

Automation Solutions for Mining and Tunneling



Points on Plug-and-Play

Dr. Thomas Paul, HUBER+SUHNER, and John Hooper, Ampcontrol, explain how plug and play is the future for reliable, secure mining connectivity and communications.

As mining operators augment profitability by reducing operating costs, raising asset utilisation, while improving mining safety and performance, the need for digitalisation within the mining sector has never been greater. With mines growing deeper underground and new reserves located predominantly in remote locations, it is becoming abundantly clear that technology has a huge part to play.

With the fourth industrial revolution beckoning, increasing numbers of next-generation technologies – such as sensors, automated or self-controlled equipment, and data-heavy automation solutions – are being adopted to allow for smoother and more efficient operations. All of this, however, requires reliable, high-bandwidth connectivity to manage the large amounts of data necessary for the successful daily running of the mine.

Ease of installation



Customisation



Robustness



Delivering mission-critical communication

Robust high bandwidth networks are imperative for the mission-critical communications that take place within mines, both above and below ground. Data links are the backbone of automated operations and safety critical infrastructure – transmitting information from sensors, CCTV, and voice communications throughout the mine. In order to fulfil their role, data streams need to pass over long distances and through challenging environments.

Next to the quasi-unlimited data bandwidth, fiber optic links are also intrinsically immune to electromagnetic fields, provide galvanic insulation and remain future-proof, while permitting for bandwidth-extension as demand grows. But the harsh environments of a mine can also pose a risk for the physical integrity of such networks.

With mining operations heavily reliant on their communications infrastructure to keep oper-

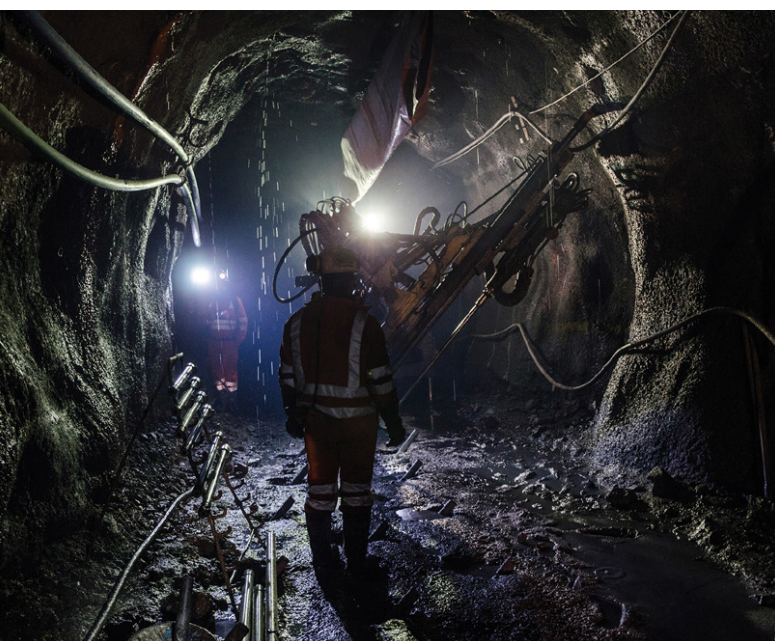
ations running, the invulnerability of the link to and between personnel and machines underground is crucial. Any outages or failures can result in downtime, the costs of which scale rapidly with duration. In order to avoid this, it is vital that companies adopt high-performance, high-quality, and long-life solutions that enable seamless underground connectivity.

Quick and easy-to-deploy infrastructure is key

In mining, production depends entirely upon having a network which is continuously accessible, in order to enable reliable communication between sensors, workers, and machines. With so much relying on it, it is evident that any damage to a mine's fiber optic network can cause significant expense and safety hazards. Network failure and outages prove a major headache for operators, with personnel having to be removed and work stopped in affected areas underground. Therefore, it is essential to have a quick-fix solution when things go wrong.

The ability to repair a network quickly is a serious challenge faced by companies throughout the industry, with issues underground being time consuming to solve. Finding an available qualified fiber optic engineer certified to work underground at short notice is challenging and costs for such experts are high.

Whilst damage to fiber optic networks cannot be completely prevented, there is an answer for operators looking to reduce downtime on the network and get back to normal much quicker in the event of a network malfunction. The trick is to use quick and easy-to-deploy infrastructure that enables fast, rapid repair – even by staff who are unskilled in fiber optic engineering.



