CASE STUDY

Wireless Blasting revolutionises Uphole Mining and delivers significant safety and productivity benefits

Barrick Hemlo - Canada

Site Profile

Barrick is a Canadian, publicly traded mining company with a portfolio of operating mines and projects across five continents. The Hemlo (William's) mine is a large Gold mine located just north of Lake Superior approximately 35 km east of the town of Marathon, Ontario Canada. In operation since 1985, Hemlo mine has produced over 21 million ounces of gold and mines approximately 90 Stopes a year.

Photo: Alimak draw point

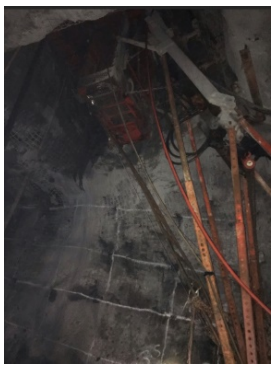
Photo: Production holes to be loaded

Situation

In early 2019 Hemlo's management team approached Orica and Manroc to explore opportunities for improvement via the application of wireless blast initiation. Through a series of workshops, Orica and Barrick Hemlo worked together to identify opportunities to use WebGen™ 100 wireless through the earth initiation technology in their Blind Alimak Mining Application.

This Blind Alimak Retreat (BAR) concept was aimed at improving both safety and productivity, and included:

- Reduced exposure time related to Alimak entries
- Improved ore-recovery from 70% to over 90%
- Increased recovery by maximising blast design, sequence, and available void
- Increased mucking rates while decreasing cycle time
- Optimised crew logistics by utilising single pass loading



Alimak climber in the brow

To expand operations and aid in the longevity of mine life, both efficiency and recovery were top priority for the Hemlo team.

Technical Solutions

Alimak Mining is normally done either in small repetitive blasts cycles, from the bottom of the raise up to an upper sill or in the case of blind Alimaks, as a mass blast into the void that exists in the raise and undercut below. Given that access is lost after the mass blast, the size of the blast (Alimak height) and recovery is often restricted by free face and available void.

At Hemlo the Blind Alimak blast performance was limited by underbreak in the top third of the Alimak (footwall break) due to the available void becoming choked off during blast progression. Using wireless blasting technology, the team was able to eliminate all void limitation. The solution was to develop a blast design with optimised burden and spacing as well as timing and blast sequencing, allowing well-defined portions of the Alimak stope to be taken at the appropriate time.

Single-pass loading was used to achieve the safety and productivity benefits. Breaking the Alimak stope into 5 preloaded portions (each increasing in size to capitalise on void created during the excavation process), allowed for flexible blast management throughout the mining process. With the ability to merge and increase blast sizes based on in-field results the operation had unprecedented control and was able to operate outside of the traditional constraints of mining cycles.

With three days of continuous loading, Hemlo was able to achieve a month and a half worth of blasting while freeing up the Alimak crews to move on to the next stope. To maximise the blasting sequence, the first blast (wall slash and five rings) was blasted with i-kon™ III Electronic Blasting System. The next three blasts (Two merged),

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were fired with WebGen™ 100 units when ready, with performance verified with bucket counts and CMS.

The Result

The results of the project stope were extremely positive and proved that wireless blast initiation can improve the economics of the Alimak stoping. Key benefits included significantly reduced personal exposure, increased stope recovery and cycle time. The success of the Alimak has also led to the introduction of wireless blasting into large blind up-hole patterns at Barrick Hemlo, solving similar issues to that of the Alimaks.

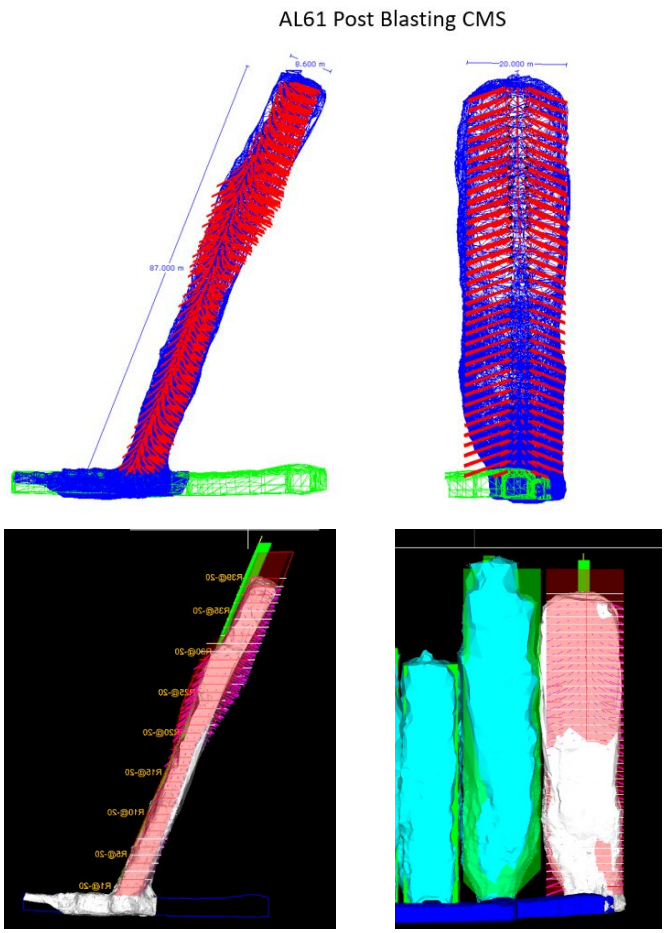
The outcomes of this project delivered a 40% improvement in productivity through decreased cycle time, faster mucking rates, improved ore recovery from 70% to over 90%, and increased safety by eliminating countless re-entries and hookups while stripping rail and logistically simplifying the operations process.

Measure	Result
Blast crew exposure time	Reduced by over 50%
Ore recovery	33% increase
Mucking rates	30% improvement
Blasting to schedule	40% improvement

Recovery improvement and productivity gains delivered significant value and increased revenue for the customer.

The project has also shown the ability to increase the height of blind Alimak stopes without concern for available void thereby eliminating the need of top sill development moving forward.

This successful trial has led to full-time technical collaboration with Barrick Hemlo mine since the end of 2019. Including this evaluation, at Hemlo, Orica has successfully fired more than 50 wireless initiating system blasts loaded with over 2,700 WebGen™ 100 units.



CMS results showing recovery rates over 90%

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Resulting blasted stope

Testimonial

“Introducing WebGen in 80m high blind Alimak stopes to eliminate overcut development and increasing recovery was a step change to our operations”

Adam Foulstone,
Mine General Manager,
Barrick Hemlo

“WebGen is a true game changer. Pre-loading an entire Alimak represented innovation, safety, and a true technological leap.”

Kevin Nelson
Mine Manager
Barrick Hemlo

Acknowledgements

The outcome of this project was possible due to excellent collaboration between Barrick Hemlo Engineering and Operations department, Orica’s Technical Services and Operations teams and Manroc Developments Alimak crews. Orica wishes to thank the customer for their support and permission to publish this case study.

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