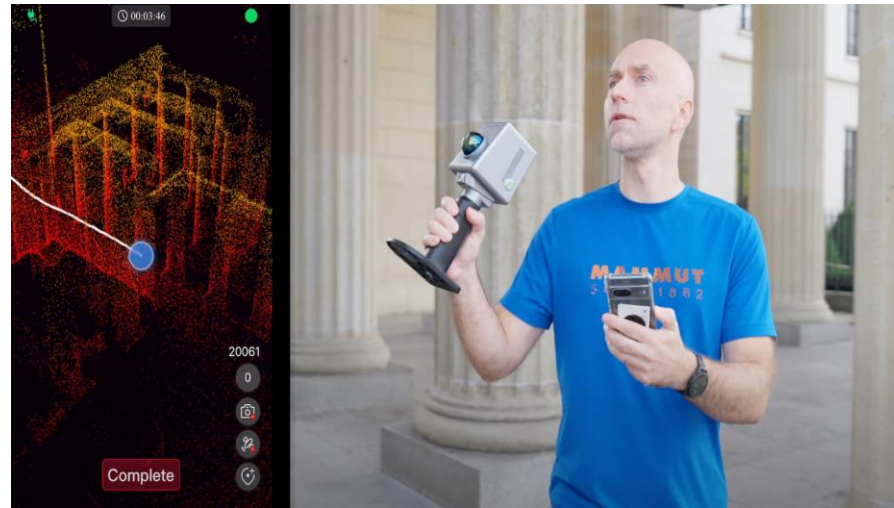


The collection of data from multiple devices to obtain more comprehensive data, making operations more flexible and efficient.

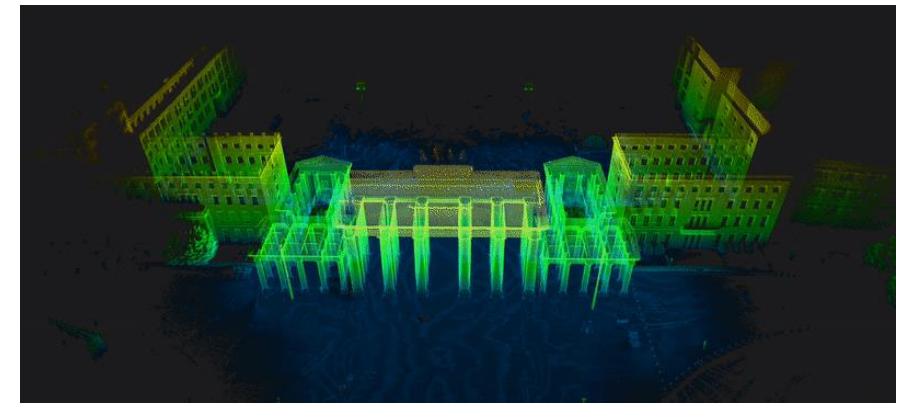


- During the actual operation of scanning in substations, the appropriate data acquisition method can be selected according to the on-site conditions and project requirements. The data acquisition methods of various devices can also adapt to different scenarios and needs.
- For example, when operating in indoor or other special environments, other types of scanner equipment may be required for data acquisition. Therefore, adopting a combination of multiple devices can better meet the various needs in practical operations, improve the comprehensiveness and reliability of data collection.
- For instance, using DJI L2 to collect top-level data and FJD Backpack Scanner to scan ground data can obtain more complete and precise results through software integration. The integrity of this data also helps to improve the accuracy of subsequent data analysis and application, thereby better supporting the operation management and decision-making of the power system.