Utilise plug and play technology

HUBER+SUHNER and Ampcontrol have combined their respective knowledge to create a speedy, innovative solution called H3RO – a robust toolkit for fiber optic networks designed for the harsh conditions in underground mines. Rapidly installed and maintained, it enables mines to deploy and expand their networks conveniently and hassle-free. Moreover, it allows them to get back to normal quickly and efficiently when things go wrong.

H3RO comprises a set of a pre-terminated modular fiber optic cable assemblies and fiber optic breakout terminals (distribution units), which removes the need for specially trained engineers for installation. Its plug and play elements support standardisation across mines of all sizes and regions. This has allowed for reductions in cost, easier rollout, consolidation of spares, and consistency for high-quality expansion within tough environmental conditions.

Combining telco grade low-loss high density push-pull and screw-on connectors with fit-for-purpose industrial breakout terminals (BOTs), cable armour and glands, forms a reliable and robust industrial solution. The BOTs remove the necessity of having large enclosures and minimises common failure points, such as unnecessary patching and needless connector exposure. This single-mode fiber optic system supports both Passive Optical Network (PON) models and traditional Ethernet, replacing the need for time consuming fiber optic terminations in the field with a standardised future-proof infrastructure.

With communication networks being critical to the core of operations, it is essential that mine

operators have access to quick and easy solutions for when failures occur or when network expansion is required.

Bringing the concept to reality

In most cases, when a mine's network is damaged, work ceases due to the loss of essential safety communication between those working on the surface and those underground, along with the ability to continue operating autonomous machinery or other digitalised features. However, when a copper and gold mine in Western New South Wales, Australia, experienced an outage caused by the severing of a communications cable, downtime was limited to the shortest time possible by adopting the H3RO solution to ensure a quick and simple repair.

As a result of H3RO's ease of use, workers unskilled in fiber optics were able to safely deploy the solution and enact a fix to get the mine's operations back up and running. The IP68 connectors and bulkheads allowed for the system to be seamlessly integrated within the existing infrastructure. The hassle-free, simple repair instilled confidence for future fast recovery in similar incidents or potential network expansion.

When installing new or replacement infrastructure, it is quite common for parts to be modified in the field to fit with the existing setup. This can be problematic within the harsh environments of mines, which can see fibers being exposed to dust, mud, and other potentially damaging elements. However, since H3RO's modularity covers a breadth of application embodiments, additional modifications were not necessary. The mine workers simply swapped out the damaged section for

the newer one, meaning time-consuming fiber field splicing was not required.

Another deployment saw the same solution providing network connectivity to underground mining equipment within a coal site, where autonomous operations were carried out with machinery. The fiber optic backbone required throughout the mine needed to offer easy integration with new and existing equipment, including third-party panels and components.

Due to the functionality of the system, monitoring and control of underground equipment was achieved by utilising pre-existing FOBOT panels throughout the mine, enabling rapid, uncomplicated expansion of the network by site staff, resulting in a high-quality, low-loss dynamic network. With a robust solution created specifically for use within harsh environments, mine operators can be certain that their fiber optic infrastructures not only deliver high performance, but high levels of practicality too.

Preparing for the demands of the future

There are many options for mining operators to consider when selecting fiber optic infrastructure for their communication networks and connectivity. A report by the World Economic Forum and Accenture forecasts that by 2025, digitalisation will have added more than US\$425 billion of value to the mining industry, with around 1000 lives saved and 44 000 injuries prevented. As such, operators within the sector will rely more and more on next-generation technology, as they become increasingly squeezed for higher efficiency and profits. With so much riding on their networks, it is essential that companies take advantage of systems that are simple, risk-free, cost-effective and that will upgrade and improve performance within the mine, while offering easy adaptability and expansion options to meet future requirements.



