MODERN MINING
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Objective, incisive editorial for people who are serious about mining

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Revisiting the licensing regime can unlock mining investment in Africa

Munesu Shoko

That the COVID-19 pandemic has shaken the world in ways not seen since the world wars is no overstatement. We would all agree that no event since World War II has had as extreme a global impact as COVID-19. Apart from the public health crisis, the pandemic is leaving a trail of economic destruction on a scale unseen in generations.

Going forward, the only acceptable response to such a crisis is to pursue a "great reset" of our economies, politics and societies. This is definitely a moment to re-evaluate the sacred cows of the pre-pandemic system, especially in the African mining sector. Some may choose to look at mining as a sunset industry plagued by rising costs, technical difficulties and political uncertainty.

I am, however, of the view that mining is an industry well positioned for a new lease of life, notwithstanding all the ups and downs. Africa is still home to some of the world's richest reserves of precious minerals and base metals and companies both large and small would like to exploit these. Some are doing so despite the political uncertainty. To provide context, the Minerals Council South Africa believes that mining investment over the next few years could almost double in the absence of threats in the country.

Mining investment could be the answer to resuscitating African economies post COVID-19. As you will see in this edition of *Modern Mining*, London Stock Exchange's newly-listed investment company, Critical Metals Plc, is targeting acquisitions of brownfield mining opportunities in the strategic metals sector in Africa.

Critical minerals are those that are essential for society and to the global economy, including antimony, hafnium, phosphorus, barite, heavy rare earth elements, scandium, beryllium, light rare earth elements, silicon metal, bismuth, indium and tantalum, among many others. Demand for many of these minerals has skyrocketed in recent years with the growing global appetite for high-tech devices. The rising demand for critical raw materials needed for renewable energy technologies and e-mobility is also apparent, and many of these are found in Africa.

The outlook for possible mining investment is therefore encouraging. Mining companies around the world are looking for growth opportunities and Africa, with its wealth of minerals, is a destination of choice for many. Governments, however, need to revisit their legislative frameworks and create an environment that is favourable for mining investment to flourish, especially the mining licensing regime.

Looking at the current mining investment, development and production environment in Africa, the legislative framework, especially the delays in granting the necessary mining permits, remains one of the lingering barriers to possible mining investment.

Governments of resource rich countries across the continent should strive to create an operating environment that is attractive to investment, thus setting their countries up for the much needed economic growth. In a recent one-on-one with Menar chairperson Mpumelelo Mkhabela, he noted that this could be achieved by, among other things, eliminating bureaucratic red tape, fast-tracking of licensing of businesses and easing the regulatory compliance regime.

It is, however, encouraging to see that there is some effort in 'resetting' the licensing regime in South Africa. A case in point is the speed with which Menar was recently granted its regulatory approvals for its East Manganese project. The R250-million project, part of the company's planned R7-billion investments, was granted environmental authorisation in February 2019, followed by the mining right in August 2019. The latest in a series of regulatory approvals is the water use licence, which was granted in September this year. The company has, therefore, received all authorisations, paving the way for mining operations.

West Africa is a destination that has seen a favourable surge in gold investment in recent years. There are several drivers behind that, but one of the important factors is that West African countries have sound regulatory frameworks that are attracting foreign investment, especially their licensing regimes. Speedy regulatory approvals are critical in unlocking investment spend, thus creating economic growth opportunities for host communities and the country at large.

Additionally, the mining codes of several West African countries provide many tax exemptions for mining companies. In Côte d'Ivoire, for example, mining companies are exempt from income tax for a period of five years following first production. Mining regulations are usually unambiguous and do not change often but, when they do, stakeholders are given enough time to plan and adapt.

It is therefore not surprising that four of the world's largest gold miners – Barrick, AngloGold-Ashanti, Newmont and Kinross – have significant footprints in West Africa, with a presence in Ghana, Côte d'Ivoire, Mali, Burkina Faso and Guinea. ■

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Coola exploration programmes in full swing

First assay results have been received from early reconnaissance work at Pensana Rare Earths Plc's (LSE: PRE, ASX: PM8) Coola Carbonatite where the company has confirmed rare earth mineralisation in rocks and soils up to 2,99% rare earth oxides. The Coola project is located adjacent to Pensana's advanced stage Longonjo NdPr Project in Angola.

Initial field programmes have commenced to test defined targets prospective for a range of high technology critical commodities including heavy rare earths, light rare earths, scandium, niobium, tantalum, hafnium and fluorspar. These commodities are listed as critical by the European Commission and would complement future production of magnet metal raw materials from the company's advanced stage Longonjo project located just 16 km to the south.

Outcropping fluorspar mineralisation has been located at Coola and systematic soil sampling and geological mapping has been completed over the 6 km by 2,5 km complex. Fluorspar, as well as being of direct interest, is also a positive indicator of the potential for additional technology metals. Assay results are awaited.

Targeted exploration programmes of soil, stream sediment and rock sampling together with geological mapping are also in progress at the Monte Verde and the 13 km by 5 km Sulima alkali systems.

Drilling at Pensana's Longonjo project in Angola.

Monte Verde is a sub circular volcanic feature that measures approximately 4,5 km by 3,5 km. The Sulima complex comprises two adjacent ring structures that together extend over a 12 km by 5 km area.

Geophysical data processing has been completed and 10 strong geophysical anomalies identified that could represent additional prospective geological systems. Follow up field reconnaissance and stream sediment sampling is underway.

The Coola project covers an area of 7 456 km^2 adjacent to Longonjo and is similarly well located in terms of modern road, rail, port and hydropower infrastructure.

Dave Hammond, chief operating officer, comments: "The Coola project contains several high quality 'walk-up' targets prospective for a suite of key strategic 'new technology' metals forecast to be in undersupply and that could complement future NdPr and rare earth production from Longonjo.

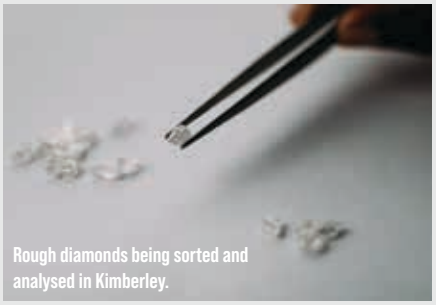
"The early reconnaissance sampling results are a great start in already confirming the Coola complex as a fertile mineralised system. The presence of substantial outcrops of fluorspar, which may have direct economic potential, is also a positive indicator of mineralisation of other technology metals within the geological system. Systematic sampling of the 6 km by 2,5 km complex has now been completed and samples despatched for assay.

"Exploration programmes are currently in progress over two other prospective alkaline-carbonatite geological systems together with stream sediment sampling and geological reconnaissance of key geophysical anomalies." ■

De Beers Group's flexible approach to rough diamond sales

De Beers Group today announced the value of rough diamond sales (Global Sightholder Sales and Auctions) for the eighth sales cycle of 2020. Owing to the restrictions on the movement of people and products in various jurisdictions around the globe, De Beers Group has continued to implement a more flexible approach to rough diamond sales during the eighth sales cycle of 2020, with the Sight event extended beyond its normal week-long duration. As a result, the provisional rough diamond sales figure quoted for Cycle 8 represents the expected sales value for the period 21 September to 9 October and remains subject to adjustment based on final completed sales.

Bruce Cleaver, CEO, De Beers Group, says: "We continue to see a steady improvement in demand for rough diamonds in the eighth sales cycle of the year, with cutters and polishers increasing their purchases as retail orders come through ahead of the key holiday season. It's encouraging to see these demand trends, but these are still early days and there is a long way to go before we can be sure of a sustained recovery in trading conditions." ■



Rough diamonds being sorted and analysed in Kimberley.

	Cycle 8 2020 (provisional)	Cycle 7 2020 (actual)	Cycle 8 2019 (actual)
Sales value($m)	467	334	297

Afrimat steps in to rescue Nkomati Anthracite Mine

Afrimat, a leading open-pit mining company providing industrial minerals, commodities and construction materials, has lodged papers in the High Court of South Africa, Gauteng Local Division, Johannesburg, asking for Nkomati Anthracite Proprietary Limited to be placed under supervision and to commence business rescue proceedings. Unicorn Capital Partners (UCP) indirectly holds 60% of the issued shares of Nkomati, which operates an anthracite mine focused on both opencast and underground mining.

Afrimat CEO Andries van Heerden says the step was necessary in order to protect the interests of the employees, the local communities and the creditors. This step makes it possible to securely inject post commencement financing into the mine and prevent liquidation of the mine. He says recent production disruptions due to COVID-19 shutdowns and an extended illegal strike have placed the mine in extreme difficulty.

He further indicates that Afrimat remains of the view that should the application be granted, the mine and the associated jobs will be saved and that Afrimat wishes to continue to acquire the mine to build up its bulk commodities segment. “I am confident that future employment prospects in the surrounding community will be available and the business rescue will result in a better return for Nkomati’s creditors.”

Afrimat has a 27,27% shareholding in UCP and upon a request by UCP, provided unsecured working capital funding to Nkomati during the period between April to July 2020. “We agreed to an extension of the repayment of certain tranches which were due and repayable. Nkomati has, however, to date been unable to settle these loans,” Van Heerden says.

As a creditor, Afrimat is able to ask for Nkomati to be placed into business rescue. Van Heerden goes on to say that, “We cannot continue to provide additional funding on an unsecured basis. At Afrimat we work very closely with communities around our mines and take great pride in our staff relations and staff development. We want the same for the roughly 160 Nkomati employees, their dependants and the community surrounding the mine and for this reason we want to ensure that the business rescue process is undertaken by a seasoned practitioner able to impart supervision and management through a business rescue plan.”

Van Heerden further indicates that Afrimat is prepared to inject post-commencement finance into the structure once the business rescue process is in place, with such finance enjoying preference, as to repayment, as contemplated in terms of section 135 of the Companies Act.

Afrimat, through a scheme of arrangement, made an offer to UCP for the remaining shares it does not already own. The circular was distributed to UCP shareholders on 9 September 2020. The business rescue application does not impact the scheme, the general meeting of which will proceed on 9 October 2020. Conditions precedent as well as shareholder approval need to be met and obtained.

“We still believe fully in the value that Nkomati can add to the diversity of the bulk commodity portfolio within Afrimat but as stewards of shareholder money and to maintain the alignment of interests, we have to ensure that a fair and equitable process is followed and our interest and the jobs, are protected,” concludes Van Heerden. ■

Record volumes and grades for Kareevlei mine

BlueRock Diamonds PLC, the AIM listed diamond producer which owns and operates the Kareevlei Diamond Mine in the Kimberley region of South Africa, reports record tonnes sorted in Q3 2020, up 34% to 123 727 (Q3 2019: 92 483). This was complemented by record carats produced during the same period, up 40% to 5 577 (Q3 2019: 3 973) and record grade achieved of 4,51 cpht, (previous record of 4,3 cpht was achieved in Q3 2019).

Operations at BlueRock Diamonds' Kareevlei Diamond Mine.

BlueRock executive chairman, Mike Houston, says: "I am pleased to report a record quarter for three of our main KPIs: production, carats produced and grade. Volumes have been strong even though we are still using our old plant; this bodes well for the future.

The increase in grade to 4,51 cpht is particularly pleasing as it follows a period of low grade while we concentrated on creating the Main Pit; we are confident that we will be able to meet or exceed our long-term guidance of between 4,0 cpht and 4,6 cpht.

"We estimate that the average price per carat is approximately 10% down on the comparative period in 2019 excluding higher value stones. The price per carat in Q3 2019 reflected the sale of four high value stones, which sold for a total of US$450 000 and in Q3 2020 we sold only one higher value stone, which was valued at US$104 000.

"I am also pleased to report that the expansion project is well under way and we fully expect the new plant to be commissioned by the end of the year as planned. I look forward to updating the market as we progress." ■

New chief executive officer for Koornfontein mine

Black Royalty Minerals Koornfontein, part of the Makole Group, has appointed Zandile Mdanda CEO of Koornfontein mine in Middelburg, with immediate effect. Mdanda will be assisted by Jacob du Plessis, together with a management team that has extensive knowledge of the asset.

Zandile Mdanda has been appointed CEO of Koornfontein mine.

According to Makole Group's CEO Ndavhe Mareda, "Makole has taken this bold move as a continued sign of confidence in black excellence, and particularly in women."

Mdanda's career is grounded in coal – she has worked her way up the corporate ladder. She broke into the industry as a trainee geologist at Anglo Coal, before eventually rising through the ranks to become a senior geologist at the company. She moved to Xstrata Coal (now Glencore) where she was appointed chief geologist. She later assumed the same position at the General Manager Project at African Exploration Mining and Finance Corporation, before moving to the Milele Group.

"Zandile is an excellent candidate as she brings both enormous understanding of the coal sector together with strong knowledge of the business, investment and economic landscape," says Mareda.

"I am excited but equally ready to take on this mammoth task of bringing this mine into operation. Coal remains responsible for 25% of South Africa's mining revenue and apart from playing a significant role within the economy, it is still a critical commodity from an energy generation and stability perspective," says Mdanda.

"It's also an opportunity to add much-needed impetus to the Middleburg economy and I'm looking forward to working with the Makole and Koornfontein teams to take the mine to new heights."

Mdanda qualified from the University of the Witwatersrand with a Bsc. (Hons) Geology and she subsequently obtained a Post Graduate Diploma in Business Administration (PDBA) from GIBS, an MBA from Wits Business School and is currently studying towards a Masters in Philosophy in International Business (MPhil) via GIBS.

Mareda says after meeting all regulatory and licensing approvals, Koornfontein is scheduled to commence operations as soon as outstanding contractual issues with Eskom have been resolved. ■

Coal miners should take the lead in being ethical suppliers to Eskom

Speaking during a panel discussion with other coal industry stakeholders, as part of the virtual Joburg Indaba on 8 October 2020, Mpumelelo Mkhabela, chairperson of mining investment firm Menar, called on coal producers to do their part in improving transparency and accountability in their relationship with Eskom.

Mkhabela said a code of ethics should regulate contractual arrangements that ensure commercial viability to both the supplier and purchaser of coal – not one at the expense of the other, resulting in public harm.

Implementation of an ethical code would bring many benefits for Eskom, including increased levels of transparency and accountability.

"The coal sector has been under attack. Coal has earned a bad reputation in South Africa largely because it has become associated with load shedding. As an industry we need to assist Eskom by providing it with coal at fair prices in a reliable manner in the interest of the economy. This will also improve the sector's reputation."

He said coal producers should consider conducting a socio-economic impact study to show the benefits of coal mining. "If we looked at the total contribution of coal producers in terms of social labour plans, local economic development plans, local procurement opportunities as well as employment, the economic significance of coal mining and would become very clear."

Mkhabela said a "just transition" to cleaner energy generation must include usage of cleaner coal technologies. "The government should consider a policy position that promotes research and development to develop those technologies to enable South Africa to benefit from its coal endowment in an environmentally sustainable way."

He reaffirmed Menar's support for Eskom's CEO Andre de Ruyter's commitment to procure coal in a robustly competitive manner. Mkhabela stressed that coal producers should also do their part by helping Eskom to make sure that it's commercially viable and is able to purchase the latest clean technologies for its power stations. These technologies include carbon capture and storage systems. "If we don't support Eskom, we will be shooting ourselves in the foot," he said.

Although Eskom's Kusile power station is using wet flue gas desulphurisation technology to reduce emissions, some of the utility's power stations need to be upgraded. For this to happen, Mkhabela said, "Eskom needs to be commercially viable and coal producers should assist by supplying it at reasonable prices." ■

New board appointment at Cora Gold

Cora Gold Limited, the West African focused gold company, has appointed Andrew Chubb to the board of Cora as an independent non-executive director with immediate effect.

