Case Study

Mining

emesent

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Project

Advancing Safety and Productivity in LHD Operations: Byrnecut shows what is possible

Key Achievements

Near real time stope hazard and volume assessments

Crews can now perform scans at any time 24/7

Increased stope turnover

Positive ROI within 2-3 hours of downtime prevention

Challenges

Load-Haul-Dump (LHD) machines, also known as scooptrams or boggers, are essential in underground mining operations, transporting ore and waste material from the mining face to designated dumping points. While remote control and automation systems allow for safer operation, they also present challenges, particularly in low-visibility conditions common in underground mines.

Operators often rely on 2D cameras, which provide a limited, poorly lit view, making it difficult to accurately assess the remaining material in a stope or detect geotechnical hazards like loose rocks and overhangs. Limited visibility not only impacts productivity but also increases the risk of operational

hazards, such as equipment damage or entrapment.

These risks are particularly pronounced in cave-style mines, where LHDs are more likely to become trapped under falling rock. The loss of equipment can halt ore extraction and lead to costly delays, with replacement machinery taking years to deliver.

Traditionally, Cavity Monitoring Systems (CMS) have been used to measure stope volumes and assess hazards, but these systems require specialist training and are dependent on the availability of trained surveyors, typically only available during day shifts. This can delay the receipt of CMS results and potentially adversely affect equipment risk management, equipment planning decisions, and productivity.

Recognizing the potential for enhanced safety, productivity, and cost savings, Byrnecut partnered with Emesent to develop the system design and conduct testing of remote autonomous scanning in one of their open stope operations. The goal was to assess whether improved situational awareness through 3D data could help operators make faster, better decisions, almost in real time to ultimately enhance both productivity and risk management of the autonomous LHD.
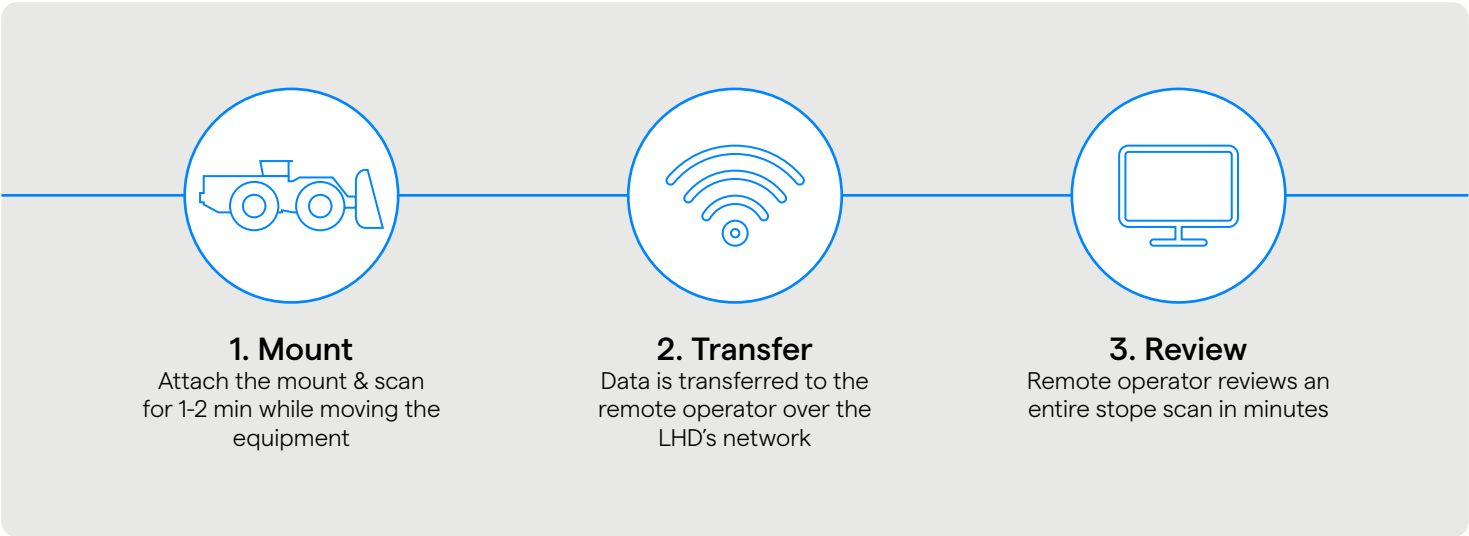
The Solution

After successful pilot testing, Emesent collaborated with global mining services provider, Mining Plus, to drive development of the solution, working with the client to understand their needs and test various options. The result was Hovermap LHD, an innovative system that utilizes advanced SLAM-based LiDAR scanning technology, offering a 300-meter range and a 360-degree field of view to capture and visualize survey-grade point clouds in the field. The unit can be easily mounted on the cab or bucket of an LHD using magnetic feet

and connects to the mine's network via the machine's onboard Wi-Fi. This setup enables remote operators to continuously scan and visualize a comprehensive 360-degree point cloud of the entire stope, even in zero-light conditions, using a dedicated tablet. This near real-time data allows for the safe, fast, and thorough identification of loose rocks, geotechnical hazards, and hazardous rill angles that could potentially damage equipment.

