The bridge to possible

Mobile Fleet Operations for Mining

Most heavy equipment operations in a mine are performed by an operator located within the mining equipment. Not only is this costly, but it also puts personnel into potentially hazardous situations such as equipment rolls or collisions. For underground mines, transportation from personnel housing to mine operator staging areas can take over an hour one way. Workers are required to wear special Personal Protective Equipment (PPE), which requires a significant amount of time to maintain. Most underground areas are dangerous and unstable. In wet muck underground tunnels, or extremely hot or cold mine locations, mine personnel's time must be limited to reduce direct exposure to dangerous environments. The use of remote operations for mining gives better visibility to location and health of the equipment, reducing time during shift change and improving the overall usage of the high-value assets.

Cisco® Mobile Fleet Operations enables mining companies to centralize their monitoring and controls of mines without putting people in harm's way. Functions that can be performed in the remote operating centers increase operational efficiency and effectiveness while improving safety. For example, the adoption of remote control and autonomous equipment operations, providing the ability to have high reliable paths without the chance of human error, has dramatically decreased the number of safety incidents involving the mobile fleet and allowed for a smaller number of operators to manage a larger fleet at much lower cost.

Benefits

- Increased haulage performance and productivity
- Increased safety for dozer operators using tele-remote operations
- Fewer safety incidents involving vehicles and haul trucks
- Lower cost to operate large asset fleet (e.g., haul trucks, dozers)
- More accurate drilling according to the mine plan
- More control over equipment planning and scheduling
- Fewer missed runs
- Reduced fuel usage
- Increased efficiency of crushers

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"The need for greater efficiencies and business resiliency is accelerating autonomous operations across industries, and Cisco is a key partner in providing the technologies needed to improve autonomous operations at scale."

Bill Kohut
SVP of US Commercial Sales
Cisco

Safety security and efficiency from above ground

Mining operations are driving toward fully autonomous operational models throughout the supply chain. Removing humans that manually operate equipment will improve productivity, improve product quality, increase worker safety, and help reduce the overall cost of operations. Use cases today involving autonomous vehicles and equipment are either fully automated, without any direct human interaction, or semi-automated, with equipment that is remotely operated and monitored. Remote operations centers can be either located close to the mine site or located completely offsite and far away from the mine.

Digital dispatch

Digital dispatch processes connect mobile fleets to the mine network, thus allowing for proper route calculations and ensuring that operators unload the correct materials in the right spots, properly sending only high-grade ore to the crusher and appropriately delivering overburden to the correct dump. Digital dispatch requires connecting the mine fleet over a wireless network. Having the ability to optimize the haul routes is a huge savings for the mining operators and is the first step in digitizing the mine.

Semi-autonomous

Semi-autonomous (remote command) machine operations include loaders in a one-to-one or one-to-many remote operator to machine ratio. One use case is a haul truck operator who can control a loader from inside the cab of the truck to load ore into his truck, thus eliminating the need for an additional operator who would be sitting idle the entire time that the truck is in transit. A ratio of one-to-one or one-to-many allows remote personnel to operate the equipment from a safe location.

Allowing operators to work from a control room located above ground while operating machinery located in a high-risk environment underground improves operational efficiency by eliminating some of the travel time, reducing downtime during shift change, improving visibility of equipment location, removing the need for PPE, and most importantly, removing personnel from harm's way. In addition, remote operators can now simultaneously manage more than one machine, thus reducing the number of operators needed.

Autonomous

Likewise, autonomous trucks can haul resources from shovels or front-end loaders in a mine to a crusher area. When fully automated, trucks may continuously operate at optimum performance, thus reducing engine wear and improving tire performance and fuel efficiency. This reduces maintenance costs and downtime and increases productivity.

Reliable network performance is critical to ensure continuous operation of equipment. IT personal strive to minimize packet loss and roaming times to achieve optimal application performance. Any computer network issues, or prolonged roaming times can initiate safety systems that result in the vehicle or equipment stopping, ultimately affecting productivity and production. Cisco's portfolio of industrial and outdoor wired and wireless products plays an integral part in providing a high-performing, highly available, and secured networking infrastructure for supporting autonomous systems in the mine.

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Why Cisco

Cisco has more than 25 years of experience in industrial networking, extending the reach of your operation while protecting your investment in remote or hazardous sites.

For additional information, visit www.cisco.com/go/mining

Build smarter, safer, more productive mining operations

Cisco Mobile fleet operation solutions leverage automation and autonomous operations to increase safety and productivity by using digital tools to lower costs for core mine operations.

- **Fleet management:** Optimize operations between haul trucks, shovels, and crushers using pervasive communications across the mine to connect these key assets, while reducing fuel usage and unnecessary wear on critical equipment.
- **Autonomous and remote control:** Build secure and reliable communications for surface and underground mines to support autonomous, semi-autonomous, and tele-remote operations for haulage, dozing, and drilling.

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