JUST GOOD
SENSE

**Chris Fischer,
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drivers in the adoption of
proximity detection systems.

While proximity detection technology has been available for some years, its adoption rate has been somewhat slow, particularly within underground coal mines. The technology has evolved over the last few years to a state where it can now be considered fit-for-purpose for underground coal mining. New developments have seen the release of approved systems, which overcome some of the earlier issues, such as false alarms. Business investment in proximity detection is a significant capital cost to a mine and therefore operators not only look for a system that greatly improves safety, but also one that will not negatively impact their productivity at the same time. In fact, with the right system in place, the reduction of safety incidents will contribute to improved operational efficiency.

Proximity detection technology

The inherently hazardous nature of coal mining necessitates that mine operators maintain an acute focus on safety. Serious incidents in various locations around the world have attracted international concern over the last 12 months. This has renewed determination and focus on improving safety levels for workers within the industry and reducing the number of accidents.

While there are many different circumstances where accidents may occur, a common risk area within the mining industry is the scenario where workers come into dangerous contact with heavy vehicles or other

The proximity detection system uses a magnetic field generator mounted on a shuttle car.

mobile equipment, or in cases when two vehicles come into unexpected contact with each other. In underground coal mining, the restricted working space and access, poor visibility and various other factors come into play to make the likelihood of serious accidents an ever-present risk.

Proximity detection systems were developed to address this need. The systems work by defining safe boundaries or zones around heavy vehicles or machinery, and then alerting both the vehicle operator and the other party when another vehicle or individual breaches the safe zone. This allows immediate action to be taken by either or both parties to avoid the potential collision.

For areas of close proximity constituting the inner zone (up to 25 m), the system may use magnetic field generators on the vehicles or equipment, along with magnetic tags carried by individuals and other vehicles. For the outer zones (60 – 80 m), the system can rely on the regular transmissions of an active Wi-Fi tag as opposed to the tag being stimulated by a magnetic field. In the event of an alarm being activated, the system may also be configured to trigger an automatic action, such as applying the brakes to a particular vehicle or shutting down the machine completely, although these actions would require thorough risk assessments to ensure they do not create other dangers.

The first fully approved system

As part of its rigorous development process, Mine Site Technologies (MST) has conducted full underground coal trials at an Australian customer site, which uses typical continuous miner and shuttle car mining sections. This process involved designing the use of the proximity detection system around the safe operating procedures for the mine and the specific equipment in use, while ensuring that operational efficiency is not compromised.

The implementation of the system represents the first fully approved proximity detection system for underground coal to be deployed in Australia.

As behavioural change among workers (who are often accustomed to a particular way of performing day-to-day tasks) is a major undertaking when introducing new technology and procedures, a key consideration is to engage the miners early in the project and keep them involved. Part of the initial process involved operating the system in silent mode in order to establish a baseline based on current behaviour. This enabled comparison once the system was deployed to track shifts in behaviour and improve safety practices.

Apart from the safety improvement due to the increased awareness of an individual's proximity to a machine and/or the vehicle driver being alerted to people within the vicinity, the system also provides a time-stamped log of events. This can include the distance location of any individual within radio sight of the machine, zone status and intrusions, as well as who or what caused a machine to stop. This valuable data enables clear visibility of the activities and movements of machines and people within the defined zones, so that specific actions can be taken where necessary to continue to drive positive behavioural change.

MST developed its proximity detection solution to be compatible with other safety systems that coal mines commonly use. Unlike other options in the market, which are essentially a bolt-on to the miner's cap, the company has integrated its personal alert devices into the integrated communications cap lamp (ICCL). The ICCL is already widely used in mines and incorporates other critical technologies, such as the PED Emergency Warning Receiver. Existing ICCLs can all be retrofitted with the device and the approach taken by MST has produced a fit-for-purpose and completely integrated system for deployment throughout a mine.

International perspectives

On an international level, proximity detection systems have been extensively deployed within the coal industry in South Africa. The country has been a leader in the adoption of this technology. Most coal mines have either selected a vendor or are well into the deployment of these systems in the underground mines. One of the reasons for this is that

South African mines are much more heavily populated than those in the US or Australia. Because there are more people underground, incidents and near misses are more common and making use of systems that reduce the risk of these is therefore a priority.

For other territories, such as the US and Australia, there are different regulatory considerations and also the likelihood of impending regulation, which will make the deployment of such systems mandatory.

The expectation is that the rest of the US will follow suit with the state of West Virginia, where there has already been a mandate passed for underground coal mines. There are a number of system deployments currently in place in the US and numbers will likely increase in anticipation of any potential mandate. However, the US coal industry – like the rest of the coal industry in general – is currently under tremendous capital cost pressure and anything that is not directly linked to a productivity or cost-saving initiative must be very well justified. A system, such as proximity detection, is obviously a major safety initiative, so many mines may be able to justify it on that basis, but there is a chance that not all mines will view it in this way.

Australia operates under a different regulatory and legal environment. Mine managers have a duty of care to their underground and surface personnel and, as a result, can be held personally liable in the event of an accident. In Australia, therefore, a more active approach is taken and most mines already have a corporate initiative underway to investigate proximity detection: either to trial it or to assess vendors. MST is engaged with all the major mining companies in Australia in this regard.

Safety and productivity

MST continues to work with customers to improve safety within the industry using a proximity detection system that effectively reduces risk, while not impinging on operational efficiency.

A proximity detection system that reduces the number of incidents, while not impacting on productivity, will have a tangible monetary benefit to a mine. Any near misses or incidents (or false alarms) can potentially stop production – and a halt to production can cause significant financial impact. Avoiding such halts in production is therefore vital, particularly at a time when the weaker global market means any lost revenue will be felt so keenly.

Potential industry regulation and the unfortunate safety incidents where personnel have lost their lives over the last 12 months is certainly driving a wave of renewed interest in proximity detection systems. However, in the current environment, these systems now need to not only deliver in terms of safety, but also in terms of facilitating the smooth operation of the mine. *WC*