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With automation technology transforming the mining industry and empowering drilling operations, the updated SmartROC MK II – the latest surface drill rig from Epiroc – makes evolutionary strides with the automation-ready platform and an array of smart features as its foundation. See story on page 8.

COMMENT

The future is critical metals

Munesu Shoko

Critical metals are vital to the functionality of various emerging technologies, yet they have a potentially unstable supply globally. 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, mainly in the renewable energy and e-mobility spaces.

The global energy sector, for example, is expected to experience a gradual shift towards renewable energy sources in the coming decades. New technologies needed to enable this shift are in many cases dependent on various critical metals. Meanwhile, electric vehicles (EVs), like many low carbon technologies, use a number of different exotic metals in their design.

To provide context, leading research company GlobalData forecasts that the European Union (EU) alone will need 60 times more lithium for 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. Meanwhile, the EU demand for rare earths, used in high tech devices and military applications, is predicted to increase tenfold by 2050.

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. Four new additions to the list are bauxite, lithium, titanium and strontium.

These metals are considered 'critical' in that they are necessary to the development of future economic needs, and yet their availability in sufficient quantities for future market demands has been questioned. Significantly, the COVID-19 pandemic has also highlighted how 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.

It is however encouraging to see substantial investment being channelled into critical metals to ensure a secure and sustainable supply in line with projected future demand. A case in point is LSE newly-listed investment company Critical Metals Plc, which is targeting acquisitions of brownfield mining opportunities in the strategic metals sector in Africa.

In a recent interview with CEO Russell Fryer, he told me that the company seeks to identify 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.

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 security of supply is seen as a strategic necessity.

Elsewhere, Pensana Rare Earths is making significant progress to bring its Longonjo project online. The Angolan-based project will be the first major rare earth mine in over a decade. With this project, the company seeks to establish a sustainable magnet metal supply chain to meet the burgeoning demand from the EV and offshore wind industries.

A 'green' technology future has the potential to be materially intensive. Countries with capacity and infrastructure to supply minerals and metals required for cleaner technologies have a unique opportunity to grow their economies if they develop their mining sectors in a sustainable way. Southern Africa will definitely play a major role in supplying platinum, manganese, bauxite and chromium, among others.

With better planning, investors can also take advantage of the increased demand to foster growth and development. Critical Metals Plc, for example, believes that Africa, especially southern Africa, offers great opportunities. The company is targeting countries such as Botswana, Namibia, South Africa, Mozambique, the Democratic Republic of Congo, Zambia and Zimbabwe.

I believe there is need for a richer dialogue around the opportunities and challenges presented by a low-carbon future. This should be designed to support policymakers and other stakeholders to better understand the issues involved and identify areas of common interest. ■

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LEVEL 2
BBBEE

Buoyant take on Northern Cape's mining potential

Joseph Mainama, principal mining engineer at SRK Consulting.

As the prospects for South Africa's minerals sector start to brighten, there was considerable mention of the Northern Cape's potential at the recent Joburg Indaba mining conference.

"It was encouraging to hear a similar message from major mining companies and juniors alike – that there is still considerable scope for exploration and mineral development in the Northern Cape province," says Joseph Mainama, principal mining engineer at SRK Consulting.

Mainama notes that Anglo American CEO Mark Cutifani mentioned in his conference address that the Northern Cape was considered to be under-explored, and that his company was interested in exploration opportunities for base metals like copper – within South Africa and in the rest of Africa.

"Kumba Iron Ore's executive head of technical and projects, Glen Mc Gavigan, also spoke of the Northern Cape being under-explored in the Kolomela and Sishen areas," says Mainama. At the same time, Mc Gavigan pointed to the Northern Cape's potential for solar-generated electricity, as the region is the second most intense solar area in the world after the Nevada desert."

This presents opportunities for mines to generate renewable energy for their operations, commented Mainama, an important step in addressing power issues that discourage mining investment.

"At the conference, Australia-listed Orion Minerals reported good progress on its brownfields Prieska copper-zinc project in the Northern Cape," he says. "Managing director Errol Smart was also upbeat about government's role in supporting exploration in the province, and he expected to see much more exploration there in the near future – which could bring a range of economic benefits even in the short-term."

Mainama notes similar positive messages from Vedanta Zinc International's business head, Laxman Shekhawat, who spoke about his company's plans for a smelter in the Northern Cape. There was also encouraging news from a demand perspective. André Joubert, chief executive of African Rainbow Minerals' ferrous division, highlighted a current under-supply in the iron ore market – putting pressure on miners to find replacement ore from Northern Cape mines.

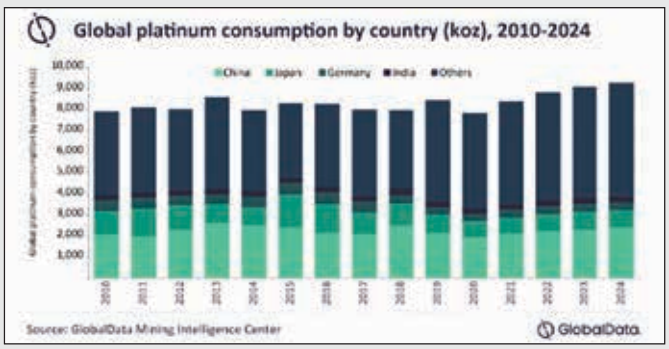
"Presentations like these suggest that the province certainly has much to offer in terms of mineral investigation," says Mainama. "In his talk on the area's geological potential, Council for Geosciences CEO Mosa Mabuza highlighted preliminary observations for potential in nickel, chrome, cobalt, pegmatite and lithium."

He notes that infrastructure development remains a vital imperative for mineral development in the region, especially rail capacity for bulk minerals. The more efficient and cost-effective the infrastructure, the lower the grade of deposit that could be viably exploited. ■

COVID-19 to reduce global platinum demand by 7,2% in 2020

Global platinum demand is set to fall by 7,2% in 2020, with the COVID-19 pandemic driving significantly lower demand from the auto and jewellery sectors. Typically these two sectors would account for 34% and 24% of total demand, respectively, with the remainder for industrial uses and investment, according to GlobalData, a leading data and analytics company.

Ankita Awasthi, senior mining analyst at GlobalData, comments: "China and Japan are the top two platinum-consuming nations and together account for 35,5% of global demand. Overall, demand from China and Japan is expected to fall by 9,2% and 11,8%, respectively. In China, the metal demand for jewellery, industrial/investment, automotive and other uses is expected to contract by 14%, 4,6% and 3,9%, respectively. Meanwhile in Japan, metal demand from these segments is expected to decline by 14% for autocatalysts, 12,1% for jewellery and 7,5% for industrial uses."



Global platinum market to decline in 2020.

While the COVID-19 pandemic is significantly impacting demand for platinum from the auto sector, over the coming years the implementation of stricter emission standards is expected to see demand recover. China has the world's largest automobile industry and consumes 7,1% of the metal for autocatalysts. The pandemic led to the closure of industrial belts and a lockdown of Chinese cities during March 2020, resulting in a 79,1% fall in the country's automotive sales in February, and a 43,3% fall in March. However, with the easing of lockdowns and opening of the economy, sales grew by 4,4% in April, 14,5% in May and 11,6% in June.

China also began implementing tighter emission 6 standards across different cities from mid-2019 and by April 2020, 16 major Chinese regions had completed implementing the China 6 standard. Along with the passenger car substitution demand, increased demand from heavy transport diesel engine vehicles to meet the strict China 6 norms is expected to push consumption growth in the coming years.

Awasthi adds: "While the recent decision to defer further implementation of the China 6 standards across the country by six months to January 2021 will delay consumption growth temporarily, over 2020-2024, platinum demand from the automobile industry is expected to grow by a compound annual growth rate (CAGR) of 3,8% globally and by 9,5% in China."

"Between 2020 and 2024, overall platinum demand is expected to increase by a CAGR of 4,3%, supported also by higher metal demand from industrial/investment and jewellery uses, which are expected to grow at respective CAGRs of 3,9% and 5,5% over the period." ■

New drill programme at Sanankoro

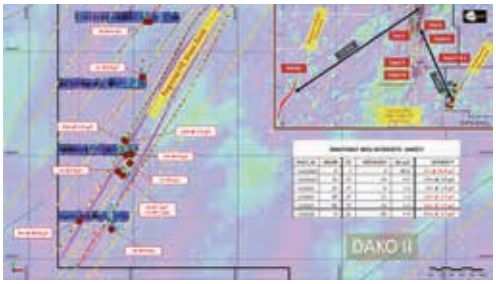
Cora Gold Limited, the West African focused gold company, has commenced a new field programme at its Sanankoro Gold Project in the Yanfolila Gold Belt, Southern Mali. The initial focus of the work will be following up the new drill discovery at Dako II.

Bert Monro, CEO, comments: "In July 2020, we reported the discovery of a new 1,5 km long gold discovery at Dako II, 7 km south of existing Sanankoro resources at Zone A. This was significant for a number of reasons, not least that it opens up the Fie Shear Zone as a new regional-scale, generative resource corridor trending +4 km north-eastward from existing intercepts, into the Bokoro and Bokoro East permits. The emergence of this new Fie corridor opens up the eastern side of the Sanankoro setting to the discovery of new truckable resources.

"We remain focused on delivering a Definitive Feasibility Study on Sanankoro before the end of 2021 having already signed a US$21-million term sheet on this basis earlier in the year. Drilling out a larger resource at Sanankoro is the key focus of our strategy as we target the delivery of a new resource statement in 2021. We look forward to updating shareholders on the results when we receive them as well as further drilling programmes across Sanankoro."

Sanankoro is made up of five contiguous permits encompassing 388 km^2. Previous work at the project has identified gold oxide mineralisation to 100 m depth and high-grade sulphide mineralisation at depth; SRK's defined exploration target for the project is 1 – 2 Moz gold to a depth of 100 m.

A maiden Scoping Study was delivered in Q1 2020 and showed Sanankoro's potential to be a highly profitable stand-alone oxide mine, delivering a high IRR and short capex payback, with an annual average free cash flow of US$23,6-million at a US$1 500 gold price. The company's strategy is to drill out more oxide resources to, in time, extend the mine life well beyond the maiden Scoping Study plan.



The Regional FSZ sits 7 km to the southwest of the Zone A deposit on the Sanankoro Permit and strike NE-SW.

Accordingly, field teams and drill contractors are currently mobilising to site to commence a new initial 18-hole 1 520 m AC drill programme. The initial focus of this work will be following up the new discovery at Dako II, where a reconnaissance drill programme covered approximately 1 500 m of the southern strike length of the target zone. A combination of artisanal workings and historical soil and termite sampling suggests the potential total length of the zone could extend to over 4 000 m. ■

Uis Tin Mine on track to achieve nameplate capacity by end 2020

AfriTin Mining Limited (AIM: ATM) remains on track to achieve nameplate production of 60 tonnes a month of tin concentrate by the end of 2020 at its flagship Uis Tin Mine in Namibia.

The company continues with the Stage I of Phase 1 production ramp-up of its pilot mining and processing facility and produced 48,2 tonnes of tin concentrate (containing 32,2 tonnes of tin metal) over the month of October, a 24% improvement on the previous month.

The production level achieved in October represents approximately 90% of the Stage I target on the basis of tin contained in concentrate. The company is targeting the processing of 45 000 tonnes of ore per month, to produce 60 tonnes of tin concentrate (36 tonnes of tin metal) per month for Stage I of Phase 1.

Tin concentrate production for the year to date totals 237 tonnes. Plant availability and utilisation have increased steadily which, combined with improved plant processing rates, yielded increased plant production. The company remains on track to achieve nameplate production of 60 tonnes a month of tin concentrate by the end of 2020.

