ABB Underground mining
Mobile Integration
**Integrated Mine automation and electrification**

- **Mine Operation Center**
- **Mine ventilation**
  - Drainage system
  - Water pumps
- **Substations**
- **GIS Substations**
- **Transformer**
- **E-Houses**
- **MCC & Drives**
- **Stockyard management**
- **Hoisting systems**
- **Communication network**
  - Wired & wireless Supervision
  - IP Telephony, video
  - Asset & people tracking
- **Mobile assets**
  - Remote monitoring
  - Production reporting
  - Work order mgmt.
- **Crushing and conveying**
  - Loading pockets
  - Crushers
  - Feeders
  - Conveyors
800xA Power management
What is Electrical Integration?

Electrical integration means integrating **Process Automation** and **Power Automation** into the same plant control system.
Integrated Mine automation and electrification
Mine operation center

- Production management
- Fleet management
- Asset & personnel tracking
- Video and voice
- Communication network

- Energy management
- Asset Management
- Process control
- Tele-remote control
- Access control
Integrated Mine automation and electrification

Communication networks

Mine Production control

APPLICATION

POSITIONING

COMMUNICATION NETWORK

Mine Safety

Video

IP Telephony & messaging

Fleet Management

Tele-remote control

Process control
Integrated Mine automation and electrification

Communication networks

Mine Operation Center

Communication network
- Wired & wireless Supervision
- IP Telephony, video
- Asset & people tracking

Mine ventilation

Substations
GIS Substations
Transformer
E-Houses
MCC & Drives

Mobile assets

- Remote monitoring
- Production reporting
- Work order mgmt.

Stockyard management

Hoisting systems

Water handling
- Drainage system
- Water pumps

Crushing and conveying
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Integrated Mine automation and electrification
Communication networks - Positioning
ABB Mine Location Intelligence – powered by Mobilaris

- Automated positioning of personnel
- Automated verification of machine work position – right machine at the right face...
- Real-time location tracking of assets
- Data and voice communication

Positioning of machines and people...

Process control
- Better visualization of the mine in 3D
- Increase productivity by knowing where your assets are and optimizing your logistics, stop searching for things!
- Increase the collaboration between your personnel
- Increased decision support
- Trace ore and other materials
- Analysis of traffic patterns
- Save energy in combination with ABB Smart ventilation integration

Safety
- Increase safety by knowing where your people are in emergency situations
- Rescue operation with simulation
- Rescue chamber optimization based on actual resource locations
- Automatically warning system by create Geofences

...positioning is a service for other services.
Integrated Mine automation and electrification

Mine Operation Center

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Substations

GIS Substations

Transformer

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Source: ABB 2020 Project Team
Typical problems

- The MTBF figures of mining machines are low. Can be as low as 8h.
- Reactive and time-based maintenance are dominating maintenance strategies.
- Hard to perform root-cause analysis and understand why machines break-down.
- Utilization rate of mobile mining machines are low, can be as low as 20-25% of available working time.
- Utilization of open faces are low. Can be as low as 20-30% of the available working time.
- High degree of unplanned activities and low plan compliance.
Value proposition

- Maximize equipment availability by moving from reactive to predictive maintenance.
- Achieve production targets and produce to plan by reducing variability and improving responsiveness to unplanned activities and disturbances.
- Maximize production flow from face, through blast cycle activities and crushing and haulage to surface.
- Track and control ore inventory for maximal flow and optimal grade.
- Increase operation awareness for all personnel of the current mine status.

"Estimated to increase production capacity with 10-20% with same resources"
The ore factory
Execute optimized plans and monitor on-line

Decision layer
- Design
- Production
- Assets
- Work
- Material
- People
- Finance

Operation layer
- Production view
- Process view
- Location view

Capability layer
- Development
- Production drilling
- Load & haul
- Truck haulage
- Crushing
- Hoisting
- Stockyard management
- Mineral Processing

Production plan → Asset availability → KPI report & visualization → Status on-line

Demand

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Integrated Mine Operations Systems

Mine production system
- Scheduling
- Production execution
- Production tracking
- Material tracking
- Resource management
- Performance reporting

Fleet management system
- Dispatch & work order management
- Remote monitoring
- Mobile asset Localization

Process control system
- Production control
- Process monitoring and control

Mine planning system
- Dispatch & work order management
- Remote monitoring
- Mobile asset Localization

Maintenance management
- Production tracking
- Material tracking
- Resource management
- Performance reporting

Finance
- Process control system
- Performance reporting

Inventory management
- Production tracking
- Material tracking
- Resource management
- Performance reporting

Development
- Development drilling
- Load & haul
- Truck haulage

Crushing
- Crushing
- Hoisting
- Stockyard management
- Mineral Processing

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ABB MineInsight™
Mine production and control system

MinelInsight™

Execution manager
- Scheduling
- Production execution
- Material tracking
- Production performance reporting

Fleet manager
- Dispatch & work order management
- On-board machine reporting
- Remote monitoring
- Equipment performance reporting
ABB MinelInsight™
Logical structure
ABB MineInsight™
System layout - overview

- 3:rd party systems
  - MinelInsight™ Web clients
  - MinelInsight™ Servers

Production network

- System 800xA Servers

Process control network

- Mine operator workplace
  - MinelInsight™ clients
  - Scheduling & dispatch
  - Remote monitoring
  - Process control

- 3:rd party systems

- Machine operator workplace
- Machine operator workplace
- Machine operator workplace
- Shift manager workplace
- Process control
  - Fixed/semi mobile equipment

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MineInsight™ integration of 3:rd party Remote Monitoring System

Machines and Monitoring Solution

800xA Control System
MineInsight™
integration of 3:rd party Remote Monitoring System
MineInsight™
integration of 3:rd party Remote Monitoring System

- Asset Optimization
- Actual operation status
- Reporting of operation results (daily, weekly, monthly)
- Reporting of operation performance according to planned
- Reporting energy consumption
- Integrated access to documentation
- Material tracking
- …
MineInsight™
integration of 3:rd party Remote Monitoring System
Mobile machine Objects

Typical Aspects
Integrated Mine automation and electrification

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- GIS Substations
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