

A Highly Technical Engineering Summit For Mine Operators Implementing Automation Technologies

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MININGTECH
AFRICA

AUTONOMOUS MINING & AI OPERATIONS

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CONFERENCE&EXPO | 30.JUNE, CAPE TOWN, ZA

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Engineering AI, Robotics & Autonomous Operations for the Next Generation of African Mines

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Africa's Most Technical Mining Engineering Conference – Built for Mine Operators

A Technical Engineering Summit for Operators Delivering Automation in Africa's Most Complex Mining Environments

MININGTECH AFRICA 2026 —

Where Autonomous Mining Moves from Concept to Deployment

Africa's Mining Industry Is Entering Its Most Critical Decade

Automation is no longer optional

Across Australia, Canada, and Latin America, autonomous haulage, remote operations, AI-driven planning, and robotic drilling are already delivering measurable gains in safety, productivity, and cost efficiency.

Africa risks being left behind — unless it accelerates now

But this is not a simple technology adoption challenge

Africa's Mines Are Fundamentally Different

Why This Event Exists

Most global mining conferences talk about innovation. This event is about implementation.

African operators are facing uniquely complex engineering problems:

- Some of the deepest underground mines
- Harsh, variable geological conditions
- Legacy infrastructure not designed for automation
- Intermittent connectivity and power constraints

You cannot copy-paste automation strategies from Australia into Africa.

An Industry at an Inflection Point

Until recently, these barriers slowed adoption.

Now, that is changing rapidly:

- Safety pressures in deep-level mining are increasing
- Labour productivity is under intense scrutiny
- Sensor technology and AI have matured
- Remote operations are becoming viable
- Connectivity solutions are improving

African mining companies are now actively defining their automation strategies for the next decade.

The question is no longer if — it is how, where, and how fast

What Makes MININGTECH Africa Different

This is not a policy forum.

This is not a high-level “future of mining” discussion.

This is a technical, operator-led engineering summit.

Every session is built around:

- Real deployment challenges
- Engineering constraints in African environments
- System integration, not isolated technologies
- Lessons from global leaders — adapted for Africa

Built for Mine Operators — Not Observers

MININGTECH AFRICA is designed specifically for:

- Mining engineers and technical leaders
- Automation and digital transformation teams
- Operations and production managers
- Innovation and technology deployment leads
- Practical pathways to implementation in Africa

Join the Engineers Building That Future

MININGTECH AFRICA 2026 Is Where Those Solutions Are Defined, Challenged, And Deployed

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08:30

Chair's Opening Remarks The Autonomous Mine Is No Longer a Concept — It Is an Engineering Challenge

Autonomous mining is moving from pilot deployments to large-scale operational systems. While regions such as Australia and Canada have deployed autonomous haulage and drilling fleets at scale, African operations face unique constraints including deep underground environments, legacy infrastructure, limited connectivity, workforce transition challenges, and complex safety regimes.

This opening address frames the central engineering challenge for the industry:

How do mining companies design, deploy, and scale safe, resilient, and economically viable autonomous mining systems in Africa's unique operating environments?

System Architecture of the Autonomous Mine

09:00

Designing the Autonomous Mine: System Architecture and Integration Challenges

Autonomous mining operations rely on a complex ecosystem of robotic equipment, AI systems, communication networks, and operational control platforms. Many mines are attempting to introduce automation technologies into environments that were never designed for autonomous operation, creating integration challenges between legacy systems and modern digital infrastructure.

This Session Explores

- System architecture required for autonomous mining environments
- Integration of robotics, AI platforms, and operational control systems
- Scalability challenges in large mining operations

Technical Focus

- Autonomous system architecture design
- Sensor fusion frameworks for mining environments
- Integration of autonomous equipment with fleet management systems
- Distributed control systems for mining automation
- Interoperability between equipment manufacturers

Learning Objectives

- Understand how autonomous mining systems are architected at the system level
- Identify key integration challenges in deploying autonomous technologies
- Explore scalable architectures for future autonomous mines

09:20

Connectivity Infrastructure for Autonomous Mining Operations

Autonomous mining systems require continuous, low-latency communication between equipment fleets, sensors, and control systems. However, deep underground mining environments present significant connectivity challenges including signal attenuation, complex tunnel geometries, and limited infrastructure for high-bandwidth networks.