Meanwhile, no confirmed COVID-19 cases have been recorded at the Uis Tin Mine to date, as strict mitigation measures remain in place to safeguard the workforce.

Anthony Viljoen, CEO of AfriTin Mining Limited, comments: "I am delighted to report, once again, further positive increases in the Uis Tin Mine's month-on-month plant performance as we enter the final stage of our Phase 1 Stage I production ramp-up. Pleasingly, the production of tin concentrate has increased to 48,2 tonnes for October 2020, which represents a 24% increase from September 2020.

"More importantly this means we remain on track to achieve nameplate production of 60 tonnes a month of tin concentrate by the end of the calendar year. As stated previously, once nameplate capacity is realised, the Company will progress towards Stage II, expanding its production levels even further. AfriTin continues to remain well-positioned to take advantage of the improving tin market fundamentals, as it looks to achieve its vision of becoming a large-scale tin producer in Namibia." ■

Progress at Keras Resources' Nayéga Manganese project

Keras Resources plc, the AIM listed mineral resource company, continues to make progress at the Nayéga manganese project in northern Togo, West Africa. During September 2020, management had a successful trip to Togo where they met high level government officials and various service providers; another trip is planned in early November 2020.

Additionally, they visited the Nayéga site to dry-test the 6 500 t per month bulk sample processing plant and associated water reticulation system, which underpinned the project's production-ready status.

The company recommenced activities on 7 September 2020 at Nayéga, focusing on exploration at the Ogaro prospect, which is located 5 km east-southeast of the main Nayéga deposit and 4 km south of the previously explored T27 deposit. 25 of the planned 50 pits are complete with the remaining 25 pits on track to be completed by the end of October 2020; channel samples will be submitted thereafter to Intertek Laboratory in Accra, Ghana, to determine grade and particle size distribution per geological horizon.

Bulk sample process at Nayéga.

Keras Resources CEO, Russell Lamming says: "Graham Stacey and I spent three weeks at Nayéga in September meeting key government officials, government advisors and various contractors and service providers to ensure that as we progress towards the conclusion of the project permitting process we are production ready. The Nayéga site visit undertaken during the trip, where both the processing plant and ancillary services were successfully dry-tested, is testament to the quality and drive of our in-country team, which has achieved this despite the severe restrictions necessitated by the COVID-19 pandemic.

"Our recent trip to Togo was extremely valuable from both an operational and corporate perspective and we look forward to advancing the appropriate discussions with the new Togolese Government following the recent appointment of Victoire Tomegah Dogbé as the new Prime Minister and Mila Aziable as the new Minister of Energy and Mines." ■

Implats delivers a strong start to FY2021

Implats has provided its first quarter production report for the period 1 July 2020 to 30 September 2020. Key highlights include zero fatalities and a 7% and 26% improvement in the reported lost-time injury and all injury frequency rates, respectively.

An 11% increase in total 6E concentrate volumes to 859 000 ounces, with an 11% gain in managed volumes to 623 000 ounces, a 23% increase in JV production to 142 000 ounces and a 6% decline in third-party receipts to 94 000 ounces, was realised.

A 58% improvement in gross 6E refined and saleable production volumes to 870 000 ounces on improved availability at group processing assets and the inclusion of contributions from Impala Canada was achieved.

Implats' CEO Nico Muller comments: "Implats has delivered a strong start to FY2021 with pleasing improvements in safety and a number of notable operational gains. This was achieved despite the continuing challenges presented by the COVID-19 pandemic and is testament to the operational resilience our team has worked so hard to develop and entrench.

"Production losses attributable to the pandemic in the quarter were minimal and our health, safety and operating protocols have proved effective in mitigating the impact of the virus on our operations, employees, host communities and customers. PGM pricing remains robust and we continue to experience strong demand for our primary products. We are well positioned to continue delivering exceptional value to all our stakeholders in the year ahead." ■

Twiga pays maiden dividend

Twiga Minerals Corporation, the joint venture between the Tanzanian government and Barrick Gold Corporation (NYSE:GOLD)(TSX:ABX), has paid a maiden interim cash dividend of US$250-million in line with Barrick's commitment to generate value for all stakeholders through the 50/50 partnership.

Since Barrick took over the former Acacia Mining's assets in Tanzania just over a year ago, it has paid approximately US$205-million to the government in taxes, royalties and dividends in addition to the first payment tranche under the two parties' agreement to settle pre-Barrick disputes. ■

Pre-drill rig mobilisation underway at Haneti

Katoro Gold plc (AIM: KAT), the AIM listed gold and nickel exploration and development company, has given an update with respect to the planned drilling programme targeting the discovery of nickel and platinum group metals (PGM) at the Haneti Project in Tanzania.

Katoro Gold PLC holds a 65% ownership interest in Haneti with 35% held by Power Metal Resources PLC (POW).

Pre-drill rig mobilisation is now underway to finalise preparations for the maiden drilling programme targeting nickel sulphide and PGM mineralisation. The technical team mobilising to site will shortly liaise with the Tanzania Ministry of Minerals and regional/local government, prepare equipment for mobilisation and arrange ground operational staffing.

The drill contractor availability has now been confirmed and the key objective is for mobilisation of the drilling rig and field team to site as soon as possible, subject to applicable COVID-19 related restrictions.

Louis Coetzee, chairman of Katoro Gold.

Louis Coetzee, chairman of Katoro Gold plc, comments: "I am very pleased that we are able to announce the mobilisation of the first exploration drilling program at Haneti. We believe that Haneti holds significant potential to host a world class nickel deposit within a previously identified 80km long ultramafic complex. Previous exploration work in this complex delivered nickel values as high as 13,6% and 2,33 g/t combined platinum and palladium." ■

Progress at Pensana's Longonjo project

Pensana Rare Earths Plc (LSE: PRE, ASX: PM8) is making significant progress to bring Longonjo online, said to be the first major rare earth mine in over a decade. With this project, the company also seeks to establish a sustainable magnet metal supply chain to meet the burgeoning demand from the EV and Offshore Wind industries.

Two studies are currently underway, a feasibility study into the production of a mixed rare earth sulphate in Angola, which is being undertaken by a number of internationally recognised consultants in Perth, Western Australia and the recently announced Wood Group study into the establishment of a UK-based processing facility to produce separated rare earth oxides.

The Longonjo mine and concentrator study is well advanced with the capital costs in line with the US$130-million reported in the Preliminary Feasibility study in November 2019.

In March 2020, the scope of the studies was expanded to include the processing of the concentrate to produce a mixed rare earth carbonate (MREC), and in early October a high grade MREC was successfully produced. ■

SmartROC MK II – pushing the boundaries in blast hole drilling

With automation technology transforming the mining industry and empowering drilling operations, the updated SmartROC MK II – the latest surface drill rig from Epiroc – makes evolutionary strides with the automation-ready platform and an array of smart features as its foundation. By *Munesu Shoko*.

Kevin Govender, area sales manager – Surface Division at Epiroc South Africa. (Credit: Munesu Shoko)

Rodney Keogh, product manager – Surface Division at Epiroc South Africa. (Credit: Munesu Shoko)

Photograph courtesy of Epiroc

With an array of smart features, the SmartROC MK II will help customers to decrease their operational costs and boost productivity.

In this changing world where much of the traditional and accepted ways of working are being questioned, Epiroc is convinced that automation technology will solve many of the challenges facing customers.

Against this background – which has been exacerbated by the COVID-19 pandemic – the company has brought to market its SmartROC MK II drill rig range, which comes with an automation-ready platform and an array of smart features. The first three units have arrived in South Africa, with one already operating at a mine in the Northern Cape Province.

The possibility to automate functions and operations that make work safer and more efficient has had a profound effect on the way mining has evolved. Kevin Govender, area sales manager – Surface Division at Epiroc South Africa, tells *Modern Mining* that some mining companies and contractors have generally been reluctant to jump onto the automation bandwagon, with traditional methods still deemed to be producing good results.

Mines have in recent years invested in automation technologies in certain areas and usually on a small scale. Today, however, interest in automation technology – especially on the back of the current COVID-19 situation – has soared as it is largely seen as a very meaningful way to solve many challenges facing contractors and mines, ranging from skilled labour shortages to the continued squeeze on profit margins.

One of the areas where automation technologies have matured is in rock drilling. Epiroc is one of the OEMs that has responded with an extensive portfolio of automation innovations as part of a continuous drive to make rock excavation safer, more efficient and productive. The new SmartROC MK II range of drill rigs is a typical case in point, with machine automation covering the full spectrum of drill rig functionality, from automatic hole navigation to rod handling and control.

The range is chock full of automated and smart systems that make the operator's job lighter, easier and safer, while boosting efficiency and productivity to levels that were previously unattainable. It is ideally suited to a range of applications, including selective and volume mining, as well as exploration, quarrying and construction.

Key feature upgrades

The new SmartROC MK II is a radical upgrade of Epiroc's predecessor range. A major talking point,

Photograph courtesy of Epiroc

The SmartROC MK II series is available in three different beam sizes to carry 5 m, 6 m and 8 m pipes and has the capacity to drill down to a depth of 56 m.

explains Rodney Keogh, product manager – Surface Division at Epiroc South Africa, is the rig's automation-ready platform, which includes the new Auto Feed Fold feature.

"The machine is fully autonomous-capable, commercially available in the coming months. This MK II model that has been deployed to South Africa has, however, been tested in Canada in a fully autonomous application," says Keogh.

Commenting on some of the key feature upgrades, Keogh makes special mention of the Auto Feed Fold. With the press of a button, Auto Feed Fold enables the operator to fold the feed for tramming or position it for drilling. This, he says, also comes in handy when operating one or more drill rigs remotely using Epiroc's BenchREMOTE system.

"The system performs a single action to place the feed into a tramming position or raise it into a position ready for drilling. This saves time and prevents damage to the drill rig cabin during operations and transport. This function is a great help to an operator when running one or more drill rigs remotely," he says.

Another key feature upgrade is the Extra Long Feed (XLF), an 8 m drill rod variant. While the predecessor was available in two feed sizes to carry 5 m and 6 m pipes and the capacity to drill up to a depth of 55,5 m, the SmartROC MK II series is available in three different feed sizes to carry 5 m, 6 m and 8 m pipes respectively and has the capacity to drill down to a depth of 56 m. "When using 8-m pipes, it is possible to drill 16-m production holes with just one rod change," explains Keogh.

The added power of the hammer enables the SmartROC MK II to drill holes from 110 to 229 mm in diameter, compared with the predecessor's capacity to drill holes from 110 to 203 mm. Thanks to the intelligent control of compressor load and engine rpm, the SmartROC MK II series not only helps to optimise the blasting process with improved fragmentation, but also cuts an already low fuel consumption by a further 20% compared to the same size FlexiROC rig model.

The Epiroc BenchREMOTE remote operator station enables operators to control multiple SmartROC surface drill rigs from a distance.

Photograph courtesy of Epiroc

Photographs courtesy of Epiroc

The updated SmartROC series is equipped with an efficient hydraulic system that reduces fuel burn and works with fewer pumps and hoses than the previous versions.

In addition, the rig range offers multi-function joysticks and adjustable speed tramming to further improve operator comfort and make trailer loading safer and easier. “On the old machine we had a couple of levers and press button functions with each controlling one or two functions. With the new machine, there are only two multifunction control joysticks controlling all the functions, allowing us to do away with many press button functions, thus improving machine operability and ultimately productivity,” explains Keogh.

In addition, the updated SmartROC series is equipped with an efficient hydraulic system that reduces fuel burn and works with fewer pumps and hoses than the previous versions. There is a 55% reduction in hydraulic oil volume. “On the predecessor we used to run a 600 ℓ hydraulic oil system, which has been reduced to 270 ℓ on the new SmartROC MK II. This translates into reduced running costs for the machine owner,” adds Keogh.

