



Digital rethinking

Digitalisation has changed the way drill and blast is perceived at one of Africa's largest coal mines, leading to better recovery and improved safety.

Maptek™ BlastLogic™ has helped Exxaro's Grootegeluk Mine revolutionise its approach to drill and blast by providing a better understanding of its processes.

Located in the Limpopo province of South Africa, the mine employs 3200 people and produces 26Mtpa final coal products using a conventional truck and shovel operation. It has an estimated mineable coal reserve of 3261Mt and a total measured coal resource of 4719Mt, from which various coal products are derived.

Because of the scale and structure of the operation, Grootegeluk Mine runs dedicated project teams that trial and assess new technology and methods before they are potentially adopted across the entire site by the production team.

Digitalisation

BlastLogic was introduced in 2019 as part of the mine's drive towards digitalisation, and due to its success in transforming drill and blast methods is now being deployed in production.

BlastLogic is an advanced drill and blast reconciliation solution that does more than fit into existing systems and processes.

The ability to guide data collection, management and analysis workflows provides a new framework for drill and blast at Grootegeluk Mine. Access to a single source of truth helps teams to better understand the mine status in real time and facilitates ongoing improvement.

Before implementation of BlastLogic, the operation did not have a dedicated QA/QC team and was yet to settle on a preferred drill navigation system. The initial targets for the project team were to

improve drill navigation through greater ability to visualise drilling compliance, and integration with smart trucks.

BlastLogic exceeded expectations on both fronts. Grootegeluk Mine had never been able to undertake drillhole validation in real time to see how the as-built holes were complying to design. A direct interface between BlastLogic and drill navigation systems allows automated live import of as-built drillhole data for analysis.

BlastLogic drill validation tools automatically retrieve data, which lets engineers take full advantage of as-drilled information. As well as providing reports of how holes compare to design, BlastLogic is able to flag calibration errors and functionality issues on the drill navigation system. This information prompted the mine to upgrade their drill navigation system.



MWD data

Using Epiroc with BlastLogic facilitates the use of Measurement While Drilling (MWD) data – detailed quality and density information can be quickly derived from geological and production drilling. The deposit is massive, and benches are made up of different coal densities. It is important to track these variations.

Engineers must take into account geological structures such as faults and dolerite intrusions when planning drill and blast activities.

Better geological knowledge helps mitigate potential dilution and leads to improved safety.

The BlastLogic Tablet, which dynamically updates drill and blast plans in the field, can also communicate directly with Enaex IBIS smart truck systems used on site to control explosives loading.

The intuitive tablet is simple to learn and work with, and the integration eliminates manual data entry – saving time, preserving data integrity and increasing safety for operators.

BlastLogic fits into the site-wide initiative to track the start and finish times of the entire mining process by providing OData system timestamps. Drill and blast elements, QA/QC, charging processes and firing data are automatically tracked.

Adopting the new system has helped underscore the value of drill and blast engineers. Dedicated staff to analyse drill compliance to pattern design as well as powder factor of the explosive and charge rules help lay the foundation for continued improvement through learning from the feedback loop.

Across the operation BlastLogic has reduced the need for manual data entry and eliminated the associated errors, ensuring that higher fidelity data is available more quickly to identify and preempt potential issues.

Safety

From a safety perspective, the engineers are excited about BlastLogic flyrock modelling, which can predict the potential extent of displacement and determine blast exclusion zones based on model inputs. This knowledge will potentially lead to fewer interruptions, less downtime when equipment needs to be moved and enable reconciliation initiatives to commence earlier.

Fragmentation modelling is also of great interest to help improve dig rates, crusher throughput and general efficiency in the mine to mill process. Engineers are keen to see BlastLogic provide fragmentation scenarios for different blocks based on changes in burden, spacing and powder factor.

Digitalisation has changed the way drill and blast is perceived at Grootegeluk.

Providing a simple improvement platform for high level short interval controls and dashboard reporting of live operating environments is one of the most important enablers for ongoing success.

Working together

Grootegeluk Mining Engineer Peter Magagane worked with the Maptek implementation team and commented that they were very supportive and the training was well understood by the end-users.

Record-keeping, drill and charge validation, floor projection and fragmentation prediction were highlighted as being most beneficial for the operation.

'The solution has provided a safe and reliable record keeping feature for drill plans, drilling data and explosives usage data. This assists with regular in-depth reconciliation,' said Magagane.

'The drill validation process helped to ensure that a detailed comparison of the planned and actual drilled data is achieved in an efficient manner, especially since the pit comprises multiple benches.'

'The system helps us achieve the desired fragmentation by proposing the amount of explosives and powder factor required per drill block, saving costs. The automated charging process was quickly learnt by the operators and it also improved their safety,' concluded Magagane.

Feedback will help Maptek refine the BlastLogic system for the site. Change management is always a challenge when implementing new processes so it is important to have a plan to address this. Improved integration with third party drilling solutions is on the wish list.

The operation aims to use the BlastLogic system to further cut drilling and blasting costs, improve the quality control process and provide auditable records of all drill and blast activities.

*Thanks to
Peter Magagane
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Exxaro Grootegeluk Mine*