This Session Explores the Communication Infrastructure Required to Support

- Underground robotic equipment
- Autonomous haulage fleets
- Remote operations centres
- High-bandwidth sensor and monitoring networks

Technical Focus

- Private LTE and emerging 5G mining networks
- Mesh networking architectures for deep underground mines
- Latency requirements for autonomous vehicle control
- Edge computing for autonomous mining equipment
- Network redundancy and fail-safe communication architectures
- Cybersecurity frameworks for mining communication networks

Learning Objectives

- Evaluate networking technologies suitable for underground mining environments
- Understand latency and bandwidth requirements for autonomous mining systems
- Explore strategies for building resilient mining communication infrastructure

09:40

Data Architecture for AI-Driven Mining Operations

Autonomous mining systems produce enormous volumes of operational data from sensors, machines, geological models, and environmental monitoring systems. Without robust data architectures, mining companies struggle to extract meaningful insights or deploy AI models effectively.

This Session Explores

- Scalable data infrastructure for autonomous mining operations
- Integration of machine data, geological data, and operational data
- Enabling AI-driven decision making in mining environments

Technical Focus

- Industrial data platforms for mining operations
- Edge-to-cloud data pipelines
- Real-time analytics for operational decision support
- Data governance and interoperability standards
- Integration with mine planning systems

Learning Objectives

- Understand the data infrastructure required to support autonomous mining systems
- Explore architectures for integrating operational and geological data
- Identify best practices for enabling AI-driven mining operations

Autonomous Haulage Systems

10:00

Deploying Autonomous Haulage Fleets in Large-Scale Mining Operations

Autonomous haulage systems have delivered substantial safety and productivity benefits in large open-pit mining operations. However, scaling these systems requires overcoming significant engineering challenges related to fleet coordination, operational safety validation, and integration with existing mining processes.

This Session Explores

- Engineering requirements for autonomous haulage deployment
- Fleet coordination and traffic management
- Safety validation frameworks for autonomous equipment

Technical Focus

- Autonomous navigation systems for mining trucks
- Collision avoidance and situational awareness technologies
- Integration with dispatch and fleet management platforms
- Operational control systems for autonomous fleets
- Redundancy and fail-safe control systems

Learning Objectives

- Understand the architecture of autonomous haulage systems
- Explore engineering challenges involved in deploying autonomous fleets
- Identify strategies for scaling autonomous haulage operations

10:20 NETWORKING BREAK

10:40

AI-Driven Fleet Optimisation for Autonomous Mining Operations

Autonomous mining fleets must continuously optimise routes, vehicle utilisation, and traffic flow in complex and dynamic environments. Traditional dispatch systems cannot manage the complexity of autonomous fleet coordination at scale.

This Session Explores AI Applications for Fleet Optimisation

- Real-time fleet coordination
- Adaptive route optimisation
- Autonomous dispatch systems
- Energy and fuel efficiency optimisation

Technical Focus

- Reinforcement learning algorithms for fleet optimisation
- Predictive traffic management systems
- AI-driven dispatch platforms
- Sensor fusion for vehicle navigation
- Integration with mine production planning systems

Learning Objectives

- Understand how machine learning optimises mining fleet operations
- Explore AI approaches to real-time fleet coordination
- Identify operational benefits of AI-driven fleet optimisation

11:00

Managing Hybrid Mining Fleets: Autonomous and Human-Operated Equipment

Many mines will operate hybrid fleets for years, combining autonomous equipment with human-operated machinery. Ensuring safe and efficient interaction between these systems presents complex operational and engineering challenges.

This Session Explores

- Operational frameworks for hybrid mining fleets
- Safety protocols for mixed autonomous and human operations
- Traffic management strategies

Technical Focus

- Human-machine interaction systems
- Vehicle proximity detection technologies
- Autonomous decision-making algorithms
- Operator awareness systems
- Safety management frameworks

Learning Objectives

- Understand risks associated with mixed fleet operations
- Explore technologies enabling safe human-autonomous interaction
- Identify strategies for managing hybrid mining fleets

Robotics for Underground Mining

11:20

Robotics for Deep-Level Underground Mining

Deep underground mining environments present extreme conditions including high temperatures, confined spaces, seismic activity, and limited connectivity. These environments require specialised robotic systems capable of operating reliably under challenging conditions.