The highlights

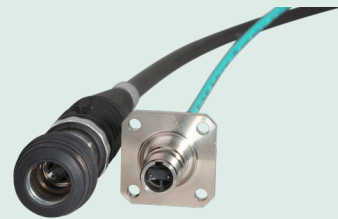
H3RO – the fiber optic distribution unit

- Compatible with ultra harsh environments
- Does not require fiber technicians to install
- Highly customisable



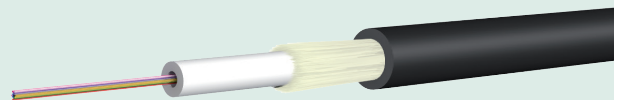
Q-ODC-12 / 24 – push-pull quick connectors

- High fiber counts packaged in robust outdoor housing
- Tool-less quick connect terminations
- High number of mating cycles

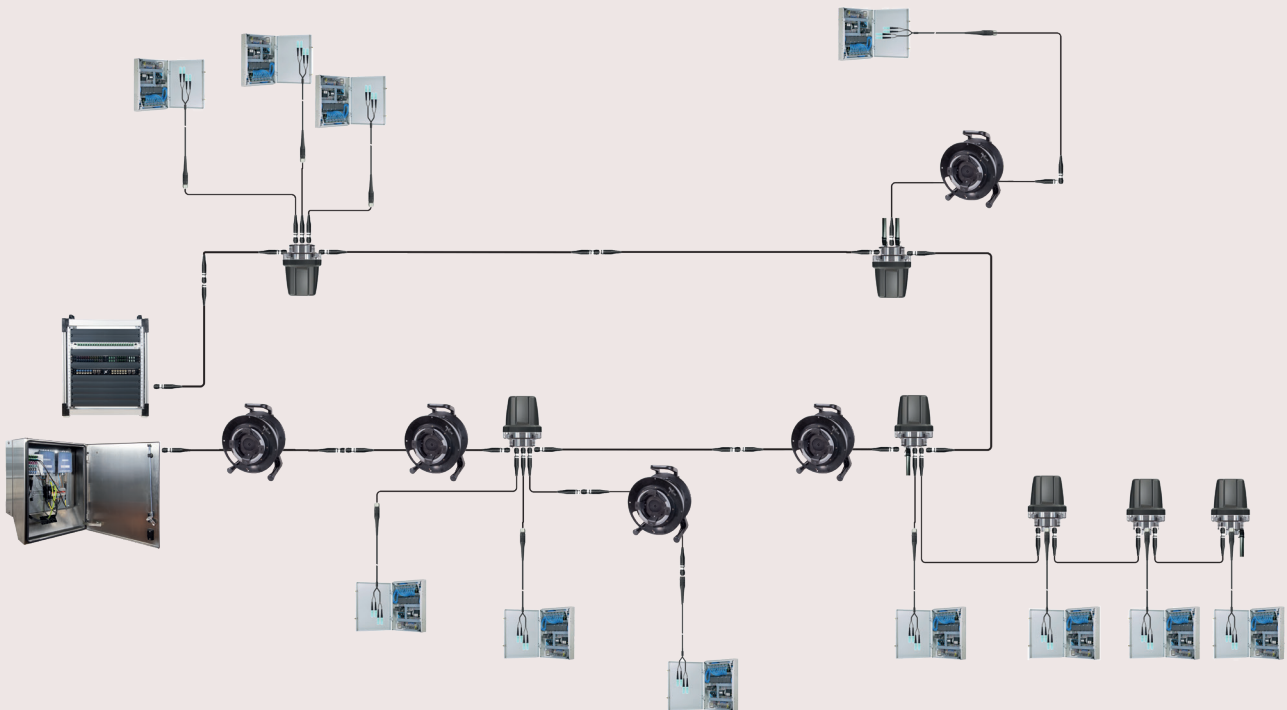


H3RO cable – fiber optic cable for the toughest conditions

- High water and oil resistance
- High strain and torsion ratings
- Great coiling capability



Network structure



Additional information



Catalogue

H3RO - Harsh environment reticulated optics



Catalogue

Fiber optic solutions for industrial applications

About HUBER+SUHNER

We are a leading global supplier of components and systems solutions. With our broad range of products and deep know-how, we serve the industry, communications and transportation markets with applications from the three technologies of radio frequency, fiber optics and low frequency. And as a global company with a presence in over 80 countries, we stay close to our customers. Always.

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About Ampcontrol Group

Ampcontrol delivers integrated electrical, electronic and control solutions to improve safety and efficiency in mining, renewable, infrastructure and industrial applications. Responding to challenges with agility and ingenuity, our multi-disciplined expert teams leverage technology innovations to improve electrical infrastructure design. From ideation through design and manufacturing, service and repair – Ampcontrol provides complete end to end solutions for energy, infrastructure and resources industries.



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