Smart features

The foundation of the SmartROC MK II, as the name suggests, is based on an array of smart features to deliver high-quality blast holes with accuracy and precision. Autonomous drilling capabilities of the rig employ already existing technologies developed by Epiroc, such as Rod Handling System (RHS), Hole Navigation System (HNS) and Auto Positioning (AutoPOS), among others. Another crucial factor is the scalability of the Rig Control System (RCS).

The Hole Navigation System (HNS), for instance, guides the rig to exactly the right location on the ground and eliminates the need for manual marking on the benches, explains Keogh. “With HNS, the rig automatically locates the position of each hole with pinpoint accuracy and drills it to the correct inclination and depth by automatically adding rods and removing the rods when programmed depth has been drilled. As a result, the pattern needs no adjusting and gets drilled as planned,” he says.

“HNS works with GPS satellite coordinates (with the assistance of a base station) to guide the drill to the exact location for drilling each hole. It ensures that all holes are drilled to the correct depth and at the correct angle according to the drill plan, improving precision and reducing non-drilling time. HNS removes the need to manually mark and survey hole positions, which greatly improves efficiency and safety on the bench,” adds Govender.

Process automation deals with the automation of workflows and covers a range of essential tools for planning drilling operations and collecting performance data. These include Measure While Drilling (MWD), a monitoring tool that enables drillers to collect relative rock hardness data.

Meanwhile, Auto Positioning, which works as semi-automatic aligning of a rig feed, reduces time and improves accuracy of rig positioning. “This smart feature significantly contributes to the quality of drill plan execution and further blasting, resulting in better quality rock fragmentation, which affects all other downstream operations such as load and haul and crushing and screening,” explains Govender.

Rig Remote Access (RRA) enables two-way communication between the drill rig and the RRA server using the site wireless network. The RRA server detects when a drill rig is connected to an access point and then sends and/or retrieves data. “Traditionally, blasting companies designed their blast pattern on their software in the comfort of their offices and then downloaded it onto a memory stick and then drove to site to download the pattern on the drill rig. With RRA, you can design your pattern on your computer and send it to the machine wirelessly and this is feature also available on the MK I variant as well," explains Keogh.

Another smart feature of note is the TeleREMOTE, a product designed to control the company’s SmartROC drill rigs from a remote location. TeleREMOTE has been designed to address the need for increased safety, efficiency and productivity. “The smart product enables the operator to access and run multiple rigs from a control centre located

Key takeaways

- Epiroc South Africa has launched the new SmartROC MK II drill rig range in the local market
- The first units have arrived in South Africa, with one already operating in the field
- The new SmartROC MK II is a radical upgrade of Epiroc’s predecessor range and a major talking point is the rig’s automation-ready platform, which includes the new Auto Feed Fold feature
- The range is chock full of automated and smart systems that make the operator’s job lighter, easier and safer, while boosting efficiency and productivity to levels that were previously unattainable

inside an office environment," explains Keogh.

Remotely operating drills is the fastest growing trend to optimise drilling operations. With that in mind, the Epiroc BenchREMOTE remote operator station enables operators to control multiple SmartROC surface drill rigs from a distance.

The system allows for a single operator to operate up to three drill rigs at once, while allowing them to store information of up to 10 drill rigs. The operator can perform all of the same drilling functions that can be executed in the cab, with communication between the BenchREMOTE and remote rigs ensured via closed and secured wireless networks. The solution also supports geofencing for added safety.

"Our BenchREMOTE system is an example of how automation technology helps reduce safety incidents on site by keeping people out of harm's way. It allows operators to control the rig from up to 100 m line of sight or 40 m on an elevation using the exact same console and without causing any delay to operations," says Govender.

Meanwhile, Epiroc's Certiq telematics solution gathers, compares and communicates vital equipment information through a user-friendly web portal. Certiq also records information for later use in training, assessment and planning. It is a key component in a comprehensive solution to optimise workflow and enhance monitoring and management of the drill rigs.

Changing dynamics

For centuries, mining has been generally regarded as a tough industry. Now that reputation is fast losing relevance as new technologies like automation change the status quo. Govender is of the view that technology is evolving constantly and mining operations are starting to embrace remote operation of equipment.

"This technology results in significant fuel savings, increased productivity and cost savings on consumables. With the touch of a button, an operator can troubleshoot any problems that may arise on the drill rig. Smart operations also take operators out of harm's way by allowing them to operate machines remotely when drilling on dangerous areas of the bench," says Govender.

The SmartROC MK II, he says, proves the power of autonomous machinery and brings the future of mining within reach today. "The SmartROC MK II will help our customers to decrease their operational costs and boost productivity. Automation translates into greater efficiency, and efficiency translates into greater profits," concludes Govender. ■

Bucking the trend

Andries van Heerden, CEO of Afrimat.

In the face of a brutal COVID-19 influenced downturn, Afrimat's Bulk Commodities segment – buoyed by strong iron ore prices and a weaker rand – bucked the downward trend with a solid contribution to the group's interim results for the six months ended 31 August 2020. The recent addition of new iron ore assets, CEO Andries van Heerden tells *Munesu Shoko*, will further strengthen the company's iron ore capacity, while the potential acquisition of a high-quality anthracite asset will enhance the company's commodity diversity, thus positioning Afrimat as a serious junior miner in the bulk commodities sector.

What started out as a simple construction materials business has in recent years become more sophisticated with the addition of industrial minerals and iron ore to the stable. Following its establishment after the 2016 acquisition of the Demaneng iron ore mine – previously known as Diro Manganese Proprietary Limited and Diro Iron Ore Proprietary Limited – Afrimat's Bulk Commodities segment is becoming a significant part of the group's business.

This is validated by the division's recent solid contribution to the group's interim results for the six months ended 31 August 2020, where it delivered growth of 135,8% in operating profit to R325,8-million. The excellent performance, says van Heerden, was largely due to favourable iron ore pricing and the weaker rand during the reporting period.

The Bulk Commodities sector was instrumental in Afrimat's overall solid results in the face of the sudden and unexpected global COVID-19 pandemic. The disruption, says Van Heerden, was countered by the company's successful diversification strategy, as well as the implementation of proactive measures to manage and minimise the impact of the pandemic, bolstered by cost reduction and efficiency improvement initiatives.

Commenting on the results, Van Heerden explains how what he terms the "trifactor in our

Nkomati Anthracite Proprietary Limited mines high-grade anthracite, which positions it as a key supplier to the local market.

The upside of Nkomati is that it is one of those high-quality reserves that the market demands and is willing to pay a premium for.

favour" has allowed Afrimat to thrive in the face of the current challenges. "Three things worked in our favour. Firstly, the diversification strategy is proving to be the cornerstone of the business, more so during the pandemic where our traditional Construction Materials and Industrial Minerals businesses endured a difficult time, with the Bulk Commodities segment offsetting the slow growth in the two other segments," he says.

Secondly, the company's values-based entrepreneurial culture is paying dividends. Thirdly, a very strong balance sheet is enabling growth. Using the cash generated by successful operations, the company has reduced its debt, while deploying the surplus cash to making further acquisitions, which in turn leads to further diversification, thus driving further growth.

Afrimat has gone into the downturn with a strong balance sheet, which has enabled further acquisitions in the bulk commodities sector. The company recently concluded a deal to acquire Coza Mining (iron ore) and is pursuing the acquisition of Nkomati mine (anthracite), which will further reinforce its diversification strategy.

Coza Mining deal

Speaking to *Modern Mining*, Van Heerden says while the company remains diversified, with a strong footprint in its traditional Construction Materials and Industrial Minerals businesses, Afrimat is increasingly finding the mid-tier mining segment, especially in bulk commodities, highly-attractive. The company sees a lot of potential in those assets deemed unattractive, mainly because of their size, to the big mining houses.

To further grow its Bulk Commodities segment, Afrimat has added Coza Mining to its iron ore portfolio. The acquisition includes three mines, namely Jenkins, Driehoekspan and Doornpan, adding substantial potential to Afrimat's iron ore and manganese operations in the Northern Cape. The high-quality resource, which is located adjacent to the company's current Demaneng iron ore mine, affords Afrimat additional iron ore sources to extend the 'life of mine'.

Most importantly and in line with Afrimat's dedication to diversification, iron ore from Coza will now also be sold into the inland market, with an off-take agreement with Arcelormital already in place. "This means that no additional pressure is placed on our current export allocation on the Saldanha iron ore rail line, although we will welcome any additional capacity allocated to us on this line."

The total purchase consideration is R300-million in cash tranches, dependent on approvals from authorities such as the Department of Mineral

Above: The competitive advantages of geographic location and unique metallurgy – some of the critical criteria Afrimat uses when evaluating any potential acquisition – are in place at Nkomati.

Right: The possible acquisition of Nkomati mine gives Afrimat access to a new mineral with a different profile and cycle, thus further diversifying the Bulk Commodities segment.

Resources and Energy and Water Use Licence confirmations.

Van Heerden adds that given the proximity to the existing Demaneng operations, leverage opportunities exist. The asset includes a possible manganese resource for further exploration, which is similar to Demaneng and again, synergies through the combination of these resources are possible.

"Further expansion opportunities exist to increase the resource size at Driehoekspan and Doornpan, but this will likely only take place into the future, as it remains the Afrimat operating style to take over and stabilise operations before attempting expansion," Van Heerden elaborates.

A mining contractor agreement is in place with Coza, which allows Afrimat to initiate mining operations during the interim period until all conditions precedents are met, starting at the Jenkins mine.

"As usual, we conducted thorough due diligence and we are confident that these three mines will add to the commodities segment. The ability to supply the inland market further strengthens diversification within the segment," he says.

Van Heerden tells *Modern Mining* that he expects Coza to produce in the region of 1,25-million tonnes of saleable product in about a year after Afrimat starts operations. "We will start ramping up around July next year, and during the second year of operation we should be able to reach the 1,25-million capacity," he says.

Nkomati update

Elsewhere, Afrimat is in the process of expanding its bulk commodities footprint into the anthracite

sector, which Van Heerden regards as “a very interesting business space”. The possible acquisition of Nkomati mine, says Van Heerden, gives Afrimat access to a new mineral with a different profile and cycle, thus further diversifying the Bulk Commodities segment.

“The upside of Nkomati is that it is one of those high-quality reserves that the market demands and is willing to pay a premium for. Operationally, however, Nkomati is a business we will need to turn around. We have previously turned around loss-making businesses into strong cash cows, and leveraging this experience, we are well aware that there is need to be careful and precise in execution,” he says.

Commenting on the state of the Nkomati transaction, Van Heerden says as a large creditor, Afrimat had applied for business rescue proceedings, which have been granted by the court, and had received shareholder approval to proceed with the scheme of arrangement that had been proposed. “We believe that the competitive advantages of geographic location and unique metallurgy – some of the critical criteria we use when evaluating any potential – are in place at Nkomati,” he says.

“This, coupled with the high market demand for high quality, clean burning anthracite, will add tremendous value to our Bulk Commodity diversification strategy. High-quality anthracite remains a sought-after product by large smelters in South Africa for metals smelting, fabrication and furnaces,” he adds.

