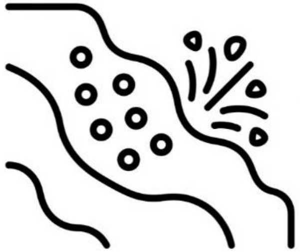

DJI GEOSPATIAL
MINING SOLUTION

Mining Industry Overview

- Over 15,000 active mines worldwide.
- The market is expanding year by year.
- Labor shortages are driving up mining costs rigidly.
- Drones are increasingly being applied in the mining industry.

Exploration and Construction

Time-Consuming



Drill and Blast

Ore Waste

Load and Transport

High Energy Cost

Operation Management

Lack of Risk Management

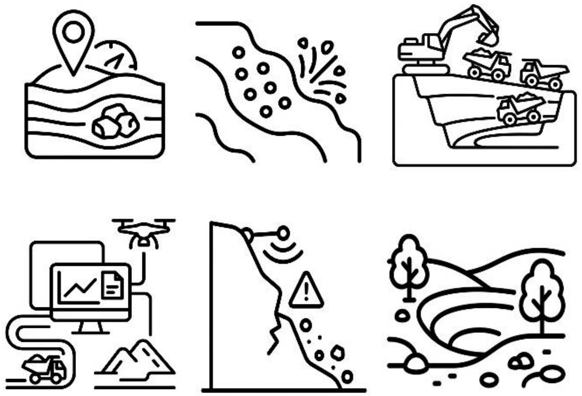
Safety Monitoring

Slow Response

Reclamation

Ground Instability

MINING SOLUTION



PSDK | MSDK | ESDK

TERRA API | Cloud API | 云云对接

Full Lifecycle Application	Rich Hardware & Software	Multiple data outputs	Development Interfaces
Survey and Transportation	Hardware + Software + Platform	Surveying, Safety, Progress Photos	Hardware Expansion
Operations Management	Entry to Professional	Videos, Vectors, Rasters...	Software Integration
Reclamation and Greening	Affordable Costs	Everything You Need	Platform Interoperability
Meets all-stage needs	**Low procurement**	**Compatible with workflows**	**Core to smart construction**

EXPLORATION AND CONSTRUCTION

High-Precision Surveying and Mapping

Geological prospecting mainly analyzes research by conducting on-site manual surveys. To improve efficiency and reduce labor intensity, satellite remote sensing combined with hyperspectral and thermal infrared methods is now often used for large-area exploration, followed by on-site manual verification.

Low Precision

Large sampling intervals and low accuracy in ground magnetic surveys

Low Efficiency

TPS/GPS data fails to reflect subsurface mineral distribution accurately.

Multi-source Data

multi-source integration of surveying and mapping data.

Harsh Environment

Mineral resources are mostly distributed in undeveloped areas; infrastructure is limited.

EXPLORATION AND CONSTRUCTION

TIR Vein Identification for Ta–Nb Deposits

Rare Metal Mineral Resources

China ranks second in the world in niobium reserves, and first in tantalum ore reserves.

Adding 0.02% niobium to steel increases strength by 25%

Widely used in maglev and superconducting fields.

High Prospecting Difficulty

Deposits are generally small in size; many are concealed deposits.

The degree of alteration development in the deposits is low, making it difficult to distinguish them from ordinary rocks.

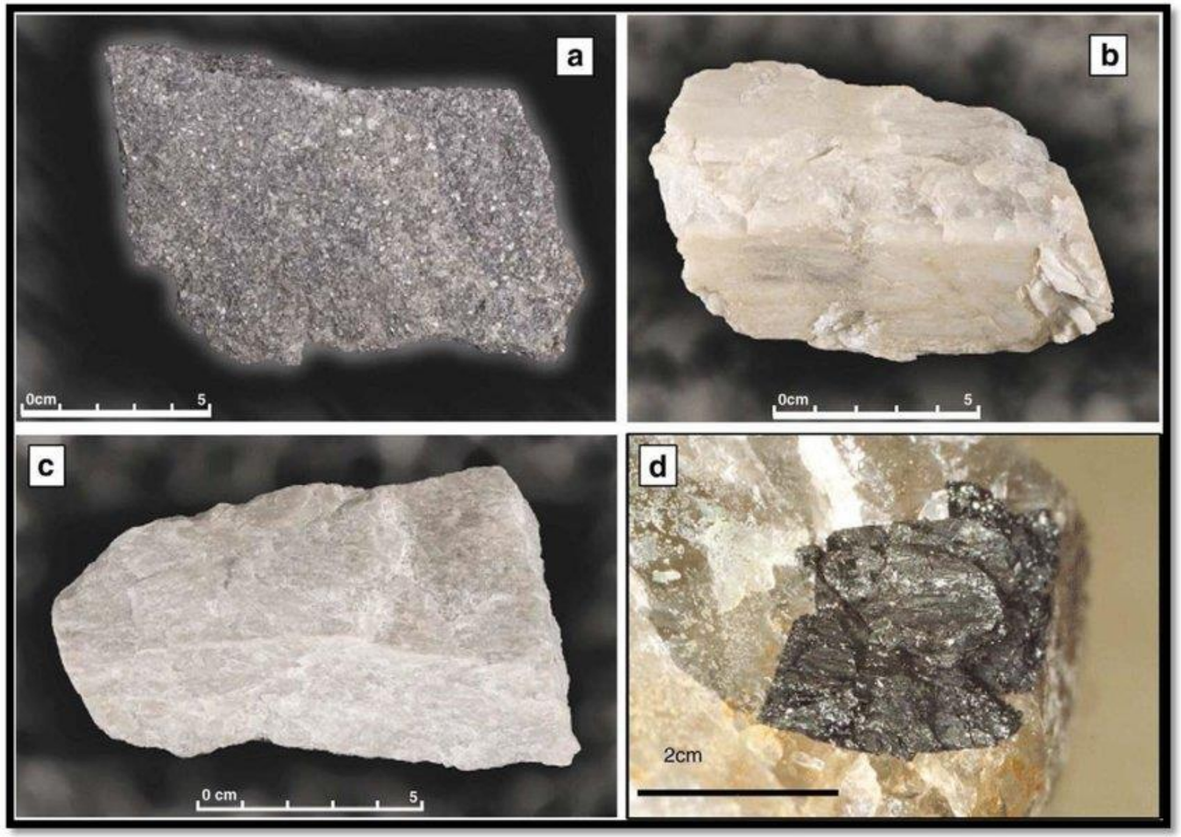
Radiation characteristics appear only in the near-infrared bands

Integrating Multi-Source Data

Landsat-8 + H30T thermal imagery + in-situ spectral data

Integrate supporting information by inversion of thermal infrared data

Achieve identification of ore-forming veins



EXPLORATION AND CONSTRUCTION

Space–Air–Ground Remote Sensing Mineral Exploration

LANDSAT-8

NASA launched it on February 11, 2013.

It achieves global coverage every 16 days.

Equipped with OLI and TIRS, 11 bands in total.

