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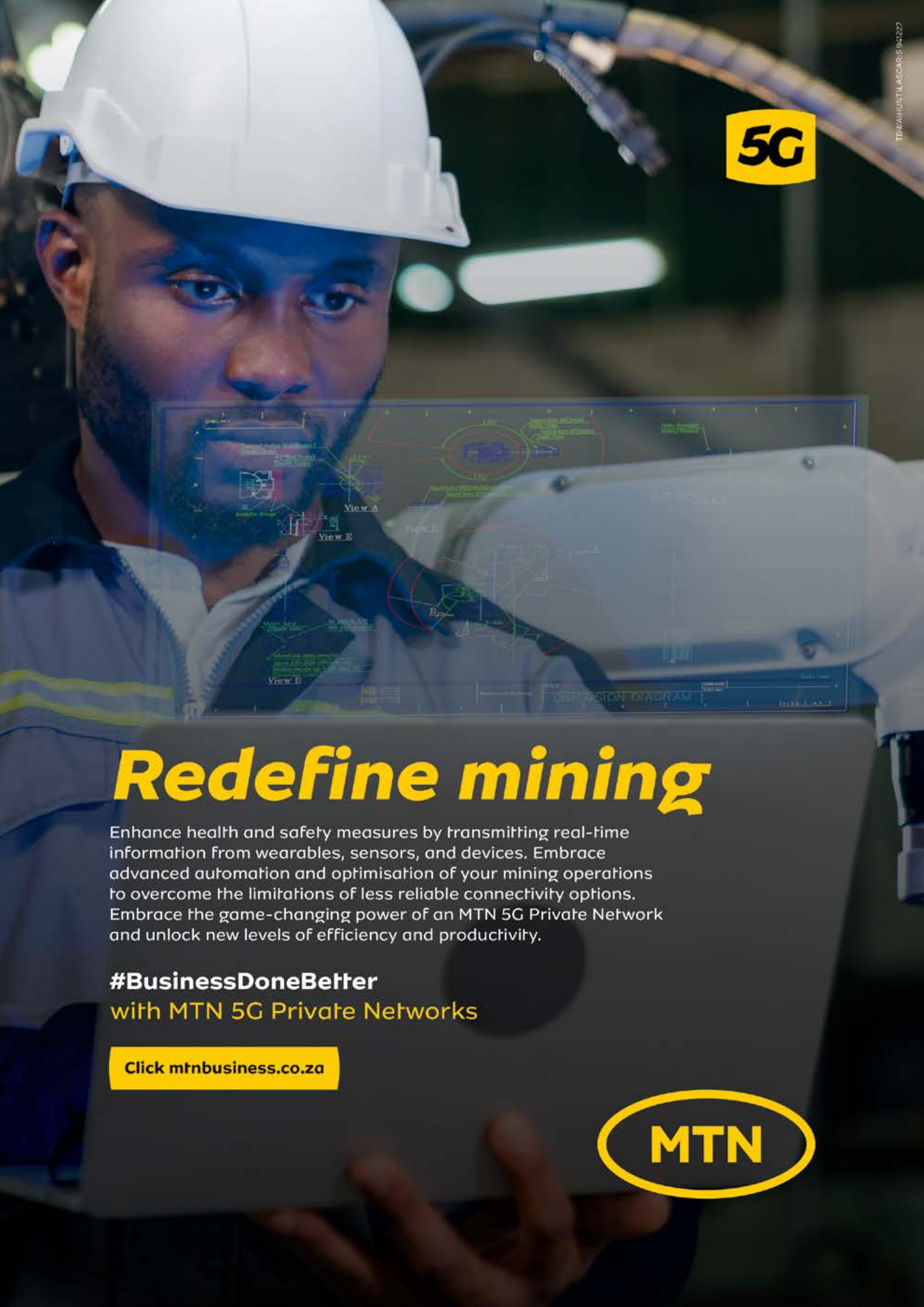
For people who are serious about mining

IN THIS ISSUE

- **UMS brings fresh thinking** to shaft sinking
- **Cora Gold eager to start construction** on Sanankoro
- **MMP advances mechanical cutting initiatives** for NRHR mining
- **Maptek drives mining's** future readiness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CONTENTS

ARTICLES

COVER

COMMODITIES OUTLOOK

GRAPHITE

WEST AFRICAN PROJECTS

MINING TECHNOLOGY

REGULARS

MINING NEWS

COLUMN : ROSS HARVEY

SUPPLY CHAIN NEWS

ON THE COVER

Mining and engineering services provider UMS brings fresh thinking to the highly complex task of shaft sinking. See story on pg 6.

COMMENT

That chunk of coal

"A diamond is nothing but a chunk of coal that did well under pressure."
Henry Kissinger

Nelendhre Moodley.

Despite a waning desire for diamonds, the precious stone nevertheless continues to hold pride of place at many events, including the recently held Miss South Africa competition, which saw Natasha Joubert crowned, and become the first winner to wear the brand-new coronet dubbed *Mowana*, 'Tree of Life'.

Mowana is the brainchild of Ursula Pule, creative director and co-founder of Nungu Diamonds, the sponsor of the new Miss South Africa crown. According to the press statement, the crown is made up of over 800 stones comprising diamonds, gemstones, and cubic zirconia, with the biggest weighing 15 carats. Joubert becomes the 67th queen to be announced since the pageant began.

Diamond miner, De Beers Group recently celebrated a key milestone with the delivery of first production from the underground operations at its Venetia Mine in Limpopo Province. The overall construction of the underground mine is now 70 percent complete, with construction and production ramp-up continuing over the next few years. The $2.3 billion investment bolsters De Beers' global production and will benefit the South African economy and host communities until at least 2045, the company said.

However, the sector continues to face headwinds with De Beers Group rough diamond sales for Cycle 6 2023, showing a dip in demand.

Al Cook, CEO, De Beers Group, said that in line with seasonal trends, rough diamond sales continued at a lower level during the sixth sales cycle of the year.

"Participants in the diamond industry's midstream sector continue to take a cautious approach to purchases in light of ongoing macroeconomic challenges."

The miner, however, looks forward to later in the year when most celebrations, including Thanksgiving, Diwali, Christmas, New Year and the Chinese New Year – and subsequently the gifting of jewellery – occurs.

BDO South Africa's Servaas Kranhold and Jacques Barradas, also flagged the decline in the demand for rough diamonds, noting that in the past year, the diamond industry had faced a series of challenges that led to a notable shift in its landscape.

"From a 15 to 18% reduction in diamond prices over the past year to the unsettling decline in pricing and volumes at market tenders among major mining companies, the industry is in the midst of a transformation," they said.

Meanwhile, that original source of the diamond – coal – is making waves and not for the usual reason of being a fossil fuel and thereby 'dirty and polluting'. Oh no, there's a class action brewing, initiated by coal miners over occupational diseases.

Human rights lawyers representing coal mineworkers recently filed a class action lawsuit against mining companies South32, BHP and Seriti Power, seeking "legal remedies for sick miners and the families of workers who died as a result of coal mine dust lung disease" and associated illnesses.

A few years ago, gold sector workers filed a lawsuit against gold miners which led to a R 5 billion class action settlement.

The Tshiamiso Trust, established to compensate former gold mine workers who contracted silicosis and tuberculosis (TB) after working in mines, recently paid the first R1bn to 11 316 eligible claimants. Six mining companies were party to the agreement — African Rainbow Minerals, Anglo American, AngloGold Ashanti, Gold Fields, Harmony and Sibanye-Stillwater.

In this edition

Our cover story outlines how UMS Group's expertise in key projects across the globe continues to grow (pg 6). Other notable stories in this edition include the Lindi Jumbo project which is targeting production in early 2024 (pg 14), Cora Gold as it chomps at the bit to get going on its Sanankoro project (pg 18), the Mandela Mining Precinct, which is advancing mechanical cutting initiatives for NRHR mining (pg 26) and technology specialist, Maptek, which is on a journey to ensure mines are future ready (pg 32). ■

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Boost your business with best-in-class drilling

The global rock drill rig market was recently projected to grow at a CAGR (Compound Annual Growth Rate) of 5.5% during the forecast period of 2018-2028. The global water well drilling market size is expected to reach $4.12 billion by 2028 – CAGR of 5.20% from 2021 to 2028. Maintaining leadership in the water or rock drilling market is essential in keeping your company ahead of competitors in these rapidly growing industries and partnering with Powerbit Rocktools can help you maintain your competitive advantage.

The company is renowned for listening intently to its customers and cultivating an in-depth understanding of their challenges, problems and goals. And, with over 20 years of experience, Powerbit drilling products remain at the forefront of technology at affordable prices.

With a singular focus on customer needs and a passion for excellence, Powerbit Rocktools continues to innovate; empowering drilling businesses to conquer even the most challenging drilling operations with ease and efficiency.

As the industry rapidly adopts technological advances and mining and drilling operations expand to new frontiers, the need for robust and reliable rock drilling tools has become even more critical. In the face of extreme and challenging environments, businesses need cost-effective and enduring solutions to conquer the tough terrain they inhabit.

Powerbit has been a prominent player in the southern African mining industry since 1996, addressing the unique demands of drilling-related industries with unwavering dedication and a commitment to excellence.

The company's product range is extensive and purposeful, catering to various drilling needs across industries. The fit-for-purpose line-up includes DTH hammers and bits, RC hammers and bits, tri-cone bits, top hammer bits and rods, casing systems, grinding machines and more. Each tool has a proven history of enhancing drilling operations' efficiency and longevity.

One key factor that sets Powerbit apart is its focus on building long-term partnerships with its clients. Thomas Chao, MD at Powerbit Rocktools, emphasises the value of maintaining a reliable supply chain in the context of African industry, where drilling and geotechnical excavation operations form the backbone of resource extraction and optimisation, driving the continent's survival and progress.

"In the drilling industry, our clients can't afford downtime. We pride ourselves on being a partner who is always on hand to help our clients address their unique challenges. Our team is not just a supplier, we are a valued partner for our clients' businesses. And that makes all the difference.

"We consistently maintain and adapt to new quality standards by collaborating with our facilities offshore and continuously work alongside our clients to understand their needs and provide products that serve their specific requirements."

Powerbit collaborates with its facilities in Taiwan, China and Japan, where they have advanced research centres and applied technology experts in the rock drilling tools field working tirelessly to innovate new products and methods, cultivating a practical understanding of emerging engineering challenges to effectively tailor their products to meet clients' specific needs.

Powerbit Rocktools MD, Thomas Chao.

The value of economical, long-life rock drill bits, hammers and grinding machines in today's drilling operations cannot be overstated. Powerbit recognises these tools' pivotal role in enabling clients' success and driving infrastructure projects that underpin local economies.

The Powerbit Product Roundup is a testament to its commitment to empowering progress in drilling operations. From DTH hammers and bits to top hammer drilling tools and RC hammers and bits, each product is meticulously engineered to ignite the power of remarkable rock drilling. With a versatile range suitable for various working conditions and industries, Powerbit is well-equipped to serve diverse clientele with different drilling requirements.

Each Powerbit product is meticulously engineered for efficiency and longevity.

Prieska Crown Pillar +105 Level Mineral Resource increases to 2.3 mt

ASX-listed Orion Minerals has taken a key step in its early mining strategy at the Prieska Copper-Zinc Project (Prieska Project) in the Northern Cape, with the completion of an updated Mineral Resource Estimate (MRE) for the near-surface +105 Level Crown Pillar comprising Indicated and Inferred Resources of 2.3 mt grading 1.7% Cu and 1.6% Zn. The updated MRE for this shallow portion of the Prieska deposit represents a robust focus for the trial mining programme scheduled to commence in the next few weeks.

The +105 Level Crown Pillar is located in close proximity to existing underground infrastructure and can be readily accessed, allowing trial mining activities to commence immediately with all required permits and funding now in place.

This programme will generate key metallurgical and other data that will assist with process plant design and also feed into an updated Bankable Feasibility Study (BFS) for the Early Production Strategy at Prieska.

The updated MRE for the +105 Level Crown Pillar brings the total Indicated and Inferred Mineral Resource including the Deep Sulphide Mineral Resource of the Prieska Project to 31 mt grading 1.2% Cu and 3.6% Zn.

