Applying artificial intelligence and the cloud to optimise blast designs

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# ABSTRACT

Key trends in the mining industry, such as automation, data analytics, and optimisation, focus on achieving more efficient, productive operations with fewer resources. With the rapid growth of data, the next step is to establish effective processes and systems that leverage this data to support value-driven decision-making.

Significant resources are often allocated to developing accurate simulation models. However, these models are frequently not integrated with existing systems, limiting their utility. In the specialised area of blasting, integration with upstream and downstream processes is essential for driving sustained improvements and value.

This research presents an approach based on artificial intelligence and cloud computing to address complex mining challenges, enabling competing objective optimisation - like good fragmentation and low vibration - through population-based methods that reveal trade-offs across multiple solutions. Secure cloud-based processing accelerates computation, delivering results in timelines not feasible with desktop processing.

A new capability is now available that automates the generation of the three primary components of blast design - drill pattern, charge plan, and timing - in minutes. Integrating seamlessly with leading drill and blast design and reconciliation software, this advanced technology supports fine adjustment for the engineer, and accurate on-bench implementation to achieve reliable downstream performance.

This innovation that incorporates fundamental blasting design principles and empirical models allows mining engineers to focus on higher level thinking and consider how all the factors that influence blast performance can be engineered to better control outcomes. Importantly, this approach will help maximise operational efficiency and contribute to reducing environmental impact and energy costs, promoting a more sustainable drill and blast function.