H30T

H30T is used to collect Thermal Infrared Data

After Landsat 8 completed data collection

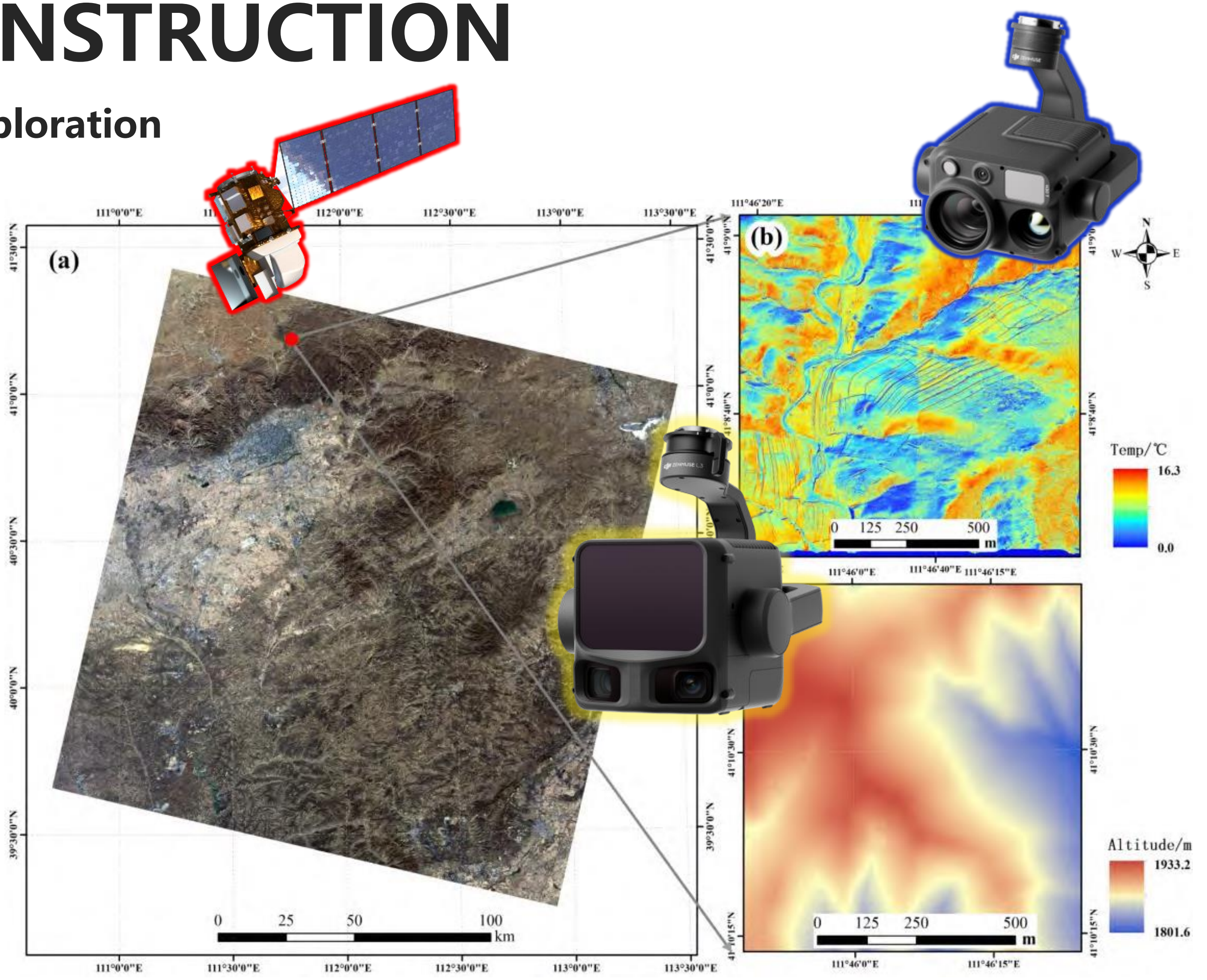
Operations were carried out immediately

L3

L3 is used to collect point cloud data to generate DEM

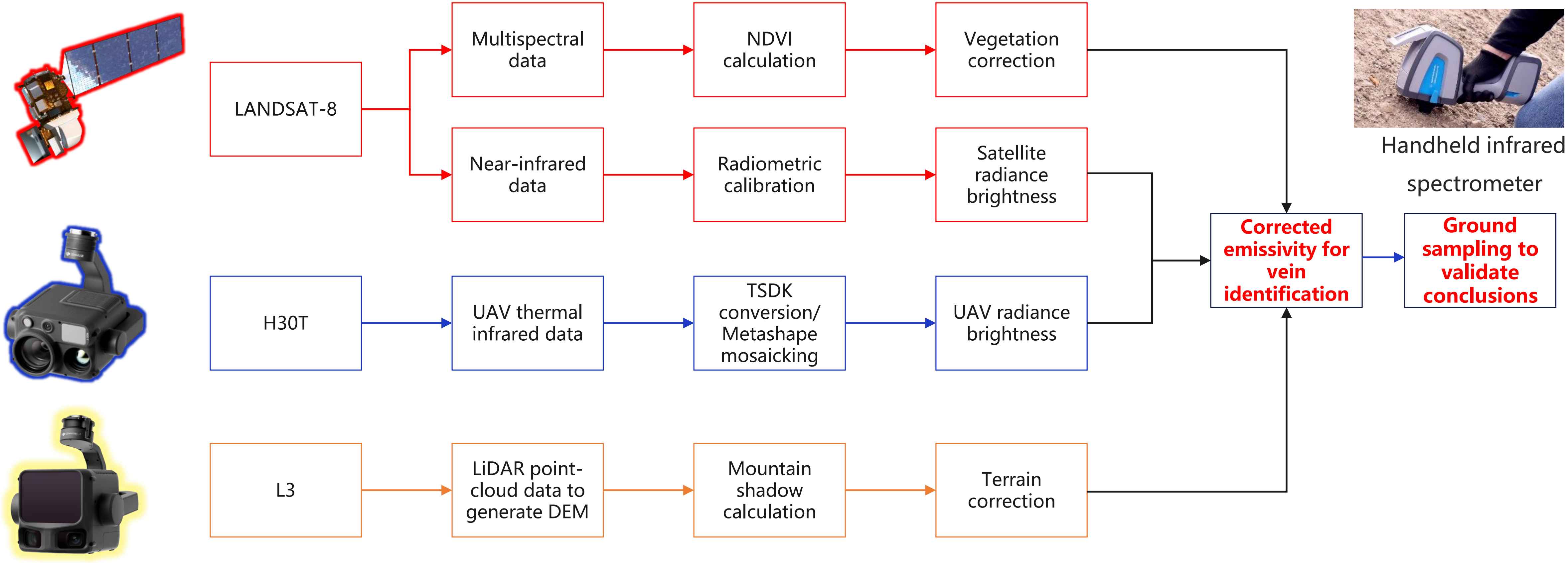
Open-source 30 m DEM data from ASTER

1 m-resolution DEM is acquired



EXPLORATION AND CONSTRUCTION

Space–Air–Ground Remote Sensing Mineral Exploration



Because the emissivity data from remote-sensing satellites are severely affected by the atmosphere and terrain shadows, it is necessary to use UAVs to collect higher-precision temperature and terrain information at low altitude to correct the remote-sensing data!

EXPLORATION AND CONSTRUCTION

China Hutou Mountain: Integrated Space–Air–Ground System

Identification Results

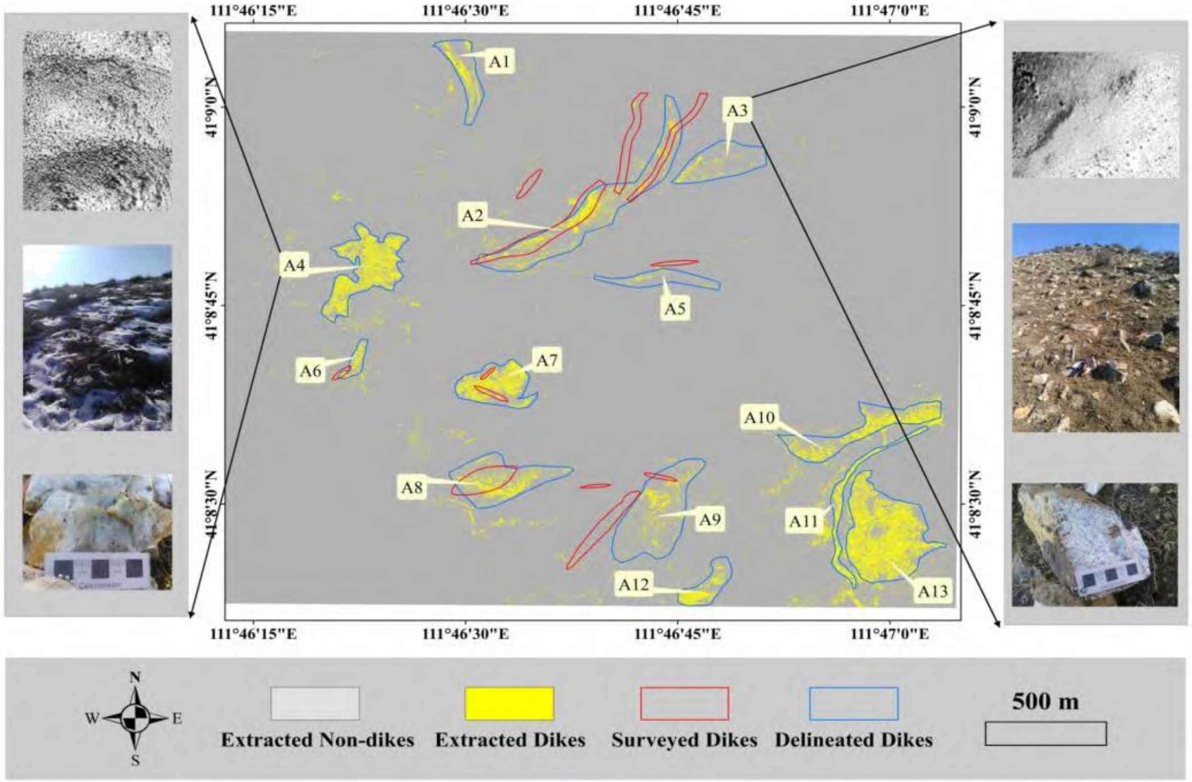
- Red boxes indicate already proven veins.
- Blue boxes indicate newly discovered veins after correction using H30T.
- Identification accuracy reaches **93%**.
- Compared with traditional manual surveying, **twice** as many vein distributions were discovered.

