

CAPTURING DATA THAT HELPS MINING COMPANIES GAUGE THE RISKS POSED BY CAVITIES

How Dwyka Mining Services is using Emesent Hovermap to scan and manage unknown voids

BACKGROUND

Headquartered in Johannesburg, South Africa, Dwyka Mining Services (DMS) is a specialist mining technology platform to the African mining sector with clients across the continent. The company is frequently called upon to deliver bespoke technology-driven solutions for complex technical problems.

THE CHALLENGE: EXPOSED CAVITIES IN AN OPEN PIT ENVIRONMENT

In November 2020, Emesent partner Dwyka Mining Services was contracted to assess the geometry and volume of a cavity that appeared within a client's open pit in South Africa, following surface blasting activity. The exposure of the void posed a significant safety risk to personnel working in the area, and to equipment. The company sought an understanding of how far the cavity extended and the potential causes for its emergence. Mine managers also required data to help determine whether it was safe for personnel to continue with mining activities in the direction of the cavity. An attempt to survey the cavity using a conventional drone-mounted LiDAR was unsuccessful because the cavity inhibited the drone's access to the GPS navigation system. The company subsequently sought an alternative means of safely surveying the cavity.

THE SOLUTION: SEND IN HOVERMAP

Dwyka Mining Services personnel used the Emesent Hovermap scanner mounted to a DJI drone M210 to carry out a single 5-minute flight into the void.



Hovermap at the entrance of the pit void that DMS scanned in a 5-minute beyond-line-of-sight flight.

THE DELIVERABLES: RAPID SCAN AND REVIEW

Point cloud processing took 15 minutes. The client received a digital twin of the cavity, as high-resolution .laz files and imagery, in under two hours, which includes travel time to and from the pit.

DMS used CloudCompare software to measure the cavity and report dimensions 62.6 m wide, 91.1 m in length. The high-resolution data also exposed the geological structures within the cavity. The client imported these deliverables into its mine CAD software to update the geological and geotechnical models and improve the structural interpretation for that section of the pit.

KEY ACHIEVEMENTS



Reduced safety risk for survey personnel



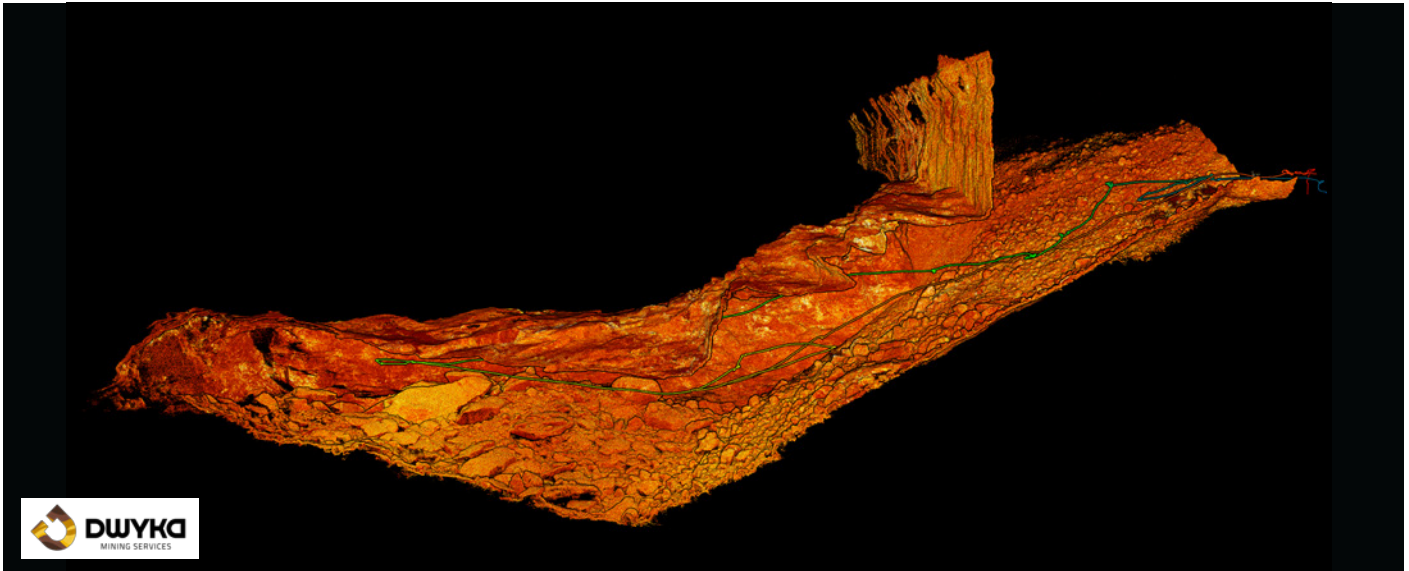
Detailed data about an unstable, inaccessible void delivered within hours