Chubb is currently a partner and head of mining at natural resources focused investment bank Hannam & Partners. Previously, he was a managing director at Canaccord Genuity, where he worked for eight years in the natural resources team. He has a broad range of international corporate finance, restructuring, capital markets and M&A experience focusing on the metals, mining and natural resources sectors. At the date of this announcement (7 October), Chubb holds a total of 210 526 ordinary shares in the company.

During Chubb's career, he has successfully advised on numerous IPOs, public and private equity and convertible capital raises and M&A transactions including AIM, TSX, ASX, NASDAQ and Official List companies, with a particular focus on Africa. Prior to joining Canaccord Genuity, he spent four years with law firm BLP and has a first class law degree from Manchester University.

Ed Bowie, non-executive chairman, says: "Andrew's extensive experience working in the natural resources sector advising AIM listed companies, particularly in Africa, will be invaluable to Cora. Cora is extremely pleased to welcome him to the board with immediate effect as we are embarking on an exciting and busy period for the company." ■

Crucial step forward in the development of Mahenge

Armadale Capital plc continues to focus on fast-tracking its Mahenge project to production. The company has been engaging with potential international manufacturing and construction companies as to their suitability and capability to complete the graphite processing plant in Tanzania.

A group of international companies have been short-listed with final selection imminent, following which work will commence on the FEED component. The first stage of the work will be for the selected EPCM to complete a metallurgical test programme to enable the detailed selection of the processing plant equipment.

Metallurgical testing has confirmed that Mahenge can produce high quality, high purity graphite, with conventional technology achieving consistent purity of above 97% TGC, some of the highest grades in the sector, with identified target markets; a large proportion of concentrates in the medium size fractions are confirmed to be ideally suited to the battery market whilst coarser grind sizes can retain a larger proportion of larger flake sizes, suited to the expandable and graphite foil markets.

Throughout the project's development, Armadale has continued to engage with potential international mining contractors to develop strategies for the construction and mining requirements of the project. This has assisted Armadale in developing a fit for purpose approach in the development of the project from construction to production operations.

Positive progress also continues to be made on finalising the company's mining licence application. The ESIA application for the project was submitted by Tanzanian based, registered and certified environmental consultants to the NEMC in Tanzania in September 2020. A site visit has since been completed by NEMC, Armadale staff and the company's lead consultant as part of the ESIA application.

"We are delighted to announce another crucial step forward in the development of Mahenge. Appointing our chosen EPCM will mark the commencement of the next preparatory phase of mine construction and take us another step closer to production," says Armadale chairman, Nick Johansen.

"In addition, the completion and submission of the ESIA is one of the final necessary components in the Mining Licence process and I would like to thank all those involved for their efforts in completing this important piece of work in such a short time frame. Receipt of a Mining Licence will be one of the final and most important de-risking milestones for the Project and we look forward to being able to update further on this as we work with NEMC to conclude the final licencing components," he adds.

"Alongside this, as previously indicated we continue to be positively engaged in development funding options. Testament to Mahenge's highly compelling project economics we have received strong interest, and we are naturally committed to securing the best option for our stakeholders. We will update shareholders on further developments as soon as we are in a position to do so."

"With project financing, a mining licence and commencement of mine construction all imminent, Mahenge, and indeed Armadale, is on the cusp of transformation. Ultimately, Mahenge's value potential is clear, and it is our responsibility and focus to convert this into meaningful returns for our stakeholders. To deliver on this, we have devised a staged development plan giving a fast-tracked, low-cost route to production. This is truly an exciting time of development." ■

Contango acquires Garalo Gold Project in Mali

Contango Holdings Plc, the London listed natural resource development company, has acquired the Garalo Gold Project in Mali for US$1-million. The acquisition of Garalo, which is expected to commence gold production in H2 2021, further advances the company's strategy of acquiring defined assets with near-term production potential and modest capital requirements.

In conjunction with the acquisition, the company has raised £1,8-million (before expenses) through an oversubscribed placing of 36 000 000 new ordinary shares of GBP0.01 each at a price of 5 pence per placing share. The placing was undertaken by its broker Brandon Hill Capital Limited and is expected to provide sufficient funds to bring Garalo into production in H2 2021.

The Garalo permit occupies 62,5 km^2 in the Sikasso region of southern Mali, 200 km south-east of the capital Bamako and close to the Guinea border. The permit is surrounded by a number of multi-million ounce gold deposits and the region is home to some of the world's leading gold miners, including AngloGold Ashanti, IAMGOLD, Barrick, B2 Gold, Endeavour Mining and Hummingbird Resources, which has helped to establish Mali as the third largest gold producer in Africa.

Contango has secured an agreement to acquire Garalo for US$1-million, of which US$100 000 has already been paid to the vendor, who will retain an initial 25%. ■

Interim CEO for Resolute Mining

After five years with Resolute Mining Limited (ASX/LSE: RSG), John Wellborn has stepped down from his role as MD and CEO.

Resolute chief financial officer, Stuart Gale, has been appointed as interim CEO while an executive search process is undertaken. Gale will be well supported by Resolute's executive team and the board.

Resolute chairman Martin Botha says: "John has worked hard to reposition and transform the business over the past five years, and the time is right to introduce a new CEO to take resolute forward, to deliver improvement in operational outcomes and resilience, and to deliver the next phase of sustainable value for the company.

"Under his leadership, Resolute has been active corporately to build its mining profile and dual-list on the London Stock Exchange. On behalf of the board I would like to thank him for his valuable contribution and wish him well in his future endeavours."

Resolute CFO Stuart Gale has been appointed as interim CEO.

Interim CEO Stuart Gale joined Resolute as CFO in January 2020, having previously held senior executive positions at Fortescue Metals Group Limited and Wesfarmers.

The board is commencing a comprehensive process to recruit a new CEO with the skills and industry experience to lead the executive team and deliver on Resolute's strategy. ■

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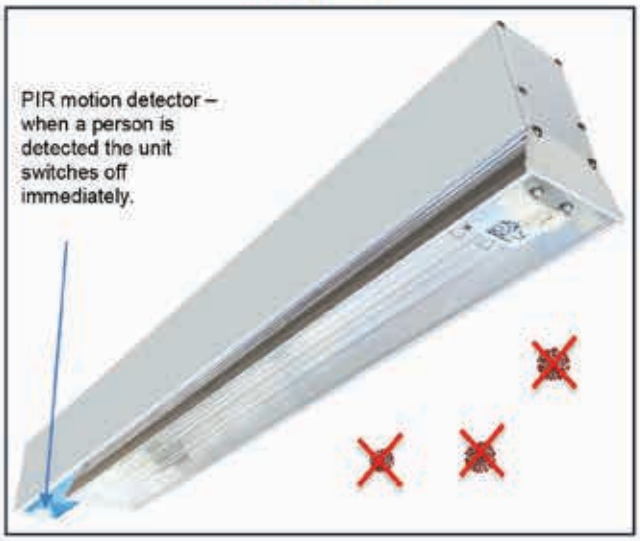

Pendant or surface mount or recessed mount UVC - germicidal unit.
For surface cleaning of pathogens.

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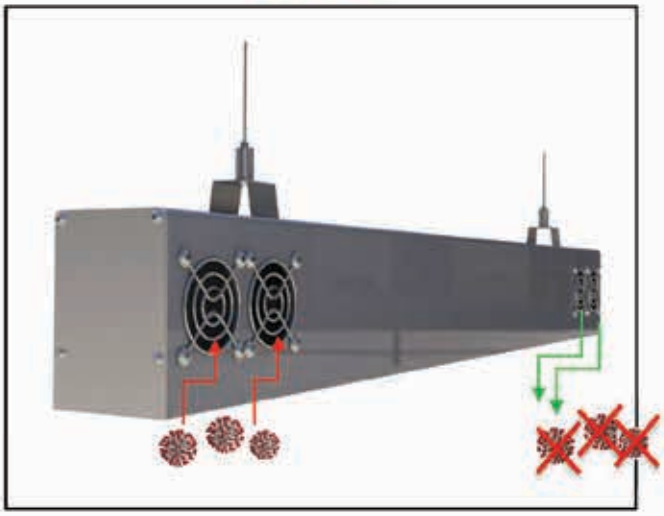

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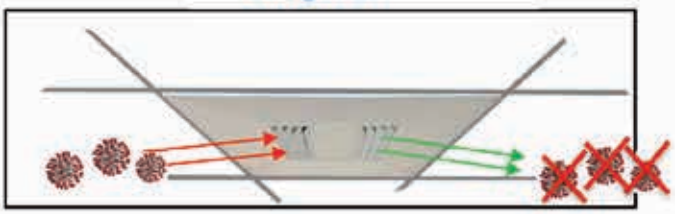
Pendant or surface mount or recessed mount UVC - germicidal unit.
For scrubbing the air clean of pathogens.

Jaeger 3



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Mobile substations the answer for remote mining projects

At a time when mine operators are looking at ways to overcome barriers to stay competitive, Hamar Controls' mobile substations offer big advantages over traditional brick and mortar solutions, especially for remote mining projects, pilot plants, fast-tracked projects and plants that may need to be relocated from time to time. By *Munesu Shoko*.

About 70% of Hamar Controls' business in the mining industry is in materials handling.

Established in 1981, Hamar Controls initially manufactured electrical switchgear and controls, control panels, distribution boards, junction boxes and control equipment as well as all types of panel-mounted electrical and control equipment. From around 2015, the company became a specialist provider of turnkey electrical, control and instrumentation services, all the way from design to supply, implementation, site installation and commissioning. Hamar Controls is an experienced supplier of switchgear and control panels that conform to the latest standards.

The company has a wide footprint across the industrial space. Projects undertaken to date span across industries such as mining, food and beverage, ports and harbours, petrochemical, potable and wastewater plant, power generation plants as well as alternative energies such as solar, wind and biofuel plants. The mining industry, at 60%, constitutes the bulk of Hamar Controls' business. About 70% of its business in the mining industry is in materials handling, while the remaining 30% is in process work.

Hamar Controls works across commodities, including coal, iron ore, platinum, gold and diamonds, among others. The company has worked for major mining houses, contractors and original equipment manufacturers in the mining space. Some of the key names that quickly come to mind, explains MD Chris Joubert, include mining majors such as Anglo American Coal, Exxaro Resources, De Beers

Group, Kumba Iron Ore, AngloGold Ashanti and several others. The company has also partnered major OEMs such as thyssenkrupp, Takraf and Sandvik.

Mobile is the answer

With mines seeking to cut their costs at every opportunity, Joubert believes Hamar Controls' mobile electric substations and control cabins offer a practical solution for remote mining projects, pilot plants, time-sensitive projects and plants that may need relocation from time to time.

The company offers two main types of mobile substations in the form of standard containerised and custom-built electrical substations. The container substations are built using either new or used shipping containers as a base, with several modifications made for it to be suitable for use as a substation. The wooden floors are removed, and re-enforced steel floors are installed. The roof and walls are insulated and emergency escape doors are installed together with air conditioning and lighting. Depending on customer requirements, further additions such as pressurisation and fire protection can be installed.

The standard containerised substations, says Joubert, come in 3 m, 6 m and 12 m sizes with a width of 2,6 m. "If the customer wants a different size to these standard ones, we can still customise to fit the specification or requirement," he says.

Out of the containerised enclosures, Hamar Controls can build control rooms, laboratories, battery centres, dedicated plant or equipment rooms and electric substations. When it comes to electric substations, the company offers low and medium voltage solutions. Low voltage is up to 1 000 V, while medium voltage is anything up to 33 kV.

The other type of mobile substation is custom-built units, where a customer may need a control room or electric substation that may not fit in a standard container. Often this is dictated by the need for more space. "Electric equipment generates heat and you need ample space to cool the area," explains Joubert. "In most instances larger mobile substations are a result of either simply needing more space or there could be temperature or explosion venting constraints where you need more space to dissipate the temperature or expansion of gases, resulting from a possible switchgear explosion."

Hamar Controls team at the Roodepoort factory with a mobile electric substation for a Mozambican mine.

The purpose-built mobile electric houses are made out of steel with an internal subframe, outer steel sheeting and typically chromadeck inner sheeting. Insulation panels, usually fire retardant, are sandwiched between the outer and the inner sheeting. These mobile units can come virtually in any size, with the only restriction being transport. "If they become too wide, they are difficult to transport. Typically these would be in the order of around 3,5 m to 4 m wide by 8 m to 12 m long," explains Joubert. In the line of purpose built enclosures, Hamar Controls also designs and supplies purpose built control cabins, mostly for use on materials handling machines.

Key advantages

Containerised and custom-built electrical substations offer an array of advantages over their traditional

Hamar Controls supplies mobile control stations for materials handling machines.

Hamar Controls' newly-built mobile electric substation destined for Mozambique.

brick and mortar counterparts. Most mines in South Africa, says Joubert, still prefer the traditional brick and mortar solutions. However, it's important to note that building an electric substation out of brick and mortar, he says, is probably the same cost as opting for the mobile substation, yet mobile solutions offer several benefits.

The customer, says Joubert, can have the equipment built into the substation remotely, get it tested and commissioned and then shipped to site. "This is more beneficial for fast-tracked, time-sensitive projects, because you can build the plant on the mine site in parallel with the electrical substation which is built off-site. When the site is ready for the substation, you can just transport it to the mine and connect the cabling," he says.

The other advantage, adds Joubert, is that when working in remote places, especially mines in Africa, valuable site resources such as engineering and testing are often limited and expensive. With the use of a mobile substation the equipment is mounted in the substation at the Hamar Controls factory and most of the engineering and testing can be executed off-site in South Africa. "All the expensive resources can therefore be applied here in South Africa and then just ship the entire tested facility to the mine site for connection and hot commissioning," he says.

With modern switchgear, there is a lot of setup work to do. On starters, variable speed drives and networks all pre-set work, programming and network testing can be done off-site if the mine opts for a mobile substation. If a control system is incorporated into the substation the complete system can be tested together with switchgear and controls before releasing the equipment to site.

"On many of our projects in the past we have completed the control, network, starter and VSD setups at our factory in South Africa. These are expensive functions," notes Joubert. To provide context, he adds, a VSD specialist easily charges between R2 000 and R2 500 an hour.

"If you have to send a specialist to Guinea to do the setup, for example, you will have to pay them for up to two weeks, factoring in the travel difficulties, inductions and possible delays, while the actual work may take only a day or two. Here in South Africa we can have the specialist at our factory for a day or two, compared with several weeks into Africa. As most people involved with mining projects have experienced, the exact time of when commissioning will take place is not fixed and it is often difficult to book specialist resources at short notice. Except for

Key takeaways

- With mines seeking to cut their costs at every opportunity, Hamar Controls' mobile electric substations and control cabins offer a practical solution for remote mining projects, pilot plants, fast-tracked projects and plants that may need relocation from time to time
- The company offers two types of mobile substations, standard containerised and custom-built electrical enclosures
- The standard containerised substations, come in 3 m, 6 m and 12 m sizes
- Additionally, Hamar Controls supplies skid-mounted solutions for applications where substations or electromechanical plants need to be moved to new locations from time to time

Control cabin for a ship loader designed and manufactured by Hamar Controls.

the wasted cost as a result of extended time periods, more exact planning, setup and commissioning resource allocation can be done when the substation and equipment is at our factory," he says.

"For our Malaysia project, for example, we had two load sharing conveyor drives connected via a 2 km fibre link and we never had to send the VSD specialist to site. We did all the setup and testing here in Johannesburg and performed the hot commissioning via remote link. Commissioning time was reduced to two days setup and testing in Johannesburg and less than a day of hot commissioning on the VSDs via remote connection. Imagine if we had to fly the specialist to Malaysia, then we would be looking at a week, at least," adds Joubert.