Conclusion

Using high-precision thermal infrared data from H30T

The reflectance of satellite infrared data can be effectively corrected

Providing effective data support for the exploration of Mo–Pb veins.



EXPLORATION AND CONSTRUCTION

Hardware Expansion

M400/350+UFO-CS

Survey area: 4 km^2, elevation difference: 800 m.

DSM terrain-following flight at 8 m height

8 sorties per day to complete the survey

Data Preprocessing

Archon Aeromagnetic Data Preprocessing

Magnetic Anomaly Map

ArcGIS Pro

Integrate magnetic anomaly maps with 3D models

Display magnetic anomaly spatial distribution

Recognize correlation with structures and terrain

DRILL AND BLAST

South African Mines

Open-pit mining primarily employs design blasting. Based on the physical properties of different rock layers, appropriate types and quantities of explosives are selected. After periodic blasting, loading and hauling operations are carried out.

Inaccurate Drilling

Cost overruns，Wasted Ore.

Blasting evaluation

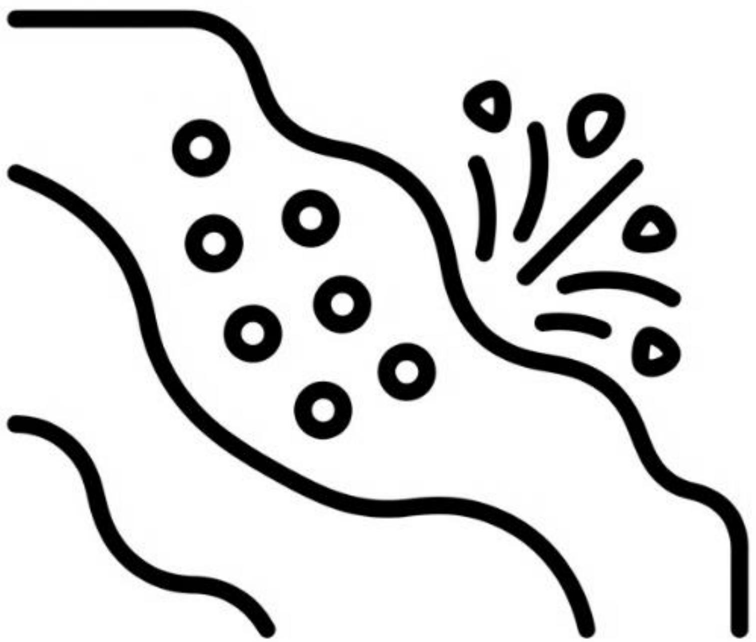
Hard to estimate the blasting output

Incomplete info

Flawed drill and blast.

Harsh Environment

Higher drill and blast risks.



DRILL AND BLAST

South African Mines

DJI M4 Series

M4E drone is used for collecting terrain data .

M4T drone is used for safety construction patrols.

Coverage extends to the 3-kilometer blasting management.

D-RTK3

D-RTK3 provides real-time centimeter-level positioning for drones

D-RTK3 supports GCP deployment to ensure survey accuracy.

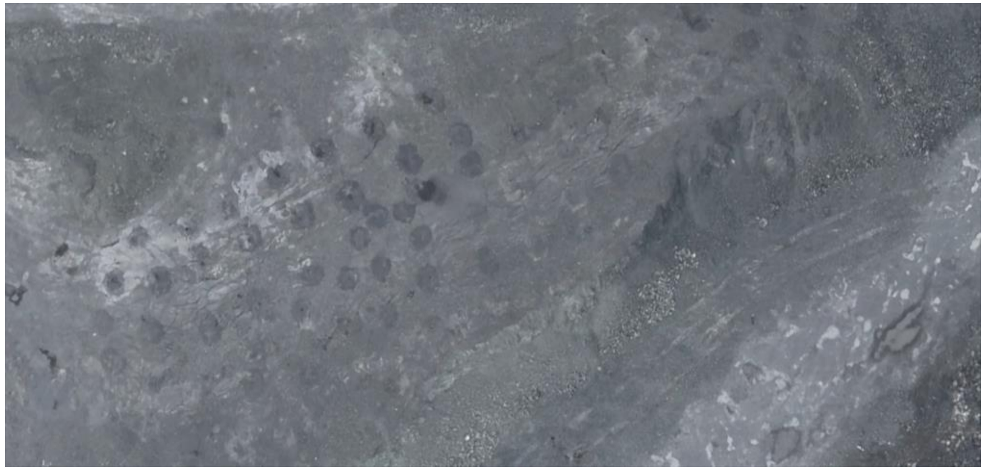
D-RTK3 is used for precise blast hole layout.

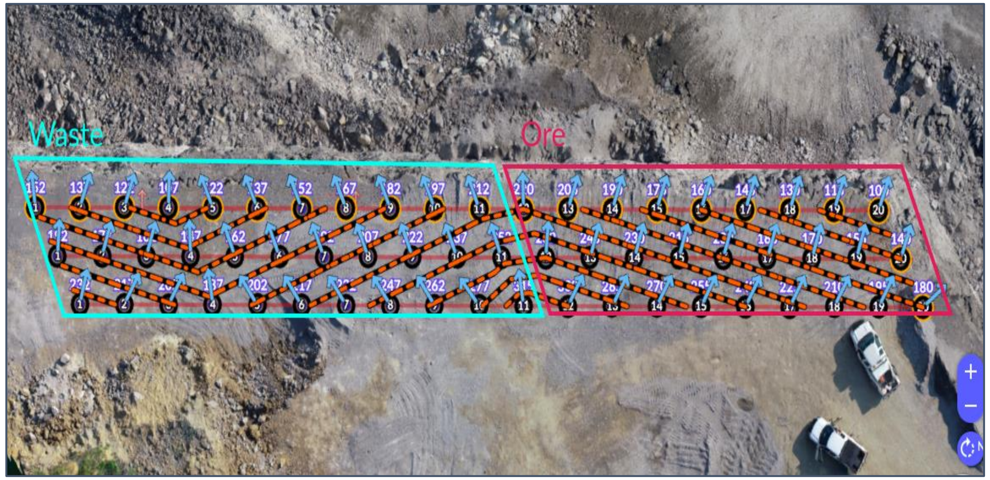
Data Processing

DJI Terra reconstructs M4E survey data into 3D models.

Imported into 3DMine for blast design and outcome forecasting.

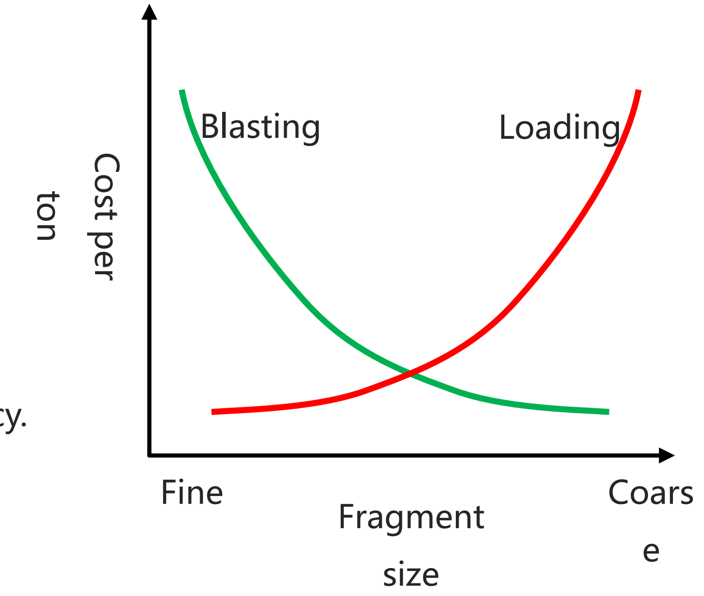
Pre-blast Design, Drilling & Blasting Monitoring, Post-blast Evaluation





DRILL AND BLAST

Tangshan Iron Mines



Mine Blasting Requirements

Uniform fragmentation after blasting is required for efficient loading and hauling.