In conclusion, Van Heerden says while the company has enough funding to take advantage of several opportunities, there is need for the right skills to execute these projects. “You need three things to be successful in business: a good opportunity, the right people and the necessary funding. The most difficult part is finding the right people. I believe we have sufficient funds on our balance sheet and many opportunities, but the challenge is now making sure that we have the right ‘jockeys for our horses’,” concludes Van Heerden. ■

Key takeaways

- Afrimat’s Bulk Commodities segment made a solid contribution to the group’s interim results for the six months ended 31 August 2020, delivering growth of 135,8% in operating profit to R325,8-million
- The excellent performance was largely due to favourable iron ore pricing and the weaker rand during the reporting period
- Afrimat went into the COVID-19 influenced downturn with a strong balance sheet, which has enabled further acquisitions in the bulk commodities sector
- To further grow its Bulk Commodities segment, Afrimat has added Coza Mining to its iron ore portfolio. The acquisition includes three mines, namely Jenkins, Driehoekspan and Doornpan
- Afrimat is in the process of expanding its bulk commodities footprint into the anthracite sector with the possible acquisition of Nkomati mine

Progress update: Yaouré Gold Mine to

With several key milestones reached, Perseus Mining's Yaouré Gold Mine is expected to pour first gold in December this year, more than a month ahead of schedule, according to MD and CEO Jeff Quartermaine. By *Mark Botha*.

In an April 2020 article published in *Modern Mining* on the progress made at the Yaouré Gold Mine in Côte d'Ivoire, Andrew Grove, group GM, BD and IR at ASX and TSX-listed Perseus Mining, said several key substructures of the project had been "progressing well", in line with a stretch target of pouring first gold by December 2020. The contracted date for first gold was January 2021, he said.

We touched base with Perseus Mining once more, for an update on the progress made at the Yaouré Gold Mine project since April.

Perseus Mining MD and CEO Jeff Quartermaine.

Milestones

Jeff Quartermaine, the company's MD and CEO, says the commissioning of "elements" of the processing plant has commenced with first ore being "put through the crusher and over conveyors." He says the tailings storage facility (TSF) is fully constructed and lined, and that a Certificate of Practical Completion has been issued.

"High-voltage power lines and construction of the substations is complete. The system is capable of being fully energised from the grid, and this is due to be completed by the Ivorian power authorities by 17 November, enabling full commissioning of a fully loaded plant to take place."

In terms of completion targets and budget, he says the mine is expected to pour first gold in December this year, more than a month ahead of schedule. The total construction cost, including measures to combat the COVID-19 pandemic, is projected to be below the budget of US$265-million.

Ramp-up to production

Quartermaine says first mining activities were carried out by mining contractor EPSA Internacionale

Once fully operational, the mine is expected to process approximately 3,3-million tonnes of ore per year.

pour first gold ahead of schedule

in late August and have been steadily increasing ever since.

"When fully operational, we expect to process approximately 3,3-million tonnes of ore per year. Ramp-up to full production is expected to be reasonably quick and we are looking to pass various completion tests and be in a position to declare commercial production during the March 2021 quarter."

The mine, which is located in central Côte d'Ivoire, some 40 km from the capital Yamoussoukro, has an internal rate of return (IRR) of 27% and a 32-month payback period at a gold price of US$1 250/oz. It is one of three mines belonging to Perseus Mining in

The total construction cost, including COVID-19 pandemic measures, is projected to be below the budget of US$265-million.

The Yaoré mine is located some 40 km from the Ivorian capital Yamoussoukro.

The tailings storage facility at Yaoré is fully constructed and lined, and a Certificate of Practical Completion has been issued.

the West African region, along with the Edikan mine in Ghana and the Sissingué operations, also in Côte d'Ivoire.

Challenges

The development of Yaouré has been without challenges, with COVID-19 being the biggest contest encountered so far.

"The most serious challenge encountered in the development of the mine," says Quartermaine, "has been keeping our people safe and healthy during the COVID-19 crisis and ensuring that expatriate workers were not adversely impacted by fatigue or stress arising from very lengthy rosters made necessary by international travel restrictions."

In terms of work still to be done, Quartermaine says commissioning of individual components of the processing plant has been underway for some time and that commissioning of the complete processing circuit is scheduled to start mid-November, once the high-voltage power system has been energised by CI Energies, the Ivorian power utility.

"Recruitment of the entire management and workforce is very close to completion," he says. "Training of plant operators has commenced and is ongoing, and outstanding licences needed for full operations are pending issue by the relevant state authorities. These are expected very shortly."

Construction of the project is managed by Perseus Mining's development team who, together with engineering company Lycopodium, also built the company's Sissingué gold project ahead of time and on budget.

Yaouré Gold Mine at a glance

The mine was acquired in April 2016 when Perseus took over Amara Mining PLC. A definitive feasibility study (DFS) was completed in October 2017 and Perseus has since completed a front-end engineering and design (FEED) study, contracted Lycopodium to construct the plant, secured funding, obtained the exploitation permit and commenced construction.

Yaouré holds three exploration permits in a region covering 360 km^2. The exploitation permit PR397 covers a 53 km^2 area. Perseus owns a 90% interest in Perseus Mining Yaouré SA, owner of the Yaouré mine, with the other shareholder being the government of Côte d'Ivoire, with a 10% free carried interest.

Proven and probable ore reserves total 27-million t, grading 1,8 g/t gold containing 1,56-million oz of gold inclusive of 2,1-million oz of measured and indicated resources, as of 30 June 2019. Yaouré's life of mine gold production totals 1,4-million oz at an AISC of US$759/oz over 8,5 years. Exploration potential is significant including an initial underground inferred resource of 595 koz grading 6,2 g/t gold.

The mine is situated within the eastern half of the informally named Bouflé greenstone belt in central Côte d'Ivoire. The belt is a north-north-east trending assemblage of Palaeoproterozoic volcanic, sedimentary and intrusive rocks of the Birimian supergroup. ■

Key takeaways

- ❑ The commissioning of elements of the processing plant has commenced with first ore being put through the crusher and over conveyors
- ❑ Commissioning of the complete processing circuit is scheduled to start mid-November, once the high-voltage power system has been energised
- ❑ The system is capable of being fully energised from the grid, due to be completed by the Ivorian power authorities by 17 November
- ❑ The mine is expected to pour first gold in December this year, more than a month ahead of schedule
- ❑ The company is looking to pass various completion tests and be in a position to declare commercial production during the March 2021 quarter

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Coal miners' drive for cost reduction and increased productivity

While coal remains South Africa's staple energy source for the foreseeable future, the coal mining industry is facing an uncertain period, with ores grades depreciating significantly, exacerbated by low coal prices and the general low appetite to fund new coal plants. In the face of these struggles, Frengelina Mabotja, senior metallurgist and capital sales engineer at Kwatani, tells *Modern Mining* that process equipment has a huge influence in coal mines' drive for ongoing cost reduction and increased productivity to mine profitably.

Frengelina Mabotja, capital sales engineer at Kwatani.

Notwithstanding South Africa's aim to reach net zero emissions by 2050, the country's energy plan still anticipates a continued major role for coal. Currently, more than 90% of South Africa's energy is generated from coal, mainly mined and burned in the north-east by state-owned power provider, Eskom. South Africa's coal mining landscape is driven largely by its domestic market and remains responsible for sustaining a significant chunk of the country's energy requirements.

Most of the coal supply, says Frengelina Mabotja, senior metallurgist and capital sales engineer at Kwatani, is currently from a handful of major mining houses. In recent years, she says, Eskom started moving away from the traditional cost-plus models in its quest to develop and support the junior miners market with black ownership, resulting in a rise of junior coal players.

A 4,3 m screen being prepared for dispatch from Kwatani.

"Kwatani has over the years partnered with both majors and junior miners, utilising our expertise to provide customised cost-effective, fit-for-purpose processing solutions to suit both parties' needs. We work across the coal mining spectrum and are equipped to understand the specific needs of both the majors and juniors and engineer solutions which cater to individual specific needs," explains Mabotja.

For this reason, Kwatani offers two distinct equipment ranges tailored to each party's specific requirements and capital budget. The requirements can vary significantly between a junior, small scale miner and a long-life major i.e. operating lifespan, tonnage throughput, efficiency and yield requirements as well as type/size of product needed, among other parameters.

Industry trends

The industry, according to Mabotja, indicates that the conditions that will be encountered in future coal mines will undoubtedly differ from the current ones, as the more easily mined coal has already been processed. As seams with greater amounts of overburden are mined, she says, surface mining will potentially become much more expensive.

"The coal industry is currently enduring low coal prices with a recovery in the short term very unlikely.

A large banana screen leaving Kwatani for a customer operating in the coal mining sector.

Additionally, the appetite for funding of new coal plants and expansions is low, resulting in significant uncertainty in the sector. Consequently, there is a strong drive for continuous cost reduction and increased productivity across majors, juniors and the industry at large," says Mabotja.

Apart from the initial capital expenditure, she says, processing equipment at mines has an enormous influence on production efficiency, tonnage and operating costs. With that in mind, Kwatani offers long-lasting, robust vibrating screens and feeders designed for continuous tonnage and high efficiency, which reduces the processing cost per ton and the overall cost of running the machine over its lifetime.

"There have been few changes in mining and processing of coarse coal in recent years. Although some of the old technologies are still being used, we have over the years seen increased demand for high-capacity equipment for small to fines coal processing, with banana 'high capacity' screens commonly preferred in that application," she says.

Holistic approach

Given that screening equipment is a critical component of any coal plant, and as such can be the cause of unscheduled and costly plant shutdown if failures occur, regular maintenance is essential to prevent this.

With its holistic approach, through collective processes and mechanical expertise, Kwatani continues to successfully offer and implement tailored value adding models to coal mines in South Africa. The approach is to pay attention to the complete process. That, coupled with the company's customised engineering design, results in equipment robustness, longevity and safe operation, which is always a priority.

In the current environment, major coal miners are typically looking for large-scale equipment to boost efficiencies and high tonnage throughputs, she says. "Kwatani offers a comprehensive, customised range that includes some large, high capacity screens, for example, the 4,3-m wide banana screen which is well suited to this requirement."

Kwatanis's engineering team places a major focus on optimising the structural integrity, weight distribution and lifespan of the equipment. The OEM's screens can therefore process high tonnages in heavy duty applications, while delivering high efficiency.

"We consider various factors that affect the fatigue life of the screen in order to provide a durable, robust, long-lasting and high performing unit. We have supplied a large number of screening machines, with the majority of them currently operating at some of the largest opencast coal mining operations in the world," she says.

Kwatani's brute force grizzly feeders for run-of-mine (ROM) operations are capable of sizing and feeding material from high drop heights, operating at up to 2 000 tph. "Furthermore, we ensure that we engineer our equipment to seamlessly fit into the existing structures, avoiding the need to make costly changes to given infrastructure," says Mabotja.

The junior coal sector, she adds, operates at the opposite end of the scale and typically requires smaller-scale, modular plants processing up to

Kwatani's large 4,3 m wide banana screen manufactured for coal mining.

250 tph, incorporating smaller screening equipment below 2,4 m in width.

"We have a dedicated product range which is tailored to the budget and needs of these processing plants. Because junior miners often need to start generating revenue as quickly as possible, they operate not only on very tight budgets, but also short delivery times which we are able to accommodate with our dedicated floor space and jobbing system needed for this product range," says Mabotja.

Major benefits

Major coal miners benefit from Kwatani's customised service level agreements, which include: continuous audits at given time intervals to measure the performance and condition of the equipment; on-site training from artisans through to supervisors; on-going operating and maintenance training; on-site stockholding management; refurbishment programmes; as well as cost per ton agreements where Kwatani is fully responsible for equipment operations, replacements, refurbishments and maintenance.

"These agreements are structured so that we share in the gains and losses of the mine. We get paid only when the mine is producing according to expectations. For this reason, we have a full team on site, daily to ensure that the screens are always in top shape and any issues are resolved imminently," she says.

Junior mining houses may not require such extensive service level agreements but do however need regular visits and quick turnaround times on service calls to ensure they remain operational for as much time as possible. Kwatani's experienced service team serves this sector of the market and offers financially flexible options to suit clients' budgets.

