About Dundee Precious Metals

Dundee Precious Metals Inc. (TSX:DPM) is a Canadian-based international gold mining company with operations and projects located in Bulgaria, Serbia, and Ecuador. The company is committed to responsible mining focusing on health and safety, transparency, sustainability and stakeholder dialogue. This is rooted in DPM core values, leaning on the strategic pillars of ESG, innovation, and community prosperity. With a team of dedicated people, Dundee Precious Metals is unlocking resources and generating value where the business and the community can thrive and grow together.

Exyn Nexys powering an autonomous scan with a DJI350.

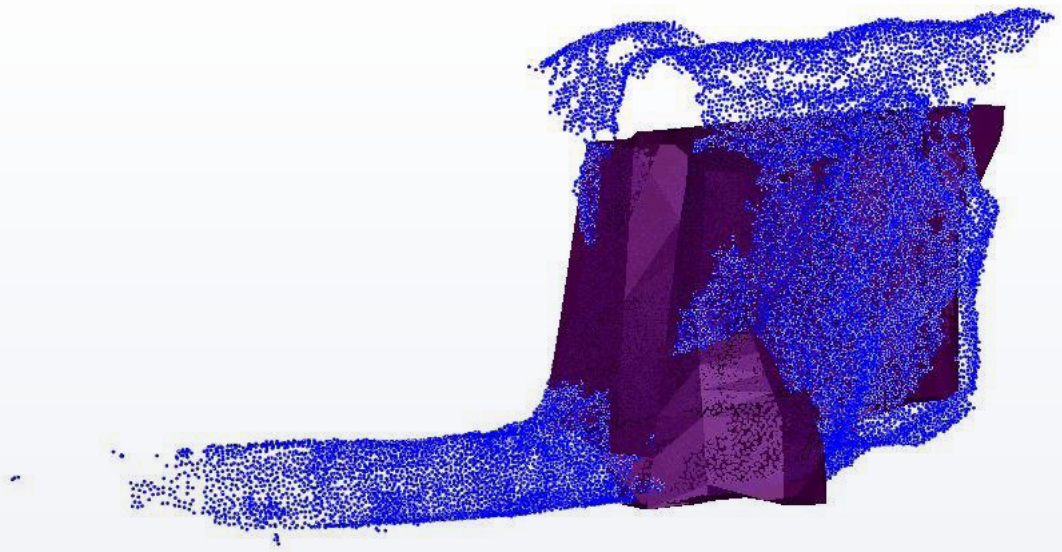
Challenge

Dundee Precious Metals is known for being technology-forward, and always on the lookout for innovative solutions to enhance the safety and efficiency of their underground operations. The traditional methods of collecting geospatial data are not only time-consuming but also limited in terms of the amount and accuracy of data they could gather. Additionally, there are areas in the mine that are difficult or impossible to access with their existing technology, which limits their ability to make fully informed decisions, and introduces possible inefficiencies.

As a long-time partner of Exyn, DPM was keen to test the new Nexys — a modular 3D mapping solution with integrated aerial robotic autonomy — designed to reduce time to capture, increase safety, and drive efficiency for challenging, complex, or dangerous environments.

Solution

Using the Exyn Nexys allows DPM to collect geospatial data from the underground mine workings in the safest and most modern manner possible. Safety is their highest priority, and this is one of the main benefits they report from using the system. Additionally, they can now collect millions of data points in a much shorter time compared to legacy systems. The level of detail obtained when scanning production stopes with the system is like a “fulfilled dream” for any underground mine surveyor. The system enables surveyors to safely reach and scan areas that were previously inaccessible, allowing them to make more informed decisions across different mining processes. Tsvetan Balov, Senior Drilling and Blasting (D&B) Engineer notes “Using the Nexys to autonomously scan the stopes gives us greater accuracy. This greater accuracy helps us to more precisely design adjacent stopes or, in the case of blasting issues, to design additional blast holes.”