Uneven and excessively large fragmentation after blasting severely impacts loading efficiency.

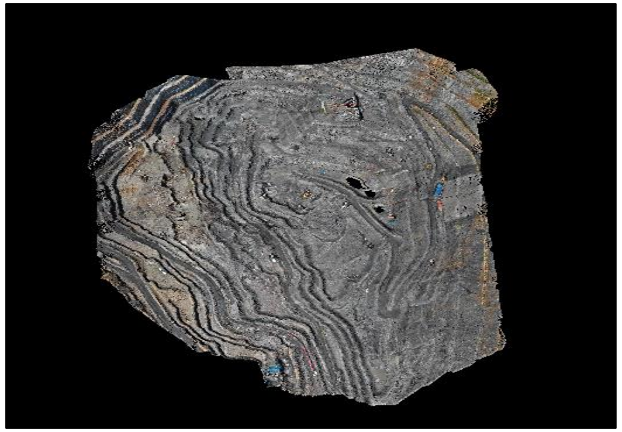
Optimizing the design of blasting explosive quantities is a critical task.

Traditional Methods

On-site sampling and analysis by personnel.

Blasting parameters primarily set based on experience.

Leads to overuse of explosives and higher costs.



DRILL AND BLAST

Explosive Consumption Prediction

DJI Solution

Use the M400 + L3 to surveying.

Analyze post-blast fragmentation sizes using aerial photos.

Simulate blasting effects on models for blasting design.

3DMINE Blasting Simulation

Simulate boreholes and explosive parameters

1–3 samples → big accuracy gain

3 samples → negligible gain

3 samples per blast area is optimal

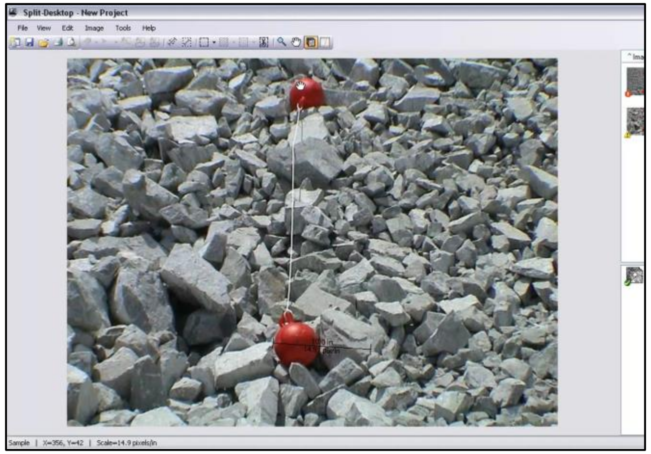
Hexagon SPLIT Software

Automated fragmentation segmentation

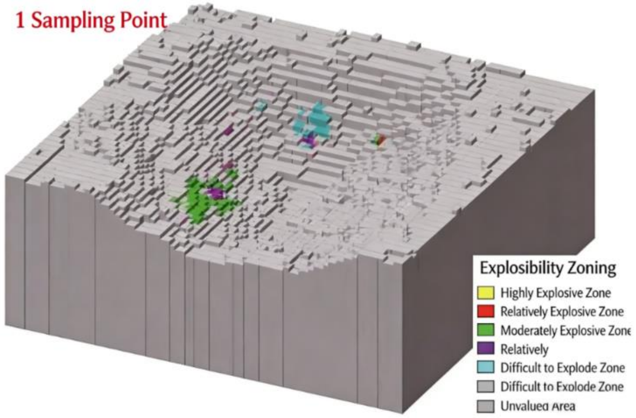
Use scale markers to measure size

Generate fragment size distribution chart

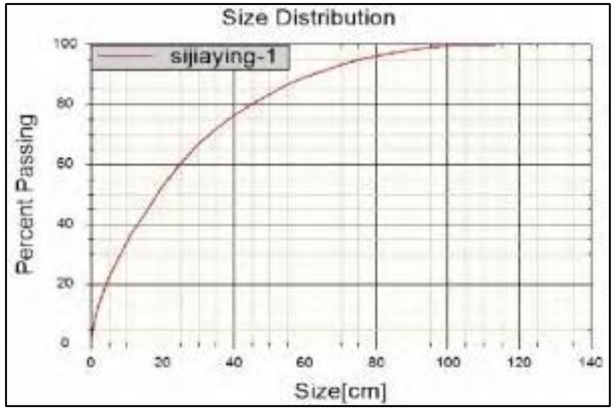
Raw P1 Aerial Image After Blasting



Fragment Segmentation and Size Statistics with SPLIT Software



Effect of Sampling Density on Blasting Simulation Results



Fragment Size Distribution Result

DRILL AND BLAST

Explosive Consumption Prediction

Explosive Prediction

Use drone analysis to predict explosive consumption

Average mean error: 0.15 kg/m³

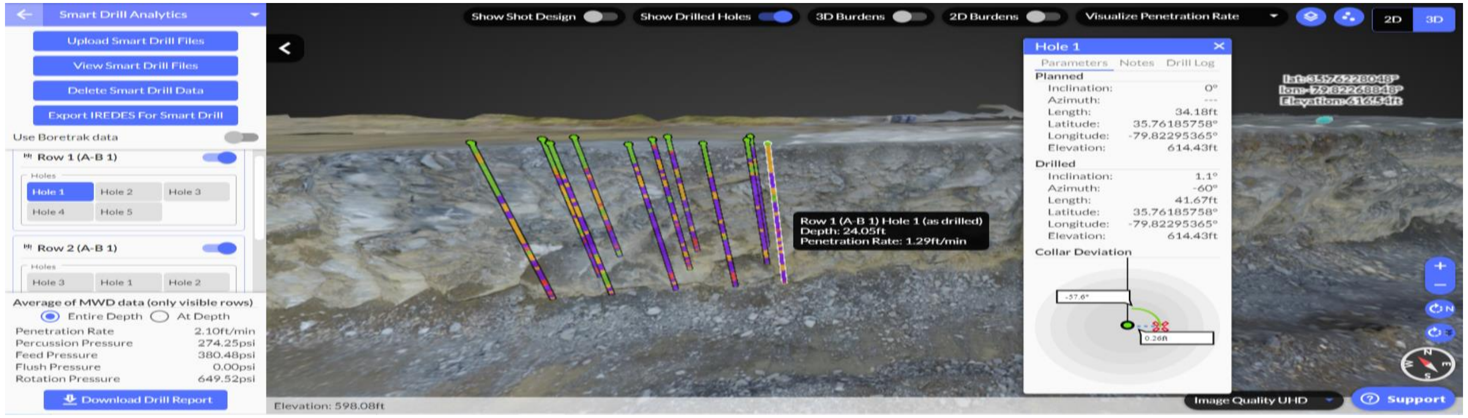
Blasting Cost Reduction

Reduce manual sampling labor

Improve safety and efficiency

Match manual analysis performance

Achieve cost reduction and efficiency improvement



No.	Blast Area Sample	Blastability	Actual (kg/m³)	Frag Size (cm)	Predicted (kg/m³)	Abs Error	Mean Error
1	South Wall Magnetite Quartzite	Difficult to blast	1.05	25.62	0.99	0.06	
2	South Wall Hematite Quartzite	Difficult to blast	0.9	25.25	0.95	0.05	
3	Northwest Wall Quartz Sandstone	Easy to blast	0.53	27.71	0.64	0.11	
4	Southwest Wall Mixed Rock	Easy to blast	0.47	36.22	0.13	0.34	
5	Southwest Wall Mixed Rock	Easy to blast	0.55	45.82	0.29	0.26	0.15
6	Northeast Wall Biotite Leptite	Medium	0.59	30.79	0.58	0.01	
7	East Wall Biotite Leptite	Medium	0.77	36.18	0.68	0.09	
8	Southeast Wall Biotite Leptite	Medium	0.78	22.02	0.67	0.11	
9	Southeast Wall Hematite Quartzite	Difficult to blast	1.02	16.11	1.12	0.1	
10	Southeast Wall Magnetite Quartzite	Very difficult to blast	1.09	19.55	1.18	0.09	

Manual vs. Simulated Explosive Consumption Comparison

LOAD AND TRANSPORT

Full-process Digital & Intelligent Control

Data shortage and manual-driven operations directly restrict efficiency, and drive up overall costs and safety risks.