Some customers are challenged by a lack of skilled personnel or stretched resources. Mine personnel are often required to maintain entire processing plants, from building infrastructure to crushers and screens. Kwatani's service offering assists with maintenance prediction, using the company's latest condition monitoring technology. Out of this involvement in the lifecycle of the equipment, the company also gets to identify future design improvements to continually drive lower total cost of ownership on its custom engineered equipment.

Additionally, Kwatani's in-house research and development enables the company to complete specific application test work and back its process simulations and engineering designs, to improve efficiency and increase throughput.

Kwatani has over the past 44 years established a successful equipment reference base and track record across the country's major coal mines. The company has also made a significant entry into the junior mining side of the coal sector, and has positioned itself as a screen supplier of choice for this group of customers.

"Our operating mantra – engineered for tonnage – ensures that each coal customer is provided with a customised, fit-for-purpose solution that is robust and durable, delivered to the required operating efficiency at the required tonnage, while reducing the overall cost of operation," she says.

In conclusion, Mabotja says the significance of new developments is continuously discussed and shared on the Southern African Coal Processing Society platforms, thus offering OEMs insights into the needs of coal miners. "The emphasis is not only to offer a piece of vibrating equipment, but also to stay abreast of market trends with a product offering that is in line with the ever-changing market demands," she concludes. ■

Key takeaways

- The coal industry is currently enduring low coal prices with a recovery in the short term very unlikely
- Additionally, the appetite for funding of new coal plants and expansions is low, leading to significant uncertainty in the sector
- This has resulted in a strong drive for continuous cost reduction and increased productivity across majors, juniors and the industry at large
- Apart from the initial capital expenditure, processing equipment at mines has an enormous influence on production efficiency, tonnage and operating costs
- With its holistic approach, through collective processes and mechanical expertise, Kwatani continues to successfully offer and implement tailored value adding models to coal mines in South Africa

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Unpacking new trends in coal processing

Ernst Bekker, product specialist at Multotec.

The composition of coals mined in different areas can vary widely. Since the very early days of mining, coal quality has been improved by removing unwanted mineral matter. Over time, coal processing plants have evolved considerably. In a one-on-one with *Modern Mining*, Ernst Bekker, product specialist cyclones at Multotec, unpacks some of the new trends in coal processing.

Commenting on some of the major trends in coal processing, Ernst Bekker, product specialist cyclones at Multotec, says coal miners are today sweating their assets, and want longer lifecycles from their process equipment. This means that better maintenance is required. Customers are also wanting shorter lead times for stock; they want to hold less stock on site and rather rely on the supplier for quick delivery.

"Over the past couple of years, we have seen coal processing equipment on mines being pushed to the limits of its design capability, with higher tonnages placing more demands on equipment. Mines are therefore relying more on suppliers to maintain equipment and ensure that it performs optimally. This requires closer working relationships between the supplier and customer; in the past suppliers would be called upon only when necessary," says Bekker.

The average age of coal processing plants is increasing steadily, he says, as not many new plants are being constructed. To keep these plants operational, suppliers are required to ensure that their equipment lasts longer but remains reliable and efficient.

Water scarcity and acid mine drainage are a growing focus at coal plants, where there is a strong drive towards zero liquid discharge and maximum water recycling. "Mines want to reduce their water usage in the process plant, and so suppliers must also look at how they can contribute. This requires that our equipment designs carefully balance water use and efficiency; the customer still needs a high level of

Multotec is there to support mines that rely more on suppliers to maintain equipment and ensure optimal performance.

performance from our equipment, in spite of using less water. The concern with water conservation is also driving a strong focus on dry beneficiation," says Bekker.

The focus on beneficiation of fine coal is becoming more intense, he adds. While fines were generally discarded in the past, mines now want to recover this resource for commercial and environmental reasons. The required dewatering process, however, can be costly.

"We find that new coal plants are smaller and simpler in design, moving away from complexity and towards fewer items of equipment in the flowsheet. This often leads to fewer large units being installed instead of multiple smaller units. In certain situations, this can result in a change in separation or performance efficiency and it is the supplier's responsibility to ensure the impact on the process is minimised," he says.

As mines look to streamline their operations, they would prefer to deal with fewer suppliers – to reduce the points of contact they need for procurement. Monitoring and automation of coal plants, reasons Bekker, is thus being increasingly adopted as a strategy to inform and expedite decision-making. As mines embrace the Fourth Industrial Revolution, plant operators are capturing real time data and looking to analyse and interpret it in greater detail.

"The state of the global and local economy means that coal mines continue to be price sensitive in their procurement. This focus on the bottom line can mean short-term gains from cheaper products, but can also undermine longer-term efficiencies if the equipment's performance is not optimal. It is important that qualified process staff remain integrally involved in making procurement decisions," he says.

Remote monitoring of coal plants is an innovation that is also being pursued by a number of mines, especially as the COVID-19 pandemic continues to affect how people must work. This holds potential for the sector, although most plants will continue to rely on a physical presence of managers and operators for some time to come.

"To provide context, valuable progress has been made on a Mpumalanga coal mine, where a 'digital twin' model has been applied. This gives managers the ability to test operational changes on a virtual platform, before applying them to the real-life operation," says Bekker.

Key drivers

A key driver of developments in coal processing is efficiency, says Bekker. Mines and plants are pushing the boundaries of equipment performance, to maximise coal recoveries while holding down costs. In addition, coal is now competing with other forms of energy sources like solar and wind power which are becoming more cost-competitive.

Multotec's extensive range of products allows it to supply most of the equipment in the dense medium separation process and it continuously improve designs and capabilities of equipment.

"In terms of using technology to monitor operations remotely, the COVID-19 pandemic has also been a factor. It has accelerated the pace of these trends, as a way of allowing more social distancing in the workplace and work-from-home arrangements," he says.

Bekker adds that there is a growing realisation that coal is a limited resource in South Africa, as older mines close down and our traditional coalfields become depleted. This is driving initiatives to make better use of the deposits currently being mined.

The impact of climate change is now undeniable, he says, with weather patterns being altered. In areas where coal plants must operate in drier conditions, innovations are required that allow plants to mitigate these effects through water-saving beneficiation.

"Efficient plant operation requires that the right decisions be made as quickly as possible, both to optimise equipment and to mitigate risk. This time factor is driving developments in data technology, so that data can be analysed with speed and accuracy," he says.

The safety focus on mines is continually more intense, adds Bekker, with senior people in mining

Efficient plant operation requires that the right decisions be made quickly, to optimise equipment and mitigate risk.

companies being held accountable for incidents. These legal consequences are driving new trends that may not always make operations easier. Where equipment on a coal plant is barricaded due to its moving parts, for instance, this may complicate the process of evaluation and maintenance. Mines will need to be innovative in keeping the momentum of their equipment performance initiatives, while ensuring the highest levels of safety.

Wide range

Multotec's extensive range of products allows it to supply most of the equipment in a dense medium separation process in coal plants, and the company continuously improves the designs and capabilities of this equipment.

"On the screening side, we have ongoing development of polyurethane screen panels to treat wet and sticky material without extra addition of water. Normally, more water is used to wash off clay material. The benefit here is of course reduced water usage," explains Bekker.

Multotec is also exploring the use of rubber for panels, due to its flexibility that helps avoid blockages. It is also more wear-resistant.

In terms of its wedgewire products, the company is incorporating a wider range of stainless-steel grades and profiles to improve efficiency and performance. Tests have been conducted with special wear coatings on wedgewire to improve operational life, demonstrating that life expectancy can be increased quite dramatically.

"We prioritise safety in the handling and installation of modular screen sections, so we regularly assess and improve our design for easier handling," says Bekker.

"As part of our leveraging of technology to monitor performance and predict maintenance requirements, we are evaluating the use of sensors in panels to indicate wear, pegging or damage. There is even scope to apply this technology to monitor the integrity of screen frames, to ensure optimal performance of the screen deck. These innovations help reduce unplanned downtime.

Magnetic separation

Multotec supplies a variety of magnetic separator drums, the most common being the low intensity magnetic separator used in coal. Magnetite consumption is as critical as always and most pronounced magnetite losses through conventional DMS recovery magnetic separators occur when the slurry level in the machine is not at optimum level.

"Traditional manually adjustable overflow weirs require that operators see the problem and make the adjustment and this often happens only after significant losses and probing investigations to identify this root cause. The market response has been to install self-levelling tanks, but these tank designs allows coarser, dense grit material to settle in the under pan and build up to the point where the grit wears through the drum shell resulting in major refurbishment costs," explains Bekker, adding that this problem is overcome with elaborate and expensive

flushing systems which are often abandoned soon after commissioning due to their unreliability.

Multotec is launching a trialled system that will address slurry level for effective magnetite recovery while simultaneously not allowing grit to build up in the under pan. Online and remote monitoring of the magnetic separator slurry level via electronic devices will be an optional extra step towards smart plant control. This will remove or reduce the operator involvement that is generally required to ensure these units operate efficiently and this will also improve safety. By ensuring a correct slurry level, losses in magnetite recovery will be reduced and build-up of solids that can damage the magnetic separator drum minimised, thereby reducing operating costs.

Multotec's in-house test facility allows it to give customers more accurate picture of what to expect from its products.

Samplers

Multotec's proven hammer samplers are now required to take two consecutive samples in short succession to allow a mine and their customer sample into their own respective bins. A single sample increment, taken by the single rotation of a hammer sampler, cannot simply be divided into roughly two equal parts because this division exercise can result in up to five of the nine sampling errors in a single step.

"Instead, each consecutive increment must be carefully diverted to its own bin. Successive increments must not contaminate each other. Multotec has developed a reliable flopper gate that is easy to operate and gives feedback about the flopper positioning to ensure a good seal is achieved, preventing sample cross contamination. It can be easily retrofitted onto an existing operation, where this new requirement is imposed," says Bekker.

Only with the finest of design tolerances for each application can sampling precision levels be guaranteed. Multotec has developed software integration models across AutoCAD Inventor and programming code that allow parts of the design to be automated following pre-programmed design logic and interpolating from the company's data library of over 800 hammer samplers in the field globally. This innovation allows an improved and reduced design time from three weeks to five days. Shorter lead times of bespoke designed equipment is offered for hammer samplers in the 500 to 1 200 mm belt width range where sampling precision is guaranteed. This range will be expanded to meet the precision needs of the coal industry.

"There has also been a creative solution developed for the removal of tramp metal from coal being transported on a conveyor belt. Multotec now offers an integrated Eddy-current metal detector that detects both ferrous and non-ferrous metals, to actuate a tramp metal removing 'hammer sampler' that can remove the detected tramp metal from the belt in an action similar to sample taking. The hammer sampler cutter is modified more towards safe tramp metal removal and less towards precision sample taking so that tramp metal can be removed from the system without damaging the conveyor belt. This allows more uptime while preventing costly damage of items like ceramic wear linings in the plant," explains Bekker.

Spiral concentrators

A lower cut density on a spiral concentrator makes for a better quality product and higher revenue. This can be achieved with a low tonnage and dilute feed conditions, but this requires more spiral units to treat the same tonnage. Multotec's 10-turn spiral, with its continuous discard withdrawal and a re-pulper at every third turn, ensures that high tonnages can be treated while still delivering low cut densities. The benefits of this innovation include lower costs – as fewer spirals are required – and less water consumption.

"There are also tests being conducted by Multotec in Australia on automated spiral splitters, to continuously optimise the settings on each spiral. This holds exciting potential especially for plants with hundreds of spirals – allowing the spiral splitters to adjust quickly and automatically to changing feed conditions," he says.

