Mobile mining

Christian Funk discusses bringing the benefits of mobile computing to the mining industry

Above: Christian Funk
Right: The VERSO 12, one of the latest in a range of touch-screen rugged tablets introduced by JLT Mobile Computers

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A JLT computer in the cab of a mining vehicle in one of Boliden's Swedish gold mines

When the word 'mobile' is mentioned it most likely invokes an image of a smart phone and, for some, the cellular network infrastructure that enables it. Indeed, in many parts of the world the word 'cellular' or just 'cell' is interchangeable or even preferable to the word 'mobile' when talking about handsets.

However, the benefits of mobile technology are not limited to the consumer sector.

The use of mobile technology is quite different in concept from cellular technology: mobile literally means free to move, and this is a quality that is becoming increasingly important in many sectors, including mining.

The challenge here is that the mining environment is not always conducive to the needs of relatively sensitive electronic equipment such as a smart phone.

Moreover, creating an infrastructure that supports mobile technology in a mine holds many challenges, but they are challenges that are being met, for very good reasons.

ENABLING CHANGE

Mining is an industry in transition and technology is increasingly being employed in order to meet efficiency goals. Historically, the mining industry has enjoyed high margins. However, due to the increasing challenges in finding and extracting natural resources, many miners are now turning to technology to help improve their overall efficiency.

Primarily, this can be achieved through the acquisition and analysis of data. This is a proven formula. Other industries already employ advanced data-acquisition techniques coupled with data analytics to drive up efficiency in manufacturing, transport and distribution.

The first tentative step towards a more data-centric environment was taken with the move from VHF to digital radios, which supported a higher volume of data transmission. This enabled greater integration between disparate systems, such as traffic control and ventilation.

However, the environment puts specific demands on the infrastructure. Line of sight wireless communication in a deep mine can be impeded by the surroundings (typically ore-laden rock), so while WLAN technology is the preferred solution, its implementation can be much more challenging than in a modern factory, for example.

An important aspect of that environment is its propensity to change. Mining involves the removal of material, so the landscape is forever changing. This demands not only a robust infrastructure, but one that can be rapidly adjusted. In this respect, it is much more 'mobile' than a typical cellular network.

The equipment used in mining can also represent obstacles to signals. Multi-path transmission can cause an overall degradation in signal quality in a wireless network – something that will be much more prevalent in an environment where large radio frequency-reflective obstacles are constantly moving.

For these reasons, the industry is still evaluating technology and looking for an optimal solution, but some aspects are already well established, such as the use of robust mobile computers.

FINDING A SOLUTION

Ruggedised laptops are an option, but they are not the optimal solution. There is already a shift away from distributed data acquisition with local storage,

towards a more centralised approach. Again, this is an evolution that has been apparent in other industries.

The next step in modernising the mining industry is, therefore, putting mobile computers into every vehicle in a mine, allowing them to acquire and relay data from anywhere.

This clearly has implications on the design of the mobile computer – it needs to be able to withstand the harshest environments, while still being truly mobile – but the benefits are clear.

Enabling greater integration between the assets of a mine will undoubtedly bring efficiency gains. The ability to connect more aspects of an operation will deliver immediate benefits in every aspect of mining. Today, distributed systems rely on a back office for data analysis, but tomorrow will bring greater intelligence to the system, allowing increased autonomy and automation.

There are already examples of mines today that are almost entirely automated, and this trend will naturally extend to larger mines in less remote areas. While this technological evolution is largely confined to ore mines today, there is every reason to expect it will be adopted in other areas of mining in the future.

Along with robustness and flexibility, closely coupled with the latest technology – features that are common to all industrial computing applications – a critical aspect of the infrastructure needed to support this in the mining industry will be mobility, for both the equipment and the infrastructure. ▼

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