Orion's CEO, Errol Smart, commented: "Our strategy to bring the Prieska Copper-Zinc Mine back into production is now rapidly gaining momentum, with the completion of this updated Mineral Resource for the near-surface, +105 Resource Block, outlining a very attractive early mining opportunity at this fully permitted mine. The supergene sulphide, Indicated Resource, with a grade of 2.6% copper, is a compelling focus for our early mining strategy. This resource block is accessed from existing underground development via a short ramp, allowing trial mining to commence in the coming weeks. Ore sourced from the trial mining will be used for metallurgical optimisation tests and for the detailed design of an initial processing plant at Prieska." ■

Orion Minerals CEO, Errol Smart.

Lithium joint venture with Rio Tinto in Rwanda

LSE-listed Aterian, an exploration and development company advancing its portfolio of African focused critical and strategic metal assets, has signed a definitive earn-in investment and joint venture (JV) agreement with Rio Tinto Mining and Exploration (RIO) and Kinunga Mining. The agreement is for the exploration and development of lithium and by-products at its HCK JV project holding the HCK licence in the Republic of Rwanda.

Charles Bray, Chairman of Aterian, commented: "This is a transformative deal for Aterian and highlights our ability to identify potential world-class deposits in critical minerals such as lithium. We have identified 19 separate LCT (lithium-caesium-tantalum) pegmatite zones across the 2 750-hectare project, offering the prospective scale necessary to attract such a major partner as Rio Tinto."

Aterian inks agreement with Rio Tinto Mining and Exploration.

Highlights:

- ❑ Rio has the option to invest $7.5 million in two stages to earn up to a 75% interest in the licence to explore for minerals vital for a successful energy transition to renewable energy.
- ❑ Cash consideration of $300 000 over the two stages.
- ❑ Rio has the option to add Aterian's two other Rwandan projects, pending licence approval with the authorities.
- ❑ The Project has 19 identified pegmatite zones over its 2 750-hectare licence in southern Rwanda. ■

Stella Vista acquires Kalia Iron Ore Project in Guinea

Privately-held Australian company, Stella Vista, has acquired the world-class Kalia iron project in Guinea. Kalia is one of the largest undeveloped iron ore projects globally, previously owned by Bellzone Mining. Since 2007, over $350 million has been invested into Kalia, including progressing Kalia through two BFSs. Existing infrastructure at Kalia includes on-site camp, drill rigs and plant equipment. The Group will simultaneously investigate the potential of the laterite nickel deposit, which overlays the iron ore deposit.

Commenting on the agreement to acquire Kalia, Russell Scrimshaw, Chairman, said: "I am fortunate to have first-hand experience in identifying iron ore projects globally which fill the criteria of future operational mines. Kalia is such a deposit and we are delighted to have acquired it. The most important development has been the start of construction of the Trans-Guinean Railway and Port infrastructure, which will bring a new economic dawn to Guinea." ■

Stella Vista acquires Kalia Iron Ore Project in Guinea.

JC Auditors launches ESG verification for transport and logistics

JC Auditors (JCA), an independent certification body, has launched its Environmental, Social, and Governance (ESG) verification service tailored specifically for the transport and logistics sector.

The offering aims to enhance sustainability practices and promote responsible business operations within the industry. JCA's ESG verification services for the transport and logistics sector will enable companies to demonstrate their commitment to sustainability, transparency, and ethical practices.

Through a defined process, JCA will evaluate various ESG factors, including carbon emissions reduction initiatives, supply chain ethics, employee welfare, community engagement, and corporate governance measures. Says Oliver Naidoo, Managing Director of JC Auditors: "By aligning with globally recognised ESG standards, we aim to empower companies in the sector to adopt responsible business practices and contribute to a greener, safer and resilient supply chain." ■

JCA launches ESG verification for the transport and logistics sector.

Anglo American Platinum appoints Craig Miller as CEO

Platinum miner, Anglo American Platinum has appointed Craig Miller as CEO, with effect from 1 October 2023, following Natascha Viljoen's decision in February to take up the COO role at Newmont Corporation.

Norman Mbazima, Chairman of Anglo American Platinum, said: "I am pleased to extend a warm welcome to Craig Miller in his new role. Throughout the past four years, Miller has been an invaluable member of the leadership team and our Board, leading strategy development and execution and driving successful cost and value optimisation across the business. In his new position, Miller will continue to prioritise safe, stable and capable operations while fostering our high-performance culture, all aimed at delivering sustainable ounces and industry-leading returns through the cycle."

Miller is currently the finance director of Anglo American Platinum, a role he has held since 2019. With over 23 years of mining industry experience, he is a seasoned senior executive who has worked in South Africa, Brazil, and the UK, with expertise spanning Anglo American's PGMs, base metals and bulk commodities businesses. ■

UMS brings fresh thinking to shaft sinking

Mining and professional engineering services provider UMS Group, which designs and constructs underground and surface works – as well as associated surface infrastructure such as process plants – for mining clients, has earned a reputation for being an innovator. In particular, the company has brought fresh thinking to the highly complex task of shaft sinking, as Robert Hull, Group Chief Operating Officer, and Murray Macnab, Group Technical Director, made clear when they spoke to *Modern Mining* recently.

With offices in many countries across the globe, UMS has a healthy order book for shaft work, with three major shaft-sinking contracts on three continents in its portfolio, as well as an important role on a major South African shaft-sinking contract project where it is a key member of the 'owner's team'. UMS is also engaged in a number of smaller contracts where it is performing shaft and headgear upgrade and optimisation work. In addition, it is busy with studies on shaft, underground, surface and process projects for a wide range of clients.

According to Hull, one of the main contributors to UMS's success is the breadth of its service offering. "Not only are we contractors but we have a full design, engineering and procurement capability which allows us to offer clients a true seamless service – from initial concept right through to construction and commissioning," he says. "Having this full suite of services means we can beat industry norms when it comes to delivering projects, particularly when clients engage with us at an early stage of project development."

The value that UMS's broad offering can bring to projects is well illustrated by the company's current contract at the Ero Copper Caraíba Operations mine in Brazil to sink a 1 500 m deep, four-compartment, vertical shaft as part of a project to deepen the mine. The company will employ the slipe-and-line method to enlarge a raise bore hole.

"Our involvement started when we were asked by the client to review a feasibility study for the deepening project," says Macnab. "This initial engagement

led to us designing an appropriate shaft solution to meet the client's objectives and then being appointed to implement it, a task which has seen us undertake the capital cost estimation, engineering design, project schedule and procurement. We're now well into the execution phase and busy with the changeover from the pre-sink to the main sink, which will get underway towards the end of this year."

He adds that UMS has also designed a full headgear that can rapidly swing over and facilitate a changeover to blind sinking should the hole block up. "We hope we never have to use it, but it is available and further de-risks the project," he says.

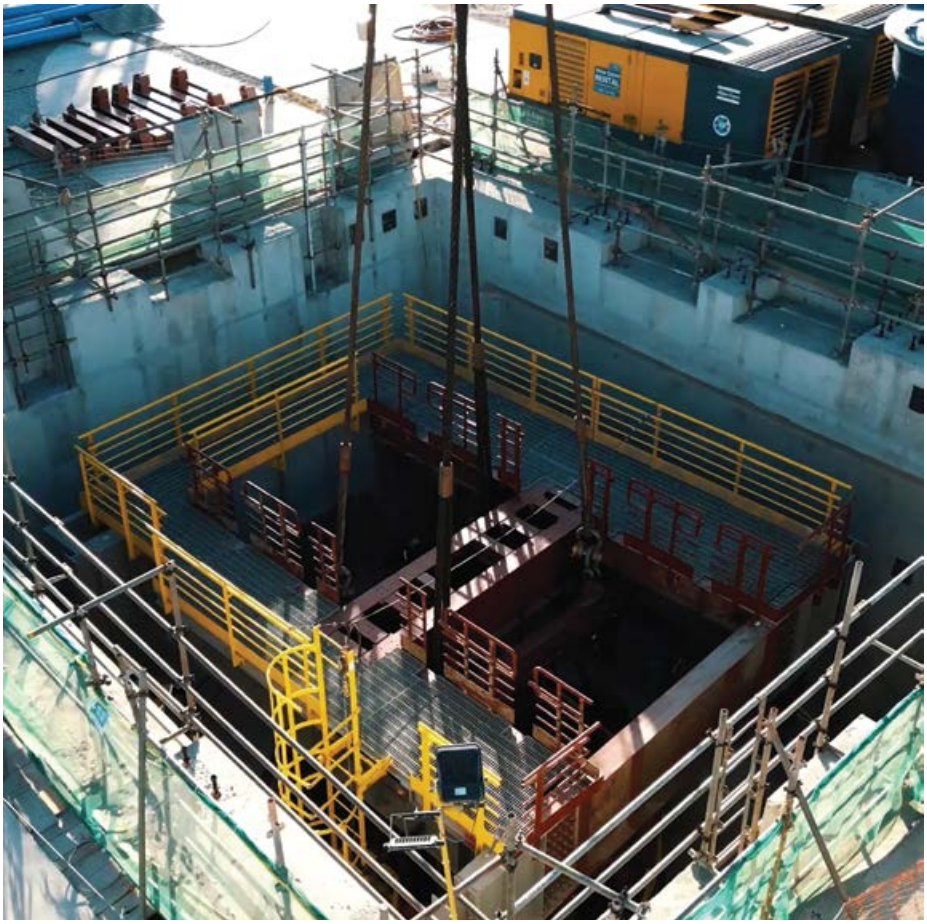
The range of skills that UMS offers derives from its rich heritage. The Group is the inheritor of the expertise of Shaft Sinkers, which was established more than six decades ago. UMS acquired the Shaft Sinkers brand in South Africa in 2015.

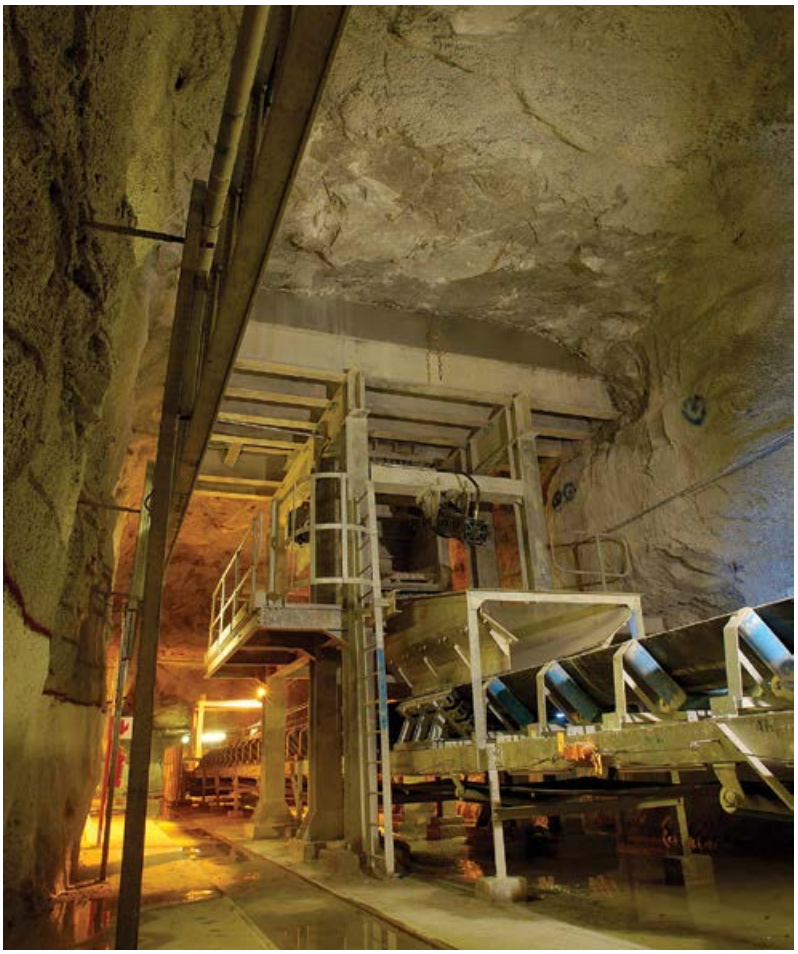
Hull points out that as result of the acquisition UMS can claim a vast library of sinking knowledge and experience built up across 250 mining and shaft projects undertaken globally, 170 km of vertical shafts sunk and over 35 km of incline and decline shaft construction.

