
CASE STUDY

Barrick/Hemlo Autonomous Mucking Implementation



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Introduction:

In the spring of 2017, Hemlo acquired the Atlas Copco S14 Autonomous Scoop. In August 2017, Hemlo commissioned the tele-remote functions of the scoop. Operators have been trained to run it from surface.



ISSUE:

Expanding the autonomous fleet (Hemlo already has automated trucking underground) required significant technological upgrades underground. Automation is seen as a potential threat to jobs. Creation of a control room to accommodate new technology. Move to 12-hour shifts caused changes to original production plan.

A number of risks were identified:

Push back from staff resulting in project delays which negatively impact production potential and ROI

- ▶ Difficulty hiring new automation operators
- ▶ Perceived safety issues
- ▶ Fear of job loss
- ▶ Dissatisfaction resulting from moves of staff work spaces
- ▶ Changes to original production plan

BACKGROUND

Barrick's Hemlo operation employs approximately 500 direct employees and 200

contractors. The mine is slated to run until at least 2021. Feasibility studies are underway to identify considerations involved in extending life of the mine to 2031. A number of

productivity initiatives and improvements are underway to provide Hemlo with the means to lower the cut-off grade and increase the ore reserve, in a safe and sustainable manner. If results are positive, Hemlo could remain a key employer to local communities for years to come.

The addition of autonomous mucking to the automated fleet in order to increase production is a key component of these improvements, which along with Digital Task Assignment and Coordination and the move to 12-hour shifts combine to increase productivity and lower our cost per tonne based on fixed costs.

Autonomous mucking is expected to result in increased mucking time, increased safety (operators not in the stope behind the scoop and everyone outside of exclusion zone, decreased operator fatigue, faster cycle time, and optimized bucket load capacity.

VALUE PROPOSITION:

Managing change through assessment of both workflow and staff concerns about autonomous mucking ahead of implementation and in real time during commissioning, and effective communication of the benefits and collection of feedback, significantly mitigated risk to the organization.

HOW IT WAS ACCOMPLISHED:

- ▶ Project assessment (number of impacted employees, type of change, amount of change)
- ▶ Conduct supervisor interview sessions and hold focus groups to gauge receptiveness of crews based on past experience with automation
- ▶ Develop communications plan to ensure timely roll out ahead of physical changes and arrival of scoop
- ▶ Develop presentations and key messages for General Foremen and supervisors to prepare for changes and ultimately roll out to crews
- ▶ Development and use of communication tools (Q&A, memos, e-mails, newsletter articles)
- ▶ Development of visual tools (posters, video)
- ▶ Ongoing observation and adjustment of messages

SAMPLE KEY MESSAGES:

Benefits of Autonomous Mucking will include:

The autonomous mucker will allow for the operation of equipment (scoop) during shift change and gas checks, operated by production muckers in the control center to help meet production targets.

This process will be safer as it will remove the operator from underground and place them in a more comfortable environment.

It extends machine life by keeping it off the walls and is easier on the drive train.

SAMPLE Q&A:

Q: Won't mining the ore body too fast reduce mine life?

A: If we can move more tonnes with the same number of people, the same amount of equipment and the same fixed infrastructure, the unit costs go down, our cut-off grade goes down, lower grade stopes become economical. As you increase your mining rate your cut-off grade goes down at a rate that increases the amount of material faster than you're increasing the mining rate. So your mine life extends as you reduce your mining costs.

Sample Visual Aid

HEMLO CONNECT

AUTONOMOUS MUCKING

Automated guidance protects both the operator and the equipment

With the Atlas Copco 9 YD Scoop:

- Operate unit from surface in isolated stope.
- Increase production tonnage.
- Technology development partnership with Atlas Copco.
- Operate from surface during shift change.

PEOPLE
Greater Safety
Better Health
& Comfort

TECHNICAL
Increase Stope Utilization & Recovery
Extend Asset Life
Higher Productivity

ORGANIZATION
Add to Mine Life
Step Change Technology
Leader within Barrick

All this sustainably lowers cost per tonne

Have a question or comment? Email them to hemloconnect@barrick.com **BARRICK**

EXAMPLE RISK MITIGATION:

Automation	Resistance	Front line employees and some Supervisors may consider this a waste of money and potential loss to jobs	Push back from staff may result in project delays, difficulty hiring new automation operators, and ultimately delay reaching production potential and ROI	Engage pilot focus group of Supervisors and front line staff to review project plan and provide feedback on design plan
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CONCLUSION:

The autonomous mucking pilot project is ongoing. PACE continues to monitor progress and adjust messaging to ensure

communications remain effective and the value of the project is highlighted in spite of delays or changes resulting from other impacts (new shift schedule changing original plan, network issues.)

Testimonial from Sean McCarthy, Superintendent, Projects, Hemlo

PACE Inc. has been an instrumental part of Barrick Gold's Digital Implementation Strategy at the Hemlo Operations. From initial assessments and discussions about our personnel's readiness for change and ability to adapt to new technology, to understanding the company's issues and risks involved, PACE has helped manage and smooth the ongoing modernization of the mine. They have been adept at helping strategize the roll-out of numerous related projects, and create change management tools that clearly demonstrate the urgency for the improvements, while also ensuring the benefits are well understood and mitigating the apprehension that often surrounds significant change.

PACE are able to clearly demonstrate and articulate the value they add and its relation to ROI around change; particularly with the implementation of new technology. I highly recommend making them a part of your digital implementation project team.