

Optimising against sloppy stoping

Such is the speed of innovation in the current age of METS development that a new product can have an immediate impact on almost an entire industry, seemingly overnight.

Minnovare is achieving exactly that with its Production Optimiser™ drilling technology with underground miners across Australia quickly adopting the new system.

The system combines hardware, software, and data analytics to address deficiencies in current underground production drilling processes. By reducing the impact of these variables, the Production Optimiser delivers increased drilling accuracy and consistency. This, in turn, materially improves mine economics for Minnovare's underground hard rock clients.

It has been warmly welcomed across the underground mining industry and is revolutionising operations.



Mick Beilby

"The last year has been remarkable with increased market penetration. The Production Optimiser is now in use on about 30% of long-hole stoping drills in Australia," Minnovare director Mick Beilby told **Paydirt**.

The development of the system is the result of Minnovare's client-centric approach to product development.

"We were underground a lot and we had engineers and tech services saying they had a big problem with blast hole deviation affecting stope performance. We hadn't realised this previously, so we focused on understanding the problem to develop a solution."

The result was partnerships with Evolution Mining Ltd at the Cracow gold mine in Queensland and Gold Fields Ltd at the Granny Smith gold mine in Western Australia to implement and validate the earliest versions of the Production Optimiser.

A white paper written in conjunction with Evolution showed how effective the system was.

Analysis of drill-and-blast activities at Cracow showed that in the previous process only 20% of holes surveyed recorded toe points within the 300mm tolerance at the toe. In contrast, the Production Optimiser was proven to limit rig set-up error, reducing average blast-hole deviation and increasing the number of holes drilled within tolerance to 50%.

Similar results have since been achieved at multiple operations owned by Gold Fields and Northern Star Resources Ltd.

The technology can be retrofitted to any underground production drill rig, regardless of age or style. Crucially, it removes operator error, reliance on survey mark-up and existing onboard systems from the set-up process.

"Blast hole deviation is one of the primary causes of poor stoping outcomes. When we started our analysis of blast holes, we saw a clear trend of error happening before the drill bit hit the rock face, which was the result of poor set-up. We identified that this error was contributing to around 60% of the resulting error at the toe," Beilby said. "If we could improve the accuracy of the set-up, we could improve the overall stope performance."

The Production Optimiser does exactly that. It is not reliant on survey, operators or existing onboard systems and is proven to reduce errors at set-up by 50-70%.

"This leads to a 40-50% reduction in blast hole deviation which equals better stoping outcomes and therefore better tonnes and grade performance," Beilby said.

Minnovare's Client Online Reporting Engine (Minnovare CORE) is a proprietary software platform that integrates the company's technology systems with third-party software providers (as an example drill and blast design software) serving as a data hub for clients' entire drilling operations. The system includes reporting and analytics functionality, allowing driller and rig performance to be analysed. The system has been well received by Production Optimiser clients with around 125,000m per month logged via Minnovare CORE and 4 million total metres logged by Production Optimiser clients to date.

"We completed a study with Northern



Minnovare's Production Optimiser is already being deployed in around 30% of long-hole stoping operations in Australia

Star after implementation of the Production Optimiser across its Goldfields operations," Beilby said. "Over 12 months at South Kalgoorlie operations, Northern Star noticed a 30% increase in drill metres.

"Most stopes were drilled using a 'dice five' drill pattern, which resulted in a lot of moves per stope, impacting drilling productivity and stope turnover rates significantly. The Production Optimiser simplified the proves with the net result being faster completion of the stope."

As well as speed at set-up, the improved accuracy was also shown to reduce the requirements for secondary blasts.

"It reduced the stope cycle by 7%, which equated to 8,000oz gold over the analyse period," Beilby said.

The analysis also showed that speed and accuracy were complemented by consistency.

"It is not just drill accuracy but also consistency was seen as a benefit, as it allowed the implementation of different drill patterns, resulting in much narrower stoping designs," Beilby said. "The net result was stopes narrowing by 0.5m which equated to 80,000t less waste for the same volume of ounces."

Beilby is confident clients will unlock more of the Production Optimiser's potential as they become more accustomed to the technology's capabilities.

"It creates consistency, meaning the outcomes are more predictable which allows companies to look at more ambitious stope design."