Planned stope on Deswik (purple) overlaid with Nexys point cloud captured during flight (blue).

Results

One notable example of the benefits of using the Exyn Nexys system for geospatial mapping in an underground mine is a recent stope with only one access point and a very complicated shape. Due to its complexity, conventional methods were unable to perform a detailed scan of the void. Traditionally, this void would be classified as complete as all of the ore would have appeared to be mined and recovered. However, when the team deployed the Exyn Nexys, they discovered a section of the stope that had not been mined, commonly referred to as an underbreak. By identifying this underbreak, the team was able to drill three additional blast holes and successfully extract ore valued at approximately US$60,000. This discovery and subsequent extraction were only possible because of the detailed data provided by the Exyn system, highlighting its significant impact on operations. Deviations between 5-7% are typical and expected with traditional techniques, however with more complete data exact deviations can be measured for each and every cavity leading to more informed, complete, and efficient mining practices reducing situations where money is being left on the table. DPM has found 10-15% of their stopes have additional ore that is discovered when the stope is completely scanned with the Exyn Solution. With approximately sixty stopes mined annually, the value of the additional ore quickly adds up.

Since adopting the Nexys system, the survey team has significantly increased the number of scans conducted on production stopes. One of the key reasons for this increase is the user-friendly nature of the system — according to the survey team, they look forward to operating it, making safety and efficiency "fun". Typically, for a stope with an average lifecycle of 30 days, five to six scans are conducted. This frequency allows them to gather very detailed information throughout the stope's lifecycle, making it easy for the team to make informed, data-driven decisions to optimize the mining processes.

Many times in a small stope the survey team saves time by using the Nexys as a handheld scanner. This allows them to be very efficient in areas where they know there are no hidden/shadowy areas. They are able to get into an area and map it in two to three minutes and get out. They can then go to another stope and mount it quickly onto a drone for an autonomous flight if they need to. According to Hristo Dobrev, Senior Mine Surveyor "The ability to use it in different configurations, such as a handheld scanner, vehicle-mounted device, and scanning drone, makes it practical and easy to use. It saves the team time and effort, with the final result delivering high quality, actionable data."

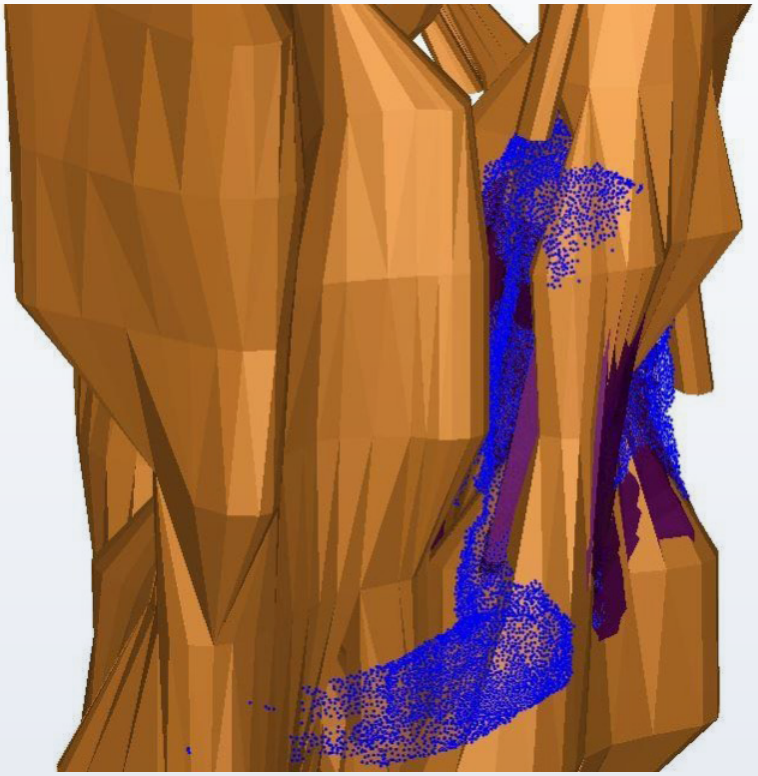
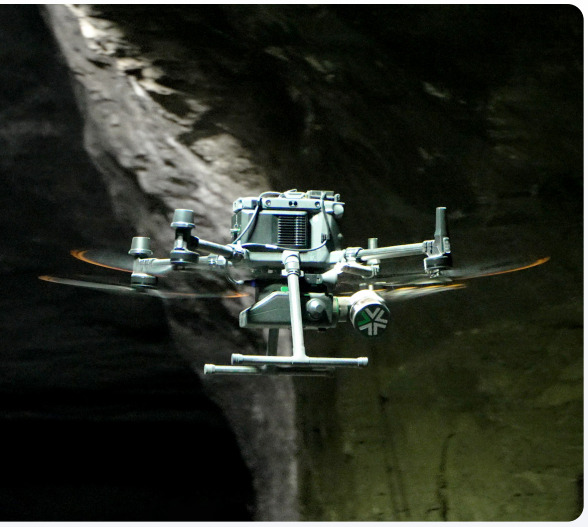