Ineff.Management

Manual inspection fails to detect road defects in time, causing excessive tire wear and high fuel costs

Lack of Loading Control

Manual judgment of loading volume/fragmentation causes overloading/underloading and downstream downtime

Outdated Stockpile

Manual on-site stockpile survey leads to low measurement accuracy and high personnel safety risks

On-site Safety Risks

No real-time monitoring of slopes and haul roads, with collapse and rollover hidden dangers

LOAD AND TRANSPORT

STRAYOS & DJI: INTELLIGENT HAUL ROAD OPTIMIZATION

Field Data Acquisition

M4E completes full road network survey, captures high-res pavement images

Onboard RTK/PPK provides calibration, meets mine survey-grade accuracy

Efficient low-risk field work, 80%+ efficiency

Scheme Optimization

Strayos automates aerial processing for survey-grade 3D road digital twins

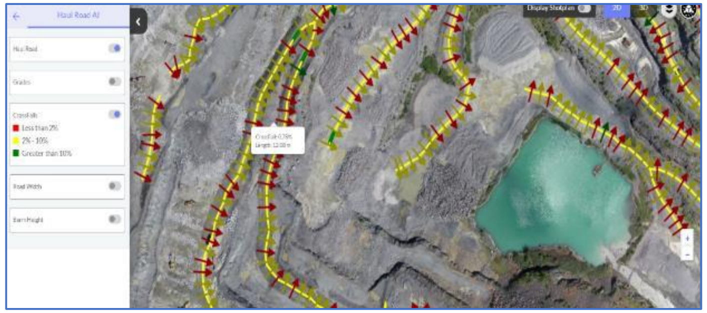
AI intelligently identifies road defects, generates graded risk distribution map

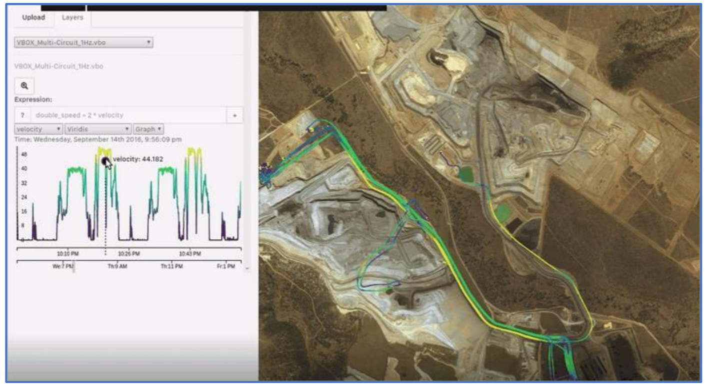
One-click road optimization deliverables, multi-format export for mine system docking

Closed-loop iterative optimization

Drone re-survey & truck data verification, confirms actual tyre & fuel cost reduction

Long-term cost reduction, full transport process closed-loop management





OPERATION MANAGEMENT

Safety-Driven Production Orchestration

In traditional mining, operation management is a constant negotiation between plan and reality—changing ground conditions, moving equipment, and rotating crews.

Shift Handover

Critical hazards and temporary controls are lost between shifts, leading to repeated exposure and inconsistent execution.

Equipment Readiness

Machine health, proximity risks, and operator fitness are checked unevenly, making "available" equipment not always "safe to run."

Limited Transparency

No automated KPI dashboards or reports

Disconnected Workflows

No end-to-end optimization (exploration to processing)

OPERATION MANAGEMENT

Goaf Disaster Management Case

Goaf-Related Hazards

Vast goafs in underground coal mines cause surface cracks over time.

Cracks lead to water filling and air leakage, posing severe safety hazards.

Limitations of Survey

Complex terrain makes manual survey difficult and inaccurate.

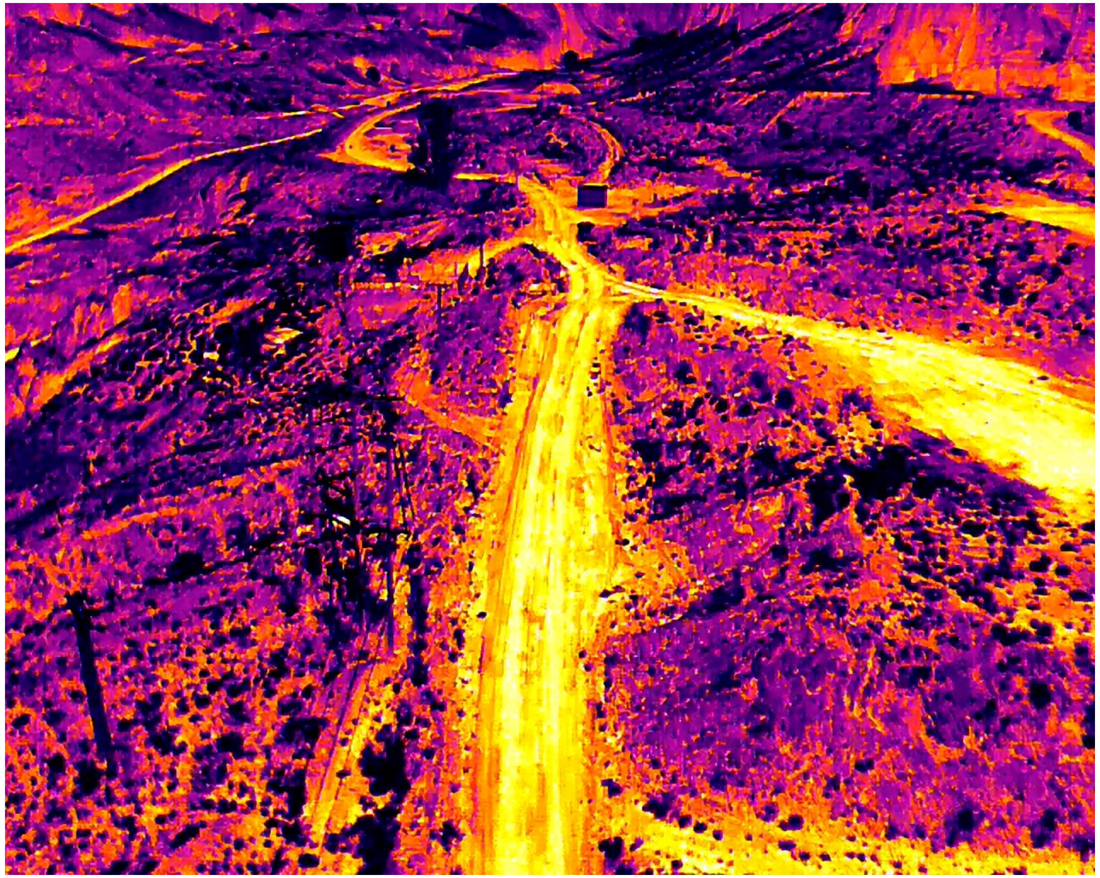
Large-scale surveys require massive resources with significant safety risks.

Lack of Risk Management

Unable to track crack propagation; delayed hazard detection.