Heritage / Archaeologic Surveys



- Heritage documentation for posterity
- Create Digital Twins
- Settlement reconstruction
- Reconstruct heritage by reversed engineering (a.o. 3D-printing)

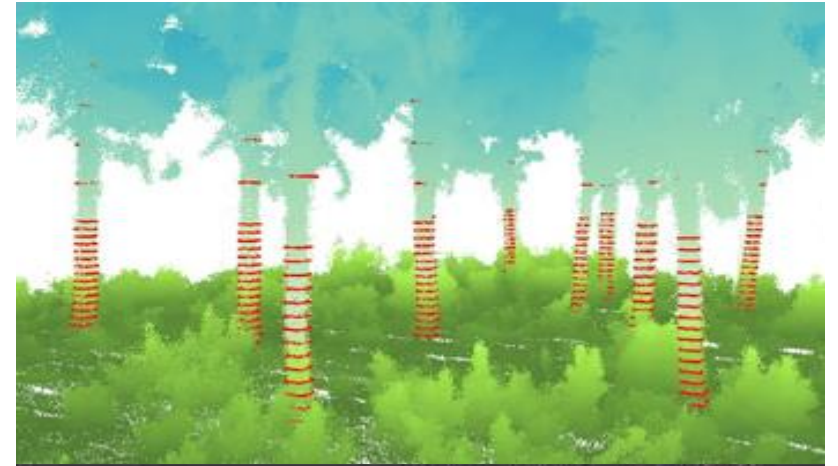




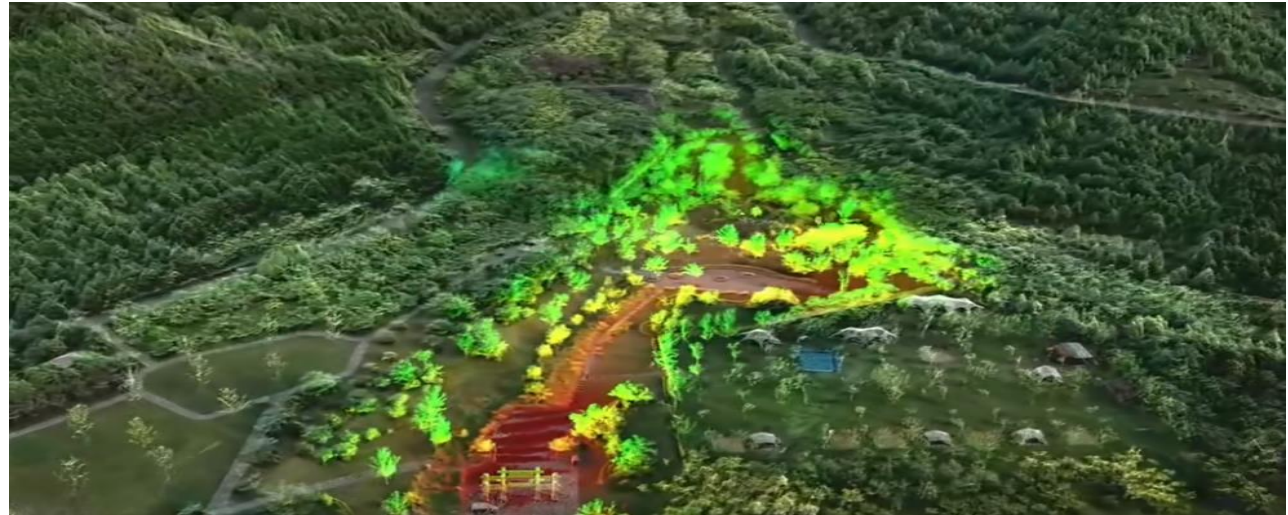
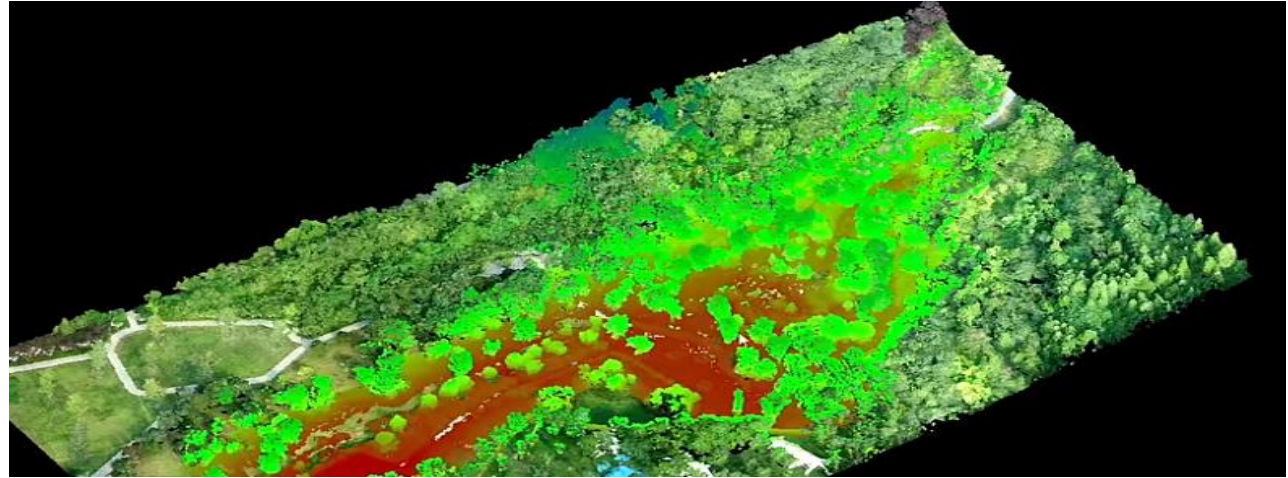
Other Market Segments

