2021: Smart mining comes of age

Automation and control, smart mines and sustainability are three trends that will play an increasingly important role in the mining sector in 2021 as it emerges from the shadow of COVID-19

By Max Luedtke*

The switch to remote services has accelerated in 2020, as mining companies embrace Industry 4.0 solutions that automate operations for optimised productivity, reduced equipment downtime and costs, predictive rather than preventative maintenance, and enhanced safety for mine personnel.

Smart mines will make better use of the wealth of digitalised data available from working silos, equipment, assets and applications – so that by the time it gets to operators it is analysed and on a device that is easy to use and interact with, allowing them to make rapid, smart and informed decisions.

Reducing the carbon footprint and accelerating the journey to the all-electric mine is a business priority for mining companies and their customers, reflecting the importance placed on climate change and the environment by society as a whole, and enshrined in global treaties such as the Paris Agreement.

REMOTE POSSIBILITIES

We are entering into the new normal: a new process of execution and managing projects remotely.

Historically risk-averse, miners are reappraising technologies that until now have not been universally accepted, with an increased focus in both industry and academy on human-automation interaction.

Digital applications remotely monitor the condition of mines and mineral processing plants to offer a complete online view of automation, instrumentation, electrical, mechanical or process equipment.

This allows specific maintenance-oriented algorithms to help predict, and alert users to, upcoming maintenance needs and possible equipment failures, as well as labour, travel and electricity costs.

These solutions allow companies to safely overcome human touchpoints and travel restrictions resulting from the COVID-19 pandemic and respond to increased demand for state-of-the-art automation systems and platforms. The uptake of automated solutions in mining also means a skill transformation is on the horizon, with user interfaces and experience technologies increasingly in use and demand.

SMART MOVES

When it comes to the future of the mining industry, one thing is very clear: the road to digitalisation is not optional. Research by management consultancy McKinsey & Company estimates that mine digitalisation could save US$373 billion by 2025, raising productivity and safety, and reducing waste.

No single company can realize this vision alone. Just as mining operators, large and small, require experienced partners who know which practical steps will get them there, technology leaders need ambitious customers and ecosystem players to develop solutions that bring real value to people. ►

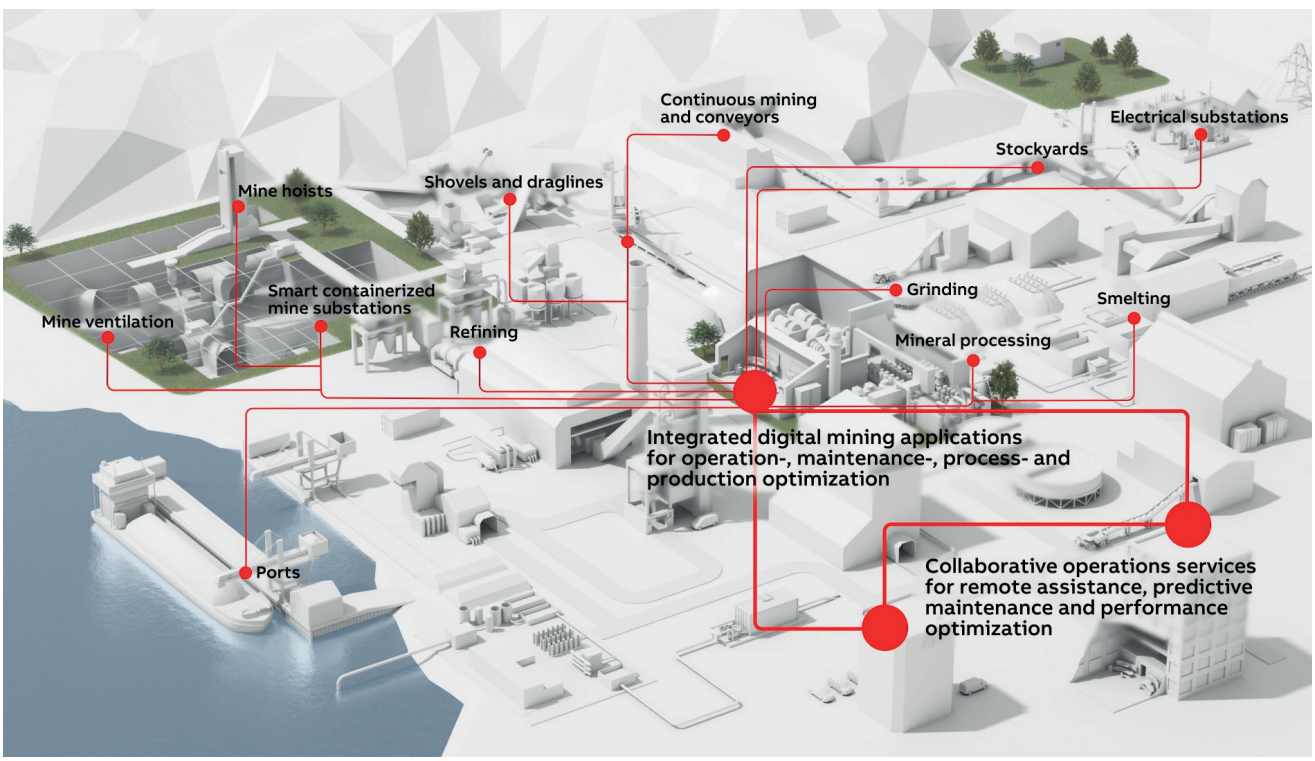

ABB Ability MineOptimize connects and optimizes all stages in the lifecycle of any openpit or underground mine

