



Tunneling Solutions

That Move Depths

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Tunnel construction is one of the most demanding disciplines in the underground sector. Confined working spaces, changing rock conditions, and the highest safety requirements call for precise planning, reliable communication, and intelligent automation.

Becker Mining Systems offers a comprehensive portfolio of networked systems – modular, scalable, and proven in practice. Our solutions are robust, designed for sustainability, and can be seamlessly integrated into existing infrastructures.

From communication and power distribution to monitoring and security to transportation and data analysis, they create efficiency, safety, and transparency underground.

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Tunneling Solutions by Becker Mining Systems

- **smartflow** – Intelligent control and monitoring
- **smartcom** – Networked communication in tunnels
- **smartsense** – Real-time environmental monitoring
- **PDS4.0** – Proximity detection for maximum safety
- **Tagging & Tracking** – Real-time positioning for greater safety
- **ENDIS4.0** – Systematic energy distribution
- **Haulage** – Efficient transport of materials and personnel
- **MineView AI** – Artificial intelligence for greater safety and efficiency

smartflow

Intelligent control and monitoring

With smartflow, Becker Mining Systems offers a powerful SCADA platform that monitors, controls, and analyzes processes in tunnels in real time.

smartflow has a modular design and can seamlessly integrate all Becker components – from power distribution and ventilation to safety systems. The visualization of all process data on a central user interface provides a complete picture of operational processes.

Whether fan control, water pump monitoring, or energy flow analysis, smartflow ensures transparency, efficiency, and optimal resource utilization in tunnel construction.



With smartflow, complex operational processes become transparent and controllable – from traffic flow monitoring to the deployment planning of personnel and equipment. All relevant data can be analyzed, visualized, and optimized in real time – for maximum efficiency in tunnel operation.

smartcom

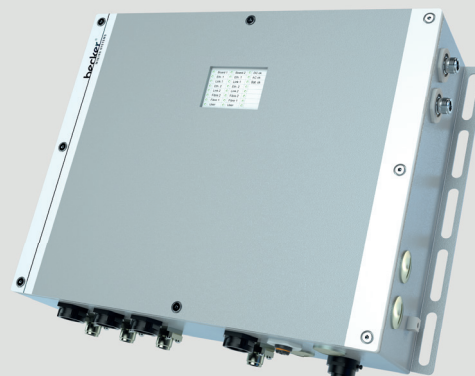
Networked communication in tunnels

Reliable communication is the backbone of any tunnel infrastructure. With smartcom, Becker Mining Systems provides a modular communication platform that combines voice, data, and video in a unified network.

Whether for use in construction phases, maintenance zones, or logistics areas, smartcom ensures stable connections and clear communication at any depth. The system supports both wired and wireless networks and can be flexibly adapted to existing infrastructures.

smartcom also includes the proven WRAP system – a robust system component that combines router and switch functions for underground applications. This allows all systems of Becker Mining Systems, from sensors to controls, to be directly net-

worked with each other. smartcom creates a networked infrastructure with a variety of communication channels – from stable WiFi access to connections for fiber optics and Ethernet (RJ45) to data exchange via RS485. This ensures that communication remains reliable and fast at all times, even under the toughest conditions.



smartsense

Real-time environmental monitoring

The smartsense series provides precise measurement data for all relevant environmental parameters in tunnels: temperature, humidity, air velocity, dust, gas, and pressure.

Thanks to their modular design, sensors can be individually combined and cen-

trally managed via smartflow. This enables continuous monitoring of air quality and operational safety – crucial for health, productivity, and regulatory compliance.

PDS4.0

Proximity detection for maximum safety

With PDS4.0, Becker Mining Systems is setting new standards in underground workplace safety. The system detects the positions of people and vehicles in real time and provides early warning of potential collisions.

PDS4.0 uses precise detection technologies to monitor danger zones and automatically trigger graduated warnings or braking procedures when approaching. This reduces the risk of accidents, makes processes safer, and reduces downtime.

The system can be seamlessly combined with other Becker solutions – such as smartcom for data transmission or smartflow for central monitoring and control.



Tagging & Tracking

Real-time positioning for greater safety

The tagging and tracking system from Becker Mining Systems ensures comprehensive transparency on the tunnel construction site.

It records and locates people, vehicles, and equipment in real time, so that their position and movements can be tracked at all times.

Visualizing this data provides a complete picture of what is happening in the tunnel – a valuable basis for safety management, resource planning, and process optimization.