Hamar Controls supplies skid-mounted solutions for applications where substations or electromechanical plants need to be moved to new locations from time to time.

Additional solutions

Additionally, Hamar Controls offers skid-mounted solutions for applications where substations or electromechanical plants need to be moved to new locations from time to time.

Examples where skid-mounted solutions can be applied include mobile transformers, mobile pumps, extendable or shiftable conveyors, semi-stationary stackers, sand and slurry mining operations and many other applications where plants are of a semi-permanent nature.

"Skids are built in such a way that they can be moved by crane, front-end loader, tractor or winch. The skid can be designed to suit the customer's available method of moving it. Like the other mobile solutions, skids are manufactured and factory tested before shipping to site. If transportation is a challenge, the skids can be built and factory tested and then disassembled before transportation. Because skids are pre-assembled, they can easily be re-assembled on site by the client or by Hamar Controls personnel," concludes Joubert. ■

Bagoé acquisition consolidates Perseus's position

Perseus Mining's recent acquisition of Exore Resources is another step forward on the company's journey to transforming itself into a multi-mine, multi-jurisdictional producer of in excess of 500 000 ounces of gold per year at a cash margin of over US$400 per ounce. With its third mine, Yaouré, pouring its first gold later this year, MD and CEO Jeff Quartermaine tells *Munesu Shoko*, the company will reach the half a million ounces per year production milestone.

Jeff Quartermaine, MD and CEO of Perseus Mining Limited.

On 25 September 2020, the implementation of the scheme of arrangement between Perseus Mining Limited (ASX/TSX: PRU) and Exore Resources Limited (Exore) was completed, allowing Perseus to acquire all of Exore's assets, including a portfolio of exploration assets located in northern Côte d'Ivoire. The transaction included the PR 321 that hosts the Bagoé Gold Project (Bagoé), located approximately 70 km from Perseus's Sissingué Gold Mine.

Exore's major asset, explains Quartermaine, was its land package which comprises a number of exploration licences and applications for exploration licences. The land package covers approximately 2 000 km^2 in an area that is known to host a number of significant gold deposits. "One of the exploration licences we have acquired is known to host a JORC compliant Mineral Resource at the Bagoé Gold Project as announced by Exore earlier this year," he says.

The acquisition, he says, while being of a "bolt-on" nature, is significant for Perseus as it potentially provides an additional source of ore to be processed through the company's highly efficient processing facility located nearby at the Sissingué Gold Mine for a number of years to come.

"Based on our preliminary analysis, we believe that a proportion of the currently defined Mineral

The acquisition potentially provides an additional source of ore to be processed through the company's highly efficient processing facility located nearby at the Sissingué Gold Mine.

as a multi-mine, multi-jurisdictional producer

Resource can be economically mined, transported to Sissingué and processed through the Sissingué mill," says Quartermaine. "We believe that with an adequate level of additional exploration, there is significant potential to increase the size of the mineable resource. By processing the Bagoé ore at Sissingue, we stand to save the capital cost of building a new plant and associated infrastructure, and we can amortise all of the overhead costs of running the Sissingué operation over a much larger resource base."

Work done thus far

Significant work has already been undertaken at Bagoé. On 4 May 2020, Exore announced an independently prepared maiden JORC 2012 compliant Mineral Resource estimate for Bagoé. The estimate was based on mineralisation associated with the Antoinette and Véronique prospects. On 28 July 2020, Exore published further drilling results, this time from the Juliette prospect that highlight the potential for additional resources to be delineated along strike from Antoinette.

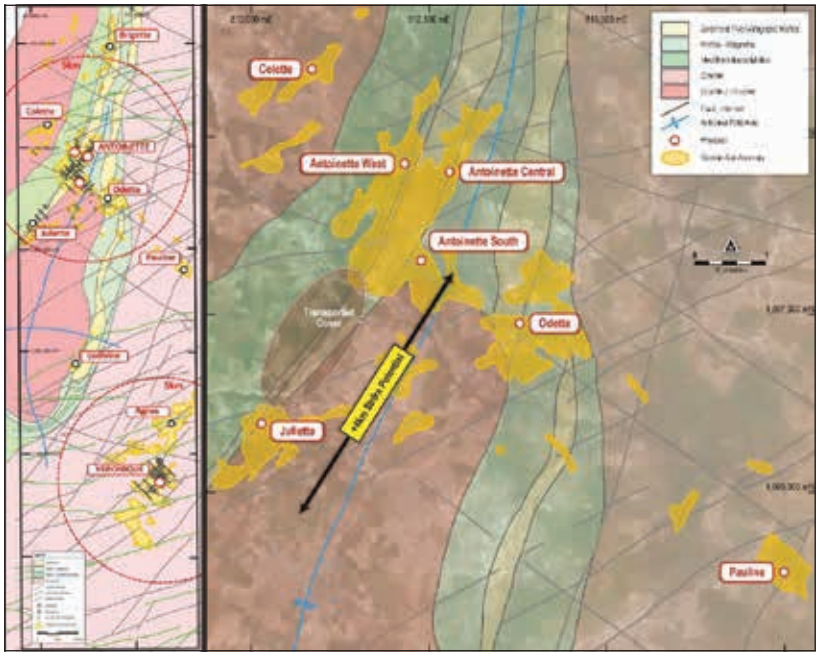
"The previous owner has delineated a Mineral Resource at Bagoé focusing mainly on the Antoinette and Veronique deposits. Further mineralisation was also identified at the nearby Juliette deposit but this was not drilled out sufficiently well for inclusion in the Mineral Resource estimate," says Quartermaine.

Perseus has already started preparation for a programme of delineation drilling at Juliette, Antionette and Veronique, as well as groundwork for the preparation of an Environmental and Social Impact Assessment (ESIA) covering the mining operation. When drill results are available, further work on a definitive feasibility study (DFS) of the Bagoé project will also be undertaken.

"In addition to this, our exploration team will also be taking a very close look at the other tenements in the land package and most likely will also mount a

From the due diligence work Perseus performed before acquiring Exore, the company is confident it can economically mine Bagoé and in the process add quite a few years of life to the highly profitable Sissingué operation.

Deposits and prospects locations at the Bagoé Gold Project.



The Bagoé Gold Project is located approximately 70 km from Perseus's Sissingué Gold Mine.

series of early stage exploration programmes where warranted," adds Quartermaine.

From the due diligence work that the company performed before acquiring Exore, Quartermaine is confident that Perseus can economically mine Bagoé and in the process add quite a few years of life to the highly profitable Sissingué operation.

Work to be done

Perseus now intends to undertake a DFS to confirm the technical and financial viability of a development concept for Bagoé. Proposed work includes:

- Reverse circulation (RC) drilling of each of the Antoinette, Véronique and Juliette prospects to generate sufficient data to enable estimation of Measured and Indicated Resources and conversion into Ore Reserves.
- Twinning of four RC holes at Antoinette and five RC holes at Véronique with core drilling to verify the widths and grades of key Exore RC drill intercepts that drive the currently defined optimisation pit shells.
- Drilling of four diamond HQ3 core holes at Antoinette and two HQ3 core holes at Véronique to characterise geotechnical conditions in the vicinity of pit walls.
- Conducting additional metallurgical test work to determine the performance characteristics of the ore through the Sissingué plant and variability testing.
- Drilling water bore holes and aquifer testing to determine dewatering requirements, water chemistry and water supply at each of the prospects.
- Multi-element assays of selected mineralised intercepts for ore chemistry characterisation, to assist tailings geochemistry assessment.
- Conducting acid base accounting test work and waste characterisation analysis.
- Drone surveys to generate Digital Elevation Models and aerial photographs to be used for planning and mapping purposes.
- A study of proposed ore transport routes.

At the time of writing, drilling at Bagoé was scheduled to start in the second week of October and finish in late December 2020. The target date for completion of the DFS is June 2021.

Work will also be undertaken to prepare an ESIA for Bagoé. Local environmental consultant CECAF has been engaged to undertake this work. A field survey was due to commence in the first week of October 2020 and the fully documented application for the ESIA is scheduled to be filed in the March 2021 quarter.

Early stage exploration activities will also commence in parallel with the DFS and ESIA work. Initially exploration will focus on the prospective opportunities identified by Exore on the Bagoé tenement and will include:

- Drilling of the Antoinette-Juliette 'gap' to follow up previous encouraging intercepts in AC and RC drilling beneath transported cover.
- Drilling to follow up encouraging drill intercepts between Antoinette and Antoinette South.
- Drilling to follow up encouraging intercepts on strike extensions of the Véronique deposit and at regional prospects such as Odette and Brigette.

Proving viability

With the completion of the Exore acquisition, Quartermaine tells *Modern Mining* that Perseus is now keen to move forward to prove the financial viability of a development concept for the Bagoé

With Perseus's third mine, Yaouré, coming on stream later this year, the company will reach the 500 000 ounces of gold per year production milestone.

Gold Project and if possible, increase the size of the mineable Mineral Resource.

"Given the outstanding performance to date of the plant of our nearby Sissingué Gold Mine, we are very pleased to potentially have the opportunity to access what we believe will be a material source of additional mill feed within trucking distance of the Sissingué mill," he says.

Perseus's exploration team, which includes a number of former employees of Exore, as well as its drilling contractor, are mobilising to site and drilling, at the time of writing, was expected to be under way by mid-October 2020.

"There is a good deal of work to be done in terms of exploration drilling, evaluation and licensing before the development of Bagoé becomes a proven concept, but we are very confident of achieving a positive outcome and as a result, place Perseus in a position to continue to generate significant benefits for all of our stakeholders through our northern Ivorian operations.

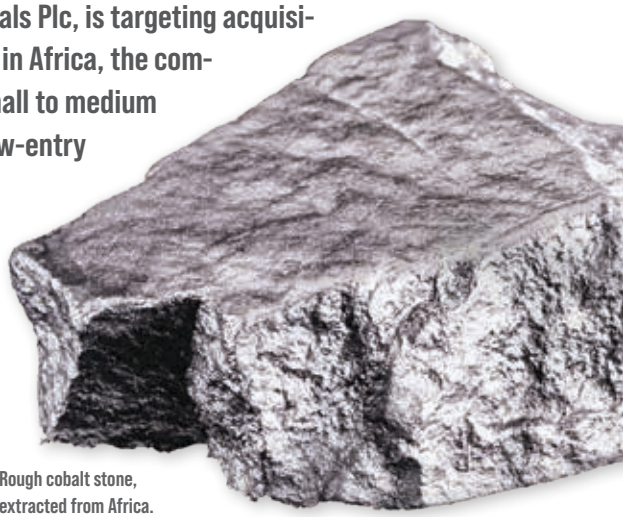
"The acquisition of Exore is a significant step forward on our journey to transforming Perseus into a reliable, multi-mine, multi-jurisdictional producer of in excess of 500 000 ounces of gold per year at a cash margin of well over US$400 per ounce. With our third mine, Yaouré coming on stream later this year, we will reach that production milestone. The challenge for us will be to sustain this level of production for many years to come and in the process enable Perseus to consistently generate material benefits for all our stakeholders," concludes Quartermaine. ■

Key takeaways

- ❑ Perseus Mining Limited has acquired all of Exore Resources Limited's assets, including a portfolio of exploration assets located in northern Côte d'Ivoire
- ❑ The transaction included the PR 321 that hosts the Bagoé Gold Project, located approximately 70 km from Perseus's Sissingué Gold Mine
- ❑ Based on its preliminary analysis, Perseus believes that a proportion of the currently defined Mineral Resource can be economically mined, transported to Sissingué and processed through the Sissingué mill
- ❑ Perseus now intends to undertake a DFS to confirm the technical and financial viability of a development concept for Bagoé

Critical Metals targets acquisitions in the strategic metals sector in Africa

Established in 2018, LSE newly-listed investment company, Critical Metals Plc, is targeting acquisitions of brownfield mining opportunities in the strategic metals sector in Africa, the company's initial focus, CEO Russell Fryer tells *Munesu Shoko*, will be on small to medium known deposits as opposed to exploration, prioritising projects with low-entry costs and potential to generate near term cash flow.



Rough cobalt stone, extracted from Africa.

Following its recent listing on the London Stock Exchange (LSE), Critical Metals Plc, a mining investment company established to target opportunities in the overlooked and under-analysed mining sector, has put wheels in motion to start acquisitions in the critical and strategic metals sector in Africa. CEO Russell Fryer tells *Modern Mining* that "we are in the initial stages of narrowing down the list of potential acquisitions and we hope to start transacting by the end of this year".

Critical Metals is looking to build a profitable mining company by identifying investment gaps in the small mine market on the African continent, primarily in the critical and strategic metals space where supply/demand fundaments are forecasted to continue to improve as critical raw metals play an increasingly important role in global economic and technological development.

Why critical metals?

Fryer says Critical Metals was born out of the board's intention to create an investment vehicle to identify and acquire brownfield opportunities in the strategic metals sector as defined by the United States and European Union.

Beryllium is one of the minerals targeted by Critical Metals.

According to the American Geosciences Institute, critical minerals are those that are essential for society and to the economy. Demand for many of these minerals has skyrocketed in recent years with the growing global appetite for high-tech devices. The rising demand for critical raw materials needed for renewable energy technologies and e-mobility is also apparent.

The European Commission recently expanded its list of critical metals from 26 in 2017 to 30 in 2020. Previously, the 26 critical metals comprised antimony, hafnium, phosphorus, barite, heavy rare earth elements, scandium, beryllium, light rare earth elements, silicon metal, bismuth, indium, tantalum, borate, magnesium, tungsten, cobalt, natural graphite, vanadium, coking coal, natural rubber, fluorspar, niobium, gallium, platinum group metals, germanium, phosphate rock and strontium. The list now also includes bauxite, lithium, titanium and strontium.

To provide context, estimates suggest that the EU will need 60 times more lithium for electrical vehicle (EV) batteries and energy storage by 2050. With the annual production of EVs set to grow from 3,4-million in 2020 to 12,7-million in 2024, and battery production growing from 95,3 GWh to 410,5 GWh over the same period, demand for lithium is expected to rise from a forecasted 47,3 kt in 2020 to 117,4 kt in 2024 at a 25,5% compound annual growth rate (CAGR), according to GlobalData.

Elsewhere, EU demand for rare earths, used in high tech devices and military applications, is predicted to increase tenfold by 2050. Significantly, the COVID-19 pandemic has also highlighted how deeply global supply chains can be disrupted in a short space of time, and the importance of ensuring resilience through a secure and sustainable supply of critical raw materials.

Set of various titanite rocks.

Target metals and destinations

While the pool of strategic minerals is large, Critical Metals has identified antimony, beryllium, cobalt, copper, fluorspar, tungsten, titanium, tantalum and vanadium, as its initial target metals. These commodities have been identified by several governments as "critical minerals" and so guaranteeing supplies is seen as a strategic necessity. "We believe that the market conditions of these minerals will remain strong in the short to long term," says Fryer.

With strong demand fundamentals and pricing, the initial focus is on near-term production opportunities, prioritising cash flow generation over exploration upside and where the board believes opportunities have been overlooked and underanalysed. The company believes Africa, especially southern Africa, offers great opportunities.

Critical Metals believes a big advantage of these minerals is that most of the large mining houses have no interest in them. "If you look at metals such as antimony, tungsten and vanadium to a lesser extent, global mining majors are not interested in them. We therefore don't have much competition in this space," says Fryer.