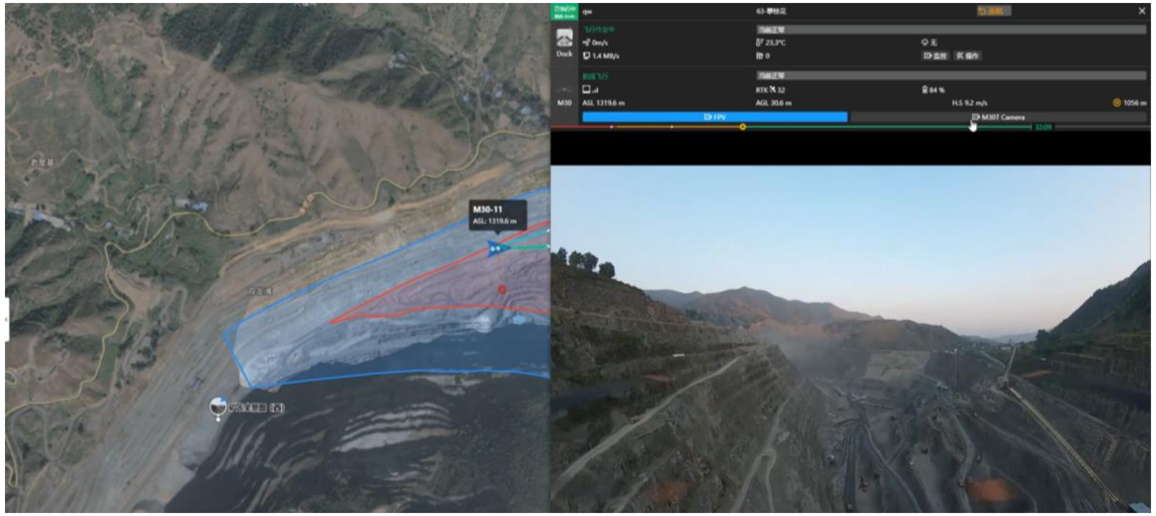
Cannot quantify filling effectiveness; secondary risks unaddressed.

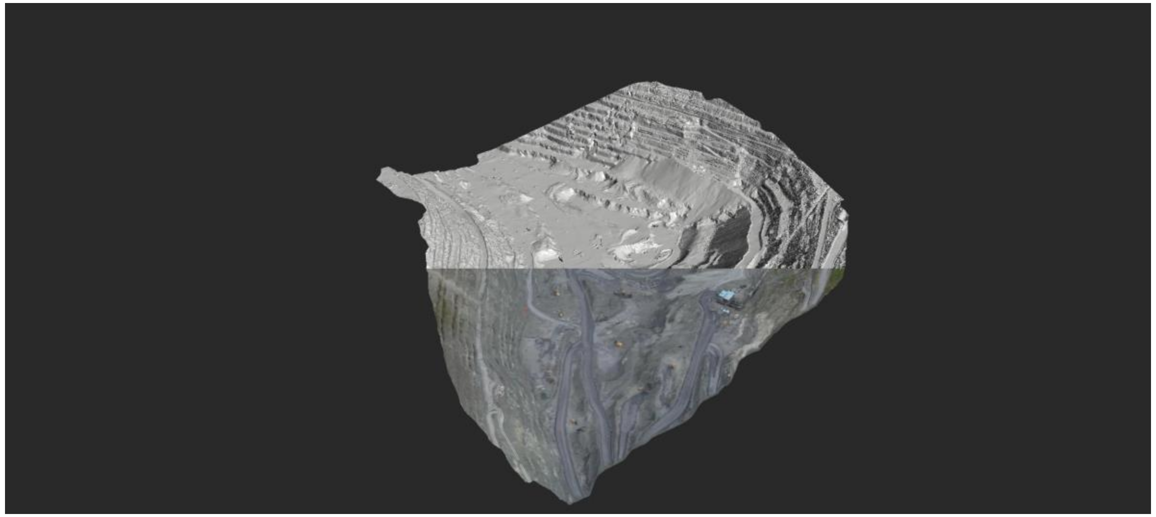
Crack data isolated from other data, hindering comprehensive assessment.



OPERATION MANAGEMENT

Solution Selection





DJI Dock 3

24/7 unattended, high-frequency surveys for dynamic crack monitoring

Scheduled & anomaly-triggered modes to capture crack propagation

Auto-uploads imagery for reliable DSM data

DJI Terra

Generates high-precision DSM & 3D models for accurate crack measurement

Compatible with third-party software for crack detection & vectorization

Exports standard data to integrate with management systems

BIM

Cloud APIs connect drone data pipeline for live stream & BIM analysis

Cloud-to-cloud integration enables low-cost, closed-loop data applications

Workstream Integration with Existing Smart Mining Platforms

OPERATION MANAGEMENT

Australia Gold Mine – Daily Production Intelligence (KCGM Case)

Production Visibility (Daily)

Owner needs daily KPIs beyond shift narratives: material moved, pit advance, and stockpile delta.

Deep pit geometry (up to 480 m) creates blind zones and limits safe ground verification.

Daily site snapshots must be repeatable to compare "today vs. yesterday" consistently.

Volume-to-Tonnage Control

Coverage of ~5.5 km² requires consistent baselines across active faces and stockpiles.

With ~10 cm elevation accuracy, surface differencing supports measurable cut/fill and pile change.

Volume deltas can be converted into daily tonnage using agreed density factors for reconciliation.

Shift-Ready Turnaround

Within a 5-hour operating window to match dispatch and planning cycles.

Fast exception-finding: unexpected gains/losses, rehandle signals, or changes outside plan.

Provides an auditable record for end-of-day reporting and contractor accountability.

Need a fast, repeatable deep-pit workflow to turn surface change into daily production KPIs.

OPERATION MANAGEMENT

Australia Gold Mine – Solution Selection

DJI M400 + L3 + D-RTK 3

Survey depth: 480 m deep open-pit; coverage: ~5.5–5.7 km²

DJI Pilot 2: import pit boundary KML and generate terrain-aware routes

Support long-range scanning across benches and high walls (850 m max scan distance)

20-min flight | 15-min acquisition vs 3-hour traditional workflow

Data Quality & Processing

On-site point cloud processing in ~1 hour with completeness check

Average point density: ~96 pts/m² for consistent pit/stockpile surfaces

End-to-end survey cycle in ~2 hours to match operations tempo

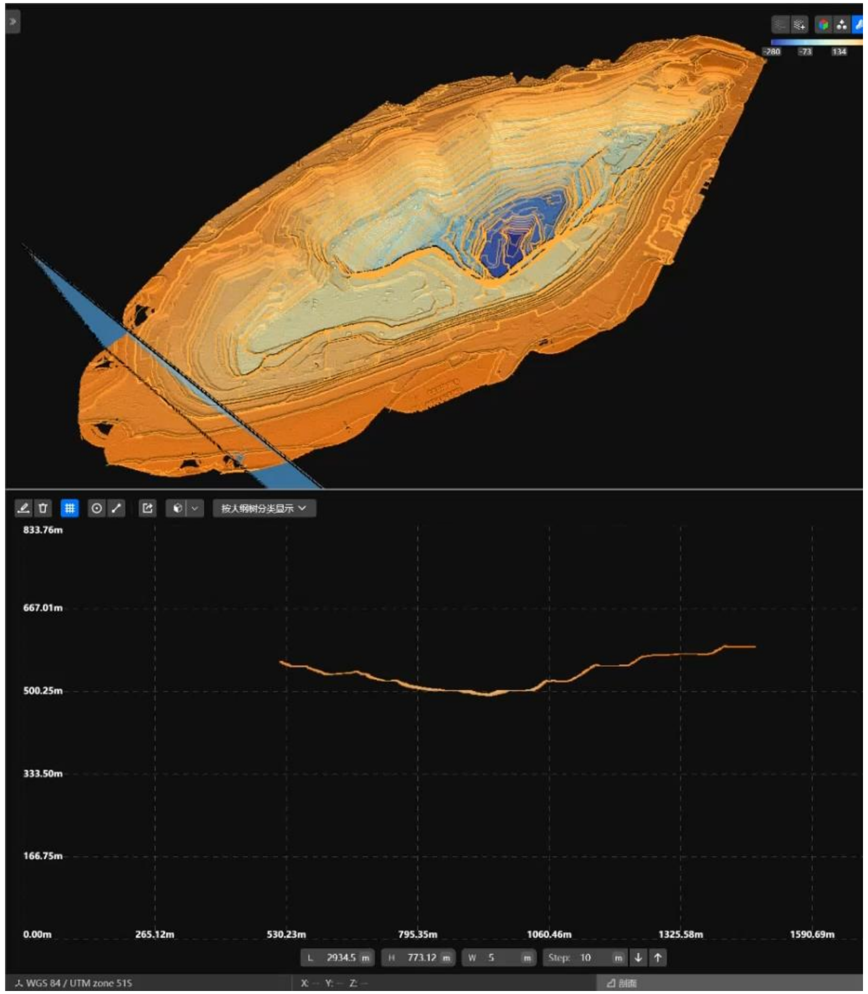
Outputs: Point Cloud + 3D Mesh + DOM/DSM

Daily Production KPI

Quantify daily changes: pit advance, cut/fill deltas, stockpile gain/loss

Convert volume deltas to tonnage using agreed density factors for reconciliation

Outputs: Daily Volume/Tonnage Report + Change Hotspots + Evidence Pack



SAFETY MONITORING

Continuous Risk Visibility in Traditional Mining

In traditional mining, key risks—like sudden gas spikes, ground shifts, equipment clashes, and worker fatigue—can get worse fast between regular checks. Safety monitoring is hard not because we lack data, but because coverage is spotty, signals are unreliable, and alerts often don’t turn into quick, consistent on-site actions.