ENDIS4.0

Systematic energy distribution

Energy supply plays a central role in tunnel construction. ENDIS4.0 offers a modular, safe, and flexible solution for energy distribution in underground facilities.

From power supply for machinery and lighting to integration with smartflow, ENDIS4.0 ensures efficiency and reliability in every phase of the project.



The robust design and modular construction facilitate maintenance and adaptation, while the intelligent control system prevents overloads and failures.

Haulage

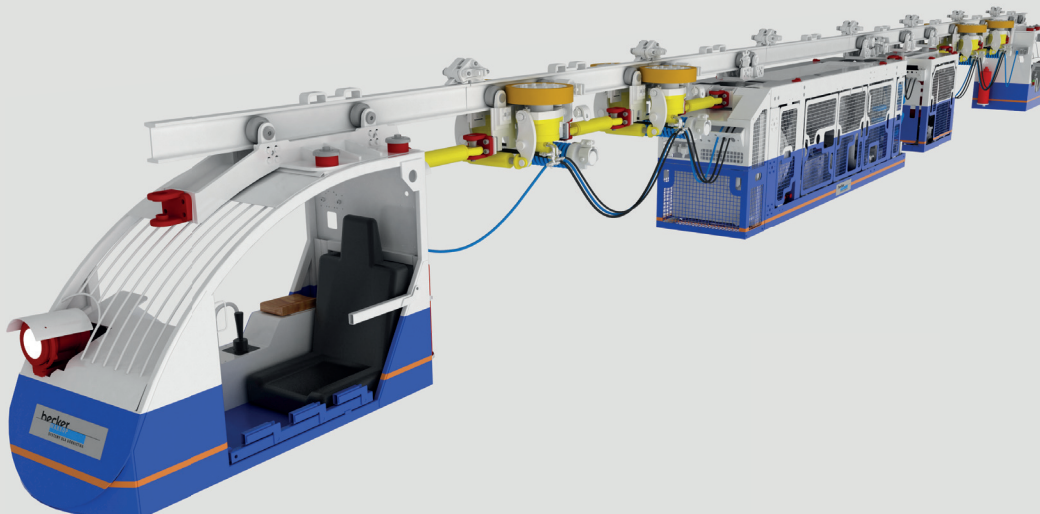
Efficient transport of materials and people

In tunnel construction, every minute and every meter counts. With transport systems from Becker Mining Systems, material transport and personnel transfers can be organized efficiently, safely, and predictably.

Whether ground-based locomotives, trains, or suspended monorail systems – our transport systems ensure safe and efficient transport of personnel and materials, even under extreme conditions. Thanks to their modular design, they can be flexibly adapted to any environment, are low-emission and, if required, suitable for use in potentially explosive areas.

Robustness, reliability and ease of use are just as important as the highest safety standards. Becker Mining Systems also offers continuous conveyor systems – such as powerful chain conveyors and continuous crushers – for a seamless flow of materials in the tunnel.

Integration with PDS4.0 and smartflow further automates and monitors the transport process – for maximum efficiency and minimum downtime.



MineView AI

Artificial intelligence for greater security and efficiency

MineView AI brings the advantages of modern image processing and artificial intelligence directly to tunnel construction sites. The platform analyzes sensor data, camera images, and process information in real time and displays it in an intuitive user interface.

This allows deviations to be detected early on, safety standards to be monitored, and workflows to be improved in a targeted manner. Three core applications are already in focus today:

Drill Count and Monitoring

Automatic recording and analysis of boreholes – for precise documentation, pattern recognition, and increased efficiency in tunneling.



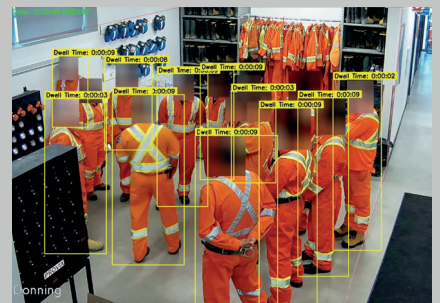
Conveyor Belt Monitoring

Continuous monitoring of conveyor belts – AI detects damage, blockages, or material jams, preventing costly downtime.



