

# GLENCORE KIDD OPERATIONS CONVERGENCE MONITORING

**How Emesent Hovermap technology is helping Glencore improve convergence and ground control monitoring at Kidd Operations.**

## BACKGROUND

Owned by Anglo-Swiss mining giant Glencore, Kidd Operations is situated northwest of Sudbury, Ontario, Canada. The operation comprises the Kidd Concentrator and Kidd Mine, the world's deepest base metal mine, producing around 67,600 tons of zinc, 33,500 tons of copper and 1.6 million ounces of silver each year.

## CHALLENGE: MONITORING DRIFT CONVERGENCE QUICKLY AND SAFELY

The site turns over around 55 stopes a year and has a shaft bottom of 3,015 meters (9,889 ft). Stopes are serviced by a network of interconnected drifts and tunnels, many of them difficult to access. Ground stress exceeds rocks strength at this depth, and deformation must be monitored closely.

Historically, gathering accurate data from drifts and tunnels quickly and safely was a challenge for Kidd Operations' survey and geotechnical teams, given the limitations of CMS technology then in use.

Kidd Operations management sought a means of improving their ground control intelligence, and reducing the safety risks for Glencore personnel and contractors.

## SOLUTION: SEND IN HOVERMAP

In May 2018, Kidd Operations management agreed to trial the Hovermap scanner at the site. Emesent partner Unmanned Aerial Services captured high resolution point cloud data from a stope and drifts within the mine. In January 2020, Glencore purchased a Hovermap unit for use at Kidd Operations.

The Hovermap unit is used by surveyors and geotechnical engineers almost daily to monitor deformation, detect and manage geotechnical hazards within stopes and drifts, and increase their knowledge of the rock mass and ground control conditions. Data is captured by walking or drone scans.

## KEY ACHIEVEMENTS



Improved safety for Glencore team



Earlier identification of geotechnical issues and improved mitigation



Richer understanding of rock mass behavior and geological structures



More effective monitoring of ground support throughout the mine

“At this depth, we’re in a high stress geotechnical environment with constant deformation. The effect of mining on our ground support has to be monitored so we can keep our access drifts open and maintain safe access. Hovermap allows us to maintain an accurate, up-to-date picture of what’s happening down there.”

Iain McKillip, Manager Mine Technical Services, Kidd Operations



Remote data collection for convergence monitoring helps maintain ground support throughout the mine.

## DELIVERABLES: ACCURATE DATA, HIGH RESOLUTION VISUALIZATIONS

Hovermap data is easily processed into point clouds and imported into Glencore's automated data processing and database system. Powered by artificial intelligence, the system geo-references each scan and can align and compare data of the same drift or tunnel, making it easy to measure deformation and convergence over time. Geotechnical engineers also use industry-standard point cloud analysis tools, and the data is exported into AutoCAD and other mine planning software.



Real-time visualization enables the operator to thoroughly capture a drift and investigate possible problem areas.

“From a geotechnical perspective, Hovermap captures the detail that we really need at a level of accuracy we weren't able to get previously. It never ceases to amaze me just how much it 'sees'. The range and point density are incredible, the SLAM system is very accurate, providing us with quality data to make more informed assessments.”

Sierra Mercer, Ground Control Engineer-in-Training, Kidd Operations

## BENEFITS: RAPID, SAFE DEFORMATION MONITORING

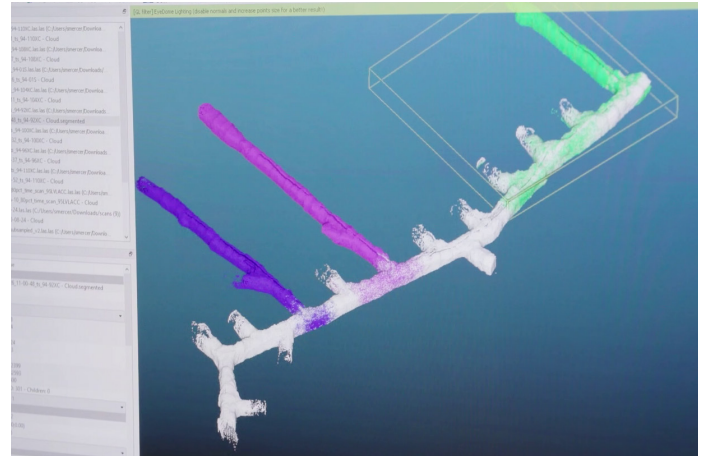
Hovermap enables mine personnel to capture accurate, high resolution scans of drifts and tunnels quickly and safely. The detail and accuracy of the Hovermap data enables geotechnical engineers to identify geological structures and deformation.

The point cloud data is compared across time intervals to measure convergence in drifts and identify potential rock burst zones and wedge failures.

Being able to track deformation over time can help planners and ground control engineers determine whether drifts and tunnels should be reinforced and kept in use, or abandoned and alternative means of access sought.

The versatility of Hovermap – walk, drive, fly – helps the geotechnical team to monitor ground support throughout the mine, even in areas where it's not safe to enter. Hovermap is also used for re-entry planning, scanning previously mined areas where the condition of the support is unknown.

The high resolution scans enable geological structures to be identified. The geotechnical engineering team identifies and tracks joint sets and faults throughout the rock mass. This helps them predict where these structures might cause seismicity or intersect with access drifts or production stopes.



Drift scans are compared over time to monitor for deformation.

## IMPROVED GROUND SUPPORT

The detail contained within Hovermap scans helps the geotechnical team improve ground support design and better manage the geotechnical risk in the world's deepest base metal mine.

The accuracy and resolution of Hovermap data allows Kidd Operations to make more informed mine planning and management decisions.

Use of Hovermap by the survey and geotechnical teams continues to increase and Kidd Operations intends to purchase a second unit for the site.

Emesent is a world-leader in drone autonomy, LiDAR mapping, and data analytics. Founded in 2018, Emesent has since built a reputation for delivering high-quality data capture in the mining, infrastructure, survey and mapping industries. Our flagship product, Hovermap, is a smart mobile scanning unit that combines advanced collision avoidance and autonomous flight technologies to map hazardous and GPS-denied environments. Hovermap is uniquely versatile, it can be mounted to a drone, cage, backpack or vehicle to map challenging, inaccessible areas. With a wide range of applications, Hovermap is being used by customers around the world.