"Along with the acquisition, we also purchased a fleet of winders and other sinking equipment, which we've subsequently expanded significantly," Macnab adds. "We now have more than 35 units in our fleet which can be deployed at short notice to projects. This gives us a distinct competitive advantage as procuring new winders can take between two and three years."

UMS's South African sinking operations are run by Takalani Randima (who is the first woman to run a shaft sinking company). The Professional Engineering services division is managed by Graham Roberts. Both have extensive operational underground mining experience.

"Deeply rooted in our culture of innovation at UMS is that we question the conventional wisdom,"





says Macnab. “Having said this, we’re also prepared to go with traditional methodologies and equipment, suitably modified, when it is appropriate. In general, our philosophy is to embrace technology. In particular, we are great believers in mechanisation and we’re also starting to apply 4IR technologies to shaft sinking through our company UMS 1Worx, a recent acquisition, which is a specialist in this field.”

Macnab believes that one of the big challenges facing shaft-sinking organisations is to match the sinking rates that used to be achieved in the 1980s and earlier. “The problem was that these rates of vertical advance were achieved at a cost, which I can attest as I was a junior engineer back then working on a sub-vertical shaft sinking project for one of the gold mines,” he recalls. “Yes, our progress was good but – as was the case with all shafts being sunk at the time – the number of injuries incurred was unacceptably high.”

He says that starting in the 1990s, shaft sinking rates dropped as the focus on safety improved. “This occurred because the industry, for reasons of safety, started to move away from concurrent work, where you would have teams working one above the other,” he states. “It was the right thing to do and it achieved its aim of making shaft sinking safer but it was also taking much longer to sink shafts. At UMS, our approach has been to try to approach the productivity that was achieved back in the 1980s without in any way compromising safety. We’re of the view that working underground must be as safe as working in an office.”

As proof that this goal is attainable, Macnab points to one of UMS’s current shaft sinking contracts – a nearly 700 m deep ventilation shaft in New Mexico in the US.

“We recently achieved a sinking rate of 105 m over a month, which is truly exceptional, and yet we have an unblemished safety record,” he says. “Even more amazing is that we only have 54 people working on the shaft sinking, with only five or six below surface at any one time. I compare this with what I saw in my early days in the mining industry, when there would typically be around 60 working inside the shaft, about half on shaft bottom and the rest in the stage and working above each other. It was a nightmare. Today, it’s organised, safe and pleasant.”

Macnab says that a major contributor to the excellent sinking rates on the New Mexico contract is its use of a vertical shaft mucker (VSM). “The VSM has been used in South Africa with unsatisfactory results

but we've modified both the machine and the manner in which it is employed and the results are exceptional. We've replaced the long operating levers with joysticks – this is less fatiguing for the operator, who can now lash and load while expending a quarter of the energy."

He adds that the drill jumbos being used by UMS all have remote control capability, allowing the operator to stand in a safe position at all times.

On its Brazilian contact, UMS will be turning to the traditional cactus grab for lashing the blasted rock with kibble tipping in the headframe in the event of the raise bore hole becoming blocked. "Cactus grabs have largely fallen out of favour because of the safety issues they present," says Macnab. "Nevertheless, they are extremely effective and can outload any other machines around. We've worked in close conjunction with our supplier in South Africa to address the safety concerns associated with this equipment and – to further promote safety – we will not have anyone working at shaft bottom during lashing."

Aside from its US and Brazilian contracts, UMS's third major shaft contract is for the sinking of the production and ventilation shafts for Lucara's Underground Expansion Project (UGP) at its Karowe diamond mine in Botswana.

Hull says that UMS's current shaft work will continue to keep it busy for at least two to three years to come. "Our contracts in Brazil and Botswana both have about 30 months to run but our New Mexico contract will be finishing next year so we will be working hard over the next few months to renew our order book. We already have some additional work at the Brazilian project and elsewhere in South America, as well as other locations in which we operate, so we're very confident that we should be able to sustain and exceed the strong growth we've experienced over the past several years." ■

Ionic Rare Earths – securing critical elements for the 'new economy'

Though small in population, Australian companies have an international reputation for being innovators. This is true across all sectors of the economy – the circular economy for magnet and heavy rare earth elements (REE) is no exception.

One such Australian company is big on its vision and mission to truly displace existing technology and supply chain markets so that an ex-China world can focus on growing net-zero industries.

ASX-listed Ionic Rare Earths is an Australian listed enterprise with a clear vision to use human ingenuity coupled with purpose to create disruptive technologies, seed new supply chains and build partnerships to sustain a new and transparent market.

The new economy will be built on the foundations of circularity. With this concept in mind, IonicRE will mine, refine and recycle magnet and heavy rare earth elements. This will unlock new sources of the newly dubbed 'strategic raw materials' to empower global industries centred on carbon neutrality and advanced manufacturing through a more resilient supply chain for future generations.

Managing Director Tim Harrison said: "Ionic Rare Earths' focus is to secure critical elements for the new economy. We will do this by harnessing our technology to accelerate mining, refining, and recycling of magnet and heavy rare earths critical for the energy transition, advanced manufacturing, and defence industries."

Supply Fundamentals

Today, the bulk of the world's supply of magnet rare earths – both light REEs Neodymium (Nd) and Praseodymium (Pr), and heavy REEs Dysprosium (Dy) and Terbium (Tb) – emanates from China, which controls the release and price fluctuations of these strategic and critical elements.

Ionic Rare Earths' focus is to secure critical elements for the new economy.

Rare earths are amongst the most resource-critical raw materials; they are of the highest economic importance and at the same time feature a high supply risk. China has a dominant position in every value addition step in the conversion of mined REEs to value added products.

Unlike industrial metal pricing, set by a clear and open market vis a vis the London Metals Exchange, the market for magnet and heavy REEs is at best opaque and threatening to Western economies.

This stranglehold has the capacity to render Western manufacturing and industry uncompetitive and obsolete, significantly affecting the roll out of net zero carbon technology. Governments, including the EU, USA, UK, Japan and South Korea have responded through policy to combat this position, looking to support the development of new sources and value addition from mined products all the way through to value added permanent magnets.

In July this year, China restricted exports to the US of two metals — germanium and gallium, which are key to manufacturing electronics and semiconductors.

IonicRE's potential value stems from its integrated strategy through 1) mining magnet and heavy rare earths projects, 2) refining magnet and heavy rare earths to high purity rare earth oxides (REO), and 3) recycling end-of-life magnets into high grade,

Rapid acceleration of Ionic Rare Earths' technology, ready to scale globally.

Development of Ionic Rare Earths Makuutu project.

separated REOs to help stimulate new metal, alloy and magnet capacity across key new markets.

IonicRE's Makuutu Rare Earths Project in Uganda (IonicRE's share 60%) is IonicRE's and Uganda's flagship mine and currently ranks amongst the world's largest and most advanced ionic adsorption clay (IAC) deposits outside of China. As a globally strategic near-term resource, Makuutu is a low capital development and long-term security of magnet and heavy REO supply free of environmentally challenging radionuclides. The Makuutu Project has received environmental permits and is now progressing to Demonstration Plant scale. Currently under construction, the Demonstration Plant will validate product quality and is intended to confirm the potential to optimise the existing Stage One Definitive Feasibility Study results.

Harrison said, "Once we have been able to measure and report against science-based targets, Makuutu is expected to have a net positive carbon effect and economic benefit for Ugandan stakeholders. With the Makuutu Demonstration Plant now in construction, the team will continue to de-risk heap desorption processing methods and product quality. The philosophy at IonicRE is to produce sustainable, traceable magnet and heavy rare earth elements. We are heavily focused on how we manage all ESG matters with no harm to the environment."

IonicRE now producing magnet REOs from Recycling Demonstration Plant in Belfast, UK

IonicRE believes that creating a secondary market for recycled, separated magnet REOs is a climate action imperative. It not only supports the energy transition but seeds new downstream metal-to-magnet capacity decoupled from China to contribute positively to the future sustainability of the planet.

IonicRE's 100% owned subsidiary, Ionic Technologies, based in Belfast UK, announced in June 2023 the first production of sustainable, traceable, high purity (99.9% grade) separated magnet REOs from end-of-life magnets and waste materials. This milestone has been delivered with the support of the UK Government's Innovate UK Automotive Transformation Fund Scale-up Readiness Validation (SuRV) programme, which awarded Ionic Technologies a grant of £1.72 million in September 2022 to accelerate the development of the technology to demonstration scale.

Preparing RAB drilling pad (left) and field assistants weighing clay samples (right) in preparation for dispatch to laboratory for testing in Perth.

"Recycling end-of-life industrial magnets into separated magnet REOs within a 9-month period is a brilliant outcome for our Belfast team and the UK government. This demonstration of the technology enables the UK to benefit as it will help to safeguard the British EV automotive industry.

Our Belfast facility is key to us harnessing our technology to accelerate our mining, refining, and recycling of magnets and heavy rare earths."

Now that recycling capability in Belfast has been proven, IonicRE is emerging as a front runner to help fill this material deficit in these strategic elements, working closely with value addition peers to create a more vertical supply chain for Western governments across these manufacturing markets.

Magnet REO product laid out in Ionic Technologies' showroom in front of a permanent magnet synchronous motor (PMSM), showing >99.5% grade Nd2O3 product on right.

THE RACE IS ON for supply chain resilience

The immediate need to focus on supply chain resilience can easily be seen in 2023 benchmarks for these strategic raw materials through the EU Critical Raw Minerals Act, as it calls for:

- ❑ At least 40% of the EU's consumption for processing within Europe
- ❑ At least 15% of annual consumption from recycling
- ❑ Not more than 65% of EUs annual consumption of each strategic raw material at any relevant stage of processing from a single third country

To understand the outlook and current fragility in supplying industries reliant on magnet and heavy REEs – and to highlight IonicRE's unique value proposition – the capacity for offshore wind turbines highlights the case in point. ■

Evolving coal to meet current and future energy needs

A drastic reduction of coal energy supply will come at a hefty cost for South Africa, as the country grapples to cope with growing poverty levels and record high unemployment.

Menar MD, Vuslat Bayoglu, raised concerns about SA's ability to afford an overhaul of the power system to suit renewables, at a time when the GDP growth rate has dropped to 0.4%. Bayoglu spoke during a panel discussion at the Coal and Energy Transition Day conference in Johannesburg on Tuesday, 18 July.

Amongst available baseload suppliers, hydrogen is rated as the most expensive at an estimated cost of $239 MWh, followed by nuclear power at $225 MWh, while coal is about $74 per MWh and gas around $94 MWh. "Renewable energy is the most expensive resource," he said.

Bayoglu raised concerns about SA's ability to afford an overhaul of the power system to suit renewables.

Bayoglu spoke during a panel discussion at the Coal and Energy Transition Day conference in Johannesburg on Tuesday, 18 July.

South Africa's priority should be closing the gap between rich and poor, and providing jobs. "Coal is the country's third biggest employer in the mining sector with more than 90 000 employment opportunities already created. We have the potential to create more jobs through coal," said Bayoglu. "Solar panels are produced in China, and we do not produce wind turbines in South Africa. But when a coal mine is opened, we can employ between 400-800 people."

The Just Energy Transition plan states that R648 billion would be needed for the 2023-2027 period to integrate green energy resources and reduce coal usage. Bayoglu noted that it was not clear where the funds would come from.

"Despite the challenges, coal's resilient nature will see it evolve and maintain its position as a significant contributor to the world's energy mix. Eskom needs to invest in clean coal technology through retrofitting or building power stations with carbon capture functionality to support reliable energy supply," he added.

