



Berm Monitoring System Case Study

Reliable Berm Monitoring in Harsh Environmental Conditions

The Operational Challenge

In mining environments, windrow stability is a critical safety concern. Yet the ability to monitor berms effectively is often compromised by environmental extremes. High temperatures, freezing conditions, reduced oxygen levels at altitude, and weather interference can lead to equipment failures, inaccurate data, or complete monitoring blind spots. These issues increase the risk of undetected non-compliance, delayed responses, and ultimately, operational incidents that could have been avoided with better visibility.

The Solution: BMS for All Conditions

The Berm Monitoring System (BMS) was developed to address these limitations. It enables reliable, real-time monitoring even where traditional systems struggle. BMS combines rugged hardware, intelligent software, and advanced LiDAR technology to provide accurate windrow height assessments in some of the toughest operating environments – ensuring that environmental factors no longer compromise risk management and safety performance.

Extreme Temperature Operation with Full Data Continuity

Temperature extremes can shut down monitoring equipment, degrade battery performance, and disrupt internal electronics – leading to data loss or unreliable reporting. This is especially problematic when windrow stability changes rapidly due to ongoing tipping or weather shifts.

BMS solves this by maintaining full functionality between 0°C and 45°C, with an optional cold-weather kit for environments as low as -30°C. It uses temperature-resistant materials, internal climate control, and protective housing to ensure monitoring never stops – meaning no data gaps, no blind spots, and uninterrupted compliance tracking during critical operations.



BMS deployed at +45°C



BMS deployed at -10°C

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High Altitude Adaptability for Remote and Elevated Sites

At high altitudes, lower air pressure affects the conductivity of components and increases the likelihood of electrical discharge failures. This puts conventional monitoring systems at risk of malfunction, just when reliability is most needed in remote or difficult-to-access locations.

BMS solves this by using specialised insulation and high-altitude-rated electrical components that maintain performance integrity in low-pressure environments. This allows for dependable windrow monitoring in elevated mines, mountainous terrain, or remote highland operations where maintenance access is limited.

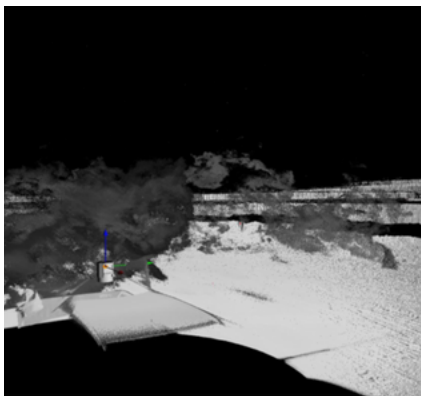


BMS Deployed at 4500m aMSL

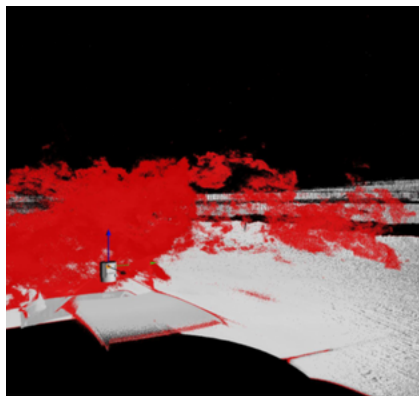
Accurate Monitoring Despite Adverse Weather Conditions

Rain, snow, fog, and dust storms can degrade monitoring accuracy by distorting sensor readings or obscuring visibility. Poor data quality can lead to misjudged windrow heights, false positives, or missed warnings – all of which compromise safety and delay corrective actions.

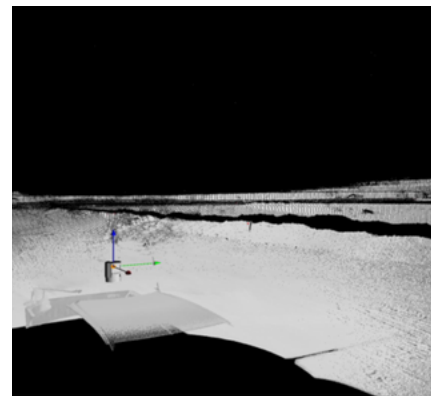
BMS counters this with Riegl LiDAR Waveform Processing technology, which filters out atmospheric noise and interference to deliver reliable terrain mapping, even in heavy precipitation. This ensures high-fidelity, actionable data in all weather conditions – reducing uncertainty and enabling faster, more confident decision-making.



Wave Form Processing – Raw Scene



Wave Form Processing – Detection of Noise



Wave Form Processing – Noise Removed

Conclusion

Environmental extremes should not compromise operational safety or compliance monitoring. The Berm Monitoring System provides mining teams with a dependable, intelligent tool that continues to perform when other systems fail. By overcoming environmental barriers to accurate windrow tracking, BMS helps sites reduce risk, meet safety standards, and make informed operational decisions – no matter the climate or conditions.