This Session Explores

- Robotic technologies for underground mining
- Automation of hazardous mining tasks
- Remote and autonomous operation of underground equipment

Technical Focus

- Underground robotic mobility systems
- Sensor technologies for underground navigation
- AI-enabled robotic perception
- Robotic drilling and material handling
- Autonomous navigation in GPS-denied environments

Learning Objectives

- Understand engineering challenges for underground mining robotics
- Explore technologies enabling robotic underground mining operations
- Identify opportunities to improve safety using robotics

11:40

Autonomous Drilling Systems

Drilling operations require high levels of precision and adaptability to changing geological conditions. Autonomous drilling systems must integrate sensor feedback, geological models, and machine control systems to maintain accuracy and operational efficiency.

This Session Explores

- Automated drill rig control systems
- Real-time geological feedback integration
- Precision drilling technologies

Technical Focus

- Sensor-guided drilling systems
- AI-driven drilling optimisation
- Rock face mapping technologies
- Drilling automation platforms
- Integration with mine planning systems

Learning Objectives

- Understand the architecture of autonomous drilling systems
- Explore technologies enabling precision drilling automation
- Identify productivity gains from drilling automation

12:00

AI-Driven Ore Body Modelling

Modern exploration generates enormous volumes of geological and geophysical data. Traditional modelling methods struggle to process these data sets efficiently, limiting the accuracy of resource estimation and mine planning.

This Session Explores

- Machine learning techniques for geological modelling
- AI-driven exploration analytics
- Predictive resource estimation

Technical Focus

- Deep learning for geological interpretation
- Geospatial data integration platforms
- AI-assisted resource modelling
- Predictive exploration algorithms
- Integration with digital mine platforms

Learning Objectives

- Understand how AI enhances geological modelling
- Explore machine learning applications in mineral exploration
- Identify opportunities to improve resource estimation accuracy

AI-Driven Operational Optimisation

12:20

Predictive Maintenance for Mining Equipment

Mining equipment failures cause significant operational disruptions and safety risks. Autonomous mining systems introduce new layers of mechanical, electrical, and digital complexity that require advanced monitoring and predictive maintenance strategies.

This Session Explores

- AI-based equipment health monitoring
- Predictive maintenance frameworks for mining equipment
- Integration with maintenance management systems

Technical Focus

- Machine learning failure prediction models
- Vibration and acoustic monitoring technologies
- Sensor-based condition monitoring systems
- Predictive analytics platforms for equipment maintenance
- Integration with enterprise asset management systems

Learning Objectives

- Understand predictive maintenance technologies for mining equipment
- Explore machine learning approaches for failure prediction
- Identify strategies to improve equipment reliability

12:40

Digital Twins for Mining Operations

Mining operations involve complex interactions between equipment fleets, geological models, and processing infrastructure. Digital twin technologies allow mining companies to simulate and optimise operations in real time.

This Session Explores

- Digital twins of mining operations
- Simulation-based optimisation of mining systems
- Real-time operational modelling

Technical Focus

- High-fidelity simulation platforms
- AI-enabled operational forecasting
- Digital twin integration with mining control systems
- Sensor-driven operational monitoring
- Predictive production modelling

Learning Objectives

- Understand digital twin architectures for mining operations
- Explore simulation technologies for operational optimisation
- Identify use cases for digital twins in mining

13:00 LUNCHEON NETWORKING

14:00

AI-Optimised Mine Planning

Traditional mine planning relies on static models that struggle to adapt to dynamic operational conditions. AI-driven planning systems enable continuous optimisation of mining operations.