The world's first electric trolley in an Arctic climate at Boliden's Aitik openpit mine

Mines too often include built-in silos with disparate data. Effectively unifying that information and the operational side of projects to make optimum use of data is the cornerstone of a smart mine.

Data-driven decision-making leads to smarter mine operations that maximize resource efficiency, and can be seen in action at the world's most advanced and integrated mine at Garpenberg in Sweden. ABB's System 800xA control solution is the 'brain' behind the automated mine, collecting data from Garpenberg's 400-plus electric motors, 280 variable speed drives and two massive hoists.

Its operators and engineers, stationed at 33 different workplaces, are linked to tablet-equipped workers via a wired and wireless communication network installed in the mill and part of the mine.

Early engagement between mining company and technology provider will continue to be key. ABB's Enterprise Digital Transformation approach for the mining industry helps customers to clarify their digital strategy, achieve strategic targets faster, and focus on the right projects with the best return on investment.

The benefits of early involvement are illustrated by two projects: SIMS, a collaboration between ABB and Hydrogen Optimised to develop large-scale green, hydrogen production systems; and ABB's work with the University of Western Australia to advance industry 4.0 open process automation standards, and on an integrated systems project at Gold Fields' Granny Smith mine near Perth.

SUSTAINABILITY AND SAFETY

Sustainability is a key trend. ABB envisages that carbon footprint figures will be attributed to every stage of the mining process, with more spotlight on the supply chain. Operators must demonstrate to end consumers that they are reducing indirect Scope 3 emissions that occur in the value chain.

Electrification is one key area of predicted progress in low footprint mining in 2021. ABB's view is that automation and digital solutions will work alongside electrification to monitor energy usage and help miners reach their sustainability targets, and improve the quality of the working environment.

ABB is focused on realizing the all-electric mine and helping mines in their journey towards carbon neutral operations by going all electric, beginning with moving from diesel to electric vehicles (EVs).

Diesel-electric trucks can easily be attached to a trolley line, allowing them to run at a higher speed, and reducing diesel consumption by 90% and gas emissions from transportation by up to 90%.

There are already mines that are targeting zero emissions, and the events of 2020 have expedited the process. First, remote working has fast-tracked the switch to remote services, eliminating so much travel, Second, it has led to workshops and collaboration, and some groundbreaking projects.

CASE STUDY: THE SUSTAINABLE UNDERGROUND MINING PROJECT

Will it be possible using electrification, automation and data sharing to reduce carbon dioxide (CO2) emissions at a mine to zero – while at the same time increasing productivity by as much as 50%?

Devised by Swedish mining company LKAB, the Sustainable Underground Mining (SUM) project visualises a once-in-a-generation technology shift that will set a new world standard for sustainable mining at great depths, in partnership with ABB, Combitech, Epiroc and Sandvik.

Test work in LKAB's Kiruna mine in Sweden as well as in a virtual test mine will study the best way to build a CO2-free and autonomous production system. The project also aims to create a completely safe mining environment for humans, using the Konsuln orebody to create a decentralised future workplace featuring an autonomous electrical mobile transport system in a mixed environment.

ABB has provided electrification solutions, connected control and operations management systems, high visualization and mobile operator workplaces. ABB will build a demonstration workshop to connect electrical and automation systems.

By 2022, the ABB electrification and automation solutions will be fully installed at Kiruna as part of the SUM project and the aim is that a new global standard for mining production will be set by 2030.

COLLABORATION AS A KEY TREND

This pioneering SUM project is part of a wider trend of suppliers creating dedicated collaboration groups with the aim of bringing new technology solutions to market – one that has been accelerated by the creation of virtual working groups in response to the COVID-19 pandemic.

Collaboration is everywhere as suppliers, academia and large mining companies partner to rethink innovative business models as well as technologies. Virtual gatherings of customers and OEMs have led to a clear understanding that the more involved technology companies like ABB are earlier in a project – and the more partners are sitting around the table – the quicker the progress for all stakeholders.

It is becoming increasingly common for suppliers to create dedicated collaboration groups, where real time process information is available to all organizations involved, in order to reach the best possible solutions for customers. This shows a way of bringing new technology solutions to market for safer, more sustainable and more efficient mining production processes in 2021 and beyond.

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