

► minerals for the rapidly growing demand for fertiliser. The change of transportation systems from fossil fuels towards electro-mobility creates needs for technologies for mining and processing of rare-earth elements."

Aramine will be displaying its battery-powered L140B miniLoader, which has a new optional quick replacement system (QRS) that the company states totally changes the way a battery machine can be used underground.

The standard machine offers four hours autonomy, which allows mucking 3-4 faces in one shift with an integrated charging system. The new optional QRS features a quick disconnect battery module that does not increase the length of the machine. This allows the machine to be run full-time without immobilisation during charging time.

Aramine states that its R&D department has worked hard to reorganise the components inside the machine and select an extremely reliable and safe connecting system with a maximum of power in order to keep the force of the miniLoader.

Epiroc is launching an integration between its Serpent Ventilation solution and Mobilis Mining Intelligence (MMI) at Bauma. This aims to help increase safety and health for operators and improve energy efficiency in underground tunnels or mine sites. MMI can monitor ventilation components and installation as well as control airflow based on sensor monitoring.

Epiroc is also launching its 'A bit smarter' concept at the show – this is a set of digital solutions that turn consumables into smart, connected components using customer data and the latest wireless technologies.

SUSSING OUT SUSTAINABILITY

With decreasing ore grades, scarcity of essential resources and stricter environmental regulations, it's no wonder miners are on the lookout for new ways – and technologies – to help them remain cost efficient and boost productivity, while still staying sustainable in the future.

For Siemens, Dirscherl says, sustainability is a key theme, and the company is working with miners to achieve greater transparency of their mining processes to save on energy and water consumption.

"Additionally, we are developing more efficient drive solutions in combination with sustainable sourcing of equipment to achieve these goals," he adds.

Haver & Boecker's focus for this year's Bauma is 'our blue planet'. "The question is not whether we should stop mining," suggests Grotjohann. "The question is how mining processes and machines can be built a little bit smarter, more efficient, water saving, using less energy, and minimising emissions – all of this to protect the environment we are living in."

He concludes: "Haver & Boecker is ready to work with customers in this direction."

FLSmidth CEO Thomas Schulz says demand for minerals has surged as smart phones, computers, electric vehicles, renewable energy solutions and vast numbers of other devices based on minerals like copper, gold and lithium have become global necessities.

"Tapping into these growth opportunities for the mining industry is not as simple as it sounds," he notes. "Greater scarcity of resources such as energy, water and raw materials ... leads to more complex and costly operations."

"Minerals producers have to minimise the use of resources and environmental impact, while optimising production and maximising their investment."

Accordingly, the industry is in need of innovation and new ways of working.

"To reduce emissions, we either need to find new sources of energy to keep the equipment and vehicles running, reduce emissions from the energy we use today, or find ways to increase production using the same amount of energy as today," Schulz emphasises.

At Bauma, among other things, FLSmidth will be highlighting the rapid oxidative leaching (ROL) and dry stack tailings processes.

The company is currently working towards a demonstration-scale plant for the ROL process, which makes it possible to develop mineral deposits containing arsenic for recovery of copper, gold, and silver, ►

Siemens will exhibit references and use cases about digitalisation for mining in combination with its product portfolio, e.g. COMOS, PCS-7, SIMIT and its IoT system Mindsphere



▶ while complying with stringent environmental regulations.

Dry stack tailings, in turn, can recirculate up to 95% of mine process water and eliminate the risks of catastrophic tailings flow when a dam fails.

Schulz explains that while the concept is not new, in recent years, FLSmidth has put significant efforts into improving the technology to make it commercially viable.

Part of the R&D took place in cooperation with Goldcorp, and the gold miner and FLSmidth have co-developed the EcoTails filter technology. This is a process that blends filtered tailings with waste rock, creating a geotechnically stable waste product and eliminating the need to keep conventional slurry tailings contained in a dam and submerged in water.

Schulz stresses that innovative solutions must also be financially viable.

"Customers must have an opportunity to grow their business while minimising their impact on the environment," he says.

"Sustainability and productivity cannot be thought of separately – it's two sides of the same coin."

Sempertrans' R&D focuses on developing innovative conveyor belt compounds, like the energy-saving TransEvo or an environmentally friendly lead-free compound.

"TransEvo significantly reduces the so-called indentation loss at the idler stations, which is responsible for up to 60% of the overall running resistance of the belt," explains Ullmann. "This technology can reduce the power consumption needed to run the conveyor system by up to 25%."



The company's Transpipe belt is another engineered solution for material and environmental protection. It is loaded like a regular conveyor belt and then formed into a pipe shape – this allows enclosed material transport while providing several other advantages over conventional conveyor belt systems. Ullmann says: "Our specially designed constructions and compounds for this application ensure to provide the longest lifetime possible."

In general, conveyors can be the most efficient means of transporting bulk materials. "When compared to truck transportation, conveyors bring many advantages," notes Ullmann. "They are not only more cost-efficient, faster and safer, they also show higher availability and are more environmentally friendly."

Judd agrees that reducing or eliminating wasted resources, be it fuel to run trucks, the energy costs of blasting, or the wear and tear on equipment, is hugely important to mines that are seeking more sustainable mining methods.

Hexagon partners with FluidIntel, whose fuel management system, AdaptFMS, handles more than 3.5 billion litres of fuel and other hydrocarbons annually for six of the world's biggest mining companies. Judd says: "We're in the process of integrating AdaptFMS with our fleet management and enterprise solutions."

The company is also helping customers extend the life of their mining equipment with Asset Health. This solution is designed to help maintenance and operations staff to identify machine health trends in real time, allowing them to improve efficiencies and minimise equipment downtime.

"We're also helping mines reduce energy consumption on several fronts with high-precision machine guidance that delivers accuracy and instantaneous feedback," comments Judd. "This means improved loading times across the fleet, less mis-routed material, fewer hours of rework on ramps, roads and benches, and fewer over- and under-drilled holes. The quality of material produced is better and fragmentation is improved thanks to precise drill-hole placement and depth."

One of the areas of sustainability that ABB is particularly interested in is the ability of mining companies to ride through their economic cycles, led by demand and commodity pricing.

"Mines cannot control market prices. But they can control the cost of production, so ABB is helping them focus on just that. It's clear to us that downtime adds up to the most significant cost. That's why we focus on increasing the reliability of equipment," says Eros. ▶

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ABB said, as a leader in digitalisation, it can provide an overall package that includes collecting and analysing data, and presenting it in an easy-to-understand format that helps mine operators make fully informed decisions