Hidden Hazard Zones

Limited line-of-sight and inaccessible areas leave blind spots where instability and gas buildup can start undetected.

Alarm Overload

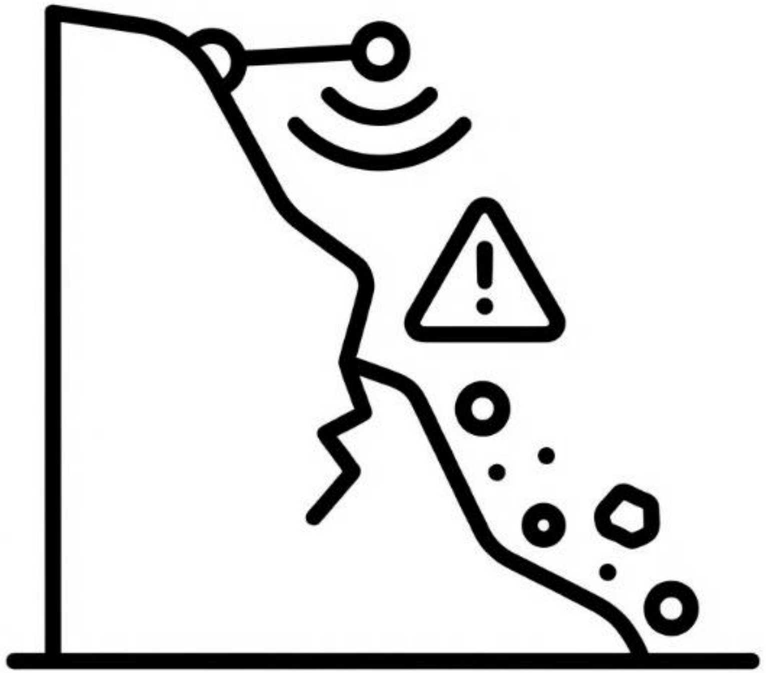
Dust, vibration, moisture, and blasting degrade sensors and networks, causing dropouts and delayed warnings.

Alarm Fatigue

Threshold-based alerts generate noise; teams learn to ignore alarms, while real events get buried in clutter.

Slow Response

Even accurate readings may not become clear decisions—who stops work, where to evacuate, and how to document compliance.



SAFETY MONITORING

Rio Tinto Kennecott- Use DJI Drone to Improve Work Safety

Background

Rio Tinto, one of the largest metals and mining corporation continuous to use drone method to improve safety and efficiency at the Bingham Canyon Mine.

Project Challenge

Employees need to walking through hazardous areas such as movement truck road.

Traditional monitoring equipment is difficult to place inside unsafe areas of the mine.

Blasting caused rocks unstable, costly production equipment may operate in unsafe areas.

Key focus areas

High wall geometry checks: bench width, catch bench continuity, berm integrity.

Rapid cross-sections and volume change to support scaling, trimming, and clean-up plans.

Verification loop: before/after evidence for mitigation actions and access control.

SAFETY MONITORING

Solution Selection (High Wall Management)

DJI Matrice 4E

Repeatable high-wall patrols for benches, catch benches, and exclusion boundaries.

Post-blast / post-rain rapid checks to refresh hazard zones within the same shift.

DJI Dock 3

Scheduled flights for frequent updates without sending crews into risky areas.

Supports cloud-based modeling and intelligent operations for continuous site coverage.

DJI Terra

3D reconstruction and mapping for consistent surfaces and measurable geometry Source.

Change detection between repeat flights to flag deformation or material loss/gain early

Outputs: Orthomosaic + DSM+ Cross-sections + Change Hotspots

SAFETY MONITORING

Queensland Mine Case Study (High Wall Management)

DJI M400/350+P1

Highwall area of Gooneyella Riverside Mine, Queensland

Conduct high-precision visible light image acquisition

Obtain high-resolution data with 3–4 cm GSD

Terra&Modify

Generate high-precision highwall DSM in Terra;

Refine models (denoise, fill holes) in Modify.

Export a refined 3D model ready for direct use in mine analysis.

Maptek Vulcan & Sentry

Import data into Vulcan to analyze strata, structural planes and assess slope stability.

Use Sentry to compare multi-temporal models and identify abnormal displacements.

RECLAMATION AND GREENING

From Closure to Living Landscapes

Reclamation is not a single project milestone—it is a staged process of reshaping landforms, rebuilding soils, restoring water balance, and establishing long-term vegetation. In traditional mining, progress is often constrained by safety realities (unstable ground, legacy hazards, and restricted access), making it difficult to verify outcomes consistently and to keep restoration on schedule.

Ground Instability

Subsidence, loose slopes, and abandoned infrastructure limit where crews can work and how frequently sites can be inspected.

Water Uncertainty

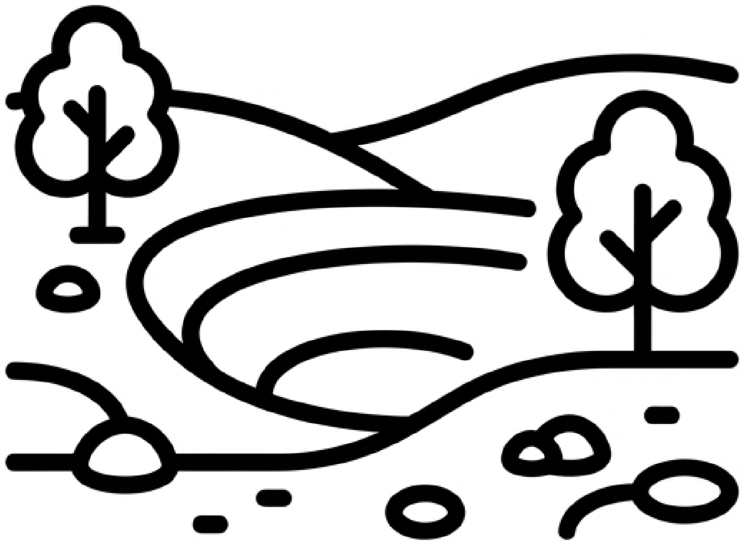
Ponding, seepage, and potential acid drainage complicate grading plans and require continuous checks beyond periodic sampling.

Soil Variability

Borrow material variability and compaction issues can prevent root growth, even when the surface “looks” finished.

Proof Gaps

Evidence for regulators and communities is scattered across photos, tests, and contractor logs, slowing sign-off and increasing rework.



RECLAMATION AND GREENING

Abandoned mining area management, Jilin, China

In order to restore abandoned mining areas and achieve the reuse of land resources. Use DJI drone to collect geographic information data for a certain mining area.

Task

Number of mining areas: 27   Mining area: 0.4-1.2 km^2/ each

Collecting geographic information data serves the preliminary design of governance plans.

Challenges

Abandoned sites contain unstable slopes, residual voids, and unmanaged runoff that complicate reclamation sequencing.

Limited safe access and inconsistent on-site evidence make it difficult to plan, execute, and verify greening outcomes at scale.

