CASE STUDY

World's first implementation of wireless initiation into a sub-level cave mine

CMOC Northparkes, Australia

Site Profile

CMOC Northparkes is an underground copper mine located near Parkes, New South Wales, Australia. The mine uses a combination of block caving and sub-level caving mining methods to process 6.5 million tons per annum of ore. With a vision of being a technological leader within the industry, Northparkes was keen to trial and implement a pre-charging blasting program into the sub-level cave part of the operation using Orica's WebGen™ 100 wireless initiation system.

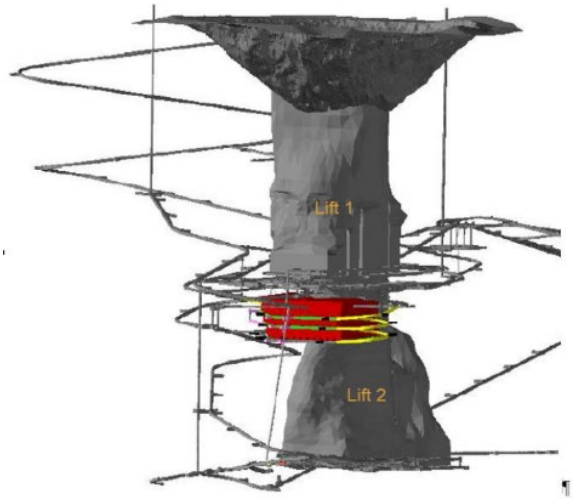

Diagram 1: The sub-level cave sits between Lift 1 and Lift 2 block caves

The Situation

The sub-level cave operations were mining a wedge of pre-conditioned ground that was unable to be mined through the original Lift 1 block cave. Combined with the geology of the ore body and conventional blasting methods, a significant amount of rework due to overbreak, dislocations and collars were being generated. With the presence of overbreak , charging was often being conducted with a reduced burden on the brow necessitating shotcreting of the brow to reduce rockfall exposure risk to the charge crew.

The primary goal for the introduction of pre-charging to the sub-level cave was to significantly reduce the exposure risk to employees and equipment from the brow loss and rework. However, pre-charging using wired or tubed initiation systems was not possible due to pre-conditioned ground and poor ground conditions near the existing cave. This was a key roadblock for Nothparkes to achieving the optimal performance from the sub-level caving operation.

Technical Solutions

In 2018, Orica was looking for a foundation partner to lead the way in the application of wireless initiation in blasting. The opportunity to apply the leading-edge technology of Orica's WebGen™ 100 wireless initiation system resonated with the Northparkes' vision and the mine committed to a 24-ring demonstration.

The Result

The trial was undertaken in 2018 using the WebGen™ 100 Firing Service with an Orica WebGen™ Engineer on site seven days a week. Northparkes took a partnership approach to the trial and worked with the Orica WebGen™ engineers in completing a detailed baseline and performance analysis of pre-charging using a wireless initiation system. The results were significant.

Measure	Result
D&B crew exposure time	Reduced by 75%
Re-drills	Eliminated
Re-work Shotcreting	Reduced 96%
Dislocated holes encountered when charging	Reduced 33%
Double ring firings	Eliminated
Firing to schedule	25% improvement
Drawpoint availability	37% improvement
Cave flow performance	15% improvement

The trial validated the WebGen™ 100 wireless initiation system as the enabler for Northparkes to implement pre-charging in the challenging sub-level cave environment. The adoption of pre-charging in the 24-ring demonstration enabled the removal of personnel from the line of fire at the drawpoint brows. The performance analysis confirmed direct cost savings achieved as a result of pre-charging with WebGen™ 100. Increased drawpoint availability and improved

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cave flow performance translated into a substantial benefit to the operational performance of the sub-level cave.

With the safety, direct cost savings and operational performance improvements delivered, Northparkes made the decision to be the first company in Australia to undertake a full conversion from a wired electronic initiation system to the WebGen™ 100 wireless initiation system for the sub-level cave. The service commenced in January 2019 and, as of April 2020, 192 rings have been blasted using over 4,400 WebGen™ 100 primers.

Removing people from the line of fire

During the trial it was confirmed that a wired initiation system would not be suitable for pre-charging due to the amount of brow loss encountered in the pre-conditioned ground. Additionally, the risk of damaged leads and/or loss of access to the collars of pre-charged holes would lead to increased exposure risk to employees working at the brow.

Diagram 2: Two pre-charged rings amid a lost brow.

In Diagram 2, there are two pre-charged rings indicated by white tape hanging from the holes and reflective markers (green for front ring, orange for second ring). The brow had broken back past the collars of the front pre-charged ring. A wired initiation system would not be able to safely fire this ring due to exposure and access concerns. With the WebGen™ 100 wireless initiation system, this ring was fired remotely without issue and at no risk to employees.

The simplicity of no tie-in

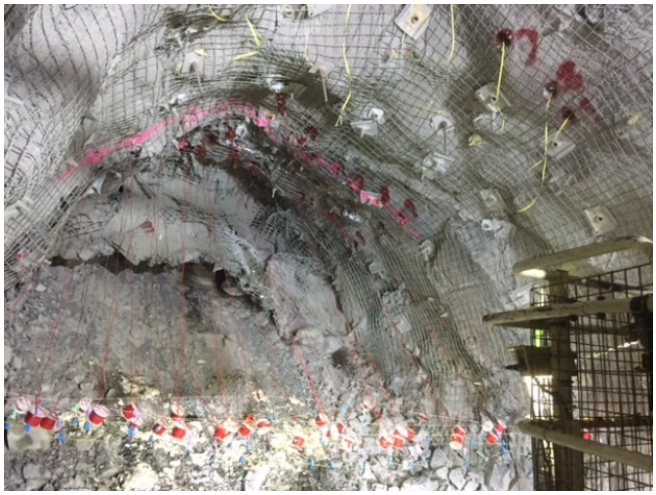

Diagram 3: Complexity of stand-up rings charged with a wired initiation system against simplicity of a wireless system

In diagram 3, it is evident that stand-up rings charged with a wired initiation system (lower half of picture) are complex against the simplicity of the wireless system in a pre-charged ring (yellow tape hanging from holes at top of picture).

Testimonial

"With WebGen™, we've been able to increase our primary draw and we've also been able to eliminate redrills. We see at Northparkes that this offers us the best opportunity around being an industry leader in mine design and mine construction for future block cave mining." Rob Cunningham, Mining Operations Manager, Northparkes Mines

Acknowledgements

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