Centrifuges and filters

Multotec's range of centrifuges and filters from its holding company Siebtechnik in Germany can treat both fine and coarse coal. Among the product innovations is the application of wireless monitoring for coarse coal centrifuges. The vibration frequency, vibration displacement and bearing temperatures are some of the measurements which allow for optimal performance and prevention of unplanned downtime.

Recent improvements to fine coal centrifuges which utilise a scroll to assist with discharging the product, now includes a redesigned scroll which has replaceable high wear resistant flytes from steel with

high precision tolerances to set up the clearances between the scroll and basket accurately. This helps to maximise the performance of the centrifuge.

Cyclones – dense media

Multotec is constantly optimising the design of its dense media cyclones to improve performance on the separation of fines, as well as the use of alternative wear materials to extend operational life. With greater flexibility built into the design, the cyclones can treat fluctuating tonnages over their lifespan. If a mine decides to change throughput volumes, therefore, it does not need to change the cyclone itself – only certain components.

Development and extensive testing on the use of sensors to detect metal in ceramic-lined cyclones has been completed and results are promising. The system incorporates Artificial Intelligence (AI) and based on the test work done and results obtained to date, investigations have now been expanded to other areas that will assist plants in optimising throughout. "There is also testing underway in our Australian division to remotely monitor the thickness of wear lining in cyclones – a potential game-changer for predictive maintenance."

"The incorporation of 'green dot' ceramic tiles in our cyclones already makes it easier to identify tile wear during inspections – as the green dot shows through at a certain depth," says Bekker.

Cyclones – classification

In its classification cyclones, Multotec has continuous improvement projects that investigate alternative inlet designs to achieve more efficient separation, especially with fine coal. The company has also incorporated alternative wear materials to extend life span.

"We focus not only on the mechanical life of our units – their physical ability to last – but also on extending their efficiency life cycle, which reflects performance. For instance, ongoing wear creates undulations on the inner surface of a cyclone, and this causes inefficiencies. So, while ceramic tiles might last longer, other materials might retain a smoother surface for better separation. We design custom solutions, depending on the application, using these alternative materials, to ensure the customer is always getting optimal value over the life of our cyclones," explains Bekker.

Efficiency of equipment relies on good maintenance, so it is vital that servicing is as easy as possible. Multotec therefore builds ease of maintenance into its cyclone range, so that it can be carried out regularly – enhancing performance and value to the customer.

"As part of our overall sensor development programme we are addressing wear lining thickness and performance conditions in classification cyclones. This may be able to pick up roping conditions in the spigot, for instance. There is even scope to employ artificial intelligence in achieving optimal conditions in these units," he says.

Multotec's cyclone innovations are therefore delivering benefits including improved separation efficiencies, longer operational life, lower costs, and safer maintenance and inspection. "We are also improving our ability to predict more accurately when maintenance is required," he adds.

Pumps and water treatment

Multotec's pumps product line-up now includes a new range of slurry pumps suited to pump applications ranging from abrasive mill discharge slurry streams to flotation concentrate and tailings disposal. The pumps' design improves efficiencies and wear life, and commonality of spares which means less stock inventory for mines.

Meanwhile, Multotec has introduced water treatment products into its range, and has partnered with Australian based water treatment innovator, CleanTeQ. The continuous ion-exchange technology is unique to CleanTeQ and addresses acid mine drainage and water scarcity challenges faced by the coal industry.

In conclusion, Bekker says Multotec's in-house test facility – which is used to evaluate most of its products – is becoming increasingly popular with customers. It allows the company to give customers a more accurate picture of what to expect, and reduces their risk in procurement.

"We have always held open days and training session for customers, and during the COVID-19 lockdown have developed our virtual training platform. These value-added sessions, which focus on technical issues rather than sales, have been well attended. They also help young professionals who might not be getting the practical experience they need, giving them insights to make better decisions on the plant floor," concludes Bekker. ■

Key takeaways

- ❑ Coal miners are today sweating their assets, and want longer lifecycles from their process equipment
- ❑ The average age of coal processing plants is increasing steadily as not many new plants are being constructed. To keep these plants operational, suppliers are required to ensure that their equipment lasts longer but remains reliable and efficient
- ❑ Water scarcity and acid mine drainage is a growing focus at coal plants, where there is a strong drive towards zero liquid discharge and maximum water recycling
- ❑ Mines want to reduce their water usage in the process plant, and so suppliers must also look at how they can contribute
- ❑ Multotec's extensive range of products allows it to supply most of the equipment in a dense medium separation process in coal plants, and the company continuously improves the designs and capabilities of this equipment

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Protecting important underground mine assets in real-time

The adoption of personnel and asset tracking technology is on the rise throughout the mining industry. In this article (exclusive to *Modern Mining*), Chris Mason, VP of sales for EMEA at Rajant Corporation, discusses how, if tracking technology is to provide a solution to one of the biggest challenges across IIoT industries – such as underground mining – must be backed by reliable, robust connectivity which can thrive in the face of the most extreme conditions.

Chris Mason, VP of sales for EMEA at Rajant Corporation.

The mining sector is a dynamic and fast-growing global industry. For Africa, one of the largest and most influential mining regions worldwide, vast amounts of precious mineral commodities such as valuable platinum, copper and gold are produced every day. Rivalling the output of countries such as the United States, Australia and Russia, South Africa has two of the top 10 largest gold mines in the world and South African mining companies dominate the African market, with Anglo American netting US$29,87-billion in revenue in 2019.

While mining technology has improved immensely over time, the machinery, devices, and vehicles used still make it a hazardous business. Communication technology is emerging as a tool to alleviate the dangers, ensuring hazardous areas such as underground mines can be made safer to protect personnel and increase operational efficiency.

The Industrial Internet of Things (IIoT) is facilitating the significant growth of the number of connected devices and equipment, increasing the vast amount of data and communications being sent and received. If mining operators utilise integrated solutions such as automated machinery, data analytics, sensors, connectivity, and surveillance systems, the rewards can be plentiful.

From 2003 to 2030, Deloitte estimates that US$50-billion will be invested into mining projects in Africa. To ensure safety as production increases, African mining operators can benefit hugely from implementing advanced communications systems. They can ensure their operations and applications remain low-risk and productive, and that vital connectivity keeps running both underground and on the surface.

Unparalleled opportunities

To meet the fierce demands for modern mining, the industry is determined to harness and deploy digital technologies that will enable it to build the mines of tomorrow. While the introduction of new technologies continues to provide unprecedented opportunities, operators are keen for reduced costs and improved worker safety. Operators must have a reliable and robust communications system to efficiently manage and monitor high quantities of high-value machinery and equipment over a vast environment.

Extending or repairing fibre networks requires significant time and expense. Highly dependent on fixed infrastructure, traditional wireless networks, such as Point-to-Multi-Point (PMP) and Wi-Fi, and even LTE cannot be easily relocated and involve additional complex re-configuration, which can take a significant amount of time. In an ever-changing mine environment, the coverage for such systems can be drastically impacted, which can affect real-time productivity levels. It is essential that a communications solution deployed in a mine function in extreme conditions and be capable of seamless transport away from new blast zones, without any need for changed configuration.

Also, with high throughput demands and complex environments with varying depths and slopes, the mine topography can limit the ability of the wireless signals to travel and poses a significant hurdle for operators to overcome. If networks don't have the durability to withstand the harsh conditions, expenses can arise from regular technician visits.

To meet the fierce demand for modern mining, the industry is determined to harness and deploy digital technologies that will enable them to build the mines of tomorrow.

Mines will struggle to meet production targets if the network has too much downtime or cannot support the functioning of critical applications. The industry is consistently vying for more effective and efficient methods to boost productivity levels and ensure that personnel safety is optimised.

Unbroken connectivity for worker safety

Mines require wireless networks that provide proven, dependable, mission-critical connectivity and that have a high level of resilience that can adapt to a diverse array of topographies, particularly in remote areas, without any downtime. Being connected in all corners of the mine is essential for people working underground and their support teams, so that there can be swift and instant communication in emergencies.

Mining corporations must have the visibility and awareness of employees' various locations and status to maximise safety, especially when operating hazardous equipment. Therefore, individuals can focus on the task at hand, while their wellbeing is being monitored. With the tracking equipment, staff can identify potential hazards and risks ahead of time to avoid employees being placed in dangerous situations. With real-time asset monitoring of machinery, support staff can anticipate maintenance to prevent failure or downtime.

The adoption of personnel and asset tracking technology is on the rise and will address one of the most important challenges the industry faces. However, it must be backed by connectivity that can overcome the most extreme conditions – ensuring that personnel can be kept safe when performing day-to-day operations and that assets can be protected.

Harnessing and deploying a robust and reliable wireless infrastructure can also provide real-time data on the mine's assets health and performance directly to the command centre. This can include all information such as production levels, current locations of equipment and vehicles, a vehicle's operating parameters, and any faults in the network. This sees an increase in visibility across a mining operators' assets, equipment, and staff and keeps mining production moving.

Rajant's helping hand

Mining operators must take great care when selecting their wireless network, and flexible 'mesh' networks can prove to be a true game-changer for productivity and efficiency. A mesh network consists of devices (known as nodes) that can transmit and receive data autonomously, which are fitted to machines and people in a network comprised of hundreds of similar nodes that can all seamlessly communicate with one another. With the ability to

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CROWN PUBLICATIONS

While mining technology has improved immensely over time, the machinery, devices, and vehicles used still make it a hazardous business.

build highly mobile and robust connections in industrial environments, Rajant's wireless Kinetic Mesh network is ideally suited to meet the mining industry's fierce demands.

For the harsh and changing conditions typical of the underground mining industry, reliable connectivity is crucial, and Kinetic Mesh provides just that. With vehicles, equipment, and people always in motion, operators desire seamless communication between mobile or fixed assets. Rajant BreadCrumb nodes facilitate this via multiple peer connections, and every node in a Kinetic Mesh network has the ability to act independently with full routing capabilities. The Breadcrumb can receive and transmit data simultaneously whilst also acting as a local Wi-Fi transmitter.

Dynamically selecting the fastest route for traffic to the next best path if any other becomes blocked or unavailable, the Rajant InstaMesh networking protocol provides outstanding network performance in an underground mining's subterranean conditions. Importantly, a connection is not compromised by the task of moving the backhaul network around in adverse conditions or away from blasts, allowing personnel and equipment to continue production regardless of the operational environment.

Proven connectivity benefits

Internationally, mining operators across the globe are utilising Rajant for both open-pit and underground communications. In the prosperous African mining region, Rajant has deployments in South Africa, Lesotho, Botswana, Mozambique, DRC, Zambia, Mali, Guinea, Cote D'Ivoire, Angola, Burkina Faso, Namibia, and Madagascar.

All of these mines require a network that can help realise the full benefits of being a digitalised mine. It's well-proven technology in action 24 x 7 x 365. The deployment of a redundant and wireless Kinetic Mesh network will support the future of mining and support all technologies, providing operators with the peace of mind to fully capitalise on the new age of digitisation and reap the benefits for their workforce. ■

The right time for moving to automated monitoring

Automated deformation monitoring systems offer a multitude of benefits that enable mining company stakeholders to make crucial decisions related to life safety, productivity and environmental wellbeing, write *Riley Smith* and *Jesse Huff* of Trimble Monitoring.

Automated monitoring offers around-the-clock data to enable decisions that protect people, product and environment. It also creates operational efficiencies across multiple disciplines of a working mine site. Another benefit is that it provides data on demand so stakeholders have the information needed to make timely and accurate decisions.

Timing is everything

When a potential hazard is detected, timing is critical. Automated monitoring helps save lives because it continuously and quickly delivers the data needed to support a safe working environment. Mining safety teams receive alerts with all pertinent detail needed to act on the potential hazard.