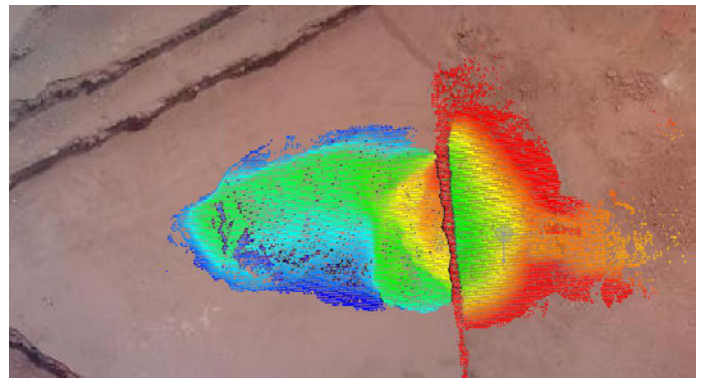
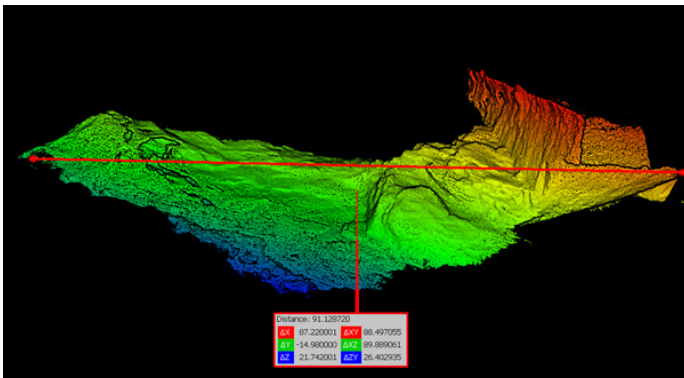
Cost effective collection of accurate data to inform mitigation and planning



Minimal disruption to production at the site



Profile view of the void that opened in an open pit mine showing cavity shape, fragmented material and Hovermap trajectory. DMS delivered a high-resolution digital twin in just two hours, including traveling to and from the pit, scanning the void, and processing the data.



Left: Profile view of void. Dimensions measured off the point cloud indicate the void, 91 m x 62 m, extended into the next bench, halting drilling. Right: Plan view of bench with point cloud overlay shows extent of void into the adjacent bench.

THE OUTCOME: PREVENTING INCIDENTS AND CHARTING A WAY FORWARD

Using Hovermap data, Dwyka Mining Services’ client was able to visualize the ground conditions and complete an internal condition evaluation of the cavity. Armed with these insights, the company made the immediate decision to suspend mining processes in the area and commence risk mitigation/remediation activities. The rapid capture and production of the cavity digital twin provided mine management with much needed data and clarity for their decision-making.

The data collected by Hovermap increased mine engineers’ geotechnical knowledge of the rock mass and void volumes at the site. With this knowledge, the client’s technical services team was able to assess the extent of the cavity without exposing personnel to safety risks and to quickly determine how production personnel could access the area to continue drilling and blasting. This minimized production downtime at the site.

DMS continues to find new use cases for the Hovermap scanning technology at client sites across the African continent. These include mapping stopes and inspecting orepasses, drawpoints, raisebores and underground infrastructure.

“Using Hovermap technology gave our engineering team the power of certainty; making it possible to move from a position of unknown to known very quickly. Hovermap is a user friendly and flexible solution with multiple use cases and a valuable aid for safe mine planning and management.”

Anonymous – Senior Superintendent, Listed Open Pit Mine

“Emesent Hovermap comes into its own when the unexpected occurs and the potential for disruption and delay is high. It enables us to rapidly capture the information our clients need to make decisions on the fly and navigate a way forward, safely.”

Jamie van Schoor – CEO, Dwyka Mining Services