Image of ore body (orange) overlaid with point cloud (blue) and stope plan (purple), showing an overbreak into the ore body that resulted in additional ROI.

"With the point cloud from the Nexys, we are 100% sure that what we see on the screen is what is underground. In the past (with the legacy system) the first questions we asked the surveyors after providing a model were: "Are you sure? Are there any blind spots or shadows?" Now we are sure. No blind spots. No shadows."

Tsvetan Balov | Senior Drilling and Blasting (D&B) Engineer, Dundee Precious Metals

hello@exyntechnologies.com • (215) 999-0200
2118 Washington Avenue, Suite 1000 Philadelphia, PA 19146



> "Implementing the Exyn Nexys in our routine underground activities increases the safety of our team, and the quality of the data enables flexible and fast decision-making for engineers and mine management, allowing us to cost-efficiently recover mineral reserves."

Nikolai Simonski | Production Director, Dundee Precious Metals

Financial Return

Tsvetan Balov, Senior Drilling and Blasting (D&B) Engineer says "Using the Nexys to autonomously scan the stopes gives us greater accuracy. This greater accuracy helps us to more precisely design adjacent stopes or, in the case of blasting issues, to design additional blast holes."

The total annual production of the mine is 2.2 mt/year. Having more reliable data allows the DPM team to maximize the output and minimize the losses of ore. Additionally, they estimate that with their two surveyors in charge of 60 stopes at ~300 scans * 20 minutes less/scan = 400 man hours/year saved by using the Exyn Nexys system over traditional scanning methods.

With standard survey rates in North America, 400 man hours equates to $25,600/year in labor savings*. When combined with safety improvements and mining efficiency improvements driven by reliable data, the ROI on a system compared to a traditional system is significant.

Products Used

Dundee Precious Metals uses a Nexys unit that is equipped with aerial autonomy. They use it in multiple configurations including handheld, vehicle-mounted, and with the DJI M350. "The ability of Nexys to be integrated with various devices according to the user's needs makes it invaluable for working in the challenging conditions of underground mines." notes Martin Kolev, Mine Surveyor.

Future Plans

Dundee's Chelopech mine in Bulgaria was one of the earliest adopters of Exyn solutions. They began using the original system more than five years ago, and today, Exyn Nexys is an integral part of their daily operations. According to Rosen Dimitrov, Mine Surveyor, DPM "The survey team's perspective of using the solution has shifted from "Not sure if this will work" in the early days of our co-development to "I cannot do my job without it." So, our future plans definitely include Nexys as a must-have solution."

*Costs include labor cost to perform the actual surveys considering a fully burdened hourly rate of $65.68

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