

Enabling the digital underground mine with Innovative Wireless Technologies

From real-time communications to a connected digital infrastructure



Digital adoption in underground mining is a journey – one that starts with a strong communications foundation. For two decades, Innovative Wireless Technologies (IWT), through its SENTINEL™ Communication System, has been at the forefront of this digital evolution, providing real-time, reliable wireless connectivity. As mining operators look to build on these capabilities to become smarter and more data driven, IWT's Clarity™ platform is helping them unify and analyse data for better operational insights.

Underground mines first adopted two-way communication for voice and tracking with the simple goal of meeting regulatory requirements. But as operators started to reap the productivity gains provided by the ability to communicate with anybody in the mine at any time, they were keen to take these capabilities further.

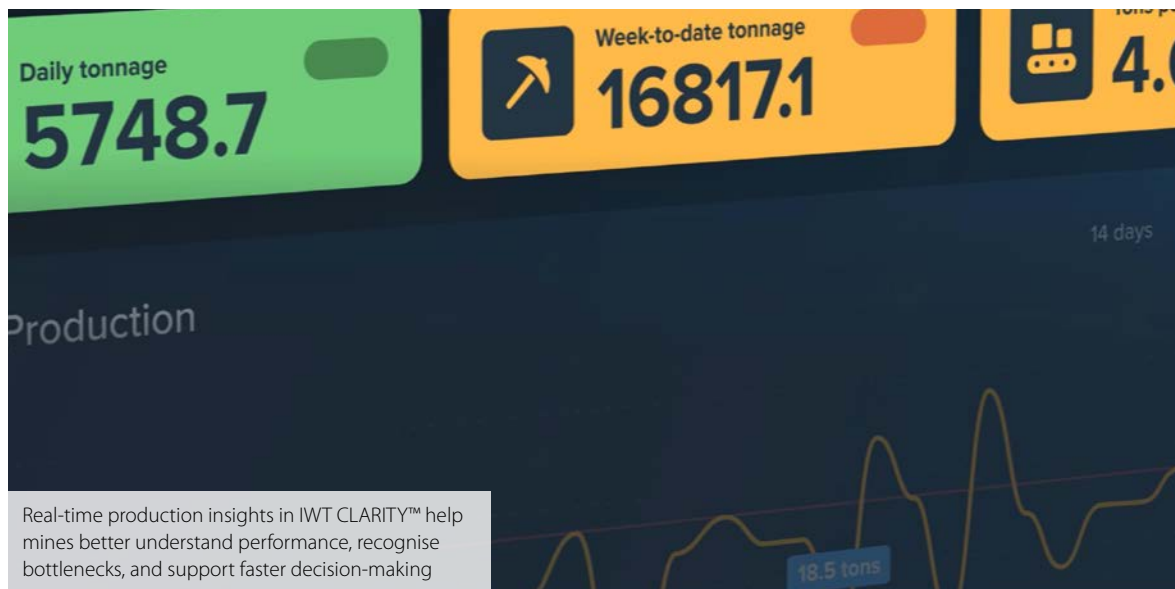
IWT's SENTINEL™ communication system provides state-of-the-art wireless communications for the unique and harsh demands of underground mining and tunnelling – where traditional above ground communications technology does not suffice.

Based on nodes, there is no single point of failure in the network, meaning the system will always reroute the signal to deliver crystal clear communications – even in the event of a mine collapse. For many mining operators, it serves as the foundation of their digital journey – an enabler to achieving connected smart data-driven operations.

Curating a connected digital ecosystem

Reliable underground real-time connectivity, such as delivered by SENTINEL, has enabled operators to pull more data than ever from the mining environment: whether it be machine, atmosphere and compliance monitoring or the movements of individual workers. Yet, with this capability has also come complexity, with disparate, siloed systems and data streams making it difficult for mine operators to derive intelligent actionable insights.

“What miners want to do now is integrate these systems, so there's a cohesive and shared context within them,” explains Jeremiah Colling, director of products and marketing at IWT. “These information streams are valuable by themselves but become much



more powerful when connected and shared in the same context, allowing operators to identify patterns and risks.”

This is why IWT – on the demands of its customers – developed IWT Clarity, a comprehensive analytics platform that combines diverse, and previously separated and siloed channels and data streams into one unified view and cohesive ecosystem. This includes myriad data sets coming not just from SENTINEL, but also SCADA software, and other industrial applications, such as conveyor belts and ventilation systems and processing plants.

From data to actionable direction

Integrating real-time voice, tracking, text, atmosphere and machine monitoring into one platform makes it easier to harness this vast – and valuable – data to enable new capabilities. This includes shifting from learning only from data on what has happened, but to also understanding what’s happening in the mine in real-time and how to respond.

With built-in AI assistance, IWT Clarity organises and transforms raw data into clear, practical insights. It provides real-time visibility across operations, enabling users to spot issues early, adapt quickly, and make smarter decisions to improve safety and productivity

“Real-time data insights push operators towards a more proactive management approach, versus a

reactive one,” explains Colling. “In the mining industry, it’s all about identifying constraints; better situational awareness of what’s currently happening in the mine enables operators to respond in real time and make changes that affect their productivity and safety.”

For example, he adds, if a dispatcher can see where their crews are live, they can better allocate their resources in real time, rather than working retroactively.

Gain predictive operational insights

The next step on the digital journey is knowing not just what’s happened or what is happening in the moment, but what is likely to happen next – and how operators can use this information to improve productivity.

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Jeremiah Colling, IWT



Asset tags provide real-time location for underground equipment, while integrated sensor data supports equipment health monitoring and predictive maintenance

[Digitisation] enables operators to do things they couldn't do before... and ultimately, predict what is likely to happen next

Jeremiah Colling, IWT

Combining data to derive predictive insights has been shown as one of the biggest value-adds digitisation can offer the underground mining environment. This is particularly so when it comes to improving production efficiency and outcomes.

Oftentimes, operators are only considering what they produced rather than the factors affecting that production: such as lost time and asset performance. But AI-driven analytics anticipates what's likely to happen next, enabling operators to act before issues arise.

IWT's Clarity platform, which is scalable and interoperable, leverages AI and machine learning models to build intelligence from data that is

accumulated over time to predict potential future outcomes. This includes profiling an ideal case of how a machine should operate so operators can start predicting and forecasting maintenance to avoid costly shutdowns and failures.

In addition, the platform enables custom visuals and dashboards to fit an operator's priorities, turning complex data into clear visuals and producing digestible insights such as executive overviews.

Become smarter and more data driven

Digitisation in underground mining is all about enabling communication and data exchanges between the harsh underground environment to the above ground, in order to keep people safe and operations efficient and commercially viable.

"This is what IWT provides through a unified AI-powered digital ecosystem that is both reliable and easy to integrate into operations," says Colling.

"Once adopted, it enables operators to do things they couldn't do before – such as understand machine and vehicle performance, monitor the atmosphere in real time, run faster diagnostics and compliance reporting – and ultimately, predict what is likely to happen next."



Smarter, Safer Mines

AI-Driven Insights. Operational Clarity.



IWT CLARITY™ brings together production activity, asset performance, underground conditions, atmospheric monitoring, and safety systems into a single operational intelligence platform. Coordinate crews in real time, reduce manual reporting, identify bottlenecks early, and use AI-derived insights to support predictive maintenance and smarter operational decisions. One platform. Faster action. Fewer surprises.

Bringing *Clarity* to Mine Operations.

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