- **Forestry**
 - Biomass volume calculation
 - Tree Inventory
 - Forest Maintenance
 - 3D terrain model
- **Media & Entertainment / games industry**
 - 3D content
 - Virtual environment
- **Education**
- **Landscaping , gardening / parcs maintenance**

- **Biomass volume calculation**
- **Tree inventory (classification)**
- **Forest maintenance**
- **3D Forest terrain model**
- **... (yet to work out in detail)**

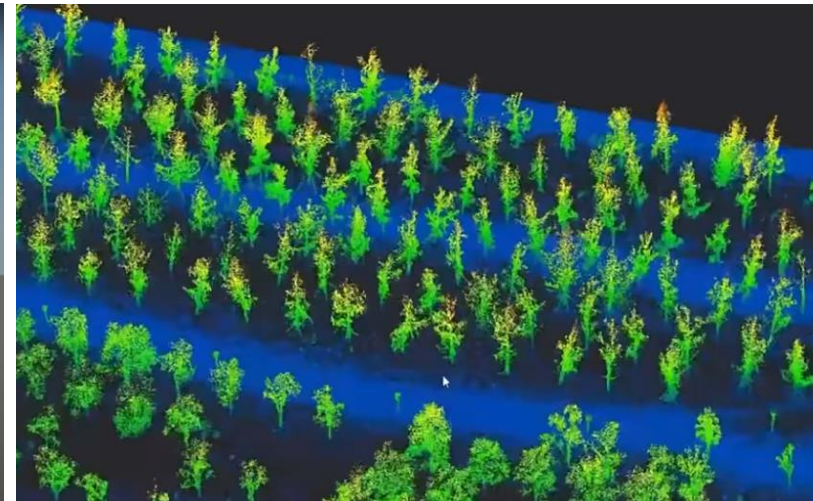
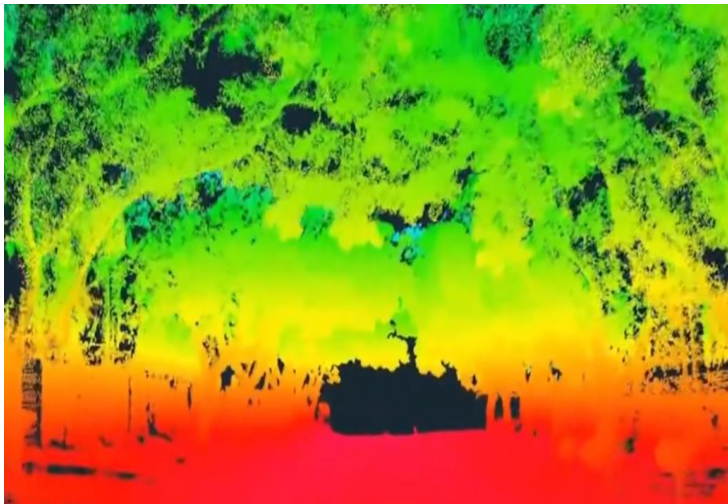
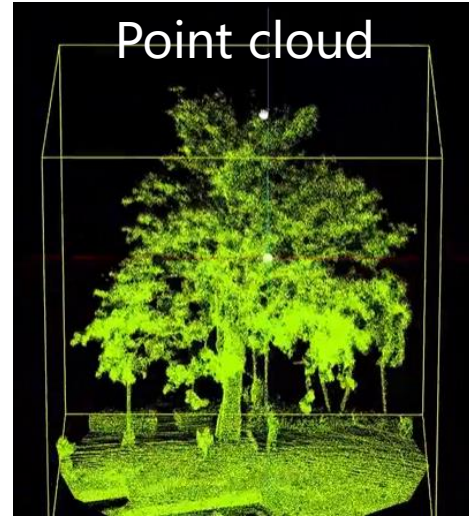


