OPMMS® | SUCCESS CASE

Automated Slope & Pre/Post-Blast Monitoring

Open Pit Mine, Georgia, USA

INTRODUCTION & CONTEXT: THE CHALLENGE OF PROXIMITY

This success case focuses on an open-pit mining operation located in Georgia, USA. The mine faces a critical operational constraint: its high-frequency blasting walls are located in close proximity to a local residential village. Because any unexpected slope failure or uncontrolled rock movement could lead to catastrophic environmental and community disasters, the mine's primary goal is to maintain absolute control over wall stability while ensuring continuous, safe operations.
To balance production with community safety, the mine required a continuous, zero-human-exposure solution to monitor real-time wall displacement and precisely calculate blast-induced volumetric changes.

CHALLANGES

- **High-Frequency Blasting Cycles:** Heavy blasting operations are conducted multiple times per week, requiring rapid assessment of structural changes.
- **Critical Proximity to Communities:** Slope failure is not an option; wall structural integrity must be checked around the clock to maintain slope stability throughout the production cycle.
- **Pre vs. Post-Blast Volumetric Tracking:** The engineering team must calculate precisely how much rock and material moved or detached after each specific explosion.
- **Hazardous Environments:** Minimizing personnel exposure by keeping surveyors and geologists physically off the unstable benches and away from active blasting zones.

SOLUTION

The mine deployed **OPMMS®** (Open Pit Mine Monitoring System), an automated LiDAR-based monitoring system that continuously scans the site on a user-defined schedule. Additional scans are automatically or manually triggered immediately before and after blasting to capture complete 3D changes.

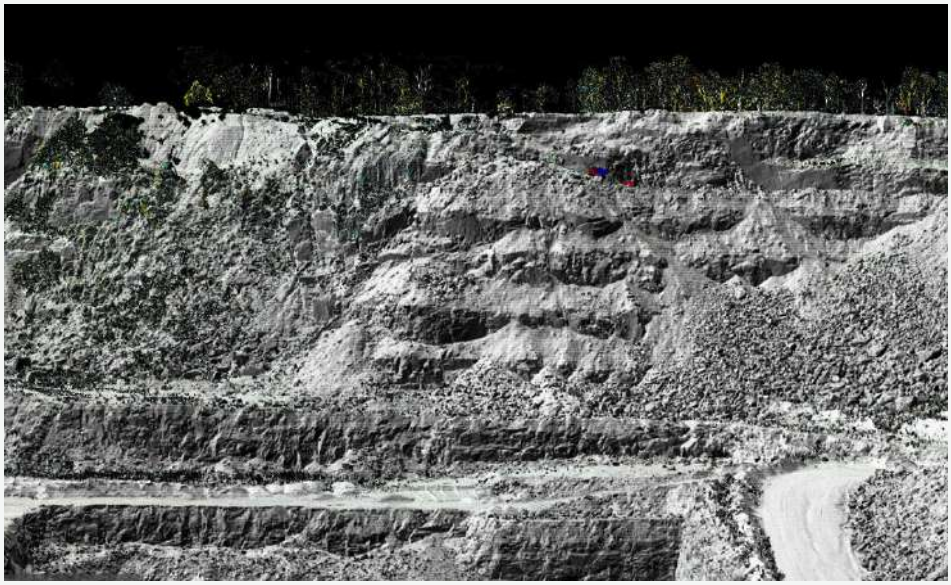

Fig 1. The laser scanner operating from within the synchronized protective field enclosure.
Fig 2. High-resolution 3D point cloud capturing the open-pit walls.

Smart Synchronized Field Protection

A customer-implemented protective enclosure shields the monitoring system from harsh mining conditions, including airborne dust, rain, and extreme weather. The enclosure is synchronized with OPMMS® scanning, automatically opening before each scan and closing afterward to protect the equipment while ensuring reliable operation.

Automated System Synchronization: OPMMS® seamlessly communicates with the shelter's mechanical window. The moment a scan is initialized by the software, the protective window automatically slides open. As soon as the data acquisition cycle finishes, the hatch closes in perfect synchronization. This shields the sensitive optics from intense blast vibrations, flying rock fragments, heavy airborne dust, and torrential downpours.

Targeted Blast Analytics

Aside from standard routine intervals, engineers can manually trigger specific scans immediately before and right after a blast.

Why is this a massive advantage? Automated scheduled scans might occur hours apart. By manually forcing a scan minutes before the siren blows and minutes after the dust clears, OPMMS® isolates the exact impact of that specific blast event. It eliminates background noise like operational excavation or natural erosion, giving engineers pure, unadulterated pre- and postblast data.