Bayoglu emphasised that the government needs to enhance private sector involvement, cut the red tape, and take decisive action in resolving the Transnet challenges. ■

Platinum: Some headwinds for the white metal

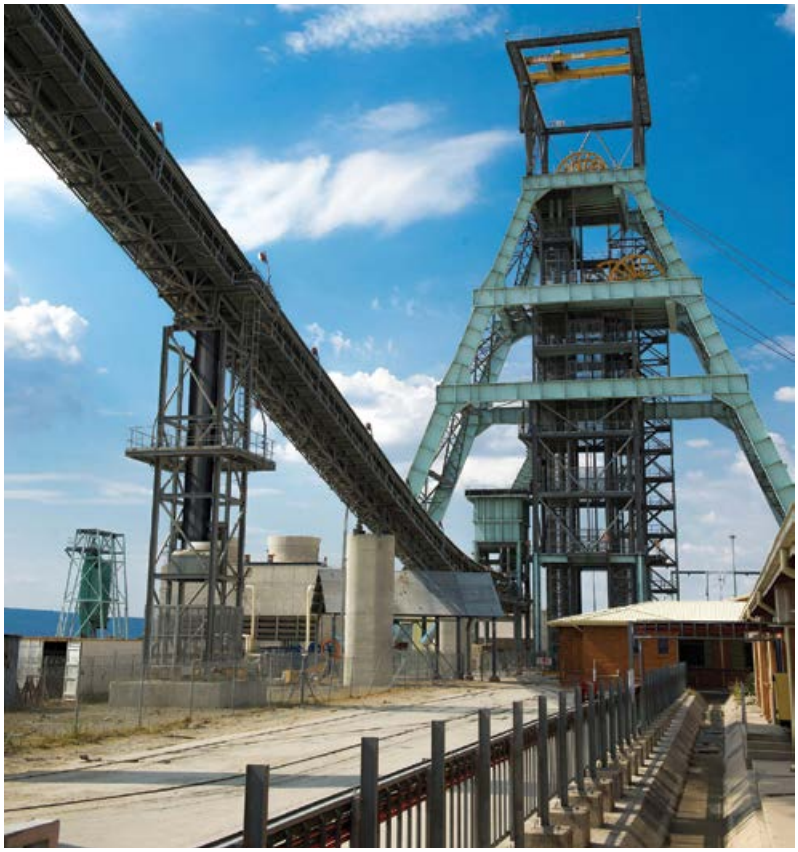
By Chief Investment Office GWM: Giovanni Staunovo, Strategist

We retain a positive outlook for platinum as we expect the white metal to benefit from substitution in auto-catalysts in gasoline powered vehicles, away from palladium to platinum. Support should also come from our outlook for a weaker US dollar and a higher gold price.

We believe platinum will be in undersupply for the rest of this year due to substitution in auto-catalysts and lower South African mine production. Hence, we expect the white metal to move back above $ 1 000/oz and continue to advise investors with a high-risk tolerance to add exposure or to sell the metal's downside price risks. That said, we are closely monitoring two possible headwinds for the metal: fewer registered diesel-powered vehicles in Europe and a lower palladium price.

We see a couple of challenges potentially limiting platinum's upside. Historically, the white metal's main auto-catalyst market has been diesel-powered vehicles. However, in Europe, the share of diesel-registered cars remains in freefall, with just 13.4% of newly-registered cars being diesel vehicles in June, down sharply from above 50% before 2017, reducing the need of platinum for auto-catalysts. The share is 15.1% for battery-powered electric vehicles, 36.3% for gasoline vehicles, and 33.2% for hybrid vehicles (which have a combustion engine and an auto-catalyst).

The other headwind comes from palladium. In 2022, palladium used to cost about 2.5 times the price of platinum, supporting the rollout of the tri-metal auto-catalyst. But that premium has narrowed to just 1.3 times currently. Should it erode further, there is a risk that substitution might slow down and weigh on platinum demand.



Platinum will be in undersupply for the rest of this year due to substitution in auto-catalysts and lower South African mine production.

Over the longer term, we think hydrogen could compensate for that demand weakness, particularly if Europe is successful in its ambitious green hydrogen plans. However, hydrogen would not be able to compensate for the near-term weaker demand for auto-catalysts. ■

Walkabout Resources CEO Andrew Cunningham.

$20 million debt facility helps Lindi Jumbo advance to production

With the finalisation in July of the $20 million loan agreement with Gemcorp, energy minerals developer, Walkabout Resources, remains on-track to deliver first production from its Lindi Jumbo graphite project in southeast Tanzania, early in 2024, CEO Andrew Cunningham tells *Modern Mining's* Nelendhre Moodley.

Walkabout Resources' 100%-owned high grade Lindi Jumbo Graphite Mine is located some 460 km from Dar es Salaam, Tanzania's capital, within the highly prospective Mozambique belt, known for its world-class, coarse flake graphite deposits.

"After the changes to Tanzania's mining laws in 2017, investors lost their desire to fund projects in that country," Cunningham explains, adding that the deal has been a massive windfall for the company. To date about 50% of the project has been funded through equity.

"The $20 million deal with Gemcorp positions Lindi Jumbo as the first graphite project in the western world to be funded, in part, through debt. So far, all other graphite projects we know of that have been built or that are currently under construction, have been funded through equity," says Cunningham, who adds that even though demand for graphite remains strong, funding graphite projects remains a huge challenge.

Having inked the deal, Walkabout Resources is cognisant that both investors and project developers alike will be keeping a close eye as the ASX-listed company develops its flagship project.

"We believe the debt funding deal is also good for our peers in the graphite space as it paves the way for them to access debt funding. However, it is important to note that the due diligence process is extremely intense."

Investment firm, Gemcorp Capital, targets emerging market opportunities, particularly projects that are close to cashflow. The funding institution approached Walkabout Resources in February this year to negotiate a funding agreement.

"As a near-term, high-demand minerals producer, the Lindi Jumbo project fit the bill for Gemcorp. The project is economically viable, has significant upside and a fairly short timeline to production and cashflow, which was essentially the attraction for the investor. Further to this, our decision more than a year ago to continue with construction meant that when we were approached, project construction was well advanced – over 60% complete – which added to its attractiveness."

According to Cunningham, the company was not deterred by the funding challenges and had plans in place that ensured project construction continued unabated. However, finalisation of the debt facility provides the company and its shareholders with much comfort and peace of mind.

Walkabout Resources initiated the first drawdown on its debt-funding in mid-July, which it is using to fully fund the project to production, make

Loading and hauling underway at the Lindi Jumbo project.

repayments on its bridging loan, and paying its contractors, with some of the funds allocated towards working capital.

From a project construction point of view, virtually all the mechanical equipment is now on site, with the EPCM contractor undertaking mechanical installation of the key equipment.

Lindi Jumbo production status

The Lindi Jumbo project remains on-track for commissioning before year-end with first production scheduled for the first quarter of 2024.

Says Cunningham: "The Lindi Jumbo project is a one-of-its-kind project consisting of an extremely high reserve grade – almost 18% – which is the highest reserve grade of any other graphite development project in Africa. From the onset, our stance has been to keep the project manageable, producing 40 000 tpa of concentrate. As we are not resource bound on the long-life asset, which has a LOM of 24 years, this leaves us with ample growth opportunities, including the ability to increase production to 50 000 tpa in concentrate, without any further capital injection. However, this decision will depend largely on market demand."

Once commissioned, the ASX-listed entity will have a full 12 months to ramp up to name-plate capacity.

"Once project construction is complete and production is ramped up to name-plate capacity, we will cast an eye towards expansion opportunities. We have 175 km^2 of exploration tenure highly prospective for graphite under our control, and the knowledge and experience to develop another mineable resource quickly and cost-effectively, if we so desire."

Graphite market fundamentals

Driven largely by the electric vehicle and energy storage market, graphite, which came off its recent 'highs' in terms of price, remains relatively attractive.

"Over the past few months, the price of graphite has come down slightly; however, the price remains robust, especially when compared to two years ago when the product was trading at a decade high".

An aerial view of the mine.

On the back of a predicted shortfall over the next decade, the commodity is anticipated to deliver healthy margins, at least for the next ten years. In fact, Benchmark Minerals Intelligence has flagged a deficit of close to six million tons of graphite in the next five years. The report suggests that 97 new graphite mines, each producing more than 50 000 tonnes per annum, will need to be built in the next 12 years if the shortfall is to be met.

"Further to this, and in line with the looming graphite deficit, the western world is pushing for alternative graphite supply aimed at reducing its dependence on Chinese production," says Cunningham.

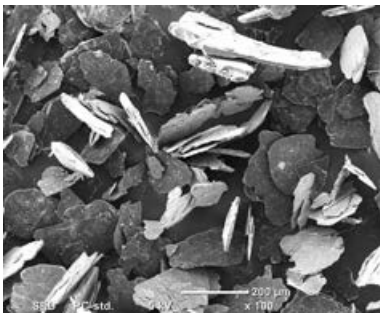
More recently though, the US identified graphite as one of four critical metals needed for the future, which is an impetus to develop more graphite mines. As it stands, not many graphite mines are being developed to meet the expected deficit.

Cunningham points out that though the US is not blessed with viable graphite deposits, Canada is and has graphite deposits that are currently under construction, with planned production scheduled to come online soon.

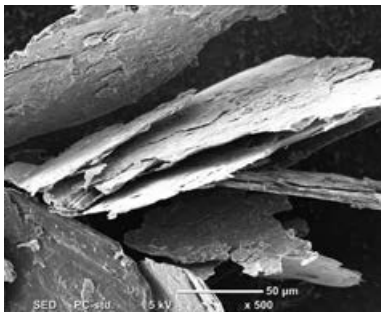
Lindi Jumbo's carbon footprint

Being a high-grade project means the mine has a small footprint, and thereby a smaller carbon footprint.

A view of the Lindi Jumbo plant.



Graphite flakes under electron microscope SEDx100.



Graphite flakes under electron microscope SEDx500.

Core sample from Lindi Jumbo project.

"Europe, Australia, and a few Scandinavian countries also contain some graphite deposits that are being developed. Though the appetite to develop graphite mines remains high, as with any mining project, operating costs need to be kept low to allow miners to compete with Chinese graphite production costs. We are fortunate that the high grade Lindi Jumbo project has some of the lowest quartile operating costs in the market, forecasted to produce at an all-in-sustaining cost of less than $500 per tonne of concentrate, which is extremely advantageous as our low operating costs provide us with a fighting chance to compete against Chinese production. Even if there is a severe downturn in the graphite market, we will still be able to make money and keep the project going."

Speaking of graphite projects in Africa, Cunningham, reveals that there are a few graphite operators in Mozambique, Namibia, and Tanzania. Mozambique is home to the world's largest graphite producer, Syrah Resources, which produces predominantly small flake.

Size matters

Large graphite flakes are the big money spinners trading at significantly higher prices than small flake sizes.

"Graphite flake size is the big differentiator between the Tanzanian graphite players and those in the rest of the world. Much of Tanzania's graphite is in the large graphite flake size category, whereas projects in other parts of the world are not as fortunate."

It is important to note that small graphite flake sizes sell at the same price even if procured for use in different applications, be it electric vehicles, battery energy storage, steelmaking or the lubricants market.

The Lindi Jumbo project's high-grade deposit is skewed towards jumbo flakes (75% above 180 microns or 80 mesh i.e., large flakes) with around a quarter of the graphite from the project in the small flake size category. This means that the majority of Lindi Jumbo's premium product will trade at the top end of the price range.

"The Lindi Jumbo project will deliver 40 000 tpa of graphite concentrate, which is still a substantial amount in a market currently delivering ~1 mtpa of graphite concentrate," Cunningham says.

He explains that for graphite developers in the early stages of firming up their resources, it would take a further two-to-three years before the projects begin delivering graphite flakes. Moreover, the poor inclination to fund graphite projects will surely be a stumbling block that will delay production time-lines.

"Given the limited number of graphite projects currently under development, we believe that our advanced project will provide us with first mover advantage as a graphite producer, both in Tanzania and the world."

Sustainability

Historically, Tanzania's mining district lies to the north of the country and, given that the Lindi Jumbo project is located to the southeast of the country, it is set to inject much needed economic upliftment to the local community.

At peak production, the mine will employ roughly 100 people. However, Cunningham is quick to point out that the knock-on effects of secondary businesses will have a tremendous impact on the extremely poor region.

"Our philosophy is to employ people from the local community first and only if we are unable to source the requisite skillset, will we look further afield within Tanzania before we start recruiting from elsewhere. The area in which the Lindi Jumbo mine is located is an area that is not really a mining jurisdiction; however, it is rapidly being developed as one of the star regions of the country," concludes Cunningham. ■

Uses of graphite

- Graphite has industrial uses in lubricants, carbon brushes for electric motors, fire retardants, and steel making, to name a few.
- It's use in the lithium-ion batteries industry has been growing at over 20% per year owing to the proliferation of cell phones, cameras, laptops, power tools and other hand-held devices.
- While the automotive industry has traditionally used graphite for brake linings, gaskets and clutch materials; of growing importance is its use in electric vehicle (EV) batteries.