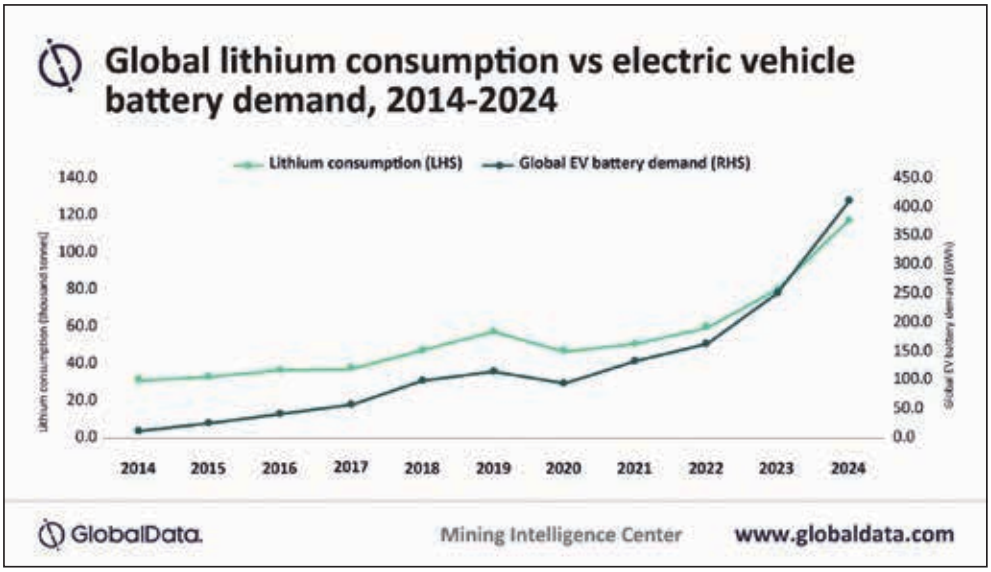
"We have identified projects from Kenya, all the way to South Africa. We are targeting countries like Botswana, Namibia, South Africa, Mozambique, the Democratic Republic of Congo, Zambia and Zimbabwe," says Fryer. "We have also set our sights on countries up north, such as Uganda and Rwanda. We have just gone through the first phase of identifying projects of interest."

"Our initial focus will be on small to medium known deposits as opposed to exploration. Our mantra is that the acquisitions have to be in production within 12 months of purchase. Exploration, on the other hand, takes about five years before you actually start building the mine. Exploration is like a lottery, you might win or not. One of the downsides is that exploration is capital intensive," reasons Fryer.

Experienced board

Central to the success of the company in its endeavours will be the board's experience in investing in

Stibnite or antimonite ore.



Global lithium demand to more than double by 2024.

the sector. Fryer leads the company, and with a background in commodity broking, he knows the space well.

Prior to establishing Critical Metals, Fryer was the co-founder and executive chairman of Western Uranium Corporation, a Canadian listed uranium and vanadium explorer. Before that, he was also the non-executive chairman of Ecometals Limited, a Canadian mining company focused on South American bulk and precious metals. Before Ecometals, Fryer was managing director covering the natural resources sector for North Sound Capital LLC, an investment advisor based in Greenwich, Connecticut. He joined North Sound in 2006 from Deutsche Bank, where he had been a director in Emerging Market Equities. Prior to that, Fryer was a director of Emerging Market Equities at HSBC in Johannesburg, South Africa.

Over the course of his 28-year investment career, Fryer has travelled extensively, obtaining on-the-ground understanding of the natural resources sector. In addition to this significant international travel, he was based in Africa from 1987 to 2004, where he gained knowledge of the market.

Fryer is complemented by two non-executive directors, Anthony Eastman and Marcus Edwards-Jones. Eastman is a chartered accountant (Australian qualified) with a number of years' experience in financial management and corporate advisory services, primarily in the natural resources sector, along with extensive experience in the public company environment, having been a director and company secretary of a number of ASX and AIM junior mining and oil & gas focused companies. He has previously worked with Ernst & Young and CalEnergy Gas Ltd, a subsidiary of the Berkshire Hathaway Group of Companies in both Australia and the United Kingdom.

Edwards-Jones is an executive chairman of Phoenix Copper Ltd, the AIM quoted North American focused base and precious metals exploration and development company. He is also MD (and co-founder) of Lloyd Edwards-Jones S.A.S, a Paris and Dubai-based finance boutique specialising in selling equities to institutional clients and advising and introducing resources companies to an extensive client base in the UK, Europe, Asia and the Middle East.

Prior to founding Lloyd Edwards-Jones S.A.S, Edwards-Jones held senior positions with Julius Baer, and was head of UK/Continental European equity sales at Credit Lyonnais Securities in London. Edwards-Jones has significant experience in worldwide institutional capital raisings for UK, Australian and Canadian listed and unlisted companies, predominantly in the mining and resources sectors. He is a former director of Georgian Mining Corp.

Key takeaways

- Critical Metals Plc, which recently listed on the London Stock Exchange, is targeting acquisitions of brownfield mining opportunities in the strategic metals sector in Africa
- The company's initial focus will be on small to medium known deposits as opposed to exploration, prioritising projects with low entry costs and potential to generate near term cash flow
- Critical Metals has identified antimony, beryllium, cobalt, copper, fluorspar, tungsten, titanium, tantalum and vanadium, as its initial target metals
- The company has identified projects from Kenya, all the way to South Africa, with countries like Botswana, Namibia, Mozambique, the Democratic Republic of Congo, Zambia and Zimbabwe being targeted

Listing and future plans

Commenting on the recent listing on the LSE, Fryer says it marks a very exciting and significant milestone in the company's history. "It will provide us with the capital required to advance our strategy to identify and acquire brownfield mining opportunities in the strategic metals sector and build value for shareholders."

Looking to the future, Fryer tells *Modern Mining* that the company might consider a secondary listing in Johannesburg, when the footprint becomes large enough. "That will be chapter 4 or 5 of our long journey. In future we might also look at expanding into North and South America, and probably list on the New York Stock Exchange. We have outlined our growth path, but it will be built piece by piece. The idea is to first have three or four operating mines that will give us the much needed cash flow. We will only start expanding once we have established our base in Africa, and that's our target for the next three years," concludes Fryer. ■

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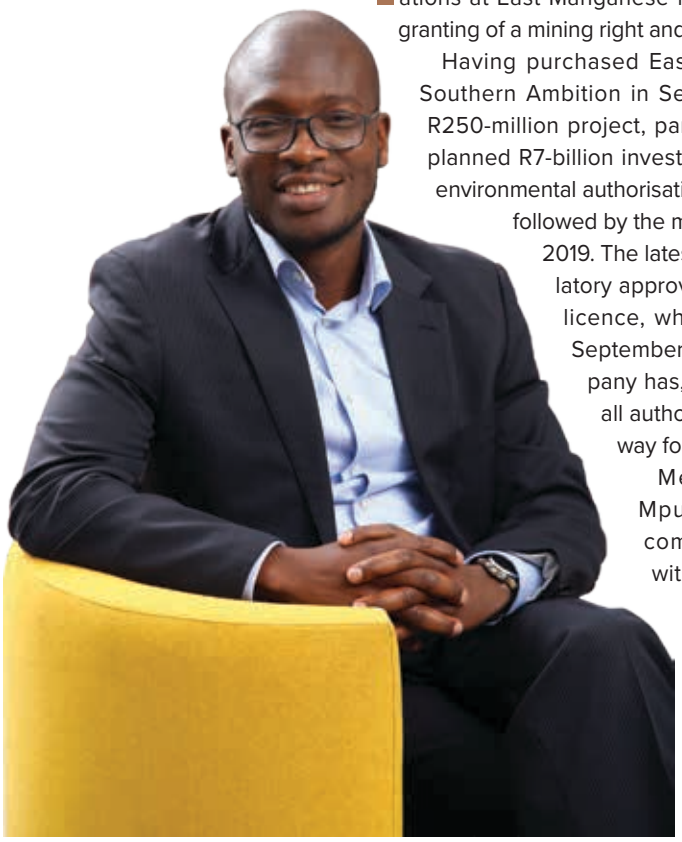
The first box cut was opened on 4 September 2020.

First ore expected in 7 – 8 months at Menar's East Manganese

Following the latest round of regulatory approvals, diversified mining investment group, Menar, has commenced mining operations at East Manganese, the company's first manganese asset located near the Northern Cape town of Hotazel. Having opened the first box cut at the start of September, Menar chairperson Mpumelelo Mkhabela tells *Munesu Shoko*, the first ore is expected in seven to eight months.



In what is the company's first foray outside its traditional mainstay of coal and anthracite in South Africa, Menar Group has commenced mining operations at East Manganese following the recent granting of a mining right and a water use licence.

Having purchased East Manganese from Southern Ambition in September 2018, the R250-million project, part of Menar Group's planned R7-billion investments, was granted environmental authorisation in February 2019, followed by the mining right in August 2019. The latest in a series of regulatory approvals is the water use licence, which was granted in September this year. The company has, therefore, received all authorisations, paving the way for mining operations.

Menar chairperson Mpumelelo Mkhabela commends the speed with which the regulatory approvals were granted, in spite of the challenges brought about by the COVID-19 influenced lockdown. "We laud the swiftness with which the authorities have acted in granting us all the regulatory approvals. To fast-track economic recovery, the government should promote a conducive environment for investment to flourish. This can be achieved by, among other things, eliminating bureaucratic red tape, fast-tracking of licensing of businesses and easing the regulatory compliance regime," he says.

Mkhabela adds that speedy regulatory approvals are critical in unlocking the investment spend in the country, creating economic growth opportunities for host communities and the country at large. He is especially impressed by Human Settlements, Water and Sanitation Minister Lindiwe Sisulu's recent undertaking to continuously improve turnaround times for applications. Mkhabela also has praise for the Competition Commission, which swiftly granted competition approvals during Menar's acquisition of the East Manganese project. The Department of Mineral Resources and Energy also did its part, with the quick granting of a mineral right. "There is an attempt in some sectors of the government to try and fast-track regulatory approvals. They have to be encouraged to do more of that," he says.

Project in detail

East Manganese Mine will be an opencast mine with a single mining pit, which is located on a small 50 hectare (ha) portion of the total 1 000 ha mining right area. The remaining unused portion of the

mining area will be used for cattle and game farming by a local farmer. “We have acquired the land portion on which the proposed pit will be located. The reserve consists of a total of 1-million tonnes (t) of run of mine (ROM) and will produce and process 30 000 t of ROM per month,” says Mkhabela, adding that the project has an expected three-and-a-half years life of mine (LoM).

He, however, believes that there is scope to grow the company’s manganese portfolio in the region, given that East Manganese is located in the manganese rich Kalahari Basin, which is host to 80% of the world’s manganese ore bodies. “We are always looking at opportunities. As a financially and technically sound company, we have the flexibility that enables us to take advantage of any opportunities that may present themselves. We will be certainly looking for new opportunities in the area to grow our manganese and bulk commodities portfolio,” says Mkhabela.

During the second week of July, the project team started grading the entrance road. The first box cut was opened on 4 September 2020.

“Our mining services team has made immense progress in preparing the mining site. Among the achievements so far is the clearing of crush/screen area, grading of all internal mine roads to suit expected mine activity. The haul road and run-of-mine/product area construction will commence soon, once competent material becomes available from the opencast pit,” says Mkhabela.

The final mine plan has been completed and the perimeters of the pit and dumps have been cleared. The full mining fleet complement will be on site by the end of October.

Due to the conical shape of the proposed pit, explains Mkhabela, it will take approximately seven to eight months to reach first ore, after which steady production will be achieved. “Due to the depth and footprint of the ore, he says, which is situated about 50 m below surface at the bottom of the pit, we cannot apply conventional strip mining, hence the conical shape with a ramp down to the ore.

“The initial phase will see us opening up a boxcut down to ore using load and haul mining processes and then waste material will be hauled to the waste stockpile area, which will be used at later stages for mine rehabilitation purposes,” he explains.

First load from the box cut at East Manganese.

A dry crushing and screening plant will be operated on site. “A major advantage of using a dry crushing and screening plant is that it will reduce water requirements and limit pressure on local water sources. An additional benefit of a dry crush/screen process is that there won’t be any need for a slurry handling facility. Products will include both lumpy (85%) and fine material (15%),”adds Mkhabela.

The mining fleet will consist of three production teams, each comprising one 75-t excavator and three 40-t articulated dump trucks (ADTs). In addition, there will also be two bulldozers that will be utilised for bench preparations, dump management as well as rehabilitation; one grader for road, loading and dump area maintenance; three front-end-loaders for product loading and a water bowser for dust suppression on site.

After a six-month period, adds Mkhabela, a fourth mining team, utilising one excavator and three ADTs, will be added on a temporary basis in order to accelerate the ramp up to first ore and to assist with civil construction (contractor yard, RoM pad, plant area and product pad).

Meanwhile, Menar has recently upgraded the existing access road linking the mine to the main road which will allow the haulage of its ore to the nearby Transnet Freight Rail line that is dedicated to manganese transport. The manganese will then be railed to the Port Elizabeth harbour for export. “Transnet has increased its ability to rail manganese destined for the export market. This is really encouraging for investors,” says Mkhabela.

The mining fleet will consist of three production teams, each comprising one 75-t excavator and three 40-t articulated dump trucks.

Due to the conical shape of the proposed pit, it will take approximately seven to eight months to reach first ore.

Project impact

The establishment of East Manganese Mine will boost economic activities in the area and create between 70 – 80 direct new jobs on the mining complex, once peak production has been reached.

The company has begun consultations with the local municipality and other community stakeholders regarding its social labour plans and to ensure that the mining activities can be beneficial to local residents.

"If we multiply this figure by 10 – which is the average number of people that are dependent on a single salary earner in South Africa – then in essence 700 – 800 people will directly benefit from this project. In addition, the indirect economic benefit of the operation, even though not quantifiable, is also far reaching. We have commenced with the recruitment process in conjunction with the local municipality," says Mkhabela.

"The importance of having good community relations cannot be reiterated enough. To that effect, our social labour plans are quite advanced. We have been talking to local authorities, in the form of the municipality, as well as other social groups, to understand the issues that affect the community," he says. "We have developed a strategy that incorporates corporate social responsibility into the mainstream of our governance system. It's an integral part of our operations wherever we do business."

Key takeaways

- Having purchased East Manganese from Southern Ambition in September 2018, the R250-million project, part of Menar Group's planned R7-billion investments in South Africa, was granted environmental authorisation in February 2019, followed by the mining right in August 2019
- The latest in a series of regulatory approvals is the water use licence, which was granted in September this year, paving the way for the commencement of mining operations
- During the second week of July, the project team started grading the entrance road. The first box cut was opened on 4 September 2020
- Due to the conical shape of the proposed pit, it will take approximately seven to eight months to reach first ore, after which steady production will be achieved swiftly
- The reserve consists of a total of 1-million tonnes of run of mine (ROM) and will produce and process 30 000 t of ROM per month over a projected three-and-a-half years life of mine

Road to diversification

Mkhabela says the purchase of the East Manganese project is in line with the company's strategy to diversify its commodity portfolio, which is integral to its quest to become a leading South African diversified mining company.

The R250-million investment, says Mkhabela, is significant for the Menar Group. "We are on track to invest at least R7-billion in the next two years. The start of the East Manganese project in the middle of a pandemic is an indication of fulfilling our investment promise to South Africa. We are looking for more assets in the manganese sector," he says.

"It is our aim to build a larger manganese portfolio in the area over time. We are committed to realising South Africa's full mining potential, by continuously seeking out new investment opportunities and East Manganese is a clear illustration of this continued commitment. The move into manganese from our controlling and management positions in Canyon Coal, Zululand Anthracite Colliery and Kangra forms part of our strategic diversification into minerals and metals beyond coal and anthracite. We believe the skills and knowledge we have gained from coal mining will hold us in good stead for our venture into manganese," adds Mkhabela.

