

The background image shows an underground gold mine. In the foreground, a large red haul truck is partially visible, with its rear lights glowing red. To the right, a red loader is positioned. The mine's interior is characterized by rough, rocky walls and a dark, wet floor. The lighting is dim, with some artificial lights illuminating the scene.

teleop
A U T O

UNDERGROUND GOLD MINE
NEVADA - 2017

CASE STUDY

ABSTRACT

The purpose of the case study is to examine the benefits of HARD-LINE's Automation package for underground haul trucks. The article reviews the application of the technology for a client's underground hauling system. The plan applied HARD-LINE's technology to minimize operating costs by installing TeleOp Auto on machinery the mine already owns, and to bring additional value to an existing ramp design. The client approached HARD-LINE to automate a haul truck as part of its underground pilot project. The system would allow the truck to maneuver the mine's 4.5 km ramp during shift changes while an operator located on surface monitors the autonomous operation. The option to assume one-to-one control of the truck is built in to TeleOp Auto.

INTRODUCTION

The client's vision is for a generation of wealth through responsible mining and the integration of a digital reinvention of its mining operations. The objective of the initiative is to prove how underground tele-remote and automation technology improves safety and productivity. Consequently, the mine trialed HARD-LINE's TeleOp Auto system on a haul truck in its underground hauling operation.

CHALLENGE

The project improved safety by moving operators from the underground environment to the office space of the surface. The objective was to increase the production of the mine, by moving material during typical downtimes. Both directly contributed to the mine's bottom line. At that point, the mine lost up to two hours of potential production time each shift. This lost time occurred during shift changes and blast cycles.

APPLICATION

HARD-LINE installed and commissioned a TeleOp Operator Station on the surface of the mine to control the haul truck. The control room was situated approximately 100m from the surface portal. The application allowed the client to trial the features and benefits of HARD-LINE's TeleOp Auto system while controlling the truck from a safe and distant location.

The unmanned vehicle was driven autonomously 4,500 meters up the ramp, from an underground muck bay to the mine's surface portal. The operator took control of the truck once it reached the surface, to park it near the entrance. The application was a step towards a 24/7 operation that is safe, efficient, and that could eliminate the downtime between shifts.

BENEFITS

HARD-LINE's TeleOp Auto system minimized downtime. It allowed the trucks to continue to transport material to the surface and travel to desired underground work zones. The autonomous solution presented minimal human interaction during shift changes and blast cycles. The operators are no longer required to travel underground or between work zones. Additionally, the system provided additional production time each shift. This contributed to efficiently sending more tons to the mill and significantly increased the productivity of the operators during each shift.

HARD-LINE's TeleOp system can increase machine utilization by a minimum of 15% per day when used during shift changes and shortly after blasts. The mine's underground ramp is the ideal environment to apply the autonomous system. It is the sole access to the underground working area and the primary pathway for moving material.

CONCLUSION

Implementing autonomous and semi-autonomous technologies are made possible through HARD-LINE's TeleOp and TeleOp Auto offerings, which are readily available to mines around the world. The mine's management team is capable of applying these technologies to the fleet of their choice, regardless of make or model. Underground automation technology is keeping frontline workers safe, increasing productivity, and drastically enhancing the utilization of mine assets. The trial application of HARD-LINE's TeleOp Auto system demonstrated the benefits of autonomous underground hauling operations for this successful project.

Disclaimer: The heavy machinery used in this project is a product and creation of Caterpillar.



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CONTACT

sales@hard-line.com
HARD-LINE.COM