Venetia Underground Project.

De Beers delivers first production from VUP

The $2.3 billion investment to take South Africa's leading diamond mine underground bolsters De Beers' global production and will benefit the South African economy and host communities until at least 2045.

De Beers Group has celebrated a key milestone with the delivery of first production from underground operations at its Venetia Mine in Limpopo, South Africa. The overall construction of the underground mine is now 70 per cent complete, with construction and production ramp-up continuing over the next few years.

Venetia Mine, South Africa's leading diamond mine, ceased open pit mining operations in December 2022 after 30 years of production from the Tier 1 asset. De Beers embarked on the $2.3 billion underground expansion in 2012, in what represents the biggest single investment in the country's diamond mining industry in decades. The highly mechanised underground operation will deliver up to seven million tonnes of kimberlite ore per year to produce ~4 million carats of diamonds annually.

Moses Madondo, Managing Director of De Beers Group Managed Operations, said: "The investment in taking the world class Venetia Mine underground enhances De Beers Group's global production for the long term and is an indication of our commitment to South Africa. Our incredible team of employees and contracting partners have pulled together fantastically to achieve this major milestone of first production from the underground operation. We look forward to seeing this high performing team continue the good work as we ramp up production over the next few years, bringing profound benefits to our workforce, our host communities, commercial partners and South Africa as a whole."

The underground project currently employs 4 300 people, mostly from the host communities of Musina and Blouberg Municipalities. De Beers commissioned a $10.5 million training centre in June 2021 as part of its operational readiness framework to enhance the transformation of people, processes and systems for the successful transition from open pit to underground mining. To date, a total of 180 employees have successfully transitioned to underground operations without any job losses for Venetia Mine's permanent employees. ■

De Beers mines first production from VUP.

VUP

Located in the Limpopo Province on the border between Zimbabwe and Botswana, the Venetia mine has been in operation since 1992 and celebrates 30 years of delivering top quality, high value precious stones. The mine contributes 40% of the country's annual diamond production.

Cora Gold CEO Bert Monro.

Cora Gold eager to start Sanankoro project construction

Gold exploration and development company, Cora Gold, is chomping at the bit to get its flagship asset, Sanankoro Gold Project, into construction as the miner awaits progress from the Malian Government, which announced a review of its mining laws in November 2022. By *Nelendhre Moodley*.

Mali, one of Africa's biggest gold producers, recently appointed Amadou Keita as the new mining minister. He replaces Lamine Traore who resigned on 31 May 2023. The government has since been in talks with gold miners over proposed changes to its mining law which could see it boost state and private Malian interests in new projects to 35%, up from 20%, of which a significant amount needs to be paid for by the Government to take up their interest.

According to Cora Gold CEO Bert Monro, the company is aligned with the Government's call for a higher percentage of local employment and is 'well within the number of local people that we want to employ at our operation'.

The West African based company recently commenced with a construction tender process as it focuses on transitioning its flagship Sanankoro Gold Project in south Mali into a producing mine and has also appointed key management ahead of project construction.

Cora Gold initiated the tendering processes for the Front-End Engineering and Design (FEED) and mine camp and a hybrid power solution, amongst others. The tendering process for contract mining will commence once the Mali Government's permit moratorium has been lifted.

"The Mali Government's moratorium on reviewing and issuing permits announced on the 28 November 2022 remains in place; at this time. Cora has prepared its application for the Sanankoro mining permit ready for submission once the moratorium is lifted. Due to the nature of the project layout, the company has been working with the relevant Malian authorities to re-draw various permit boundaries in order to create a 100 km^2 area for the mining permit. This re-drawing process will be formally completed once the moratorium is lifted. The total area of the five contiguous permits that together make up the Sanankoro Project Area will remain the same following the re-drawing exercise," explains Monro.

Given the importance of mining to Mali, Monro

A view of the recently developed camp site.

feature

remains upbeat that the Government will soon begin the process of awarding permits.

On the back of the emerging miner's "very defined strategy of becoming a near-term gold producer", the company has, over the past two years, significantly grown its resource base and delivered a feasibility study on the Sanankoro Gold Project. At the end of last year, the company completed its environmental assessment studies on the project. The gold junior recently financed the project in readiness for construction.

"What is important to note is that in quarter one, we successfully raised close to $20 million in mix consisting of equity and convertible loan notes. In June, we finalised a $70 million debt mandate agreement with a West African bank. To date, we have done a fairly good job of pulling together financing for the project, which is scheduled to cost an estimated $90 million."

The $20 million raised earlier this year came predominately from existing shareholders with a handful of new investors.

While investing into West Africa is not for all investors, the company has been fortunate to have a highly attractive project, with a high internal rate of return (IRR) and a quick payback period of a year-and-a-half once the project is in production.

"Being an open pit oxide project that is free dig means that Sanankoro Gold is a low technical risk project. As the project has a relatively low strip ratio, there is no need for expensive drilling and blasting. I believe that we offer investors a project with a relatively low technical risk and relatively high return on invested capital, which means that investors are eager to invest in our near-term project."

Sanankoro development progress

According to Monro, following its recently initiated tendering exercise for the main EPCM contractor, the company is progressing talks with an energy development business as it pursues the development of power for its project. The intention is to build a hybrid solar-diesel power station. The aim would to be running from solar power entirely during the day and generators at night. The project requires around 6MW of power.

"We have undertaken various bits of site preparation work, including the agricultural land acquired around our area of operation into specific zones and are engaging with the local community on the location of infrastructure to ensure that there is no encroachment. Essentially, we are ready to kick off on the detailed engineering and physical construction of the project."

Monro explains that in line with its heavy focus on exploration, Cora Gold has an established onsite exploration camp and a core-shed with extensive drilling core samples and RC chips.

Once Cora Gold is awarded its mining licence, the company has allocated three months for detailed engineering and design work ahead of the construction phase. The project is schedule to take 18 months to construct. "Depending on how soon we are granted our mining permit, we are optimistic that we should complete project construction by 2025."

A view of the core shed consisting of vast quantities of core samples.

In the early years of production, Cora Gold is targeting 80 000 ounces of gold per annum.

"At a gold price of $1750/oz that gives us $70 million of free cash flow, in the first full year of production. This means with a capex of $90 million, it will deliver an extremely quick payback period of under one and a half years which makes the Sanankoro Gold Project an extremely attractive investment."

The project has a reserve grade of 1.3 grams per ton, grades during the early years of mining, grades are expected to average "just under two grams per tonne for the first two to three years".

Cora Gold will initially be mining the Selin pit which consists of the higher-grade material. "However, we have three pits in reserve in total including Zone A and B."

While the project currently has a LOM of seven

In 2020, the company ran an extensive drilling programme.

Road construction underway.

years, it has "nearly half a million ounces of resource outside the reserve" and an additional exploration target consisting of over a million ounces.

"Rather than spending 10-15 years taking the project up the value curve by drilling and firming up the resource and then constructing a massive mine, we have drilled only what we felt we needed to, to get the project financed and built. As such, our focus has been on courting investors to finance the construction of a smaller scale mine. Once we have constructed the project, our aim is very much to invest in exploration to expand our resource."

During the construction phase, the project will employ roughly a thousand people and at steady-state production employ around 650 people, thereby offering much job creation in the area, which is set to further lift employment with the creation of secondary businesses.

An image of the soil samples collected.

Key appointments

In line with advancing the construction of an open pit oxide mine at Sanankoro, the company appointed key management personnel to broaden its in-house capabilities, including Project Manager, Lourens Steenekamp – who has extensive mining sector experience, having begun his mining career with Gold Fields and more recently worked as Project Manager on various projects including a greenfield oxide operation at the Syama and Tabakaroni mines in Mali for Resolute Mining and as Project Manager at Sissingue and Fimbiasso mines for Perseus Mining in the Côte d'Ivoire.

"We also appointed Frikkie Fourie – Mining Consultant, who is well experienced in platinum mining, having worked on the platinum mines in Rustenburg and Galiano Gold in Ghana where he was appointed as Vice President of Mining and head of Geology, Murray Paterson –an accomplished technical geologist with 30 years of experience."

Kenieba Project

The AIM-listed entity also holds a large permit of over 200 km^2 on the highly prospective Senegalese border along the Kédougou-Kéniéba Inlier Gold Belt, also known as the 'Kenieba Window'.

In 2020, the company ran an extensive drilling programme which identified large soil anomalies across the permit area.

"The results from the drill programme identified a number of gold discoveries, however, since then, our focus has obviously been on achieving a DFS on the Sanankoro Gold project. The Kenieba Project recently had its permit renewed. The project is ideally located in a prime location in a gold belt in Senegal, which has a number of gold mines within 50 km radius. Once we have completed construction

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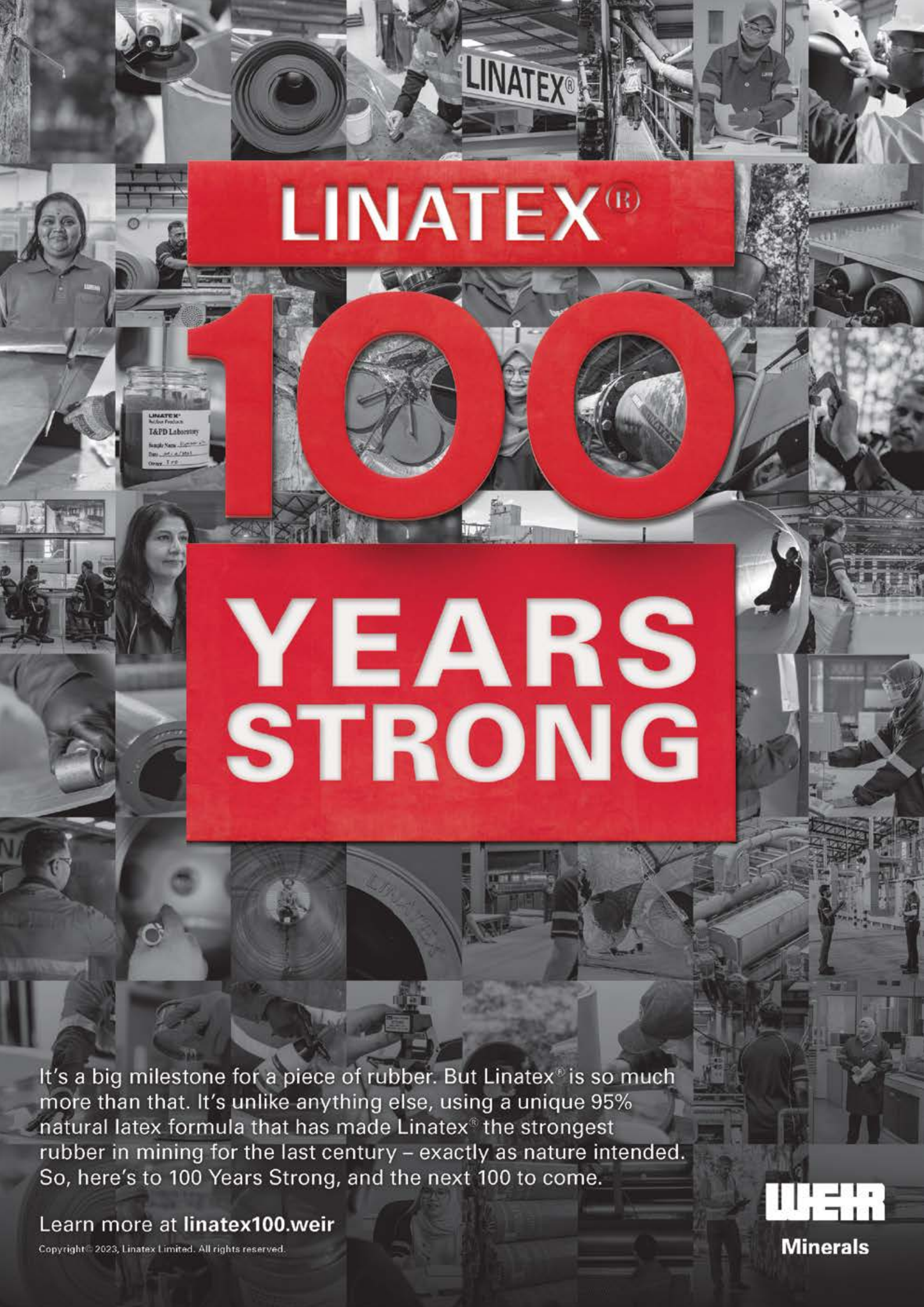

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A view of the camp site.

of the Sanankoro project we plan on undertaking more exploration work on the tenement. In fact, we recently hired a new head of geology and one of his key functions is to review Kenieba's historical data and identify areas of opportunity."