He is also encouraged by the prospects of the global manganese market. Manganese has numerous applications which impact people's daily lives. The main uses are in industrial and metallurgical applications. Manganese is essential to the production of steel, aluminium alloys, copper alloys, batteries and a variety of chemicals.

The manganese mining sector is an integral part of South Africa's economy. According to the Minerals Council, over 10 800 people were employed in the sector which equalled over R3,5-billion in employee earnings in 2019. The sector produced over 16,4-million tonnes and totalled over R47,6-billion in total sales during the same period.

"We are encouraged by the macro supply and demand fundamentals of manganese. South Africa holds the overwhelming majority of the world's manganese resources. We are confident that we can leverage our group's existing skills and relationships in South Africa to build a strong manganese business," concludes Mkhabela. ■

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Underground refuge chambers and

While legislation in South Africa requires emergency refuge chambers at underground mines, the safety guidelines are vague and lack specifications for adequate life support systems. MineARC Systems, a manufacturer and supplier of emergency refuge chambers for underground mining, among others, is calling for more detailed guidelines to be implemented by governing bodies. By *Mark Botha*.

Jason van Niekerk, MineARC sales manager (Africa).

While South Africa has a compulsory minimum standard in place for refuge chambers in mines, the requirements for what constitutes a refuge chamber are ambiguous, which is why MineARC follows its own best-practice standard.

"This might not necessarily be enforced by the Department of Mineral Resources and Energy or the regulatory bodies, although it should be," says MineARC sales manager (Africa) Jason van Niekerk.

He notes the irony that, while South Africa has the most underground mines on the continent, MineARC does significantly more business within the rest of Africa where there is a "better understanding and acceptance" of best practice standards.

"We probably supply most of the top five mines at African operations excluding South Africa."

To that effect, the company has assisted some African countries with the Western Australian, Turkish and US guidelines on emergency safe refuge systems. These guidelines include minimum requirements and stipulate redundancies for primary systems.

"For example, active compressed-air lines are a requirement at underground mines. While the Western Australian guidelines require these too, they go a step further and demand redundancies for compressed-air and power," says Van Niekerk.

"Should the compressed-air supply be compromised during an emergency, you switch over to the redundancy – oxygen cylinders and a scrubbing system to supply breathable air for as long as is required by the standards of the host country which, in some cases, could be up to 36 hours. Should the trapped personnel not be rescued in that time, an oxygen candle in the rescue chamber would provide an additional 2 600 ℓ pure oxygen – a redundancy on the redundancy."

"We receive much positive interaction from countries including Botswana, Burkina Faso, DRC, Ghana, Mali, Namibia, Tanzania, Zambia and Zimbabwe – the key countries focusing on safety systems. Some sites in these countries are aware of MineARC's products and opt for higher safety specifications than currently required by their respective host governments."

MineARC manufactures its rescue chamber units

Left to right: The MineSAFE refuge chamber is designed for tight mining confines.

MineARC manufactures its rescue chamber units locally and equips them to its own minimum standards.

MineARC's refuge chambers underground.

Rear view of a rescue chamber showing the UPS and cooling systems.

the urgent need for best practice

locally and equips them to its own minimum standards, although some components, such as the air scrubbing systems, are manufactured at its headquarters in Australia.

"Some clients have custom requirements, add-ons which don't necessarily form part of the best-practice standard," says Van Niekerk. "These include sites with no compressed-air lines. In such cases, we use positive pressure maintenance systems to artificially create the positive pressure environment which would normally have been provided by compressed-air."

A modular approach for SA

Van Niekerk recalls that refuge chamber sales were initially met with "pushback" in South Africa as local mining operations are mostly shaft mines, posing the practical problem of transporting the units down the shafts as they are often too large to fit the mine cages.

"The solution lay in modular construction: the refuge chambers are divided into sections small enough for the cage, and then moved into place and assembled underground. We have supplied three-piece units in South Africa and, in Ghana, we installed a refuge chamber in seven modular units due to an especially small cage."

He says MineARC's mobile refuge chambers typically accommodate from four to 30 people while the largest installed permanent chamber on record caters for 600 persons. In Zimbabwe, the company even installed a unit in three sections at a mine with a working height of only 1,6 m.

"We accommodated this low working height by manufacturing the chamber to a height of 1,575 m. The client is currently conducting studies on this unit with a view to install additional units for the rest of the operation next year."

Refuge chamber monitoring

MineARC's latest refuge chamber advancement is its GuardIAN Refuge Chamber Monitoring System, which provides information on variables such as the control system, gas readings and the sealing capacity of the chamber to a central location. The control room either views this information on a dashboard or the system can be configured to send alerts to the relevant departments.

The GuardIAN system has now expanded to include site-wide environmental monitoring, personnel tracking and navigational smart lighting.

"Many sites are adopting this system as they are following the smart mining route," says Van Niekerk. He refers to Mopani's underground SOB/Synchlonorium mine as one of the first sites globally to implement the technology. Since then, MineARC has installed GuardIAN at over 10 other sites across Africa, including in Zimbabwe and Ghana. ■

Key Takeaways

- ❑ While legislation in South Africa requires emergency refuge chambers at underground mines, the safety guidelines are vague
- ❑ The rest of Africa has a better understanding and acceptance of best practice standards than South Africa
- ❑ MineARC has assisted some African countries with the Western Australian, Turkish and US guidelines on emergency safe refuge systems
- ❑ Local mining operations are mostly shaft mines, posing the practical problem of transporting the units down the shafts
- ❑ The refuge chambers are divided into sections small enough for the cage, and then moved into place and assembled underground

Digitalisation – Taking the 'roof' off mining operations

The more pressing concern for mines at the moment is to rapidly ramp up production in an effort to recoup output lost during the COVID-19 lockdown. In an environment where emphasis is fixed firmly on output with less resources, Sandvik Mining & Rock Technology's Niel McCoy reiterates that digital tools allow mine operators to take the 'roof' off their mining operations, thus ushering in a new age of efficiency and winning the productivity and cost-control battle. By *Munesu Shoko*.

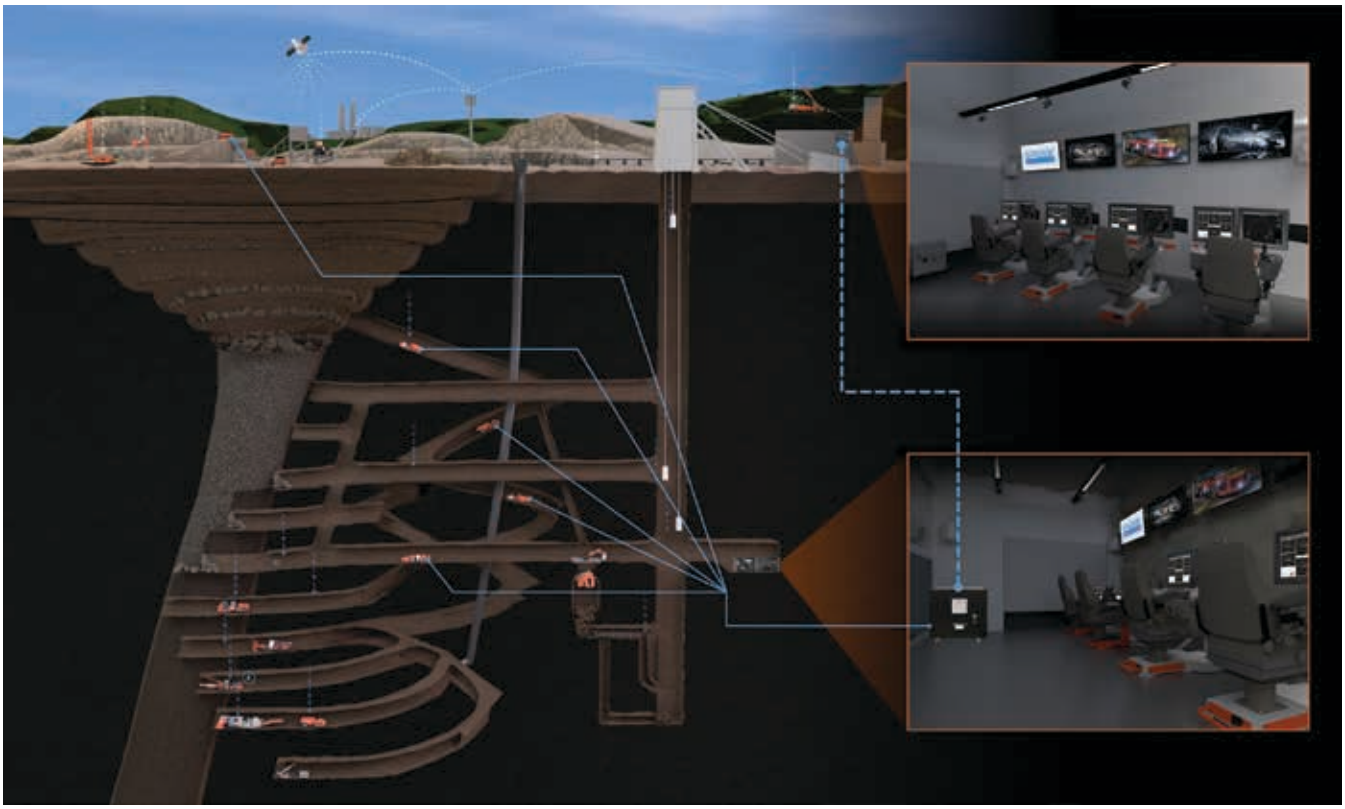
Niel McCoy, business line manager automation and digitalisation – Southern Africa at Sandvik Mining and Rock Technology.

With mines battling to achieve the same output with less people on site due to the COVID-19 restrictions, Niel McCoy, business line manager automation and digitalisation – Southern Africa at Sandvik Mining & Rock Technology, tells *Modern Mining* that digitalisation has become even more vital in helping operations deal with their ever-increasing safety, productivity and profitability challenges.

As mine operators continue to look for consistency across their operations, reductions in costs and maximum output from all their assets, digitalisation can provide the breakthrough they need, he says.

The biggest pressure, says McCoy, facing mines at this stage is to increase productivity with minimal people on site, especially in the South African context. He reasons that despite the relaxation of lockdown restrictions, with the recent move to Alert Level 1, mines still need to have a code of practice to manage COVID-19 at their operations, and therefore people working in close contact still need to be managed for an extended period. If mines keep doing this the traditional way, he says, it's going to be difficult to push up production as fast as possible to get back to pre-COVID-19 production levels.

"Digitalisation enables mine operators to take the 'roof' off their mining operations and get feedback on what is happening in real time. This helps to determine exact areas of improvement. The operational team can make informed decisions on what areas to focus on and see the results immediately



AutoMine is an automation system for autonomous and tele-remote underground equipment including loaders and trucks.

Sandvik OptiMine is used for analysing and optimising mining production and processes underground.

when changes are made. In essence, it takes the guesswork out of operational improvements," says McCoy.

Mines depend on multiple pieces of fixed plant and mobile equipment, and digitalisation can help improve overall equipment effectiveness (OEE), which holds the key to increased productivity. According to McCoy, digitalisation allows operations to see what is happening with their mission-critical assets in real time.

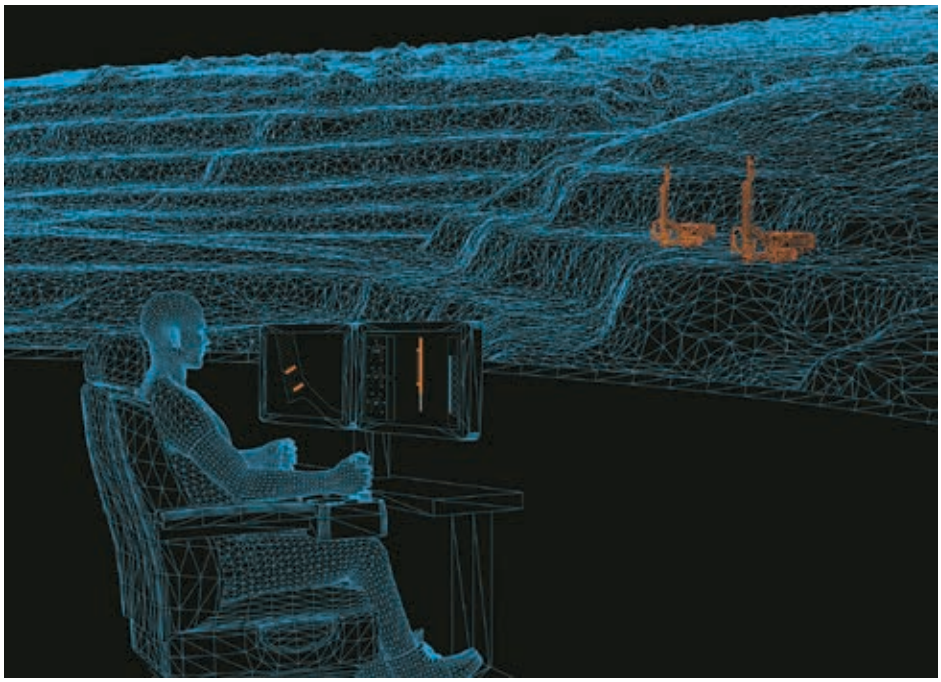
"Digital tools give you an accurate view of what is happening in the entire mining process and allows for accountability with all teams. With digitalisation mines now have a full view of all factors that affect OEE, including operational delays, late starts and early finishes, among others. The data is visual to everyone and with connectivity it is available in real time. Decisions can be made immediately to rectify deviations from the mine's plan in an informed manner. In short, it takes the guesswork out of mining," reasons McCoy.

Phased approach

While mining majors have been investing in digital technologies for several years, McCoy believes that now and post-COVID-19 is the era in which the digital agenda should be moving into the domain of the broader mining industry, including junior miners. With rapid advances in technology, along with decreasing costs overall, harnessing the power of digital has become more practical and achievable for all sizes of operations – to the extent that it is now becoming an imperative.

"From what we have seen in the industry, these systems can now pay for themselves fairly quickly and depending on the level of digitalisation that a mine wants, for example, basic telemetry reporting off the equipment may not cost much per machine per annum than what a single service kit costs – just changing filters and oil," he says. "The question is no longer about affordability, it's about whether the

AutoMine is suitable for the use in surface drilling applications.



An AutoMine operator showing how simple the system is to operate.

industry can afford not to adopt these technologies."

Commenting on adoption, McCoy reiterates that it's important for the customer to first have a clear understanding of what they want to achieve with their digital agenda. A phased approach – bringing in modules in stages – allows for a quick adoption of the technology that the mining operation needs, and certainly gets people on the floor responsible for using the technology to buy into the process. "The moment you start with a balanced suite of solutions and you have the staff asking: can we do this, what about the next step, then you have their buy-in and they quickly see the value that these tools can bring," says McCoy.

McCoy says Sandvik prefers to partner with its customers to help identify where problem areas are and develop tailored solutions for specific challenges. "There is no blanket approach to digitalisation. Adopting a phased approach and showing the value each component delivers helps digest the upfront investment required in infrastructure and networks. Adopting a phased approach also helps facilitate the change management process to entrench digitalisation in the operation," says McCoy.

The phased approach, adds McCoy, allows mining companies to identify what's relevant to them right now, pick certain key performance indicators (KPIs) and improvements that they want to manage, before they start rolling out relevant digital tools that can assist them meet their operational needs.

"Mines need to have a digital strategy, putting together the building blocks of what's going to help them get where they want to be. Start with something small that you can manage and from there you start building up your digital tools suite," he says. "COVID-19 is putting the spotlight on mine digitalisation, which will give mines better visibility of their operations in real time."