This Session Explores

- Machine learning applications in mine planning
- AI-driven production scheduling
- Optimisation of resource extraction strategies

Technical Focus

- Reinforcement learning for mine planning
- Predictive production modelling
- AI-driven scheduling algorithms
- Integration with geological modelling platforms
- Dynamic resource allocation systems

Learning Objectives

- Understand AI-driven mine planning technologies
- Explore dynamic production optimisation techniques
- Identify opportunities for AI-enabled decision support

Safety, Security and Risk

14:20

Safety Validation of Autonomous Mining Systems

Autonomous mining equipment must operate safely in highly hazardous environments. Ensuring operational safety requires rigorous validation processes, testing frameworks, and compliance with evolving safety standards.

Technical Focus

- Functional safety frameworks for autonomous systems
- Validation testing methodologies
- Hazard identification and risk analysis
- Safety-critical system design

Learning Objectives

- Understand safety validation frameworks for autonomous mining equipment

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- Explore testing strategies for autonomous systems
- Identify best practices for managing operational risk

14:40

Computer Vision Systems for Mining Safety

Mining environments present numerous safety hazards including vehicle collisions, falling debris, and dangerous working conditions. AI-driven vision systems are increasingly deployed to monitor operations and detect hazards in real time.

Technical Focus

- Computer vision algorithms for hazard detection
- Worker proximity detection systems
- AI-based situational awareness platforms
- Sensor integration for safety monitoring

Learning Objectives

- Understand how AI vision systems improve mining safety
- Explore applications of computer vision in hazardous environments
- Identify deployment challenges for AI safety monitoring systems

15:00

Cybersecurity for Autonomous Mining Systems

Autonomous mining systems rely on highly connected networks of machines and control systems. Cybersecurity vulnerabilities could disrupt operations or compromise safety-critical systems.

Technical Focus

- Cybersecurity frameworks for industrial control systems
- Network intrusion detection technologies
- Secure communication protocols
- Risk mitigation strategies for mining operations

Learning Objectives

- Understand cybersecurity threats facing autonomous mining operations
- Explore strategies for securing mining control systems
- Identify best practices for cyber-resilient mining infrastructure

Perception, Navigation & Sensor Systems

15:20

Navigation Systems for Autonomous Mining Equipment in GPS-Denied Environments

Autonomous mining equipment operating in underground environments cannot rely on satellite-based positioning systems. Navigation systems must instead combine multiple sensing technologies to accurately determine position and orientation within complex and constantly changing underground mine layouts. Reliable navigation is essential for ensuring safe equipment movement, collision avoidance, and accurate production operations.

This Session Explores

- Navigation technologies for underground mining equipment
- Positioning systems for autonomous drilling and haulage

- Sensor fusion approaches for navigation in GPS-denied environments

Technical Focus

- LiDAR-based mapping and localisation
- Simultaneous localisation and mapping (SLAM) algorithms
- Inertial navigation systems
- Sensor fusion combining LiDAR, radar, cameras and IMUs
- Underground positioning infrastructure

Learning Objectives

- Understand navigation technologies used in autonomous mining equipment
- Explore engineering approaches to GPS-denied positioning
- Identify limitations and accuracy considerations of underground navigation systems

15:40

Perception Systems for Autonomous Mining Equipment

Autonomous mining equipment must perceive and interpret complex operating environments, including moving equipment, workers, changing terrain, and environmental hazards.

Achieving reliable perception in dusty, low-light, and high-vibration mining environments remains a significant engineering challenge.

This Session Explores

- Environmental perception technologies for mining robotics
- Hazard detection systems
- Sensor fusion for situational awareness

Technical Focus

- LiDAR perception systems
- Radar sensing for harsh environments
- Computer vision systems for mining equipment
- AI-based object detection algorithms
- Sensor fusion architectures for autonomous vehicles

Learning Objectives

- Understand the sensor technologies enabling autonomous mining perception systems
- Explore engineering challenges of perception in harsh environments
- Identify strategies for improving situational awareness in autonomous equipment

Edge AI and Autonomous Control Systems

16:00

Edge Computing for Autonomous Mining Equipment

Autonomous mining systems must make decisions in real time, often in environments where connectivity to cloud infrastructure is limited or unreliable.

Edge computing architectures enable AI models and control systems to operate directly on mining equipment.

