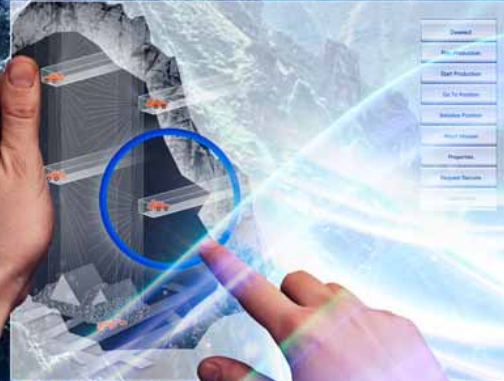


# MDEC Conference Toronto 7-9 October

## LHD Automation

Mikko Koivunen  
Marty Adams



## Environment, Health & Safety

### Our EHS Vision

Zero Harm to our people, the environment we work in,  
our customers and our suppliers

- **Our strong EHS culture**
- Arises from our values and is fully integrated into the way we 'do business'
- Relies on everyone being committed to our vision and taking personal responsibility
- Is supported by effective management systems and processes
- Delivers sustainable and continuous improvement



# Content

- Mining Challenges
- Definition of Mining Automation
- Automation Value Proposition
- LHD Automation
- Reference Applications



# Mining Challenges and Automation

- **Safety and working conditions**
  - Mining often requires working in locations with elevated risk levels
- **Mineral resource grades are declining**
  - More waste, existing mining technologies and methods becoming less efficient
- **Mines in more and more remote locations**
  - Difficult to get skilled labor
- **Lack of accurate mining process management information**
  - Daily decision making based on old reports and inaccurate data
  - Low utilization rate for mining equipment



# Definition of Automation

The technique, method, or system of operating or controlling a process by highly automatic means, as by electronic devices, **reducing human intervention** to a minimum. (Dictionary.com)

## Automation Offering for UG Mining

- **Advanced remote controls**
- **Remote Monitoring & Process Management**
- **Single equipment automation**
- **Fleet automation**

# AutoMine Value Proposition



# AutoMine Loading

- Automated loader fleet or single unit (Lite version)
- Semi automated production cycle
- Remote operation from centralized control room or mobile operator station
- Real time process visualization



# Solution Concept

## Control Center



## Production Area



## Onboard



# AutoMine

Value proposition – Safe and Optimized Mining

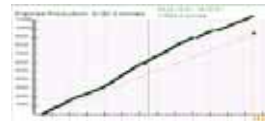
- Active Access Barriers isolating the production area
- Other operations totally separated from the autonomous fleet
- Only man-less equipment operating in the hazardous areas
- Operator controlling the fleet from a surface control room



# AutoMine

Value proposition – Safe and Optimized Mining

- Continuous operation during shift changes
- One operator controlling up to 3 autonomous loaders
- Maintenance and production optimization using exact production and condition monitoring information

A data table with multiple columns and rows, likely representing production and condition monitoring information. The table is partially obscured and difficult to read, but it appears to have several columns of data.

# AutoMine

Value proposition – Safe and Optimized Mining



- Precise Draw Control in Mass Mines
- Real – Time visualization of resources
- Interactions with other on-site systems (CMS, SCADA, ventilation etc.)



# AutoMine

Value proposition – Safe and Optimized Mining



HQ



- Real-time communication with the equipment
- Production and Condition Monitoring Reporting
- Interfaces (Smart Markers, SCADA, CMS, Reporting systems...)
- Remote Connections



On-Site Control Room



Equipment

# Implementing Automation with Success

- **Definition of objectives**
- **Understanding the application**
- **Proven technology**
- **Support**
- **Committed people on all organizational levels**
- **Skilled labor**
- **Change management**



# Automated LH514E in Action

[Video](#)



**Questions!**