Email and SMS Alert Networks

Every point cloud collected by OPMMS® is automatically cross-referenced against the site's baseline data model. If the software detects any movement or centimeter-level displacement exceeding the userdefined safety threshold, the system immediately broadcasts automated alert notifications (via Email and SMS) to the mine safety management team. This ensures instantaneous reaction times if a slope shows signs of shifting toward the village.

DELIVERABLES & ANALYTICAL MAPS

By comparing successive point clouds in the Reconstructor® add-on software, OPMMS® transforms raw data into actionable engineering reports:

- **Color-Coded Displacement Heatmaps:** Instant visualization of surface deformation and slope movement.
- **Pre-/Post-Blast Material Displacement:** Clean visual mapping of rock movement caused by blasting.
- **Automated Mass Calculations:** Instant calculations of overbreak, underbreak, and accurate excavation volumes without field measurement.

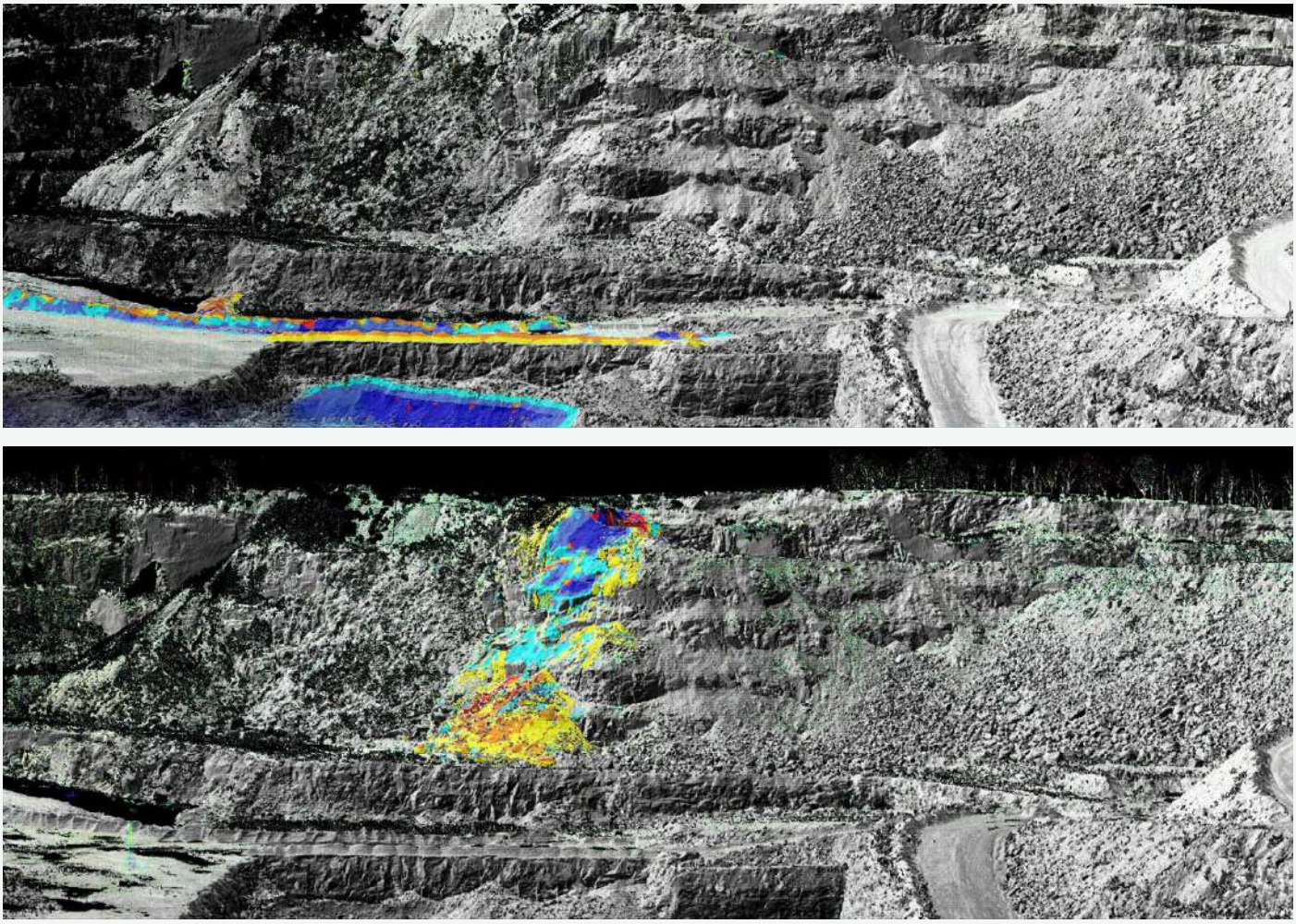

Fig 3a/3b. Displacement heatmaps overlay allowing rapid visual identification of material movement.