The manual practice of collecting and processing data, producing a report, and then reacting to that knowledge could take too long to be useful in many scenarios. Arming mine safety teams with the data they need – by automatically and continuously detecting movement and reporting on it – allows them to prepare for a catastrophe, rather than react to it.

What to expect

Companies are automating their operations now more than ever to utilise the benefits of new technologies. A mining company can eliminate an estimated 90% of the manual process and labour that goes into a typical "buddy system" monitoring campaign.

Automated monitoring saves manpower, both in measurement and data processing, and provides entire datasets to stakeholders nearly instantly after measurement occurs, thus, saving an enormous amount of time with things like handovers, shift changes and other stakeholder engagements.

Similarly, gone are the days of taking measurements, processing the data and interpreting that data. Instead, data measurement and processing is completed automatically and results are readily available.

Without the expense of the manual resources, mining companies are able to continuously run monitoring campaigns, and use the data to predict slips – sometimes to within a couple of hours. Armed with that knowledge, mining operations can continue up until the time the team deems it unsafe to do so.

After the initial setup of the automated monitoring system, it practically runs on its own. It's at this point that substantial savings are realised from reduced overhead and overtime hours for monitoring campaign work. Additionally, the labour spent on manual monitoring campaigns is now able to be utilised elsewhere.

The automated monitoring software solution should interface with all manner of instrumentation present on a modern-day mine site.

Making the move

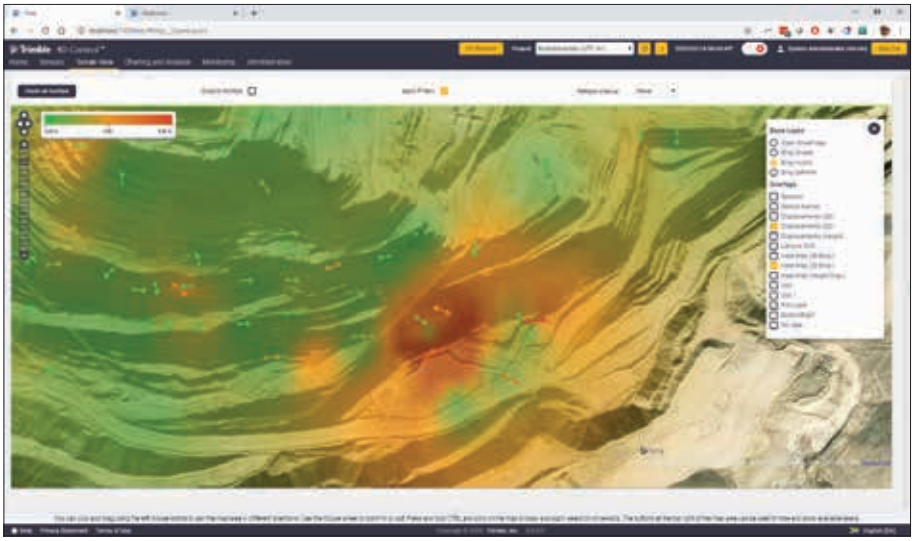
For years, mining companies have implemented the latest automated monitoring technologies in a strategic effort to uplevel their operations with timely and intelligible data at their fingertips for making quick decisions. The benefits mining companies see when moving to an automated monitoring system are:

- ❑ Protecting human resources by reducing their time in the mine;
- ❑ Data on demand with 24/7 deformation monitoring campaigns;
- ❑ Embracing a deformation monitoring solution that delivers across multiple disciplines to all stakeholders simultaneously;
- ❑ Reaping the benefits of making timely, data-driven decisions;
- ❑ Allowing technology to do its job and freeing up manpower to focus on other tasks.

Some of the considerations to make when implementing an automated monitoring system include instrumentation (GNSS, total stations, geotechnical devices); communication (site mesh, point-to-point

radios, WiFi and others) and software (Trimble 4D Control).

Once initial setup is complete, the solutions team should be accessible as needed. For instance, Trimble's monitoring team works closely with clients to assure a smooth transition from installation to commissioning. Trimble's worldwide presence – with representation in every time zone – delivers peace of mind that questions are responded to in a timely manner regardless of geographic location. The Trimble monitoring solutions team frequently provides software training and other consultations, as needed.



Data measurement and processing is completed automatically and results are readily available.

The automated monitoring software solution should interface with all manner of instrumentation present on a modern-day mine site. Cross-compatibility of these different datasets are critical for mining operations. Data from vibrating wire piezometers and data from prisms should be accessible and usable from the same software environment for a truly holistic view of stability and potential movement. Automation of these measurements and readings increases the amount of data that is available for decision making processes.

Automated total stations, such as the Trimble S9, use a variety of atmospheric information to compute PPM (parts per million) error for highly accurate (1 mm) measurements. This atmospheric data should be available in the system for analysis and interpretation.

Trimble total stations have built in barometers that poll atmospheric pressure in real-time. Couple this with the real-time temperature data feed from the Settop M1 and the entire dataset can be used in Trimble 4D Control (T4D) to see the effect of pressure and temperature on displacement readings. This is critical in trend detection.

Values can be converted to velocities, or inverse velocities in real-time, which assist in the stability analysis of pit walls, tailings dams, wind rows and other structures as needed within the mine.

Geotechnical sensors, coupled with pinpoint accurate prism data, along with high frequency positioning from GNSS receivers provide an incredibly robust complete solution for the modern mine. ■

Article exclusive to Modern Mining

Automated monitoring offers around-the-clock data to enable decisions that protect people, product and environment.

Travel restrictions no challenge for Sandvik's technology implementation

Despite the travel restriction difficulties associated with COVID-19, Sandvik Mining & Rock Technology has found novel and innovative solutions to overcoming these challenges, ensuring the company maintains its leading position in the fields of both automation and digitalisation.

Considering Sandvik Mining & Rock Technology first introduced automation solutions into its product offering some 15 years ago, and digital technologies 10 years ago – the company has been leading the way in helping the mining industry adopt and embrace the modernisation revolution.

OptiMine modules include task management, location tracking, drill plan visualizer, 3D mine visualizer, scheduler and analytics.

"The African mining industry has traditionally shied away from embracing new technologies, but COVID-19 has been the push factor in accelerating the necessity to adopt change, and this has happened rapidly as mines have had to learn to operate remotely and with limited resources owing to COVID-19," says Simon Andrews, Sandvik Mining & Rock Technology vice president for sales in southern Africa.

The adoption of new technologies however is no longer the primary objective. Finding ways to implement them remotely has now become the primary focus, Andrews continues.

With the philosophy of working towards finding a solution for any challenge, Sandvik Mining & Technology has done just that, and introduced a headset which enables it to walk and talk anyone through the process of commissioning a machine and associated software without having ever seen it before. "This offering removes all barriers associated with the inability to connect physically on the ground and is a mechanism of training in itself," says Niel McCoy, automation business development manager for Sandvik Mining & Rock Technology.

Coupled with this new skill set and offering is Sandvik Mining & Rock Technology's ability to better utilise its highly skilled personnel. "Our top level experts within the business are no longer time restricted by travel and are able to utilise their skills set across multiple mines on a more frequent basis, something we had never considered in the past but is an exercise already reaping great success," McCoy points out.

As a result of the company's efforts in ensuring digital technologies and the implementation thereof remain a top agenda for clients – regardless of remote working conditions, lockdown restrictions, etc., Sandvik has established a new communication repertoire with its clients. "Never before have we communicated so effectively or as frequently with our clients as we do now. We know more about our sites now than we ever did before, which naturally provides us with the ability to better assist our clients in any areas that we can contribute towards and give input on," Andrews concludes. ■

Cummins Filtration to the rescue

Cummins Filtration has supported one of South Africa's largest mining companies in undergoing a comprehensive trial study to extend the service intervals for automotive equipment operating at mine sites. By extending the cycle replacement hours, the ultimate goal was to increase savings associated with maintenance costs and increased uptime, thereby improving overall productivity.

"Cummins Filtration aims to be proactive in maintenance practices and use of technology. Our filters and coolant provide the best engine protection and lowest total cost of ownership by minimising the number of repairs and maximising the life of engine and the longest service intervals. Our approach is to get involved at a site level and train and work hand-in-hand with the respective sites in order to understand and resolve any challenges experienced," explains Chernise Naicker, South Africa Independent Channel account manager.

The mine sites targeted for the trials were opencast platinum, coal and iron ore mines prone to high levels of dust, which generally results in higher maintenance costs. ■

Caterpillar to offer fatigue monitoring tech

Caterpillar has entered into an agreement with Seeing Machines to deliver and support light vehicle and on-highway driver fatigue and distraction monitoring technology through Cat dealers. Seeing Machines' Guardian 2 system is an advanced, non-intrusive system that senses operator movements and analyses them for symptoms of fatigue or distraction in light vehicle applications. Seat vibration and audio alarms alert operators when a microsleep or distraction event is detected – to effectively reduce dangerous and costly incidents.

Guardian 2 joins the Driver Safety System (DSS), a rugged system for fatigue and distraction monitoring in off-highway vehicles, as part of the Cat MineStar Detect portfolio of safety technologies and services. Guardian 2 and DSS enable customers to cost effectively fit any vehicle in the fleet – heavy equipment, support vehicles and highway vehicles – with next generation monitoring systems supported by the local Cat dealer and linked to Caterpillar's 24-hour Fatigue Monitoring.

Guardian 2 replaces the DSS-H system and features new driver monitoring software, which delivers expanded capabilities. The system employs an improved sensor for enhanced resolution and an expanded field of view inside the cab. Guardian 2 leverages Seeing Machines' long and broad experience in guiding automotive OEMs in deploying this technology across a wide range of vehicles.

"The Guardian 2 system reduces the likelihood of safety incidents by alerting operators and keeping them focused on the job at hand," says Mindy Elsasser, commercial manager for MineStar Detect products. "The monitoring services also provide near real-time alerts that inform supervisors of fatigue and distraction events, allowing them to respond quickly to help prevent further incidents."

Additionally, the system provides reports and analytics, which enable site leaders to track patterns and determine if operators are having repeated fatigue or distraction events. Reports give managers visibility to the full impact of fatigue and distraction on safety and performance. ■

Quality chute designs solve many plant challenges

Often there is more than one challenge that faces a plant in moving materials, and this is one of the advantages of the Weba Chute System: it addresses multiple bulk materials handling issues at once.

Among the key challenges that plants face, for instance, are spillages and blockages at the transfer point. This creates risks to safety and the environment, leading to costly downtime.

Dust is also a common problem, compromising workers' health and even leading to regulatory non-compliance. Excessive wear of conveyor belts and transfer point components is another headache for plant operators, often requiring frequent maintenance and causing unscheduled downtime.

"The source of these issues is invariably the uncontrolled discharge of material," says Alwin Nienaber, technical director at Weba Chute Systems. "To effectively control the direction, flow and velocity of material, each transfer point needs to be custom-designed using sound engineering principles."

Weba Chute Systems develops its chute designs based on the 'supertube' effect, says Nienaber, using sophisticated 3D software as well as discrete element method (DEM) simulation for verification. The controlled transfer of material onto the conveyor belt reduces wear and tear on belts while also minimising the physical impact that creates dust. The cascade lining system can also be employed, allowing 95% of material to run on to reduce wear.

Nienaber highlights that transfer points contribute to some of the highest maintenance costs in a bulk materials handling plant, and should therefore be considered as critical elements of a minerals processing system. A chute's performance is especially relevant to the wear-life of conveyor belts, which can account for a large percentage of running or maintenance costs.

"Conveyors are carefully selected to match the plant's operational needs, as are the feeders, crushers, hoppers and screens," he says. "Unfortunately, the chutes at the transfer points are often considered as simply fabricated plate-work, and not afforded the same detailed attention."