Forestry Air-ground integration



Drone scans aerial data, S1 collects detailed tree point cloud data under the forest. The fusion of the two data makes forestry data analysis more accurate.

Forestry survey/modelling analysis



Timely scanning of forest point cloud data, analyzing forest growth by automatically calculating forestry factors and other parameters

Forestry Analysis with Rocket 1.0



ID	Latitude	Longitude	DBH	Height	Crown Width
1	22°17'52.3"N	114°00'52.9"E	1.22m	12.6m	8.30m**
2	22°17'52.3"N	114°00'52.9"E	1.22m	12.6m	8.30m**
3	22°17'52.3"N	114°00'52.9"E	1.22m	12.6m	8.30m**
4	22°17'52.3"N	114°00'52.9"E	1.22m	12.6m	8.30m**
5	22°17'52.3"N	114°00'52.9"E	1.22m	12.6m	8.30m**
6	22°17'52.3"N	114°00'52.9"E	1.22m	12.6m	8.30m**
7	22°17'52.3"N	114°00'52.9"E	1.22m	12.6m	8.30m**
8	22°17'52.3"N	114°00'52.9"E	1.22m	12.6m	8.30m**
9	22°17'52.3"N	114°00'52.9"E	1.22m	12.6m	8.30m**
10	22°17'52.3"N	114°00'52.9"E	1.22m	12.6m	8.30m**

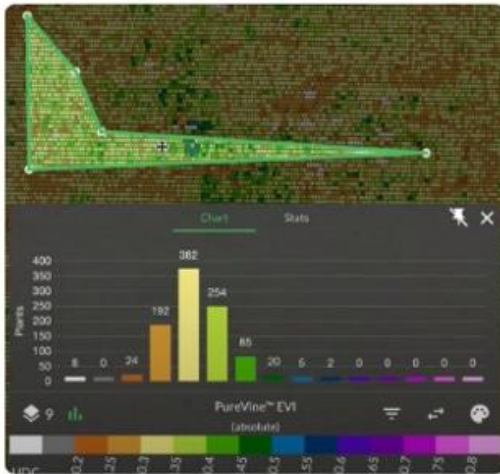
LiDAR Scanning Data:

- Tree Coordinates
- Tree DBH
- Tree Height
- Tree Crown Width

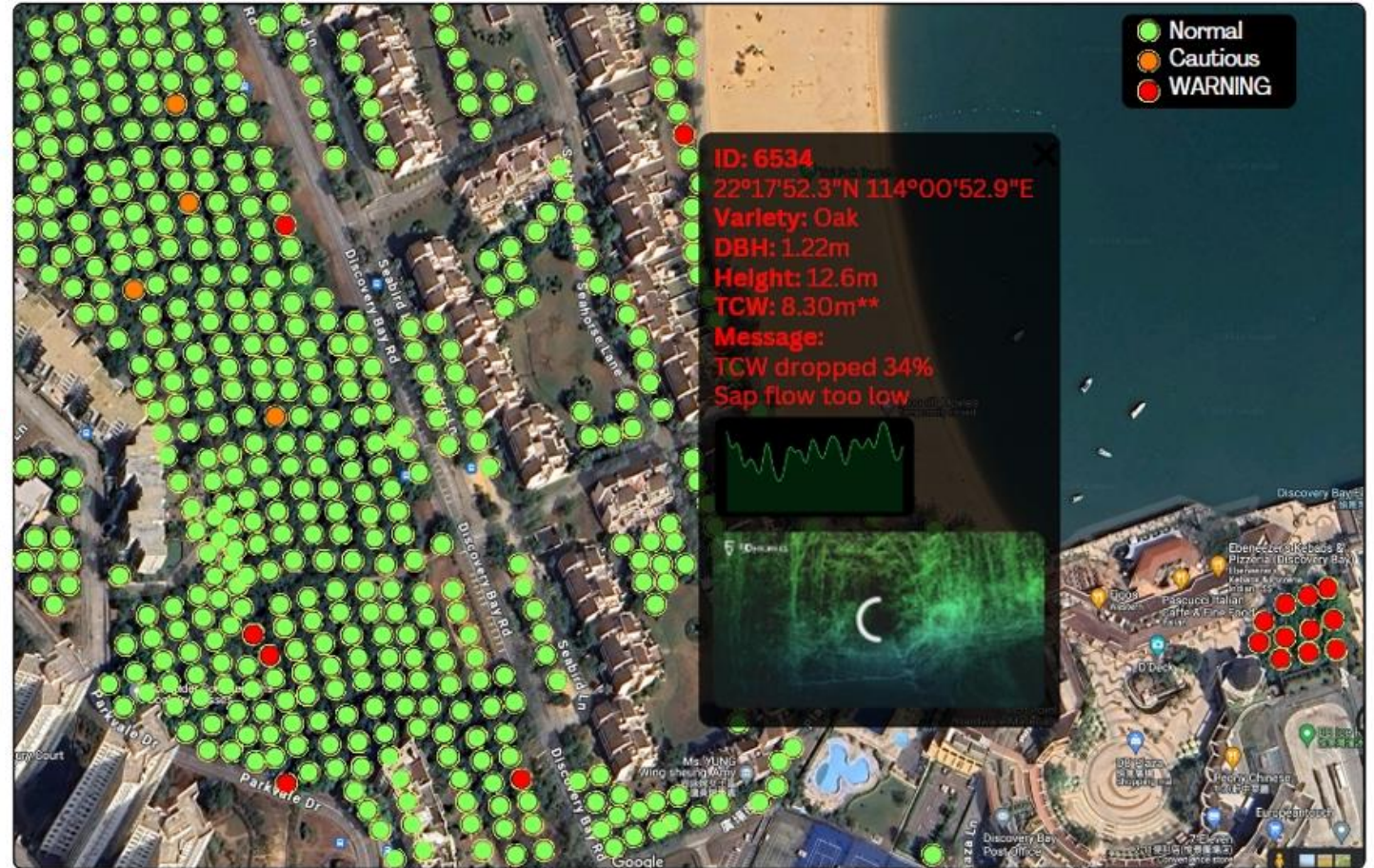
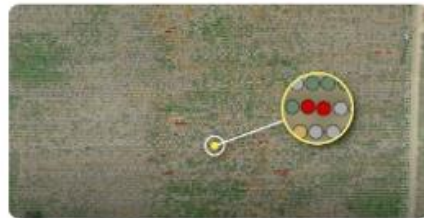


Rocket 1.0/2.0 Data:

- Climate sensors
- Soil sensors
- Dendrometer
- Sap Flow Meter
- Inclinometer



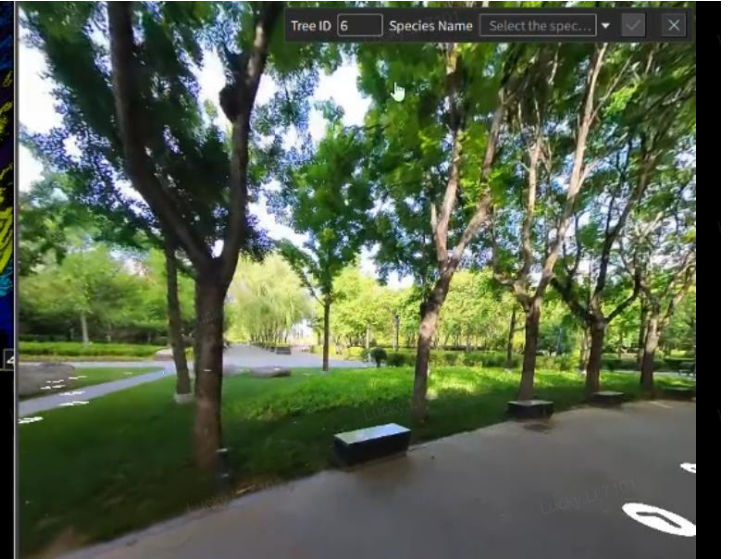
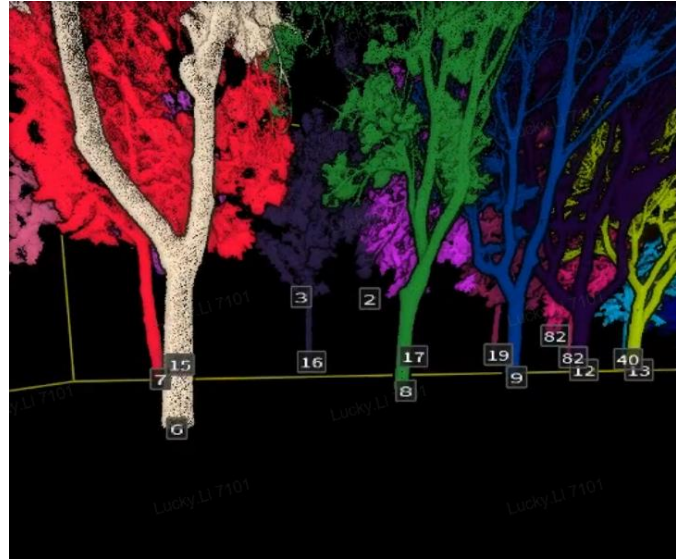
UI Reference by Vineview



By combining data from FJ Dynamics' LiDAR scanner and Rocket 1.0, the live ADAMS Dashboard can generate comprehensive reports for each tree, assigning a unique ID. This system significantly reduces maintenance time and labor costs while enhancing safety standards.

Additionally, we can calculate the CO2 absorption of each tree and use this data to generate carbon credits.