Designed for simplicity, Hovermap LHD requires no specialist training, allowing non-surveyors to perform pickups 24/7. This capability enables quick identification of remaining stope volume and more effective planning of equipment allocation, significantly boosting productivity.

Beyond LHD operations, Hovermap's versatility allows it to be used in various configurations, including handheld, on a backpack, mounted on a drone, vehicle, ground robot, or CMS boom, or lowered into shafts in a cage. This flexibility expands its applications throughout the mine, offering an even greater return on investment.

1. Mount
Attach the mount & scan for 1-2 min while moving the equipment

2. Transfer
Data is transferred to the remote operator over the LHD's network

3. Review
Remote operator reviews an entire stope scan in minutes

HOVERMAP LHD STREAMS DATA OVER THE MINE'S NETWORK TO SUPPORT RAPID DECISION MAKING

The Results

The data captured by Hovermap LHD has dramatically reduced the time needed to identify hazards such as steep rill angles, oversize material, and confirm the stability of brows, walls, and crowns during remote bogging operations. Areas that once took up to two days to scan and process can now be captured and visualized in just 10 minutes.

The value of reducing production risks from geotechnical hazards is clear. In a hypothetical copper-gold mining operation, an LHD getting stuck typically results in 1-2 shifts of lost production or even for several days. With Hovermap LHD,

the system can pay for itself within just 2-3 hours of downtime prevention, with the return on investment increasing over time.

Crews can now perform scans underground at any time, 24/7, accelerating decision-making and minimizing the risk of damaging or burying an LHD. This capability has also increased stope turnover, as underground crews can quickly assess an area and make rapid decisions on equipment relocation when the stope is clean. After realizing these significant benefits, Byrnecut decided to roll out Hovermap LHD to additional mine sites, further advancing their commitment to safety and productivity.
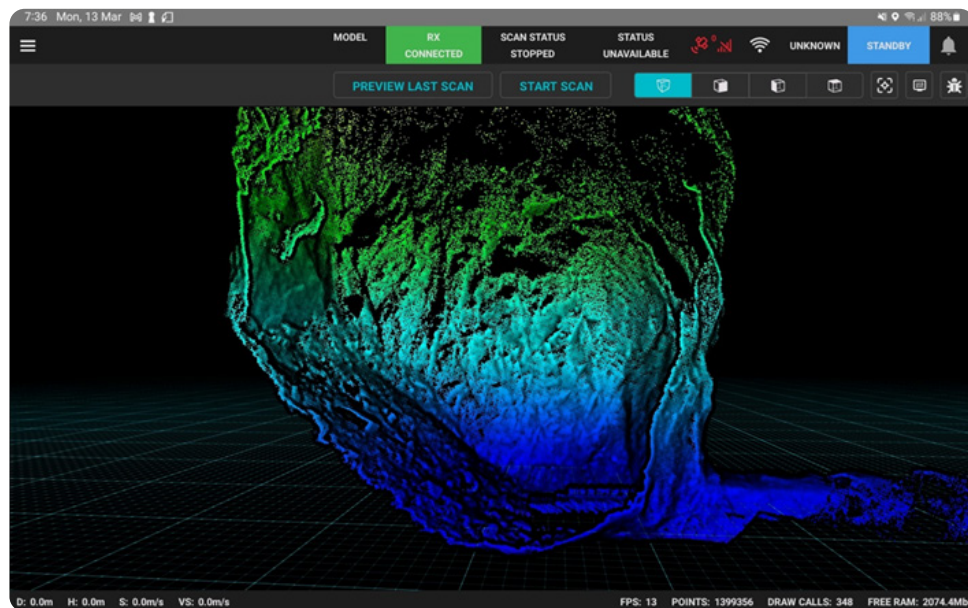
SCAN IS STREAMED WIRELESSLY TO AN OPERATOR ON THE SURFACE

Conclusion

Hovermap LHD has enabled Byrnecut to significantly enhance safety, productivity, and cost-efficiency in live mining environments. By providing operators with near real-time stope hazard and volume assessments, Byrnecut has set a new standard for operational excellence in underground mining.

"No drone. No CMS. Plug in, start, stop and you have survey-grade scans. Anyone can do it."

— Tim Campbell, Area Manager - Operations - Mining Plus

About the Client

Byrnecut is a leading specialist underground mining contractor, delivering high-quality services and innovative solutions to the mining industry worldwide. With decades of experience, Byrnecut operates across multiple continents, offering a full suite of underground mining services, including mine development, production, and engineering. Known for its safety-first approach, Byrnecut combines technical expertise with cutting-edge technology to deliver efficient, sustainable, and cost-effective mining solutions. The company is recognized for its commitment to excellence, workforce development, and strong partnerships with its clients, making it a trusted name in the global mining sector.

Byrnecut is supported by Emesent partner Mining Plus.

Interested in learning more about how Hovermap LHD can transform your mining operations?

Contact our sales team for a free demonstration, or learn more about the Underground Mine Production solution here

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