



Clean energy

Opportunities for improvement: forward thinking

Cleaner copper mining in a carbon neutral world

In this final in a series of notes, Ellen Thomson, PGNAA & Minerals Senior Applications Specialist at Thermo Fisher Scientific, explores some trends that look set to transform the mining industry, and the technologies that will help to deliver greater sustainability.

Developing a digital twin

The switch from manual to digital, data-led decisions and processes is already well underway in the mining industry. As paper records and manual processes give way to more automated, innovative alternatives, the amount of information available is increasing rapidly. Better connectivity is making it easier for plant information – such as instrument data and other relevant mine-to-mill data – to be integrated together in order to increase overall processing efficiencies, supporting data-led analytics and more informed decisions through digitalization. Developing a digital twin is one of the most ambitious and potentially valuable ways of capitalizing on this trend.

A digital twin is a virtual version of a mining operation that provides an accurate, interactive, and dynamic copy of a physical asset, enabling deep and rapid analysis and ongoing monitoring of your operation. It combines physical information from site scans, geological data, real-time feedback from process analyzers and instruments, as well as other inputs, such as power and water consumption. Developing a digital twin is a major, capital-intensive undertaking, but the rewards are significant.

Once established, a digital twin is a powerful tool for information gathering and collaboration. It can be used to identify problems more easily, and to run diagnostics and 'what if' scenarios in parallel with routine operation, with no disruption. Changes that occur over the lifetime of an asset can be predicted and

implemented into your digital twin, and the impacts of these changes can be analyzed and explored.

In summary, a digital twin can help miners to develop the most effective solutions to the problems they face, providing vital information to make smarter decisions, uncover anomalies, identify efficiencies, reduce risk, and accelerate progress towards better profitability and greater sustainability.

Building on blockchain

Mention blockchain and thoughts turn to cryptocurrencies – which are enabled by this technology – however, it has far wider applications for asset management. Blockchain is a digitally distributed database, comprising a shared ledger that is simultaneously duplicated on multiple systems. As entries are immutable and access controlled, blockchain can be used to reliably track and transfer any asset – including food and intellectual property – as it moves around the world.

Going forward, blockchain looks set to become an essential technology in the management of the global flow of critical minerals and metals. Blockchain delivers complete traceability – which is currently difficult to achieve – and can bring trust, accountability, and transparency to minerals operations everywhere, including in developing countries, or in countries

that are politically unstable. It will help miners who are operating sustainably and ethically prove their credentials, and be appropriately rewarded to further incentivize better practice, conversely making bad practice harder to hide.

Our role

These are exciting visions of the future, and we're part of the ecosystem that will help deliver them. Our contribution is in the provision of information, which is the very cornerstone of progress. By delivering analytical solutions that allow miners to measure critical parameters, we provide the building blocks for these ambitious projects. Thermo Fisher Scientific's instruments enable ore grade measurement on the mill feed conveyor, particle size analysis in the grinding circuit, and elemental analysis and impurity detection in the concentrate leaving the site. Our systems provide reliable, timely, and relevant information, and they're designed for integration into the architectures of the future.

So, even as we work towards greater sustainability within our company, we're confident that our technologies will support the mining transformation that is central to all our plans for a safer and cleaner future.

 Learn more at thermofisher.com/copper

thermo scientific