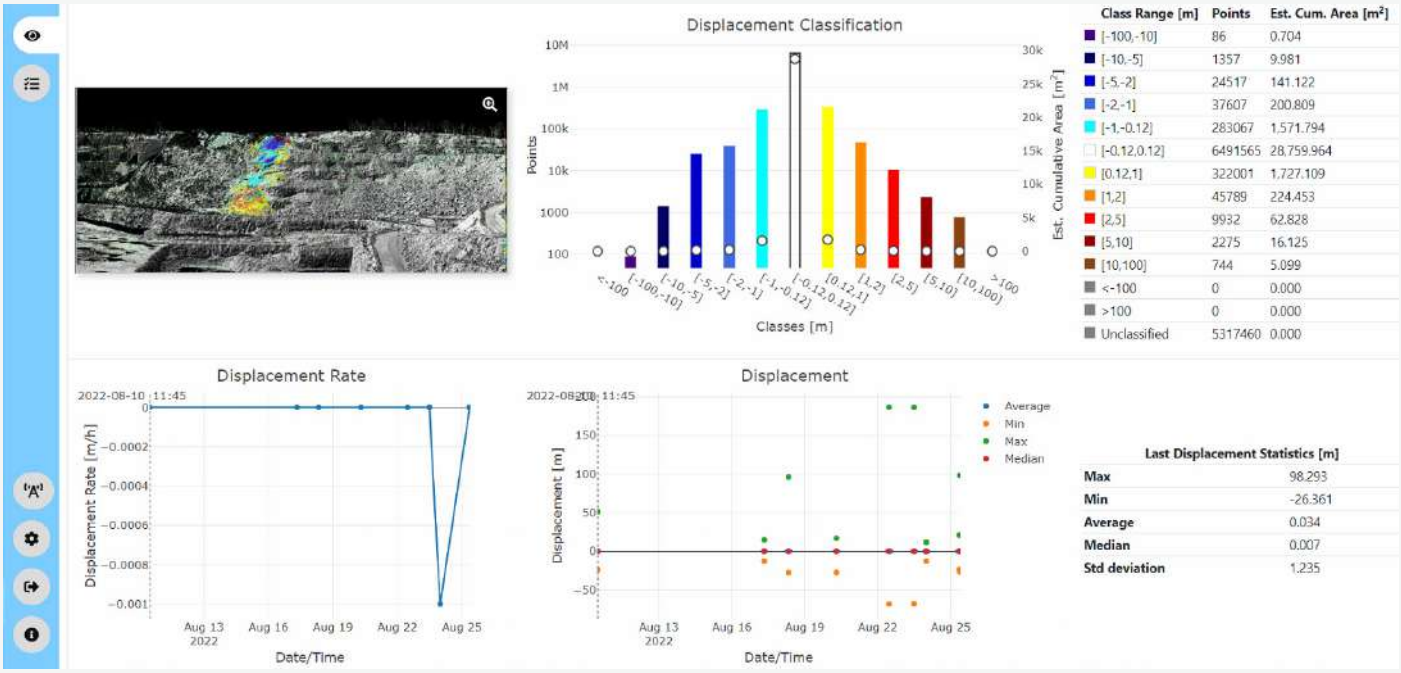

Fig 4. Automatic displacement analysis and report.

BENEFITS

- **Continuous Monitoring:** Unattended slope and blast monitoring tracking centimeter-level surface changes across the entire area.
- **Community and Slope Protection:** Continuous, unattended tracking ensures early detection of safety hazards threatening the nearby village.
- **Pure Blast Analytics:** Manual scan overrides capture the precise structural and volumetric results of every blast cycle.
- **Zero-Exposure Safety:** Drastically reduces the need for survey teams to enter active, unstable, or blast-prone areas.
- **Accurate Computations:** Highly precise pre- and post-blast documentation and volume computation.
- **Hardware Longevity:** Automated shelter synchronization protects the system from harsh mining environments, cutting down maintenance costs.

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