A permit in the Kenieba Project Area (covering 260 km^2) is Madina Foulbé (east Senegal). The mid-term renewal of the Madina Foulbé Permit has been ongoing with only limited work having been carried out on the permit during 2022. Results from RC drilling at Madina Foulbé in 2020 included 47 metres at 0.63 g/t Au (including 1 metre at 16.4 g/t Au) and 36 metres at 0.53 g/t Au (including 3 metres at 3.78 g/t Au), supporting results from previous shallow rotary air blast drilling where grades of up to 41.2 g/t Au were noted.

West Africa

West Africa is a prolific gold producing region. In fact, as of 2021, around 324 tons of gold were produced in West Africa. Although the leading gold producer in West Africa is currently Ghana, with a gold production totalling 117.6 tons in 2021, Mali also remains a significant producer of gold, producing 63.4 tons in 2021.

Accounting for 80% of the country's total exports in 2021, gold represents Mali's most important export, accounting for nearly 10% of its GDP.

Gold mining remains a leading contributor to employment in the region, with several countries in West Africa benefitting significantly from the revenue generated by gold mining.

"With the large number of mid-tier and gold majors operating in West Africa, there has been a large focus on elements such as ESG and education and training of local community members. When you have large mines, which are owned by major businesses, there is a significant benefit in terms of the impact on education. As an emerging miner and an imminent gold producer, Cora Gold is certainly benefitting from being established in an area consisting of highly trained people which means that we have at our disposal a well-educated workforce. Coupled with that is the well-established infrastructure such as roads networks," concludes Monro. ■

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Finding mineral value in changing times

There is much movement and change in West Africa's mining sector with even the more mature industry in Ghana presenting exciting prospects as emerging players, tightening regulations, new sources of investment and novel technologies contribute to a busy environment.

Vis Reddy - Chairman of SRK Consulting South Africa.

Ivan Doku, country manager of SRK Consulting Ghana.

According to Ivan Doku, country manager of SRK Consulting Ghana, the continued growth and complexity of mining in the region is demanding more expertise to be available locally, and across a range of skill sets. Through its West Africa hub in Accra, SRK Consulting is seeing the breadth of its services expand in line with client requirements.

"The continued success of the junior and mid-tier mining sector, for instance, has supported our expansion into exploration services – from our traditional focus on geotechnical engineering," said Doku. "Our Accra office is currently, independently undertaking a full exploration programme with a junior miner in the gold sector."

From alluvial to hard rock

He highlights the kind of project that makes the country – and the region – such a prospective investment destination, with the client investigating opportunities for hard rock gold mining in a region known only for alluvial operations. While Ghana's Kibi gold belt is well known for alluvial gold mining, this will be the first major mineral resource estimate for a hard rock gold prospect.

"This programme has already begun checking the validity of existing exploration data, leading to the development of a geological model based on certain assumptions," he said. "Existing samples are also being re-analysed, and there are plans for a new exploration drilling programme."

Doku explained that the bedrock of the Kibi gold belt is untapped largely because of the lack of a detailed understanding of the complexity of the shear zones which host the gold mineralisation. This project is therefore of such interest that SRK is hoping to present a paper on the subject at the upcoming annual conference of the Ghana Institution of Geoscientists (GHIGCON 2023), to be held at the University of Ghana in Legon-Accra from 24 to 27 October.

"We plan to highlight the work we have done so far in unravelling the difficulty that has been associated with the interpretation of the bedrock mineralisation within this gold belt," he said. "We hope that this will trigger further discussions among alluvial miners and permit holders on the Kibi belt – about the potential for hard rock mining in this area."

New technologies

He also highlighted the importance of new exploration technologies in the drive to define economic resources in the region, pointing out that many of the areas previously mined were explored using only traditional techniques.

"We are realising that there is still considerable potential along strike from existing or mined out operations on Ghana's gold belts, for instance," he explained. "However, it requires that we go beyond just trenching, for example, and use latest technologies such as sophisticated high level aeromagnetic surveys."

One of the trends that could open up opportunities is the reviewing of exploration data from decades ago, to initiate a process of re-evaluating previous results. While the larger companies that conducted the initial exploration may not have had an appetite to develop smaller or lower-grade deposits, there is considerable emerging interest from smaller players – especially when the gold price is buoyant.

Investment sources

"It is often said that there are no easy mineral targets left in Ghana, but this has not deterred a growing number of companies from exploring and developing orebodies," said Doku.

Indeed, West Africa is seeing an interesting shift in the source of investment, according to SRK Consulting South Africa chairman Vis Reddy. While the main interest in the region just a decade or two ago was from investors in Canada, the US, Australia and Europe, this has broadened into an established investment flow from Asian countries like China and India.

"More recently, we are also seeing interest from countries in the Middle East like the United Arab Emirates and Qatar, as they look to diversify from petroleum assets into industries like mining," said Reddy. "This marks a significant shift away from the traditional investment base, often signalling an interest from countries and companies who are not always familiar with the mining environment."

The continued growth and complexity of mining in Ghana is demanding more expertise to be available locally, says SRK Consulting.

Local imperative

This trend comes at a time when West African countries are applying mining codes and protocols that align with their own economic development agendas and with best global practice in the minerals sector. This has put the focus on imperatives such as local economic empowerment, as governments put measures in place to enhance the local benefits flowing from foreign mining investment.

"Our well-established office in Ghana, staffed by local professionals, has been able to respond to this trend for clients to be serviced by in-country expertise," said Doku. "We have nurtured our own in-house skills and broadened our network of local associates in various mining-related fields including geotech, environmental, geology and tailings."

The Ghana-based team has even deployed professional services to neighbouring countries, including a contribution to a large iron ore project in Guinea. The office is constantly building its base of local skills, and developing this expertise through ongoing contact, training and mentoring within the global SRK network of experienced specialists across a range of disciplines relevant to mining.

ESG and energy

As with other mining jurisdictions, West Africa is seeing national regulations and international codes of practice that demand compliance with the latest guidelines on environmental, social and governance (ESG) performance.

"SRK has done a great deal of pioneering work in recent years with major global miners, strategically applying ESG factors into their businesses to achieve a lower carbon future," said Reddy. "This approach is generally supported by African governments, and new entrants in West Africa are having to take this into account in their planning and implementation."

Among the implications of this is a closer focus on energy efficiency in mining operations, where mines are working towards reducing their carbon emissions by being smarter in their energy use. Security of energy supply is a related concern, he continued, as many mining companies are looking to renewable energy sources to limit their reliance on national power grids. Hydropower, as well as solar and wind energy – combined with fast-evolving battery storage technology – are likely to play a growing role in West Africa's power supply equation.

In conclusion, Doku emphasised that the increasing complexity and risk involved in exploration and mining – not least from rapidly changing legal and ethical frameworks – requires the highest standards of technical quality and professional integrity.

"These values have always been central to our philosophy at SRK Consulting, and are now more important than ever as West Africa's mining sector develops to world class standards," he said. ■

MMP advances mechanical cutting initiatives

Once the Mechanical Rock Breaking Technical Design Study, currently at early feasibility study stage, achieves its intended outcome of a fit-for-purpose mechanical cutting product, it will allow miners to unlock significant tonnages from narrow reef hard rock mines in the platinum group metals (PGMs), chrome and gold sectors, says Mandela Mining Precinct's (MMP) Martin Pretorius, Programme Manager: Longevity of Current Mining (LoCM) and Mechanised Mining Systems.

Adapted mechanical cutting equipment, such as tunnel boring equipment, for underground narrow reef hard rock (NRHR) mining will be a game-changer, enabling miners to mine more precious resources efficiently, while simultaneously removing workers from hazardous working areas.

"PGM and gold mining reserves are steadily depleting and timeous replacement of shaft infrastructure to replenish resources is a concern. Advancing mechanical cutting technology initiatives for the industry will be a boon. To date, efforts in applying mechanical cutting equipment in the NRHR environment have not been successful, largely because mining houses have been using existing equipment that has not been modified to the niche market application. As a result, it is imperative that industry players undertake pre-study work to design and manufacture equipment that is specific to the application."

Although mechanical cutting has not proved to be effective locally, internationally tunnel-boring technology has been extremely successful and is being used extensively for underground tunnelling.

Locally, NRHR mines are currently being mined using the drill and blast method – a labour-intensive high-risk, cyclical slow process, which is why the Mandela Mining Precinct (MMP) and its partners are engaged in a Mechanical Rock Breaking Technical Design Study, which is investigating options to develop mechanical cutting equipment for local narrow reef operations.

According to Pretorius, modified tunnel boring machines used in the development of underground transport, including the Gautrain, could be extremely effective in NRHR mining.

"In seeking to become more efficient, local mining houses have trialled mining equipment from local product manufacturers and international suppliers. Leading mining house Rio Tinto recently used a raise-boring machine to sink a shaft – a move away from the conventional method of shaft-sinking – and it proved to be successful. A diversified miner has also been testing tunnel boring equipment to develop a decline shaft in the Limpopo region; however, the miner encountered challenges in the process. These examples illustrate that local mining houses are keen to test equipment that unlocks benefits, and it is important to note that the equipment trialled to date has been manufactured equipment that is not designed for NRHR application."

Pretorius adds that one of the key challenges associated with testing equipment supplied by international equipment manufacturers is that a huge block of the Merensky reef or UG2 reef has to be shipped to the supplier's headquarters, which could be in Germany, for testing.

"Such an initiative comes at a massive cost, and a prolonged timeframe until miners can get the required results. The advantage of the Mechanical Rock Breaking Technical Design Study project is that it allows collaborative design and development of a product that is suitable for local conditions, and which would enable testing of the product at the MMP test mine within the hard-rock environment.

Right: Typical NRHR haulage.

Below: Typical NRHR mining.

feature

for NRHR mining

As it is, we have collaborative capability, resources, and a suitable test facility that will allow modification of the machine during its development and testing stages for the NRHR environment."

Need for speed

A key advantage of mechanical cutting equipment is that it offers speed and efficiency, and thereby increased productivity.

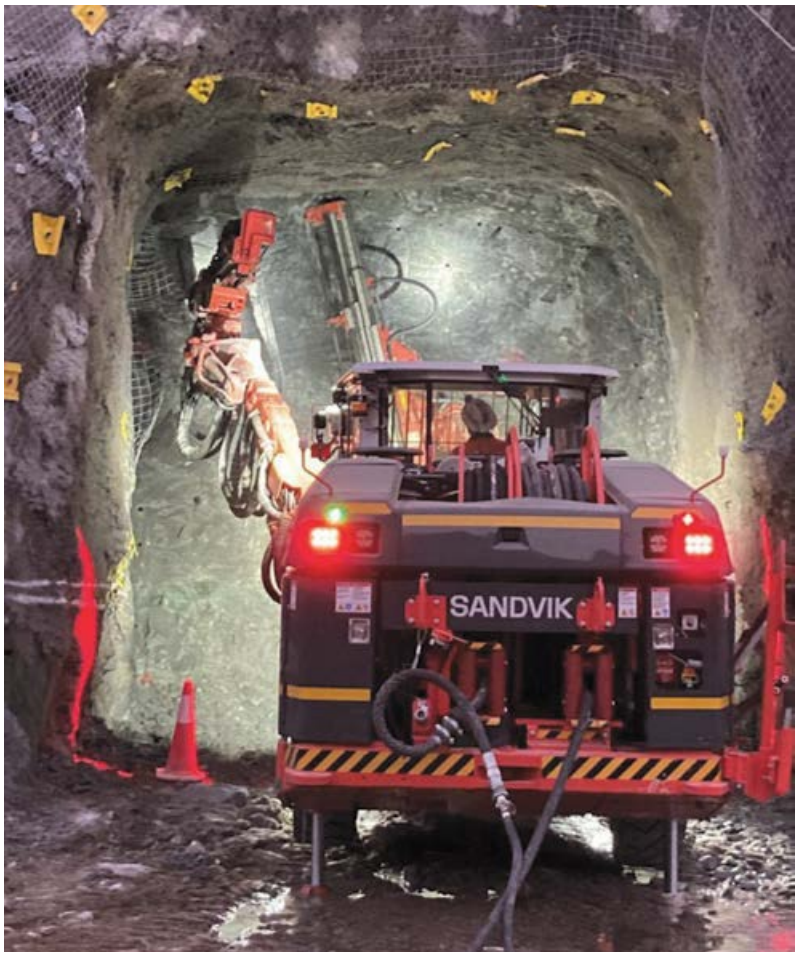
The traditional drill and blast method is bound by construction work and is undertaken a few times a month, which allows for the development of between only 100 m to 200 m per month. In contrast, a tunnel boring machine, for instance, would be able to achieve significantly improved results – as much as 600 metres per month – almost three to four times what is currently achieved.