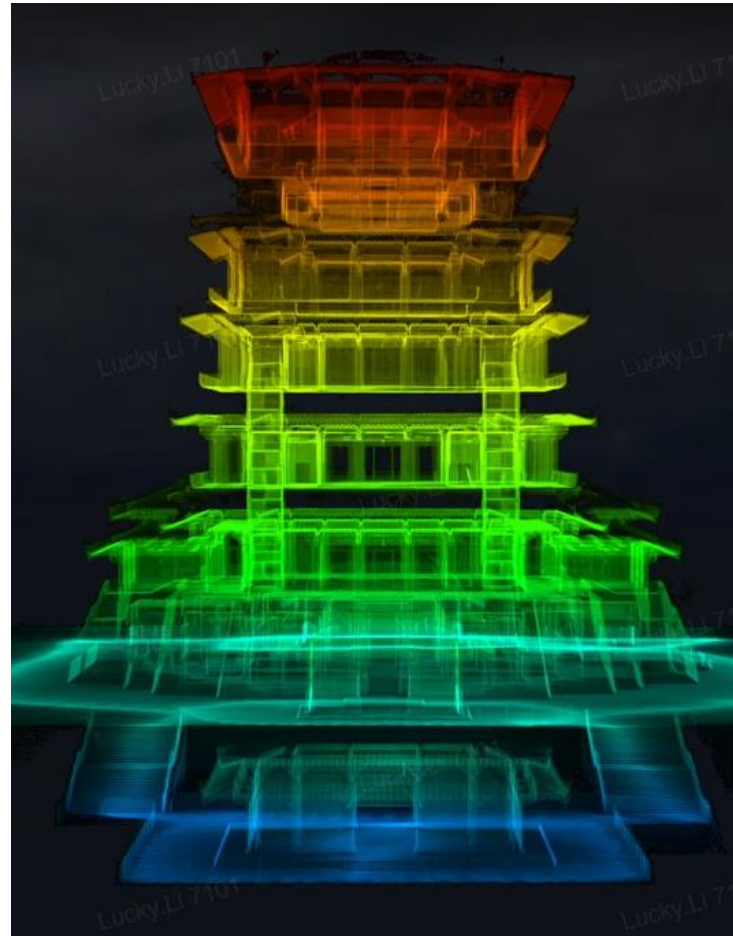
Landscaping



Media & entertainment



- 3D content
- Virtual environment



Education



- Today' s students are our tomorrow' s clients
- Special class packages incl extra student software licenses
- Only for registered educational institutes
- Only for non-profit use
- Condition to deliver student research / test reports



Robot Mapping



Scanning

Post-processing

Create map

Route setting

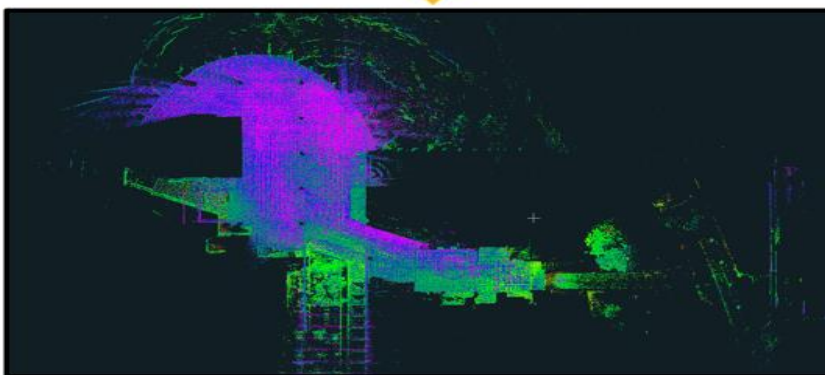
- After complete the mapping, draw the routes on the 2D map.
- The disinfection robot will follow the route and disinfect. During the operation, avoid obstacles according to the scene situation until the disinfection task is completed.



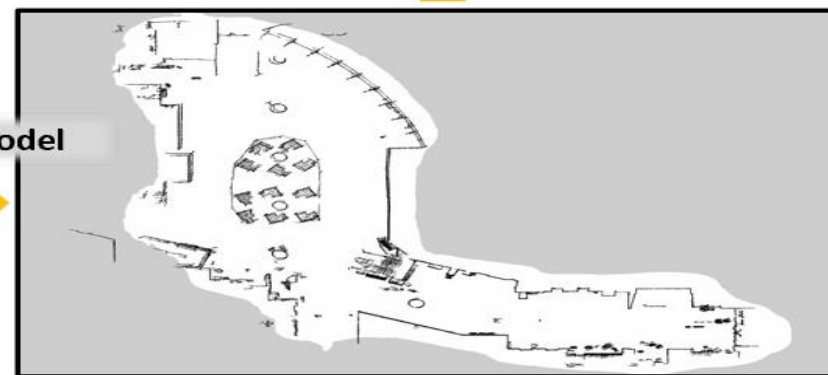
FJD Trion S1



Disinfection Robot



Trion Model



One-Stop Solution



Field



Handheld scanner



Airborne lidar



RTK backpack



Static application



Vehicle-mounted



Point cloud data las, ply, pts, e57...

Internal business



FJD Trion Model
Data processing software