Optimum chute design and customisation can solve a range of plant challenges while reducing maintenance requirements, improving transfer conditions, increasing throughput and rendering a longer life to conveyor belts. Nienaber notes that global best practice has in fact accepted the vital role that chutes play, recognising that they should be engineered to suit the specific application.

Weba Chute Systems address multiple bulk materials handling issues including correct delivery onto conveyor belts.

The Weba Chute System's design philosophy has found its way into over 5 000 transfer chute installations in mines and plants in Africa and abroad. ■

Pekka Vauramo to remain president and CEO of Metso Outotec

Pekka Vauramo will continue as the president and CEO of Metso Outotec until the end of 2023.

"This is a unique opportunity to lead the integration of two great companies into Metso Outotec and to develop Metso Outotec to become an industry leader. We are in the beginning of our integration journey and Metso Outotec has a lot of potential to increase the effectiveness of its operations and to serve its customers even better and in a more sustainable way," says Vauramo.

"I am pleased that president and CEO Pekka Vauramo will continue to lead Metso Outotec during this strategic period, providing continuation to the organisation and the strategy implementation as well as securing that the well-started integration process will be finalized successfully," says Mikael Lilius, chair of the Board of Metso Outotec. ■

TOMRA rolls out cloud-based data platform into mining

TOMRA Insight, the cloud-based data platform which enables sorting machine users to improve operational efficiencies, is being rolled out to more industries.

Following its successful launch last year by TOMRA Sorting Recycling, TOMRA Insight is now also being made available to customers of TOMRA Mining and TOMRA Food, and for all three of these industries, the platform is enhanced by new features and functionalities. This makes TOMRA Insight even more capable now than it was when successfully launched to recyclers in March 2019.

TOMRA Insight is a subscription-based service that turns sorting machines into connected devices that generate valuable process data. This data is gathered in near real-time, stored securely in the cloud, and can be accessed from anywhere and across plants via a web portal available for desktop and mobile devices.

Data captured by TOMRA Insight is analysed on behalf of customers by TOMRA Mining engineers, and key findings shared in confidential reports supplied to customers monthly.

Felix Flemming, vice president and head of digital at TOMRA Sorting, comments: "By capturing and using valuable data, TOMRA Insight is transforming sorting from an operational process into a strategic management tool. This tool is constantly becoming more powerful as we continuously develop it in response to customers' needs and priorities. New functionalities and features are released every three weeks – a routine during which TOMRA works closely with customers in pursuit of shared objectives."

Data captured by TOMRA Insight provides valuable performance metrics that help businesses optimise machine performance. Operating costs are reduced by simplifying spare part ordering and flexible access to data and documentation.

Downtime is reduced by monitoring machine health and performance in near real-time, identifying gaps in production and analysing potential root causes, by supporting the management moving to predictive and condition-based maintenance, and by preventing unscheduled machine shutdowns. Throughput is maximised by evaluating variations and optimising sorting equipment accordingly. And sorting to target quality is enhanced by having accurate material composition data which enables decisions to be based on more detailed information. ■

Orica and Glencore sign explosives technology and services partnership

Orica (ASX: ORI), the world's largest manufacturer of commercial explosives and innovative blasting systems, has been awarded the five-year explosives technology and services contract for Glencore's Australian copper and zinc operations, effective January 2021.

Orica's wireless initiating system technology, WebGen, in use at Glencore's Ernest Henry Mine.

Glencore, one of the world's largest globally diversified natural resource companies, produces and markets a diverse range of metals and minerals, with its Australian copper and zinc operations including McArthur River Mine (NT), Lady Loretta Mine (QLD), Mount Isa Mines (QLD), Ernest Henry Mine (QLD) and CSA Mine (NSW). Orica has an existing supply agreement with Glencore's nickel and cobalt operations at Murrin Murrin (WA).

As part of the contract, Orica will deliver the full suite of explosives technology and blasting services across the Glencore copper and zinc operations in Australia, including the supply of the world's first fully wireless initiating system, WebGen, BlastIQ digital blast optimisation suite of products and smart explosives delivery system, Bulkmaster 7. This partnership further strengthens and expands Orica's longstanding relationship with Glencore.

Orica chief executive Alberto Calderon says: "Glencore is a key global diversified customer, and we are delighted to be partnering with them across their Australian copper and zinc operations, integrating our most advanced technologies and solutions to solve their more complex operational needs.

"Glencore's Ernest Henry mine in North West Queensland was the first site in the world to trial and adopt our wireless explosives technology, WebGen. This deal shows Glencore's confidence in our technology roadmap as well as aligning with their strategic vision for technology to deliver added value to their operations."

Orica will work closely with Glencore to ensure uninterrupted supply to each operation, during the rapid mobilisation and transition period. ■

E and I Zambia showcases local project capacity on the Copperbelt

Experienced local electrical control and instrumentation specialist E and I Zambia has successfully completed a large project on a new process plant for one of Zambia's leading copper miners.

The contract included the installation of six electrical substations, 20 transformers, five 1 250 kVA diesel generators for backup power and a 950 m overland conveyor. Almost 250 km of cable was pulled and nearly 15 km of cable racking was constructed.

Also completed were six earth mat rings, 12 mast lights and a range of general plant earthing and lighting installations around the plant, as well as the fitting and termination of instruments. E and I Zambia conducted the work between January 2019 and April 2020, in close collaboration with both a leading design house and the end-client. According to projects manager Dave Opperman, the company has a sound track record in the country, having been active on the Copperbelt and beyond since 2002.

"The experience of our team on site, the quality of our artisans and the training of workers ensured that the quality of this job was world-class," Opperman says. "While prioritising safety and quality, we were still able to adapt to the inevitable fine-tuning of project parameters and schedules, and to deliver on the client's timelines."

Completed cable racking and cable installed.

The safety standards were well reflected in the achievement of 395 Lost-Time Injury Free (LTIF) days. This was done despite a busy site – peak manpower grew to over 270 employees and subcontractors – in a project that consumed almost 590 000 man hours. Almost all the staffing on the project was local.

"Being so well-established in Zambia, we have a solid database of skilled artisans that we can draw upon for large projects like this one," he says. "The country has a good foundation of these trades, and we can select the most suitable profile of skills to match the project."

A close relationship with trade unions – maintained by regular consultation – ensured that no labour issues arose that could disrupt the project, he says.

"The company maintains a comprehensive collective agreement with labour, and our collaboration means that the unions understand what the success of the project demands," Opperman says. "This creates a win-win relationship that allows the smooth running of projects – a vital factor in the meeting of strict deadlines."

He notes that the company is also able to optimise its local procurement through its network of reliable suppliers, while maintaining a strong cross-border supply chain for large and specialised equipment and components from South Africa. ■

Datacentrix tackles digital transformation in local mining sector

With a focus on how technology can help move the local mining sector into the future, high performing and secure ICT solutions provider Datacentrix recently held the first virtual version of its Mining Indaba event, welcoming an audience of over 200 delegates. The 2020 indaba was supported by Platinum sponsor, Huawei, as well as Silver sponsors, OpenText and Tenable.

The two-hour event was concise, and reiterated the importance of digital transformation with greater urgency now than ever before in light of the COVID-19 pandemic.

In his welcome, Datacentrix CEO Ahmed Mahomed spoke on the profound changes COVID-19 has had on the local economy, on businesses and the way we work, as well as on our personal lives, and how these consequences will continue to be felt in all areas into the future.

"It stands to reason that the effects of technology – be it robotics, artificial intelligence (AI), data mining, intelligent networks or remote working environments – will also endure across every industry, including the mining sector. The issues of how mining companies operate, how they improve both safety and productivity, and how they mine data, are becoming increasingly critical when it comes to gaining competitive advantage."

Mahomed's sentiment was echoed by the morning's keynote speaker, chief economist and director of Efficient Group, Dawie Roodt, who discussed several trends that were already well established pre-COVID: the so-called 'gig economy' (also known as the 'sharing economy', with reference to the likes of Uber and Airbnb); the increasing use of online shopping platforms like Amazon; growing numbers of remote workers; and a developing dependence on AI and algorithms.

"These are simply being accelerated because of the lockdown," he clarified. "We have also seen that tertiary sectors – more service-oriented businesses – have become much more important in recent years, while the primary sectors, such as agriculture and mining, have been eclipsed.

"However, the real winners during this time will be those primary sector businesses that manage to transform themselves into secondary and tertiary players. For example, the agriculture sector has already made changes, such as genetic engineering or drones for instance. Global economic growth is happening in one place, the tertiary services industry." ■

A connected mining truck.

Collaboration and co-operation for a safe mining industry

The COVID-19 pandemic has been a challenge that no one could have anticipated. It has had a wide-reaching impact on all industries across the globe, and the South African mining sector is no exception. By *Mxolisi Mgojo*, CEO Exxaro Resources.

Mxolisi Mgojo, CEO Exxaro Resources.

While necessary precautions were put in place as early as possible, there is still no telling just how much our industry will be affected in the long term. One thing we do know is that despite what seems to be the light at the end of the tunnel, with the easing of lockdown restrictions, we cannot afford to be complacent.

It has been a challenging time and our industry has proven to be resilient – we have been able to use previous health and safety endeavours in the battle against the pandemic. While the impact of COVID-19 has been extreme, it's because of this past experience and a swift response time that we have been better positioned to face the pandemic than many others.

The importance of being prepared

A month before the pandemic first made landfall in South Africa, the Minerals Council South Africa began producing educational materials for distribution to members, based on communications from the National Institute for Communicable Diseases and the World Health Organisation.

We made our first public pronouncement of a COVID-19 case on 6 March – the day after the first case was diagnosed in South Africa. During the announcement, we recognised the circumstances surrounding our sector and our vulnerability to infectious diseases like COVID-19. At the same time, we announced a 10-point plan which would form the basis of our standard operating procedure (SOP).

Defusing safety threats

The SOP included the features necessary to operate a mine in the COVID era. These included considerations like ongoing health education, availability of adequate PPE, sanitisers, testing capacity, quarantine facilities and daily screenings.

We are proud that this procedure became the basis of the regulatory regime after AMCU used legal action to require government to put in place more detailed, formal COVID-19 regulations for the industry.

The reality is that many mining companies have occupational health departments in place that are run by qualified medical professionals who are dedicated, determined and creative thinkers. In fact, in 2002, when our government and its health department were in the hands of HIV/AIDS denialist leaders, it was the mining industry that showed South Africa how to apply antiretroviral treatment on a mass scale.

What's more, in 2016, the mining industry's public health heroes, together with their counterparts in the unions, the Mine Health and Safety Council, and other government health institutions, launched the Masoyise iTB campaign aimed at the industry's employees and communities. Thanks to Masoyise iTB, the sector has a TB industry rate that's lower than the rest of the country.

By the time the COVID-19 pandemic arrived, our industry and its stakeholders had, over the last few decades, developed remarkable expertise in dealing with the spread of infectious diseases. We have since put that expertise to good use in an effort to combat the virus.

Response measures for zero-harm

Despite this, it is well known that restarting mining operations, especially underground operations, after a long break can have adverse safety performance consequences. And even more so since management and employees needed to focus on implementing the SOP.

We couldn't allow ourselves to neglect other Zero Harm imperatives. So, in addition to focusing efforts on our safety performance, and after talks with other industry leaders, we held a National Day of Health and Safety. The occasion focused on reinforcing behaviour change at home and at work in the face of the COVID-19 pandemic.

Another example of the mining industry collaborating with one another and various stakeholders is the oxygen relief initiative in the Eastern Cape. In addition to providing oxygen and oxygen-related products, we ensured that we had sufficient capacity for quarantining employees and their families and provided treatment facilities too. ■

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