"If mining is to continue in areas such as Rustenburg, where it takes place between 800 m and 2 000 m underground, and where the upper areas are about to be mined out, more shafts will need to be sunk. Having a piece of equipment, such as the tunnel-borer, that can rapidly develop an underground connecting highway infrastructure will significantly lower the capital costs of progressing mining in the deeper, lower areas. Furthermore, given that the Rustenburg area is home to several mines, mining houses could potentially co-fund a machine modified for their local conditions, which would deliver significant advantage to the regional players. Such a machine would allow miners to access connecting points to multiple shafts and resources, which would become the starting point for next generation shafts – these could be interlinked using raise-boring equipment."

However, given that tunnel-boring machines are developed for single use application, after which the multi-million-rand machine is discarded, Pretorius believes that opportunity exists to modify a tunnel-boring machine for extended use. Such a machine would be used to tunnel from a centre point out, connecting mines that are contiguous.

Importantly, high-speed tunnelling is becoming a critical requirement to access replacement resources timeously.

The strong demand for metals, particularly PGMs which have gained traction on the back of demand for clean energy sources, remains an impetus for introducing mechanical cutting equipment. Further to this, such equipment will reduce the number of people at the rock face, allowing them to operate within lower risk margins of semi-autonomous equipment.



Mechanised tunnel development. Exploration project using drilling and blasting and MTB methods, J Walls SANCOT 2022.

Left: NRHR infrastructure development.

Below: TBM tunnel intersection NRHR. Exploration project using drilling and blasting and MTB methods, J Walls SANCOT 2022.

Above: TBM decline in NRHR. Exploration project using drilling and blasting and MTB methods, J Walls, SANCOT 2022.

Right: TBM excavation, Robbinstbm.com

MMP

- The Mandela Mining Precinct is a public private partnership between the Department of Science and Innovation and the Minerals Council South Africa (hosted by the CSIR).
- It is an initiative aimed at revitalising mining research, development and innovation in South Africa to ensure the sustainability of the mining industry.

"The Mechanical Rock Breaking Technical Design Study project is aligned to the Mechanised Mining Systems (MMS) programme strategy, which aims to optimise mechanised mining practices that will allow for high-speed tunnelling at NRHR mines. There is a future strategic intent to develop atomised automated mining solutions for NRHR gold, chrome, and platinum mines. This project aims to find solutions for effective application of mechanical cutting equipment with advanced technological systems to replace drill and blast practices. High-speed mechanical cutting equipment will be able to open up more ore reserves rapidly. This collaborative approach, which includes industry representatives, R&D collaborators and manufacturers, will make a positive contribution to the project outcome," explains Pretorius.

Mechanical Rock Breaking Technical Design Study project

In its latest endeavour to design and develop mechanical cutting technology, the MMP has partnered with major international equipment specialists Herrenknecht, an expert in tunnel boring machines, and Robbins, which designs and manufactures raise-boring equipment.

Initiated in (2020), the project study comprises two phases, the geotechnical design and the mechanical design, with the geotechnical study (Phase 1) covering the basic mechanisms of mechanical rock cutting, the geological setting, and an understanding of key geotechnical parameters and information requirements, which are critical for any mechanical rock cutting design (Phase 2).

"As a starting point we needed to understand what mechanical cutters can achieve, the related implications of implementation, which aspects of local applications have been successful and which have failed, and why. We also explored aspects related to the exact dynamics of the mechanical cutting machine, how it can be applied, how far advanced international equipment producers are in relation to our needs and the parameters of possibility of the mechanical cutting machine, ie, its use in various applications and how far at depth we can use the equipment, given that South African gold mines, going to a depth of 4 km below surface, are some of the deepest mines in the world. What we subsequently discovered is that it is not only related to mining design as a function but extends to the civil engineering function. We also concluded that the project will have to be undertaken in two stages: Phase 1, which will include the geotechnical design, followed by Phase 2, which will include the mechanical design," explains Pretorius.

To date, the MMP and its partners have identified all the critical parameters required and have established the study framework, which outlines the steps needed to meet its objectives.

"We have completed the early work needed to understand the parameters of the project and this year have undertaken a technical study aimed at reaching out to the mining industry for information related to the parameters that will allow us to establish a database to determine a suitable initial design."

Within the geotechnical design phase, the following have been established:

- mechanical cutting equipment types and applications;
- an understanding of mechanical cutting design requirements;
- identification of the geotechnical parameters;
- a study framework to guide further study work.

According to Pretorius, the project is progressing into the second phase of the geotechnical design, which entails obtaining relevant geotechnical information.

The MMP has been collaborating with the mining industry and tertiary institutions over the past three years, and has established a technical steering committee to guide the programme.

"So far, we have good representation from the mining industry, the manufacturing sector and universities, and excellent information sharing taking place. We also have key, influential personnel in the geological space at the MMP's Advanced Orebody Knowledge (AOK) for in-depth knowledge of the orebodies and rock engineering. Given that some of the information required is beyond the normal mining practice domain, we had to look to the civil

Above: Tunnel that was excavated by the Mine Development Machine, Innovation in tunnelling. What we learn from novel tunnel boring machines, B Grothen SANCOT 2022.

Left: ROBINS Mine Development Machine, Innovation in tunnelling. What we learn from novel tunnel boring machines, B Grothen SANCOT 2022.

engineering segment for assistance and have been relying on the Civil Engineering Department of the University of Pretoria."

Further to this, the MMP has also been collaborating with industry heavy-weights Anglo American, and precious metals producer, Sibanye-Stillwater, who are supplying information from their case-studies on equipment trialled at their operations.

"The more resources we can muster, such as related high-level skills sets and financial assistance, the quicker will be the timeframe to progress the studies and get into product design and development. As such, we have included as many people and equipment experts in the project as possible. The greater the buy-in from industry and key-stakeholders, the greater the appetite and the resources to fund the project. From then it's a shorter timeframe to product commercialisation," explains Pretorius.

"Herrenknecht and Robbins participated in the process to develop the framework for the study, which included geotechnical assessments and identifying the required parameters. They shared their learnings from their case-studies and their expertise in the field."

Opportunity to unlock new reserves

While South Africa is blessed with vast quantities of PGM reserves (roughly 80% of the world's reserves), Pretorius notes that on the back of the voracious appetite for the commodity, which is driven by the need for clean energy sources, current reserves are fast depleting without replacement infrastructure.

According to SFA Oxford (2021), South Africa is a major supplier of the PGMs, namely platinum (74% of world supply), palladium (39%), rhodium (82%), iridium (81%), and ruthenium (90%).

"There is a significant demand for platinum now and in the long-term. Raising capital to sink shafts is costly and, while demand for PGMs is strong and the price is rising, it is an opportune time to develop advanced equipment. If we don't replace resources fast enough, we will have a gap in maintaining our production ounces. A key way to speed up the process is to implement tunnelling that will connect some of the shafts and significantly reduce the time of ore replacement."

Time-line to new technology

The MMP is looking to complete Phase 1 of the project – the geotechnical study portion of the initiative – by March 2024 followed by Phase 2, the mechanical design component, which is expected to take roughly two-years. By 2027, the MMP and its partners expect to be in the final stages of developing a mini-prototype and undertaking underground testing at the test mine.

Although the project is currently being funded by the Department of Science and Innovation, Pretorius says that owing to the high cost of the project, Phase 2, will require partners to co-fund the process and the design process.

"This is a high-cost initiative and therefore extremely dependent on co-funding. Just to get to the point of designing and trialling equipment at pilot scale will easily exceed R100 million. During Phase 2, we will rely heavily on external funding from mining houses, stakeholders and interested parties."

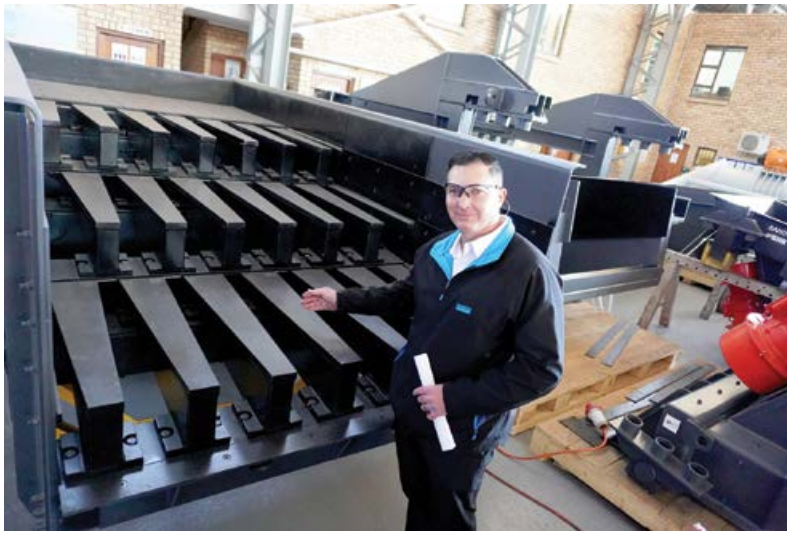
With South Africa being a leader in deep-level mining, the development of a mechanical cutting prototype will be a game-changer for the local mining industry as it will unlock significantly more reserves and thereby lift miners' profitability. Moreover, as mining is a key contributor to South Africa's GDP, the export of more minerals would mean an improved balance-sheet for the country.

"Although most mines internationally are shallow operations, the commercialisation of a mechanical cutting machine will see South Africa as a technology leader for mining at depth," concludes Pretorius. ■

Key platinum and gold miners in South Africa

- ❑ Key platinum producers include Anglo American platinum, Sibanye-Stillwater, Impala Platinum, African Rainbow Minerals, Northam Platinum and Eastern Platinum.
- ❑ Gold miners include AngloGold Ashanti, Harmony Gold, Gold Fields, Pan African Resources, Sibanye-Stillwater and Village Main Reef.

Significant step as first Sandvik screen package built in SA



Riaan Steinmann, Europe, Middle East and Africa (EMEA) Operation Director Screening Solutions at Sandvik Rock Processing, showing the grizzly bars that were manufactured using VRN500 high manganese durable plates, equivalent to AR500 plates.

Heralding an exciting new phase in Sandvik Rock Processing's presence and growth in Africa, the first South African-manufactured Sandvik screen package has been completed at the company's world class facility in Spartan, Johannesburg. The facility already produces Kwatani and Schenck products as part of Sandvik's screening solutions offering.

"This is a significant vote of confidence for our local design and engineering capability," says Riaan Steinmann, Europe, Middle East and Africa (EMEA) Operation Director Screening Solutions at Sandvik Rock Processing.

Steinmann highlights the Spartan facility's capacity to build vibrating screens from the raw materials upwards, including a range of exciter gearboxes using locally procured castings. This underpins the company's tight quality control while facilitating shorter lead times for customers.

The Sandvik screen package – ordered by a gold mining customer in north-east Africa – includes a vibrating grizzly screen with motor-driven exciter as well as five feeders and two custom engineered feed-in chutes for the package's larger 1,6 m feeders. Streamlined processes and local procurement allowed the whole project to be successfully completed within three months of the order being received.

"Screens manufactured in South Africa represent the same standard as those from Europe or India, where this particular range of screens is generally manufactured," he says. "Our proximity to the customer has multiple benefits including reduced shipping times and costs due to Southern African Development Community (SADC) trade agreements. For the local economy, exports obviously benefit South Africa, and increasing our capacity means more job creation."

The Sandvik screen package included the supply of five feeders.

Steinmann notes the importance of selecting the correct manufacturing process for this unique package, as it was key to identifying the best assembly and welding requirements for each component. All manufacturing processes adhere to Sandvik Rock Processing's strict internal controls ensuring fabrication and welding are done to the correct standards and procedures.

