

Technology drives the future of mining

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Mining may be a highly industrial endeavour that hasn't changed dramatically over the decades, but sophisticated new technologies are starting to play ever-greater roles in improving productivity and miner safety.

In the future, the mining houses that are deploying the latest technology in the areas of robotics, sensors, automation, wearables, and connectivity will likely emerge as the winners in the unceasing quest for operational excellence within the sector.

Taking a step back for a moment, historically, mining companies had very little technology at the "stope level". The physical work of blasting, breaking rock, clearing sites and then extracting ore, has remained a very low-tech activity. To use an analogy, it was like a blind man guided by a simple walking stick.

But with new technology monitoring, all sorts of data at stope level, we can contrast the example of the blind man, with a highly-skilled surgeon that deftly operates with full visibility, and with all the tools he needs close at hand.

Sensor and tracking technology at mine sites provides real-time data on everything from ore samples, temperature, air quality, ground stability, staff movements, staff fatigue to medical issues and much more.

Combined, these information feeds give mining managers a rich view on the state of operations 'at the coalface' – as the mine develops something akin to a central nervous system, which constantly gives feedback on its own health and performance.

With this, mining firms can profitably operate at deeper levels, make better predictions about ore grades and productivity levels, tailor their outputs more accurately to market demands, and better

ensure the safety of its staff.

One area that has grabbed the imagination of miners around the world is that of advanced robotics. Initial trials from mining giant Anglo American and US-based University Carnegie Mellon have already produced a working prototype that enters mine sites immediately following a blast, navigates on its own, conducts measurements, and takes readings. The robot is able to go into dangerous areas where it's not safe for humans to enter.

Ground penetrating radar technology can be used to rapidly gather high resolution subsurface information. This technology can help in determining mining safety (like rock bursts, fractures, and shear zones), mapping rock quality and establishing where mineral and metal deposits exist – enabling faster adjustments to mining plans.

In the arena of wearable technology, miners can track various environmental conditions with embedded sensors, and transmit information relating to their health and stress levels. Wearable technology can also be used to push relevant information down to the miner while he is underground.

To enable this, connectivity solutions like Fibre, WiFi and RFID need to be established to carry these various streams of information. These information highways, the nerves linking the various functions in our 'central nervous system' analogy, are critical in delivering the right data to the right individuals.

For the mining houses, the benefits of connecting and using all of these new technologies lie in both 'soft dollar' and 'hard dollar' formats. By deploying the right solutions, it becomes possible to start doing predictive analysis on miner's health, measuring labour productivity, throughput rates, extraction qualities, haulage costs and other operational yardsticks.

Ultimately, to realise all of these benefits, the mining house must hook up this pulsating, information rich 'central nervous system' to the right array of enterprise architecture. Having the correct

systems is essential – to manage all the information being generated, allocate resources based on this infor