McCoy believes that network solutions for all types of mining methods are also evolving rapidly and network suppliers are also coming to the party. "One of the key foundations of digitalisation is connectivity, and with that widely in place, typical southern African mechanised mines such as room and pillar operations, can now start to expand on their digital strategies," he says.

"For mines to have a view of what is happening in real time, it is essential for connectivity and data to flow. For a start, data will assist in helping with more effective management of operations. In the long term, data flow is essential for tools like analytics used in business improvement scenarios. Digitalisation brings the ability to change the way mines work on a day-to-day basis and the flow of data, through connectivity, is essential for this to happen," says McCoy.

Key considerations

While mines need to understand that digitalisation is something they can't do without anymore, McCoy cautions that they can't afford to just 'dump' digital tools into their operations and expect them to work; change management should be at the heart of the process.

"It takes a lot of thought process, leadership and change management for any digital tools to be successful," he says. "Because fundamentally when you start implementing digitalisation, you are changing the way people work from a process point of view, coming more towards a centralised control centre approach, which makes the operation visible to everyone in real time."

McCoy also reiterates the importance of choosing the right partners in this journey. He notes that there is no single solutions provider that can cover all the aspects of a digital mine.

A Toro TH663i equipped with AutoMine.

Inter-operability is therefore a vital aspect of the digitalisation planning. The systems, he says, will be reliant on transferring data between each other, so mine operators have to consider, firstly, a partner that can assist them with the change management process and one that understands the requirements of implementing digital tools, and secondly, a partner that is able to work with other systems to integrate all the data generated on site for them to have the overall picture of the mine.

"With Sandvik's interoperability policy, we can interface with any third-party system to provide the customer with tools to drive continuous improvement in their day-to day-operations," he says.

When it comes to digital products, Sandvik is specifically focused on Short Interval Control through its OptiMine Scheduling and Task Management modules and process optimisation through its OptiMine Analytics modules. Sandvik can also connect non-OEM equipment to this system through its Newtrax offering.

"There are many other fields such as Mine Visulatisation, Augmented Reality, Digital Twins and Real Time Smart Scheduling, among others. OptiMine is built on an open architecture which allows us to work with any other software solution providers the mine may have to help integrate systems. We are developing an API so mines can use the full power of AutoMine on non-Sandvik equipment," explains McCoy.

He highlights that Sandvik Mining & Rock Technology's experience in this field is substantial, demonstrated by the fact that OptiMine has been installed at many sites across the world. "OptiMine is currently working in more than 66 mines around the globe, and miners are understanding the value – financial and otherwise – of analytics and process optimisation," concludes McCoy. ■

Key takeaways

- ❑ With mines battling to achieve the same output with less people due to the COVID-19 pandemic, digitalisation has become even more vital in helping operations deal with their ever-increasing safety, productivity and profitability challenges
- ❑ Digitalisation enables mine operators to take the 'roof' off the mining operations and get feedback on what is happening in real time
- ❑ Adopting a phased approach and showing the value each component delivers helps digest the upfront investment required in infrastructure and networks
- ❑ With Sandvik's interoperability policy, the company can interface with any third-party system to provide the customer with digital tools to drive continuous improvement in their day-to day-operations

The digital revolution of blasting in mining

Christiaan Liebenberg, BME software product manager.

Tinus Brits, global product manager – AXXIS at BME.

The digital revolution optimises the full blasting cycle, from planning through to initiation and analysis.

The COVID-19 situation has created major challenges for the mining sector worldwide and has highlighted that digital production is more important than ever when it comes to gaining a competitive edge. Consequently, BME reports increased enquiries of its digital blasting tools as mines seek to take advantage of digital technologies to react to current and future challenges with the required degree of flexibility. By *Munesu Shoko*.

The days of trying to convince mining executives of the imperative of a comprehensive digitalisation roadmap may well and truly be over. There doesn't appear to be a mine owner or manager in the world who doesn't appreciate the immense value, efficiencies and competitiveness that can be unlocked by fully harnessing the power of digital tools.

One area in the mining cycle where the power of digital is proving its worth is in blasting. Tinus Brits, global product manager – AXXIS at BME, says mines in the SADC region, and Africa at large, are looking for innovation and technology to promote sustainability.

"We have seen a big move towards electronic detonators in the African mining sector," he says. "A big drive is the testability of the product. With electronic detonators you know immediately what is going on – you can detect possible misfiring in the range and can easily detect which detonators are not responding. We have therefore seen most mines moving over to electronic detonators."

Brits also notes a big drive for data at mines. The data, he reasons, has always been available, but now more than ever, mines are realising the value that can be driven from the large amounts of data at their disposal. "Previously," he says, "data was never really shared between the customer and the explosives supplier. There is now a big drive to make the data available to all parties for informed decisions when it comes to blasting patterns and blocks."

D. Scott Scovira, global manager Blasting Science at BME, agrees, saying that the behaviour and discipline of mining houses has changed in recent years. Previously, in the late 90s, he says, mines were very much paper driven, and operations personnel largely ran mines at the expense of engineering teams.

"Mines traditionally tend to be heavily driven by operations, and every time you introduce more work processes, they are often met with resistance. Fortunately, mine management has seen the value of big data and now it's being driven from top-down, rather than from bottom-up," says Scovira.

Scovira adds that traditionally the drill and blast function in most mines was regarded as an entry level position and was not considered a sophisticated role. "The viewpoint is changing," he says "as people realise that the entire mining cycle, the physical part of it, starts with drill and blast, and has a huge impact on fragmentation, which has a big effect in downstream operations such as load and haul as well as crusher throughput."

More experienced and knowledgeable people are thus being brought in to fill in these roles. To help facilitate that, leading blasting companies like BME are at the forefront of a digital revolution, offering digital tools to help optimise the full blasting cycle, from planning through to initiation and analysis.

BME's AXXIS Initiation system has been behind some of the world's largest surface blasts.

Above: The free Android Blasting Guide application enables users to rapidly calculate and check blast designs.

Left: BME has developed cutting-edge products, services and solutions for every stage in the explosives supply chain.

Digital innovation

Over the years BME has developed a suite of digital technologies to help mines with improved blast planning, initiation and analysis. The company has always been synonymous with innovation. Formed in 1984 as a supplier of bulk emulsion explosives, BME was the first explosives company to introduce dual salt cold emulsion technology into South African opencast mines. In 1987, the company became part of the JSE-listed Omnia Group, and today is a market leader in emulsions and initiating explosives in Africa.

In addition to emulsion explosives, BME has developed cutting-edge products and services at every stage in the explosives supply chain. Its main innovations in recent years comprise the AXXIS electronic initiation system, its BLASTMAP blast planning software, its XPLOLOG blast recording system and, more recently, the Blasting Guide app.

Electronic initiation, says Brits, has become increasingly popular due to its reliability, accuracy and flexibility, making blasting more predictable and allowing for larger and more cost-effective blasts. BME's AXXIS is a fully programmable, accurate and easy-to-use electronic delay detonator system. It is said to be one of the safest initiation systems available.

With safety in mind, AXXIS offers full two-way communication between the blasting box and detonators. During detonator logging, there is no direct communication with the detonators. Using the AXXIS system, you can programme AXXIS detonators to fire accurately at any time between 0 and 15 000 ms at one millisecond intervals. You can fire up to 600 detonators from one AXXIS Blasting Box.

BME's AXXIS system – which has built a strong customer base in the mining sectors of Africa and even beyond, mainly Australia – has been behind the world's largest surface blasts, measured by the number of electronic detonators fired in a single blast. At Zambia's Kansanshi mine – the largest copper mine in Africa – 7 401 electronic delay detonators were successfully initiated in one blast using AXXIS.

Recently, the company broke the South African record for the largest electronic detonator blast, initiating 3 780 detonators in a single blast at a manganese mine near Hotazel in the Northern Cape. The latest record was once again achieved using the company's popular AXXIS GII electronic detonation system.

BME's BLASTMAP, a software tool for designing blast timing for use with XPLOLOG and AXXIS, ushered in a new era in blast planning. It is a powerful and modern software that allows design of the blasts from hole layouts to charge quantities, deck charging and blast timing.

Christiaan Liebenberg, software product manager at BME, explains that the desktop application allows for importation of survey data of the block geometry, holes and surface, as well as virtually creating a blast and pattern of holes, adding explosive and rock types. With BLASTMAP, one can also view a blast design in 3D with full 360° rendering, create charge and timing designs based on actual hole positions and calculate costs and quantities based on actual drilling information.

"You can also create your blast designs and share the file with another user that has the BLASTMAP software installed, allowing them to view, make corrections and sign off the blast. "The blast design file exports directly from BLASTMAP into BME's XPLOLOG system allowing users to view, edit and sync planned with actual data captured to a cloud solution for XPLOLOG users to access the date from anywhere. The integration of data allows you to use the powerful blasting simulation and

BME's emulsion plants produce tried and tested, optimum quality emulsion to enhance the blasting process.

prediction modules in BLASTMAP to further analyse and improve blast outcomes on real data."

"Real-time data over local networks (GSM/WIFI) mean that the process can be monitored remotely and dipping, priming, charging and stemming procedures can be efficiently coordinated. This technology digitises the pre-blast process, reducing human error, increasing efficiency and ensuring reliable results," adds Liebenberg.

Continuous development

Historically, says Liebenberg, BME's software solutions were developed according to a specific customer request. Thus, these products – BLASTMAP, XPLOLOG and BME Blasting Guide – were previously developed in isolation.

In recent years, BME has continuously invested in its software development team and also adopted a development framework to streamline the development process and releasing of existing product features and new products in a shorter timeframe without jeopardising the quality of work.

"We continue to invest in our software team," explains Liebenberg. "Our strategy in the medium term, in terms of technology development, is to improve the existing offerings. The aim is to improve on user experience, to add new innovative features in response to current customer needs, improve application performance to reach optimal productivity and also to use data to make informed decisions, monitor blast progress and react to alerts that need immediate attention."

A case in point, as far as continued improvement of offerings is concerned, is the recent enhancement of the BLASTMAP blast planning tool with an added burden relief timing module. As an enabling tool for AXXIS electronic initiation system, BLASTMAP now has a powerful burden relief feature that gives the blaster better control over the shape and movement of the blasted rock muckpile. Burden relief, explains Scovira, is fundamental to good blast design, as the blaster needs to shape the muckpile to optimise the efficiency of the excavation fleet.

The new feature augments a range of BLASTMAP tools that have added value to BME's customers for many years, integrating with BME's AXXIS and XPLOLOG systems. AXXIS allows blast technicians to programme a detonator with the desired time delay, while XPLOLOG allows users to view, capture and sync drill and blast data to a cloud solution for real-time access to preparation progress on the blast block.

Another recent development from BME is the free Blasting Guide application for Android mobile devices, enabling users to rapidly calculate and check blast designs. Available for download from the Google Play Store, the new BME Blasting Guide mobile app replaces traditional paper booklets carried and referenced by in-field users. It includes a blast design calculator, quick calculators and prediction calculators. Other app features include surface blast design rules of thumb, environmental guidelines, a table of common rock properties and a BME contact directory per country.

The app runs both metric and imperial unit measurements, making it useful across the globe. "The new app is an integral part of BME's pioneering approach to harnessing the power of digital technology in the blasting sector," says Liebenberg. "The platform gives our Blasting Guide a mobility and ease of use that makes a blasting engineer's job easier and more productive."

In the near future, BME will also roll out its AXXIS TITANIUM, said to be the most advanced electronic blast initiation system in the world. The system, an upgrade of the current AXXIS GII, is undergoing final trials in South Africa, with a 100% success rate to date. A total of 60 blasts have been undertaken to date using the AXXIS TITANIUM. The system is expected to be launched later this year as a successor to the company's GII version.

"The upgraded system has achieved trial certification from the first phase of testing, receiving a six-month trial period confirming that it is safe to use," says Brits. "Trials are now proceeding under the control of BME, so that we can build up a history of performance data – which to date has been faultless."

Data is king

The key improvements in BME's digital offerings have been driven by the increased need for blasting data by mining management. "From an integration point of view, our products have traditionally been built in isolation. We are starting to integrate our technology offerings to allow these products to talk to one another. From stage one of the blast cycle to the very end, data needs to keep flowing," says Liebenberg.

Brits says while data has always been there, the COVID-19 scenario has fast-tracked the mining sector's need for digital systems to improve every part of the operations. "Data has always been there, but

my view is that it was never properly understood by the mine," he says.

Liebenberg says there is greater need for real-time data to drive short interval control in execution, reduce variability and shorten planning cycles. He also notes that there is an increased need for reporting and analysis of historical data and insight gained from analysing trends, patterns and opportunities for improvement learned from previous blasts. Future insight is also derived from historical analysis to improve planning and predict future outcomes using analytics.

While there has been plenty of data, interpretation has always been a concern. In its new re-development work for XPLOLOG, BME is offering the user a new customised reporting feature as the answer to the interpretation concern.

"As part of our new XPLOLOG re-development, we are giving the customer an option to select the data they want to see and how they want to see it; whether online, in pdf format, or email. The idea is to also integrate with the customer's data, pushing the drill and blast data into their environment."

Scovira says integrated data platforms support all processes at the mine. In that regard, BME is currently working with several third-party mining software providers. "We have been open-minded and so is our partners. This allows these products to communicate with each other. That has been a key focus in the past decade, to get everything to talk to each other so that there is a continuous flow of data from design through to review."

D. Scott Scovira, global manager Blasting Science at BME.

Supporting mines during COVID-19

COVID-19 has further reiterated the significance of digital blasting systems in mines. "We have actually seen an increase in requests for quotations for our software-based tools. As many people work remotely, the need to transform to digital tools has never been this high," says Liebenberg.

Scovira says the mining sector, like many other industries, is seeking to operate and function differently. Before COVID-19, many of the things were done face to face, not necessarily because they had to, but because that was the way work was done, says Scovira. "The methodology of working is now changing, becoming more data and analysis sharing driven. In the long term, I am sure some positive technology advances will come out of this. We are in a period of transformation."

In conclusion, Brits believes the future of mining is digital, where electronic detonators and related digital tools will take centre stage. "I think electronic detonators will further develop. For instance, there is talk of wireless detonators already being developed in the market. BME is also exploring such tools. That's where the future is heading," says Brits.

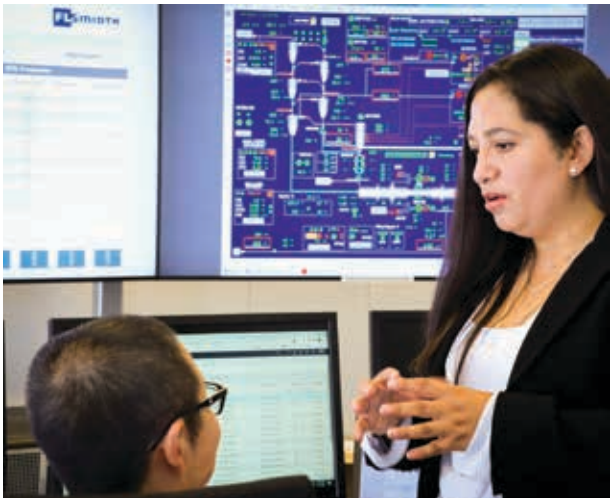
Liebenberg is of the view that to support sustainable mining "semi-autonomous technology is the future," he says. "Automation by its very nature takes people out of harm's way, avoids human error and also facilitates the upskilling of people. It doesn't necessarily have to replace people, but it creates new opportunities for people to grow."