Risk Blind Spots

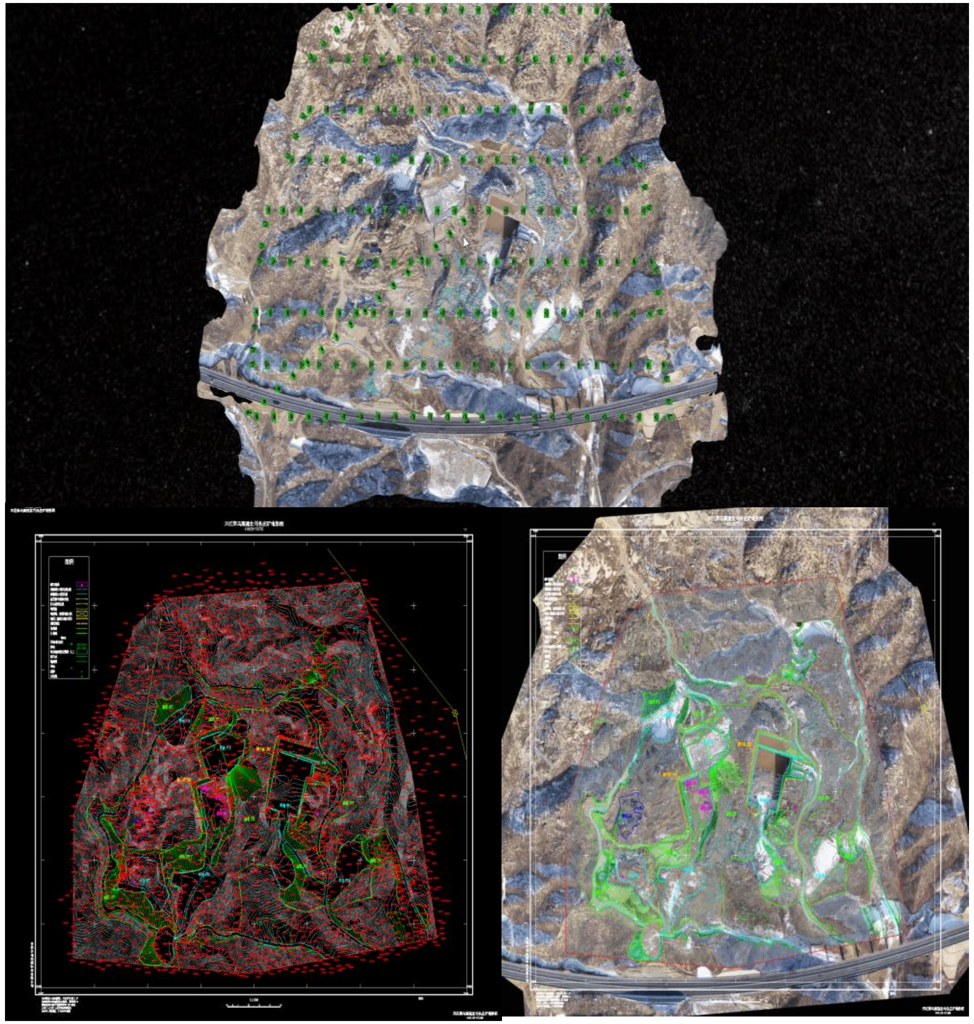
Ground movement and rockfall risk are checked intermittently.

Early warning windows are often missed.

Rehabilitation quality is hard to validate without repeatable baselines.

RECLAMATION AND GREENING

Solution Selection



M4E

Survey area: 1.2km²

DSM terrain-following flight at 50m height

1 sorties to complete the survey

Data Processing

3D Reconstruction: DJI Terra

Outputs: 3D Mesh Model + DOM

DLG Drawing

Mapping software: AutoCAD

Deliverables: DLG + Image Model

Application: Directly support greening design and construction layout

RECLAMATION AND GREENING

Monitoring & Verification Loop

Reclamation success depends on what can be measured and repeatedly verified—not just what can be drawn.

Change Tracking

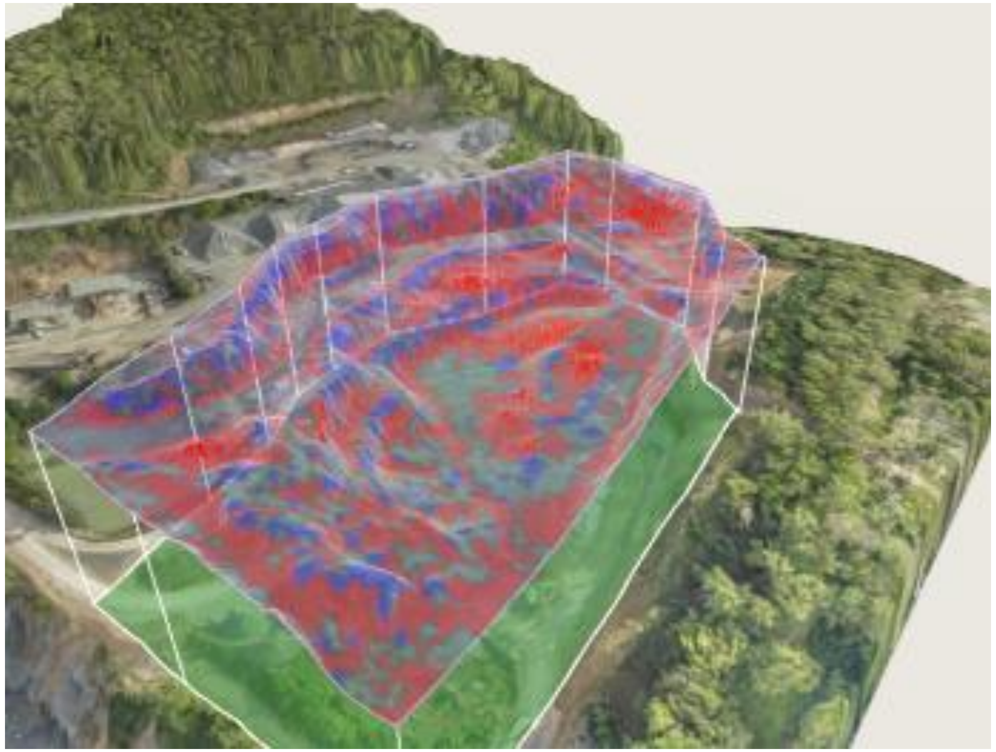
Repeat surveys after key milestones or rainfall to detect grading drift, subsidence, and erosion early.

Water & Drainage

Use terrain-derived flow paths and ponding checks to validate drainage intent and identify recurring risk zones.

Acceptance Proof

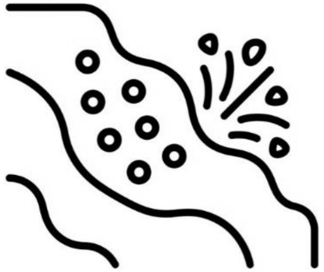
Versioned outputs + before/after comparisons + linked field records to support faster sign-off and clearer accountability.



INDUSTRY PROCESS

Exploration and Construction

TIR Vein Identification
Yunnan Open-Pit Mine



Drill and Blast

South African Mines
Tangshan Iron Mines

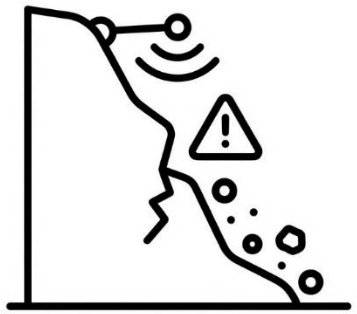
Load and Transport

Haul Road Optimization

DJI's mining solution — no separate tools needed — uses a unified "data language" to link all mining phases (exploration, blasting, transport, etc.) into a verifiable closed loop.

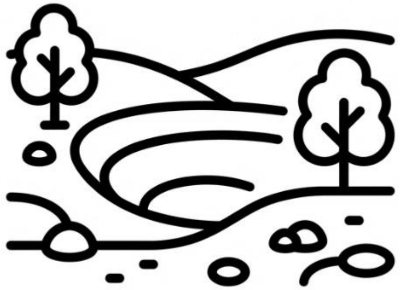
Operation Management

Goaf Disaster Management Case
Australia Gold Mine



Safety Monitoring

Rio Tinto Kennecott
High Wall Management



Reclamation

Abandoned mining, Jilin, China

dji


THANK