PPE Detection

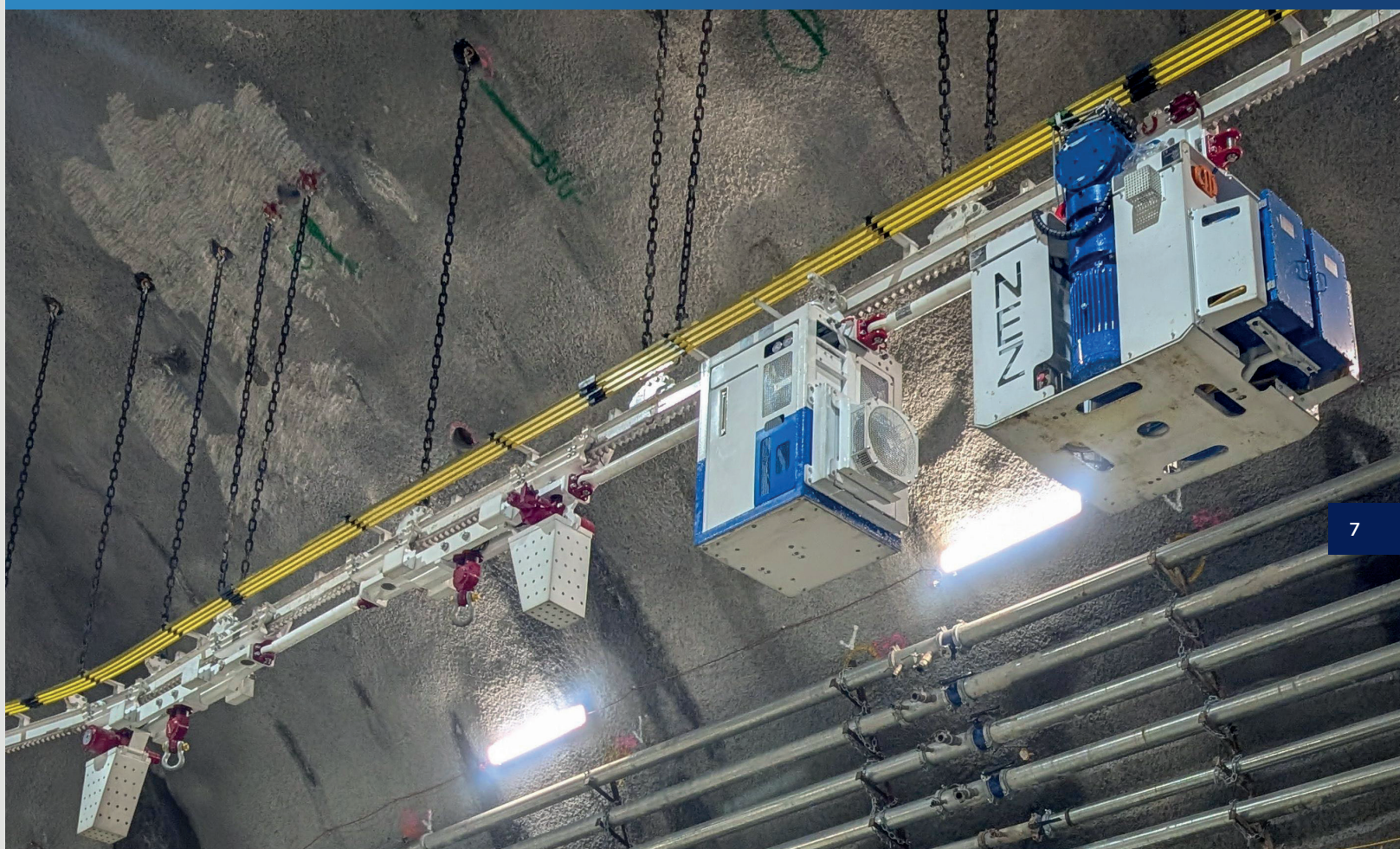
Automatic detection of personal protective equipment – for greater safety and compliance in tunnel operations.



By connecting to smartflow, all AI results are collected centrally and combined with other process data.

This creates a complete, data-driven picture of what is happening in the tunnel.

Intelligent systems for the tunnel construction of the future



Becker Mining Systems combines communication, energy, safety, transport, and data analysis in a holistic system approach.

Thanks to standardized interfaces such as OPC UA, machines and systems from other manufacturers can also be seamlessly integrated – for an open, future-proof, and

networked infrastructure throughout the entire tunnel network.

Our technologies create efficiency, safety, and transparency – and form the basis for the next generation of tunnel construction.



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