"This is a period of gap filling in mining. One of the gaps available, for example, is how do you load drill holes with explosives autonomously? That's an area currently receiving greater attention," concludes Scovira. ■

Key takeaways

- ❑ BME reports increased interest in its digital blasting tools as mines seek to take advantage of digital technologies to react to current and future challenges with the required degree of flexibility
- ❑ Electronic initiation has become increasingly popular due to its reliability, accuracy and flexibility, making blasting more predictable and allowing for larger and more cost-effective blasts
- ❑ In recent years, BME has continuously invested in its software development team and also adopted a development framework to streamline the development process and releasing of features and products in a shorter timeframe without jeopardising the quality of work
- ❑ BME reports a greater need for real-time data to drive short interval control in execution, reduce variability and shorten planning cycles

Digitalising minerals processing for more control



With its decades of product development, FLSmidth is well placed to offer customer remote monitoring, control and process optimisation.

Mining's accelerated move toward digital solutions since the outbreak the COVID-19 pandemic is being supported by FLSmidth's decades of research and development. The company has over 80 projects underway to improve its mining-related offerings.

Terence Osborn, FLSmidth's director of product and account management for sub-Saharan Africa and the Middle East, highlights that R&D is the lifeblood of the company's new technologies. So much so, that it has some 80 projects underway to improve its mining-related offerings.

"The power of digital technology is certainly a key element of these efforts," says Osborn. "Together with our Blue Box digital concept, based on our ECS/ControlCenter, which is a cybersecure interface between our equipment and cloud data storage, we use our SiteConnect mobile app to monitor the performance of equipment and process plants in real time. The ECS/ControlCenter V8 process control platform sits at the heart of our digital vision, a key component in our growing portfolio of digital solutions and services that we call ENABLR."

An example of this applied capability is an FLSmidth REFLUX Classifier modular plant operating on a South African mine. Using SiteConnect, operations managers can have real-time access to over a hundred operational parameters on the plant. Data analytics linked to the cloud data can also generate time-based trends for instant viewing on the app.

"We have also developed SmartCyclone technology for our hydrocyclones," Osborn notes. "This innovation uses sensors to detect wear and roping, a condition that reduces separation efficiency. By sending an alert when certain operating parameters are breached, the system ensures optimal efficiency is maintained, even as slurry conditions in the circuit vary."

He highlights that the company's machine-level solutions are offered as part of plant and process packages. At both plant and process level, there is also FLSmidth's advanced ECS/ProcessExpert solutions, which facilitate not just monitoring and control, but advanced optimisation enabled by state-of-the-art AI technologies.

"It is important to remember that control systems need to be flexible, so that they adapt to customers' needs and to their existing systems," he says. "With FLSmidth's depth of expertise in software engineering and machine control, we can ensure that our machine-level systems connect with all market leading control systems – to seamlessly deliver the data that mines need for effective decision-making."

The company's R&D pushes the boundaries of performance in a range of mineral processing fields. These include advancing its lamella plate technology in mineral separation applications, adapting its vertical roller mill for dry grinding in mining, and extending wear life of pumps with new polymers. ■

Metso Outotec introduces Courier 6G SL on-stream analyser

Metso Outotec is launching its next-generation Courier 6G SL on-stream analyser for direct measurement of gold, platinum and other valuable metal concentrations from ore feed, concentrate and tailings streams.

The system can measure up to 24 individual process streams.

The new analyser enables accurate real-time elemental analysis measurement, which is critical for establishing efficient process control to improve process stability and maximise recovery. "Agnico Eagle Kittilä has used the new on-stream analyser for flotation control and optimisation since October 2019. Measurement information provided by the Courier 6G SL has enabled more efficient control of the pre-flotation circuit and helped to reduce gold losses," says Lauri Veki, metallurgist, Agnico Eagle Kittilä.

The Courier 6G SL on-stream analyser builds on the Outotec Courier 6X SL analyser with a more powerful X-ray tube and measurement channels optimised for direct on-line measurement of gold and other elements from calcium to uranium. This makes it particularly suitable for applications where gold is recovered with other metals such as silver or copper.

The system can measure up to 24 individual process streams – each with an individually adjustable measurement time – to ensure optimal measurement accuracy and sampling frequency in even the most complex polymetallic flotation circuits.

The new next-generation on-stream analyser combines Wavelength Dispersive X-ray Fluorescence (WDXRF) and Energy Dispersive X-ray Fluorescence (EDXRF) technologies with a high-power X-ray tube for unparalleled measurement performance. It also features an automatic internal reference measurement for guaranteed stability under changing environmental conditions. ■

Sandvik reveals AutoMine concept

Sandvik Mining and Rock Technology used its Innovation in Mining Virtual Event on September 29, 2020 to reveal its future vision and concept for autonomous mining equipment.

The fully working and autonomous AutoMine Concept vehicle is based on the latest technologies and equipped with completely new sensing capabilities and artificial intelligence to enhance mining operations. The AutoMine Concept perceives its surroundings and environment in 3D and reacts to it in real-time. These technologies provide clear customer advantages by allowing vehicles to adapt and plan their own routes, and to find the most suitable paths even in continuously changing environments. The obstacle detection, collision avoidance and 3D online mapping capabilities improve adaptability and increase flexibility.

"The AutoMine Concept is unique, because it has been designed ground-up for autonomous use. It is the world's first fully autonomous underground mining machine built specifically for automation," says Riku Pulli, vice president, Automation at Sandvik Mining and Rock Technology. "This technology raises ease-of-use, effectiveness of asset utilization and adaptability to a new level, resulting in higher productivity. These technologies will truly change the face and pace of autonomous mining."

This game-changing platform is a foundation for using the AutoMine technology in various equipment types and can be applied to any vehicle. The AutoMine Concept vehicle also has a completely new industrial design without a cabin, and with built-in components for high reliability and productivity. This autonomy platform allows for equipment design that is optimized for its primary production tasks without compromises. Furthermore, being fully battery-electric, it drives sustainability in mining without carbon emissions. ■

The new technologies showcased in the AutoMine Concept will lead the way for the future of the existing, world-leading AutoMine product.

Cleaning up liquid spills at mines

Strict health and safety regulations in the mining industry mean that any liquid spills in workshop areas or elsewhere need to be cleaned quickly and effectively. This is where a completely natural, mineral product called Gunge Spunge is playing a major role. Produced by South African manufacturer Pratley, Gunge Spunge is the ideal product for cleaning up any liquid spills, including petrol, diesel, oil, sewage and other nuisance liquids.

Sawdust and other flammable materials were traditionally used to clean up highly combustible hydrocarbons. This is not only ineffective but also potentially hazardous. In fact, many mines and municipal by-laws now prohibit their use. Gunge Spunge offers the ideal solution in that it is extremely effective, non-flammable and eco-friendly, explains Pratley marketing manager, Eldon Kruger.

Gunge Spunge is processed from a specific mineral that is 100% naturally occurring and is completely non-toxic. Apart from its desiccating properties, whereby it absorbs moisture in confined areas prone to damp, it also has cation absorption properties, allowing it to absorb rather than mask odours. This ensures that odours are eliminated for good.

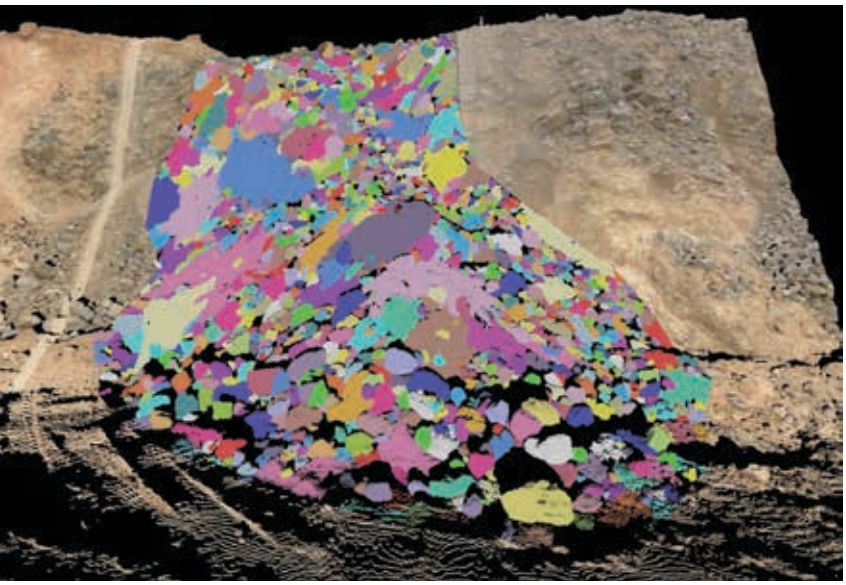
Extensive testing by Pratley's world-class research and development team has proven the application of Gunge Spunge in arduous operating environments such as mines. Gunge Spunge is supplied in 12 kg bags, although special arrangements can be made for the larger quantities required by the mining industry in particular. ■

Fragmentation analysis leads updates in Maptek PointStudio 2020

A powerful fragmentation analysis tool is a highlight of Maptek PointStudio 2020 geospatial modelling and reporting software, released to customers this week.

Better understanding of fragmentation can account for phenomenal downstream cost-efficiencies, with implications for many aspects of an operation, according to group product manager Mine Measurement, Jason Richards.

"Sub-optimal fragmentation is immediately associated with inefficient excavation and haulage," says Richards. "Undue damage to crusher parts is another impact. Excessive energy usage, crusher downtime due to wear and tear outside of planned maintenance and delivering out-of-specification product are directly linked to operational performance."



Maptek's PointStudio fragmentation analysis.

PointStudio Fragmentation Analysis allows KPIs to be achieved consistently. Individual rocks can now be modelled from scanning of muck piles and draw points to provide accurate fragmentation S-curves from blasting or caving operations.

The new tool allows blast engineers and surveyors to quickly assess the condition of blasted rock, ideally before the material heads to the crushing process. Oversize rocks can be isolated for more effective haulage and processing.

"A simple scan > analyse > report workflow provides a table where rocks outside of spec can be identified and dealt with before the material gets anywhere near the plant," adds Richards. "A unique feature allows editing rocks or fines in the 3D view and characterising any that are not correctly defined."

Visual and tabular reporting is understandable at a glance so rock can be fed with optimal dimensions for crushing.

Fragmentation analysis on 3D data is considerably more powerful and intuitive than methods that rely on analysing imagery. For operations with Maptek BlastLogic, the digital output can be used to compare actual to predictive fragmentation for continuous improvement of drill & blast processes.

Fragmentation Analysis is a paid add-on. Many other new and enhanced features will be delivered to existing customers for free in their PointStudio 2020 update.

One of the new options allows field surveyors using R3 laser scanners to complete scan registration immediately after scanning has finished.

"We have made it possible for fully registered scans to be imported from the scanner controller tablet into PointStudio," says Richards. "Subsequent scans can then be registered with a single click as they are acquired." ■

Multotec's online training gains popularity among engineers

Restrictions on personal movement due to the COVID-19 lockdown have not stopped the learning process in the mining industry with Multotec seeing unprecedented numbers attending its online training in recent months.

For Wilna Hoffmann, business development manager at Multotec Process Equipment, the lockdown has, in fact, provided an unexpected opportunity to reach even more engineers with valuable technical content and insights.

"I started to adapt our training from conventional to online methods very early in the initial lockdown," says Hoffmann. "In a series of presentations to a large mining company, we had 74 engineers attending our online session. They spent in total about 556 manhours with specialists from Multotec."

Multotec's training initiatives are nothing new; the company has conducted over 1 305 training interventions (2 054 manhours) at Design Houses over the past seven years. The difference, she says, has been the proactive harnessing of the power of digital communication platforms. This delivery channel is also much more efficient, requiring less logistical planning and taking much less time out of the delegates' busy work schedules.

"The result is that our reach has been dramatically increased," she says. "In fact, we estimate that in the first four months of lockdown, we have reached as many engineers as we did over the past seven years."

In addition to the dedicated mining house training, over 2 380 hours of training was provided from April to July this year to more than 415 qualified engineers from about 74 design houses and engineering consultancies. The virtual platforms have also added a new, international dimension to the learning, with engineers attending from as far afield as Australia, Canada, the United Kingdom and India.

Hoffmann highlights that the sessions are not sales-focused, but rather concentrate on the fundamentals of equipment design and application, including formulas, models, efficiencies and losses.

"Sharing insights on the theory and physics of mineral processes – essentially university-level content – makes the training directly relevant to qualified and experienced engineers," says Hoffmann. As a metallurgist herself, with many years' experience in a design house environment, she says that none of the training would be possible without the collaboration of her specialist colleagues at Multotec. ■

Coal mines need lower costs, raised productivity

Kwatani partners with majors and junior miners alike, offering two distinct equipment ranges tailored to each segment's specific requirements and capital budget. With over 44 years of local and global experience, this vibrating screen specialist has a strong product footprint.

"Coal prices are low and any recovery in the short term is very unlikely," says Frengelina Mabotja, senior metallurgist and capital sales engineer at vibrating screen specialist Kwatani. "Going forward, as coal seams with more overburden have to be mined, surface mining will potentially become much more expensive."

Adding to the coal industry's challenges is the unwillingness of many lenders to fund new coal plants and expansions, leading to great uncertainty. The result is a strong drive for ongoing cost reduction and increased productivity across both majors and juniors in the sector, says Mabotja.

"While most of SA's coal supply is produced by a handful of major mining houses, Eskom has in recent years sought to develop the junior market with black ownership," she says. "Kwatani partners with majors and junior miners alike, offering two distinct equipment ranges tailored to each segment's specific requirements and capital budget."

With its 44 years of local and global experience, Kwatani provides customised, cost effective processing solutions for mines' specific needs. She notes that vibrating equipment requirements can vary significantly between a smaller-scale junior miner and a long-life major. This is in terms of the equipment's size, operating lifespan, tonnage throughput, efficiency and yield requirements.

"Apart from the initial capital expenditure, mines' process equipment has an enormous influence on their production efficiency, tonnage and operating cost," she says. "Our long-lasting, robust vibrating screen and feeders are designed for continuous tonnage throughput and high efficiency. This reduces the processing cost per ton and the overall cost of the machine over its lifetime."

For the large mine segment, Kwatani's designs have included high capacity and performance screens such as its 4,3 m wide banana screen. Its brute force grizzly feeders for run-of-mine (ROM) operations are capable of sizing and feeding material at up to 2 000 tph, even from high drop-heights.

"Our engineering team has optimised the structural integrity, weight distribution and lifespan of this equipment," says Mabotja. "We have many of our 4.3m wide banana screens operating at the largest opencast coal complex in the world."

At the same time, Kwatani supplies screening equipment below 2,4 m wide for smaller-scale, modular plants processing up to 250 tph. These units are tailored to budget and provided within short delivery times. ■

Kwatani designs and manufactures robust grizzly coal screens.

New Cat D9 GC dozer delivers reliable performance

The new Cat D9 GC dozer is built for best-in-class owning and operating costs while delivering reliable performance and straightforward operation and maintenance. Sharing the same frame as the Cat D9 dozer, the new Cat D9 GC continues the series legacy with its superior durability. The frame, powertrain and major components are designed to be rebuilt to give the dozer a cost-effective second life with like-new performance.

Application-specific configurations and multiple blade attachments deliver efficient dozing performance in a range of mining, construction and industrial applications such as production dozing, ripping overburden, site maintenance, fleet support, bulk materials handling and land reclamation. Special configurations are available for desert, arctic and steel mill applications.

The D9 GC replaces the D9R and continues to feature the proven Cat 3408C engine, producing 308 kW in the new dozer. The engine now offers longer fuel and air cleaner life, a single high-efficiency oil filter for lower maintenance costs, and a new, robust self-tensioner. The D9 GC powertrain incorporates the Cat three-speed planetary powershift transmission and torque divider with free-wheel stator, which puts more power to the ground and saves fuel.

Cat D9 GC dozer dozing down steep slope.