This Session Explores

- Onboard computing systems for autonomous mining equipment
- Distributed AI architectures for mining operations
- Real-time decision making at the edge

Technical Focus

- GPU and AI accelerator hardware for autonomous vehicles
- Real-time operating systems for autonomous equipment

- Distributed AI inference systems
- Edge-cloud data synchronisation architectures
- Low-latency control loops for autonomous machines

Learning Objectives

- Understand the role of edge computing in autonomous mining systems
- Explore hardware and software architectures for onboard AI
- Identify challenges associated with deploying

16:20 NETWORKING BREAK

17:00

Interoperability Challenges Between Autonomous Mining Platforms

Most mining operations deploy equipment from multiple manufacturers. Autonomous systems from different OEMs often operate using proprietary software platforms and communication protocols, creating integration challenges for mine operators.

Achieving interoperability between equipment platforms is essential for scalable autonomous mining operations.

This Session Explores

- Interoperability challenges between autonomous mining systems
- Standardisation efforts in mining automation
- Integration of multi-vendor autonomous fleets

Technical Focus

- Industrial communication standards
- Open mining automation platforms
- API integration for fleet management systems
- Cross-platform data exchange architectures
- Autonomous fleet orchestration systems

Learning Objectives

- Understand interoperability challenges across mining equipment platforms
- Explore strategies for integrating multi-vendor autonomous systems
- Identify emerging standards for mining automation

Human Oversight and Remote Operations

17:20

Designing Human-Machine Interfaces for Autonomous Mining Operations

Even highly automated mines require human supervision. Designing effective human-machine interfaces is essential for enabling operators to monitor autonomous systems, respond to anomalies, and maintain situational awareness across large mining operations.

This Session Explores

- Control room interface design
- Operator decision-support systems
- Monitoring autonomous equipment fleets

Technical Focus

- Human factors engineering for automation systems
- Visualisation platforms for autonomous fleet monitoring
- Alarm management systems
- Real-time operational dashboards
- Augmented reality for maintenance operations

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Learning Objectives

- Understand how operators interact with autonomous mining systems
- Explore design principles for automation control interfaces
- Identify strategies for improving operator situational awareness

17:40

Engineering Remote Operations Centres for Autonomous Mines

Remote operations centres enable mining companies to control equipment fleets and monitor operations from centralised facilities located far from the mine site. Designing these centres requires sophisticated control systems, communication infrastructure, and human-machine interaction frameworks.

This Session Explores

- Operational architectures for remote mining control centres
- Technologies enabling remote equipment operation
- Workforce transformation enabled by remote operations

Technical Focus

- Supervisory control systems for mining operations
- Real-time monitoring platforms
- Distributed operations architectures
- Remote equipment control technologies
- Operational data visualisation systems

Learning Objectives

- Understand how remote operations centres support autonomous mining
- Explore engineering requirements for remote control systems
- Identify operational benefits of remote mining operations

18:00 Closing Keynote

The Roadmap to Fully Autonomous Mining Operations

Despite significant advances in robotics, AI, and automation technologies, fully autonomous mining operations remain rare. Achieving this vision requires coordinated progress across connectivity, robotics, AI systems, safety frameworks, and workforce transformation.

Technical Focus

- Technology maturity across mining automation systems
- Roadmap toward fully autonomous mines
- Integration of robotics, AI and digital mining platforms

Learning Objectives

- Understand the technological roadmap for autonomous mining
- Explore barriers to full autonomy in mining operations
- Identify strategic priorities for mining companies adopting automation

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Africa

- **Engage Directly** with Senior Mining Decision Makers
- **Position Your Technology** as a Deployment Solution — Not a Concept
- **Influence Automation Strategies** Being Defined Right Now

Built Around Real Deployment Challenges

- Deep underground mining environments
- Connectivity below ground
- Integration of autonomous systems.
- Transition from pilot to full-scale deployment

This is where real buying decisions are made.

This Is Not a Generic Mining Event

Most mining events in Africa focus on:

- Investment
- Policy
- High-level digital transformation

A Highly Targeted, Operator-Led Audience

- Position your brand at the forefront of Africa's mining transformation
- Engage directly with decision-makers solving real engineering challenges
- Secure visibility in a high-value, operator-led environment

MININGTECH Africa is different

100% focused on **engineering, systems, and real implementation**