Delivering more tractive effort to push through tough cuts, Caterpillar's elevated sprocket and suspended undercarriage isolates the final drives, axles and steering components from harsh impacts to increase machine longevity. The suspended undercarriage reduces shock loads transferred to the undercarriage by up to 50%, resulting in a smoother, more comfortable ride for the operator.

The D9 GC offers an isolation-mounted operator platform with ROPS and FOPS for operator safety and comfort. The Cat Comfort Series seat is fully adjustable with thick seat and back cushions to improve operator comfort and support. Simple hand controls combine steering clutch disengagement and brake application for each track to deliver straightforward operation. A notched fuel tank and narrow ripper carriage deliver exceptional visibility of the front and rear work areas to enhance operating safety.

The new D9 GC has many of the same components, parts and systems of the D9R dozer, offering a familiar design for service technicians. Both left and right equaliser bar pin bearings and pins are conveniently lubricated from a remote lubrication point that is easy to access. Daily powertrain oil check and sampling ports are conveniently accessed from the service platform for added safety. ■

IMDEX technology wins mining innovation award

Breakthrough drill and blast technology being developed by leading global mining-tech company IMDEX has won a Queensland mining award.

IMDEX Blast DOGTM, being developed in collaboration with Universal Field Robots and tested at Anglo American's Dawson coal mine in Queensland won the 2020 Queensland Mining Awards innovation category.

IMDEX Blast DOG is a semi-autonomously deployed system for logging material properties and blast hole characteristics at high spatial density across the bench and mine and is commodity agnostic.

No other technology has the capacity to produce the same data and provide as large an impact on downstream processes including enhancing productivity.

The judges said Universal Field Robots and IMDEX conquered the challenge of logging blast holes, while removing operators from harm's way.

IMDEX CEO Paul House says the company was honoured to be nominated. "To be the winner among such esteemed competition is a testament to the team and our collaboration partners, Universal Field Robots, Anglo American, Teck Resources Limited and Orica supported by METS Ignited."

"IMDEX has a passion to provide the mining industry with purpose-built solutions. IMDEX Blast DOG is no exception and we are investing heavily in solutions that provide significant benefit to our customers."

The IMDEX Blast DOG solution moved from concept to prototype in just four months which provided the platform and justification to develop a commercial version.

The innovation category was hotly debated, with judges looking at all five finalists as addressing the industry's big issues.

Judge Sharna Glover said IMDEX Blast DOG was "a great innovation that shows the power of partnering. A robotics platform that is able to be exported makes a very commendable entry". ■

Grindex Maxi for Steelpoort platinum mine

The quick reaction of Integrated Pump Technology saw the company come to the rescue of a platinum mining customer who urgently needed to dewater their decline shaft.

Alfred Kelsey, key account manager at Integrated Pump Technology, explains that the company, as the official Grindex pump distributor for southern Africa, maintains a comprehensive stockholding of dewatering pumps. This, he says, is key to allowing its extensive distributor network to react quickly to customer needs.

"The strength of our stockholding allowed us to effect a same day delivery of two Grindex Maxi pumps to our distributor in Steelpoort, Babata Pumps, allowing them to provide an efficient service to their end-customer, a platinum mine in that area."

The two Grindex Maxi pumps have been installed in the mine's decline shaft to ensure effective dewatering. The pumps are capable of achieving a flow rate of 30 litres per second at a head of 80 m and being of robust construction are well suited to this type of heavy-duty drainage application.

Equipped with a SMART motor protector and an air valve that enables continuous unattended operation, the Grindex Maxi pumps have found favour in the mining environment as this feature allows the pumps to run dry without operational interruptions.

The hydraulic design facilitates re-adjustment of the impeller-suction-cover-clearance allowing performance to be regained after wear. Kelsey says this is a significant feature for customers assisting in keeping life cycle costs low. Further, reliable operation is, as always, one of the most important considerations when it comes to drainage and dewatering applications, and the Grindex Maxi pump is simple and easy to maintain.

Kelsey says that installation of the pump was done by the end-customer and Babata Pump will provide any support required.

Integrated Pump Technology is the sole importer and principal distributor for the Grindex range of dewatering, slurry and sludge pumps for southern Africa. A network of nine strategically located, specialised pump distributors supported by dedicated account managers ensures effective service and customer support.

Headquartered in Johannesburg, the company operates a comprehensive service facility which supports this distribution structure. The facility includes a state-of-the-art automated pump test facility. ■

All pumps are tested to ensure operational performance prior to being dispatched to customers.

Mineral Prospectivity Mapping launched

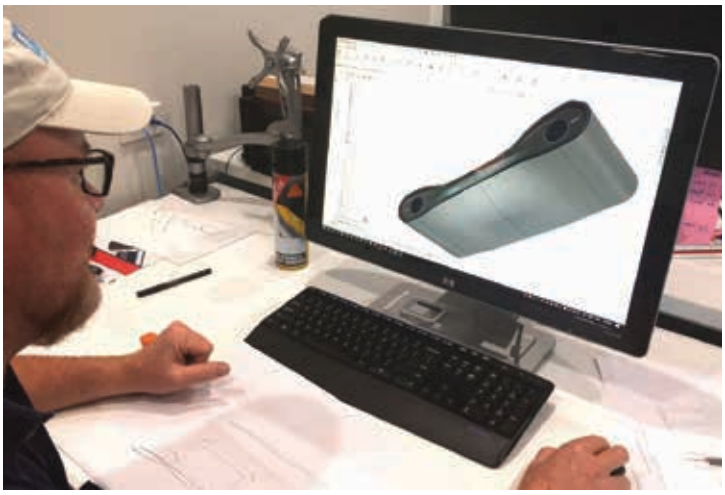
Bell Geospace and Botswana Geoscience Institute (BGI) have announced the launch of a new Mineral Prospectivity Mapping project. The announcement was formally made at the Africa Mining Summit 2020 held on September 15 – 16, 2020. The parties, delegates and stakeholders at the summit participated virtually through internet communications platforms.

Bell Geospace is one of the global leaders in gravity gradiometry and is in the acquisition, processing and interpretation of high quality airborne Full Tensor Gravity Gradiometry (FTG) data for exploration. Whereas BGI is involved in research in the field of geosciences, providing specialised geoscientific services and promoting the search for, and exploration of any minerals in Botswana. The institute is a custodian of all geoscience data/information and advice in all matters of geoscience and geohazards in Botswana. ■

Orica recognised in AFR's most innovative company awards

Orica has been awarded for its revolutionary fragmentation measurement technology FRAGTrack and entrenched culture of innovation, taking out the #2 spot in the Australian Financial Review's Most Innovative Companies List 2020 under the Agriculture, Mining & Utilities Service sector.

The prestigious annual list published by The Australian Financial Review (AFR) and Boss Magazine is based on a rigorous assessment process, led by a panel of industry experts and innovation consultancy Inventium. From a pool of over 600 nominated organisations across Australia and New Zealand, Orica's FRAGTrack has been recognised as a pioneering technology in the Agriculture, Mining & Utilities Service industry, delivering significant value for customers.



The detailed design process of FRAGTrack.

FRAGTrack, Orica's automated fragmentation measurement device, accurately and reliably measures rock size and fragmentation following the blasting stage in mining and quarrying. While traditional methods are prone to operator bias and cannot generally operate in harsher mining environments, FRAGTrack captures, analyses and reports real-time data digitally. Designed in collaboration with Design Anthology, Newie Ventures and Your Engineer Mechanical Engineering, the technology can be installed and upgraded remotely – creating safer, more accurate mining outcomes.

When judging the innovation, the AFR industry panel considered three key elements – how valuable the problem is that the innovation is solving, the quality and uniqueness of the solution, and the level of impact that the innovation has had. However, the organisation must also be able to demonstrate a truly innovative culture and a sustainable and repeatable approach to innovation across the business.

Celebrating the achievement, Orica's chief commercial and technology officer Angus Melbourne says: "Innovation underpins everything we do at Orica, and it's our pioneering spirit, amazing people and commitment to working collaboratively with our customers that allows us to continue to deliver products and technologies that are shaping the future of mining.

"Customer collaboration is key to our innovation process. By understanding our customer's challenges and sharing their goals and aspirations, we can deliver better outcomes on site today, and use these insights to create new technologies that will deliver value tomorrow." ■

New Cat 785 advances efficiency and productivity

The Next Generation Cat 785 mining truck enhances operator safety and performance, provides more intuitive and predictable operation, delivers faster and easier access to data, and streamlines maintenance – to boost efficiency and lower costs. Leveraging the Next Generation concept, the new 150-t class mining truck features an expandable technology platform, so it is future-ready.

The Cat Next Gen 785 mining truck being loaded by Cat 994 wheel loader.

"The 785 was Caterpillar's first large mining truck, introduced in 1985. It's fitting that the first Next Generation Cat mining truck is the new 785 – designed to enable mining operations to optimise productivity today and tomorrow," says David Rea, GM of Cat Large Mining Trucks. "Cat Next Generation mining trucks feature a flexible technology platform and optional configurations that help each mining operation meet their goals."

Productive hauling begins with the operator, who sits in the new state-of-the-art cab, designed for efficiency and equipped with features that automate functions. The Next Generation 785 offers a new integrated speed coaching feature to give feedback on how to operate the truck most productively. Truck responsiveness and controllability are enhanced through multiple upgrades such as the anti-lock brake system, dynamic stability control, enhanced traction control, machine speed limiting, hill start assist with anti-rollback, and cruise control. Additionally, new Auto Hoist control reduces dumping time and unburdens the operator.

The improved payload monitoring system offers more accurate measurement and dipper counts as well as enhanced overload detection and carryback calculation and reporting – to inform operators and production managers. The 360-degree surround view camera delivers a full view of the working area to the operator.

The Next Gen 785 is powered by the proven Cat 3512E engine offering selectable power options, allowing operations to match the speed of the fleet or to speed up cycle times. Two tyre options, 33R51 and 36R51 are available, to enable mines to optimise payload capacity. The larger tyres allow a nominal payload of 142 tonnes. ■

3D scanning paves way to quality chute solutions

Transfer point specialist Weba Chute Systems & Solutions leverages the power of three-dimensional (3D) scanning technology to allow the company to generate highly accurate 3D models of on-site conditions.

"The accuracy of 3D scanning means that we can rapidly gather detailed measurements of large infrastructure on a customer's site," says the company's technical director, Alwin Nienaber. "This data allows us to generate highly accurate 3D models of on-site conditions, which refines the accuracy of the equipment and componentry we develop and install in that environment."

Greater accuracy keeps rework costs in design and manufacturing to a minimum, and reduces any downtime during the installation phase. Detailed 3D scan data allows all elements of the existing infrastructure to be considered during the preliminary design stage, so that the customer is assured of a reliable costing in a project's early feasibility stages.

Nienaber highlights that there may be numerous deformations or undocumented alterations in the customer's existing infrastructure that could complicate the design and execution of a project. Manual measurement of dimensions may also not deliver the levels of accuracy required.

"Especially when we are replacing transfer points or chutes, we can significantly de-risk the process with our capacity to reverse-engineer the solution within the existing constraints," he says. "The scanned data is superimposed on our design intent, alerting us to interference that will disrupt smooth installation."

One of the key advantages of 3D scanning, therefore, is that it contributes to the level of certainty that Weba Chute Systems & Solutions can achieve in the design and implementation of projects. The precision and portability of modern laser scanners have made them invaluable in designing, building and extending technical facilities.

"Our decades of experience in the mining environment give us the capacity to fully leverage the value of 3D scanning to the benefit of our customers," he says. "This means accurate costing and seamless project roll-out – on time and on budget."

This is increasingly important as mines drive productivity and prioritise uptime, with many retrofit or maintenance projects required to be conducted during the strict shutdown periods on mines.

"Our engineering know-how is central to integrating 3D scanning into our design and manufacturing processes, improving our planning and scheduling through more precise data," says Nienaber. "We translate this capacity into reduced project risk and lower contingency costs – allowing us to work efficiently at a low margin of error even under the time constraints in these projects."

This continuous investment in systems and workflow processes is a pillar of the company's status as a market leader, with best practice at the heart of its operational philosophy. ■

Detailed 3D scan data allows all elements of the existing infrastructure to be considered.

Mining industry shows a growing interest in automation

As self-driving vehicles continue to mature, and the Internet of Things (IoT) and wireless connectivity become more widespread, the mining industry has shown a growing interest in automating parts of its mining fleet and processes. By *Eric Croeser*, Industry X MD for Accenture in Africa.

Eric Croeser, Industry X MD for Accenture in Africa.

Today, a number of companies have fleets of autonomous trucks, drills, trains and loaders at mine sites, or are piloting the use of these vehicles. There is also a growing need to automate parts of the decision making process across the mining value chain, ensuring decisions are being made "in-time" – leading to vast improvements in efficiencies and cost.

These efforts are a great leap forward from traditional practices, but they are just scratching the surface of how autonomous systems can be used in mining. With constantly advancing technology – and especially the increase in the intelligence of systems – autonomous operations have the potential to significantly increase efficiency and productivity. More importantly, they will provide miners with an opportunity to meet growing demands for environmental and social goals, including increased safety and sustainability.

To reap those far-reaching benefits, miners should look beyond automated vehicles and bring autonomy to a range of mining activities, thinking of autonomy as an embedded, fundamental capability. Doing so will make mining more productive, safe and sustainable – and, ultimately, more competitive.

The building blocks of autonomy

Bringing more autonomy to mining will require technologies ranging from the IoT, automated decision to extensive connectivity. But the key to taking autonomy to the next level will be the increasing use of intelligence in systems, in the form of artificial intelligence (AI); machine learning; robotic process automation; descriptive, diagnostic, predictive and prescriptive analytics; and scenario modelling.

These technologies allow systems to understand the data flowing through operations, enable situational awareness, develop near-real-time insights into operations and determine what options to consider. They can be used to support human operators, managers, leadership and, ultimately, guide automated decision-making and responses to changing condition – a capability at the heart of truly autonomous operations.

As companies explore increased autonomy, there are several factors to keep in mind – factors that will be instrumental to success. Companies need to:

Focus on Value: The autonomous path to value will be as different as each business. Having clear visibility of the key value drivers is critical to avoiding false starts and matching stakeholder expectations.

Address the foundation: To take advantage of intelligent technologies, companies should ensure their IT architectures are ready to support communications between various systems and types of equipment. They should also assess the interoperability of systems, which is key to integrating operations across the mine and the value chain. A lack of standardised technology and tools in the industry can make this a challenge, which means companies will have to work closely with ecosystem partners and OEMs to weave systems together. Finally, companies need to assess cyber security requirements, because a breach of autonomous systems could mean losing control of systems and processes.

Ensure data readiness: Being able to use data from various sources is critical to AI and analytics-based insights and decision-making. Companies need to consider their data-handling capabilities to capture and manage ever-growing volumes of data, while ensuring the data used to drive decision-making is accurate and trusted. Data will need to be clean, consistent and refined into datasets that can be analysed readily. And data flow will need to change, from being linear and controlled by various disciplines and segments of the value chain, to a multidirectional flow across disciplines. Overall, ensuring data readiness is a key prerequisite – without it, autonomous capabilities will be limited, at best.

Manage the change: As a rule, technology changes faster than people, and the shift to autonomy could leave employees behind if not carefully managed. Mining companies can help their people feel more comfortable with new approaches by communicating clearly, building trust and preparing them to succeed in the new environment. Companies can also apply these concepts to local communities, to manage fears about the potential impact of autonomous operations on employment and safety – and to help maintain the license to operate granted by the community.

Evolving toward autonomy

The move to autonomy will require significant change. Miners should prepare a vision and roadmap for implementing autonomous operations. This is not to say the change needs to be done all at once, or that all operations need to become autonomous. Instead, miners can move forward in gradual, targeted steps. ■

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