"The Sandvik screen range is best known for its applications in the quarrying and aggregate sector, although it is also applied more broadly," he says. At the time of manufacture, regional heads from countries such as Australia, Chile, China, Germany and Sweden were visiting the South Africa facility to discuss how this operation can contribute even more to the group's global success.

"Importantly, they were in the country to witness first hand our technical and operational capability, and to optimise our teamwork globally," he says. "This gave the South African operation the chance to showcase the high calibre of our operations, technology and expertise as well as our in-house design and production capability."

He noted that his colleagues were impressed by the standards of technological excellence that have been developed here and were looking to leverage the strong local base of experience to support the group's production needs globally. The South African facility has a well-established reputation for the manufacture of bespoke vibrating screens and

feature

feeders; this agility has positioned Sandvik Rock Processing ahead of competitors in the region.

"We achieve our high-quality standards by controlling every aspect of our production process, from raw materials sourcing through to final testing and commissioning," says Steinmann.

Key suppliers deliver steelwork in full packages, profiled and bent according to Sandvik Rock Processing's design specifications; the factory manager allocates the fabrication work to the company's highly skilled boilermakers, who begin by checking the quality of the supplied components and their compliance to drawings.

"Our manufacturing layouts are based on job-shop lean manufacturing processes to cater for any customised components," he explains. "Supporting these systems is our highly skilled workforce, who are equipped to manage complex and challenging projects."

Steinmann adds that quality inspections are conducted during the assembly process, so all aspects are checked before welding takes place. Further quality checks are done after welding as part of the company's ISO 9001 quality certified procedures and protocols.

"Our quality management systems ensure that quality is controlled throughout the manufacturing process – including material receipt inspections, non-conformance control, material control, welding procedures, fastening sequences and torquing of bolts," he continues. These systems also guide the sequence of assembling subcomponents, shot blasting, paint specifications and factory acceptance test prior dispatching of equipment.

"The successful execution of this first Sandvik screen package has underscored our position within the Sandvik Rock Processing group as world class manufacturer," he says. "This demonstrates our ability to serve not only the African continent but also the group's other regions."

Sandvik Rock Processing's Quality and Assembly Managers working together to achieve the best quality screens and feeders.

The Sandvik screen package ordered by a gold mining customer in north-east Africa includes a vibrating grizzly screen as well as five feeders and two custom engineered feed-in chutes.

Steinmann emphasises that the manufacturing of Sandvik Rock Processing's entire screen range in South Africa supports the company's initiatives to become Africa's preferred screening solution partner. This is further supported by having not just the manufacturing capacity but also full lifecycle support much closer to customers. ■

Maptek drives mining's future readiness

With technology developments advancing at lightning speed, mining houses can unlock significant opportunities. However, to be future ready and achieve the required gains, they will need to partner with leading technology providers, says Maptek's Gideon Slabbert, General Manager for Africa. By *Nelendhre Moodley*.

Maptek collaborates with mining houses and tertiary institutions.

Maptek, a supplier of innovative software, hardware and services for the mining industry, continues to play a pivotal role in helping mines to harness these benefits. The company develops 3D design and modelling, spatial analysis, and mine optimisation software.

"Individuals need future ready technology capabilities to succeed in the technologically advanced and rapidly changing mining industry. Those in the mining sector need to align with skills to manage technological solutions for mining," explains Slabbert.

"For personnel in the sector to unlock value and efficiently perform their daily duties, they need to keep abreast of the functionality in the latest tools," Slabbert continues. Maptek aids mining houses and tertiary institutions with online and in-person training, aligning them to the latest evolving technology.

He explains that given the strong demand for its expertise, the business, which has been in operation for over 40 years, is seeing a spike in the uptake of its product line.

Mining houses in Africa have been quick to adopt latest technologies, with the uptake being "so fast that mining industry skills development hasn't kept up". The company is thus working to fill the gap.

"The challenge in South Africa and Africa relates to the historical issue of limited local employment at mines, with much of the expertise residing in the hands of foreign professionals. Even when training was available, it was often not offered to local employees," says Slabbert.

Although many more local employees are being trained today, a huge gap remains in the technological skillset. Slabbert argues that this historical disadvantage has meant the African mining industry has lagged in acquiring the full value of Maptek's industry knowledge and resources.

Given that Africa is resource rich, with many countries highly dependent on the wealth it generates, the industry remains focused on improving production rates to keep abreast of global demand. This has

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Maptek plays a pivotal role in helping mines to harness the benefits of improved productivity, efficiency and safety.

resulted in a significant appetite from industry and tertiary institutions to fill the educational gap.

Slabbert says that "Every year the number of miners aligning with latest technology has soared, driven largely by the push for increased efficiency, a lower mining carbon footprint and improved safety at mining operations. The industry, which employs thousands of people, continues to invest heavily in training to upskill existing employees and new recruits.

"Increasingly the industry is making use of the latest technologies, such as artificial intelligence (AI) and cloud computing, to gain insight into how better to plan and mine more efficiently, with reduced costs and improved safety. This drive is being adopted across all mining processes, from exploration through to production systems and plant environments. Moreover, there is a big push for enhanced data capture as it promotes improved decision making."

Maptek's aim is to help mining personnel use data for better outcomes, especially technology related tools that aid miners and explorers to interrogate their reserves and deposits.

"Miners operating across a variety of commodities are keen to adopt Maptek online and in-person training programmes. As part of our service-level agreement, Maptek encourages mining houses to make a set amount of days available each year to allow our consultants to upskill mining employees. We flag mining houses a year in advance to ensure that set days are mapped out for training and skills development. To ensure that personnel get the most value out of the technological solutions offered, our programmes include revision of key technologies

The appetite for the uptake of science and technology at tertiary level has been exponential, with significant demand for Maptek training and support.

The company has several partnerships with regional universities.

and tools. Our comprehensive, hands-on training ensures that our customers' employees can implement the tools in their daily activities and unlock the full value of our solutions to keep abreast of the rapid adoption of technology."

Maptek's offering to the mining sector

The technology specialist has a vast suite of products for the mining sector, including the Maptek Compute Framework (MCF), which applies machine learning algorithms and cloud computing to process large tracts of data. This provides an ideal solution for intensive computing tasks such as stope design and modelling and Blast MCF for optimised blast design, from drilling to charging specific parameters for optimised outcomes.

"Technologically advanced tools," says Slabbert "harness vast quantities of data within hours, allowing mining personnel, such as mining engineers and geologists, time to undertake higher value work and interrogate the resulting models for the best outcomes."

Maptek partners with tertiary institutions

The technology specialist also collaborates with

Maptek recently launched VisionV2X, a collision avoidance and proximity detection tool for underground mines.

tertiary institutions to ensure that graduates entering the workforce have insight into and interact with the latest technology.

According to Slabbert, the uptake of science and technology at tertiary level has been exponential, with significant demand for Maptek training and support – in fact, the company has several partnerships with regional universities.

The University of Lubumbashi is one of the most recent tertiary education institutions to partner with Maptek. Within its academic programme, Maptek provides students with free access to the company's mine planning and geological tools.

"Students are extremely eager to take up our free online training classes, which offer structured courses with a certificate on completion. The qualification allows students in professional fields such as mining engineering, geology or quantity surveying to gain skills that distinguish them right from the start of their careers."

As of 2023, a total of 57 students, comprising 53 final year and four Masters level mining engineering students from the University of Lubumbashi, have undergone in-person training in Vulcan and PointStudio software. The courses were conducted by two of Maptek's French-speaking technical specialists.

VisionV2X allows equipment operators to detect other vehicles and personnel in proximity.

"The Vulcan training covered the basics of importing files, creating lines and polygons through to more advanced topics such as in pit design, dump design, block models, and short-term mine planning. For PointStudio, the training encompassed point cloud data importation to the creation and manipulation of 3D models. Maptek is also continuing to work with three of the Masters students to help them complete their qualifications using Maptek solutions."

In addition, the students at the University of Lubumbashi have access to the Maptek online training platform, which enables them to hone their newly developed mining technology skills.

Maptek also has longstanding partnerships with Wits University and the University of Pretoria.

"Interest in adopting the latest mining tools and technologies varies across Africa, with the big mining districts showing a healthy interest in Maptek training," says Slabbert "Our university footprint has grown to such an extent that we have established an official university council to ensure all students have access to the necessary support. The mining department of the University of Pretoria, with which Maptek has been collaborating for the past decade, continues to derive great value from our programmes, making use of our online training modules to allow students to learn at their own pace."

So great is the demand for Maptek support and skills in the sector that between two to five universities ink partnerships with the technology specialist each year.

But Governments – a key player in the mining sector – are reticent about taking up the programmes.

According to Slabbert, this essential segment which holds and manages key data related to the mining sector, including exploration licences and mineral deposits, is slower to upskill the personnel who can effectively advise on critical aspects such as health and safety.

Slabbert notes though that Goverment officials visiting mines are often exposed to Maptek technology, which in turn influences their views on health and safety measures. Using the information gleaned, Government officials often advise smaller mining operations on safety standards that they have seen administered.

"Maptek's aim, Slabbert says, "is to contribute to efficient mining operations to ensure that every miner, using our technology, can make better decisions. We offer cutting edge tools and technologies and want to be a key partner in the journey with mining houses and universities."

VisionV2X – keeping people and machinery safe

In May this year, the technology specialist launched

feature

Maptek Compute Framework (MCF) applies machine learning algorithms and cloud computing to process large tracts of data which provides an ideal solution for optimised blast design.

VisionV2X, a collision avoidance and proximity detection tool for underground mines.

Slabbert explains: "The advanced ranging system allows equipment operators to detect other vehicles and personnel in proximity and is dedicated to improving safety standards in underground mines. Since the launch, Maptek has been garnering much attention and traction in the market. Given that mining houses in South Africa have a strong safety drive, we foresee VisionV2X being integral to local underground mining operations."

Prior to launch, Maptek piloted VisionV2X at a mine in Mongolia, where the technology was deployed for over a million vehicle hours. "We worked extensively with the mine to ensure the product was ready for implementation before the official launch."

Maptek – a global entity with an international footprint

The global entity, headquartered in Australia, has a presence in all key mining regions. According Slabbert, this international footprint means that insights gleaned from various regions are integrated into the solutions, consulting and support offered.

"Where features are developed to target regional or professional segment regulatory requirements, we can roll them out to benefit all our customers, regardless of geographic region. For instance, South Africa has stringent rules relating to safety; thus, the tools we customise for the South African mining sector become a standard for products adopted by the rest of the mining world. As a result, our products serve the international community – ensuring that all mines benefit." ■

Maptek at the cutting-edge of technology

- ❑ Maptek invests in cutting-edge technology, deploying machine learning, genetic algorithms, and advanced optimisation techniques to stay ahead of its peers.
- ❑ A vast portion of the development roadmap, including current products and new releases, is aligned to the latest technologies and market needs.

feature

Ross Harvey, director of research and programmes at GGA.

The geopolitics of energy, autocratic growth and critical raw materials

By Ross Harvey, director of research and programmes at Good Governance Africa (GGA)

The world is awash with talk of net-zero, low-carbon growth, and dreams of a circular economy. Renewable energy technology and electric vehicles are at the forefront of such dreams. Desirable and laudable dreams they are too. Realising them, however, will require a more sober-minded assessment of current geopolitical realities, the difficult policy choices involved for domestic governments, and the conundrum of a hunger for critical raw materials alongside significant fossil fuel exploration expansion.

When I was an undergraduate, the political economy of international relations was marked by three main theories competing for explanatory and predictive ascendance. First, an essentially Marxist view – Wallerstein's World Systems Theory – was that the world was organised into a core and a periphery. Core countries controlled the means of production and extracted resources from the periphery – its colonies or post-colonial dependents – for the sake of making the core ever-richer and more powerful. Neat analytic categories, yes, but overly reductionist. All of history cannot be reduced to a power struggle between oppressors and the oppressed; it is way more complicated than that, and states have agency. Second, the Mercantilist view was that countries would do anything to pursue their own economic interests; this was the political economy version of realism and neoliberalism in classic international relations, which conceived of countries as billiard balls – independent, sovereign countries unamenable to global coordination. It's the most convincing theory as it accounts most adequately for war. Third, a Liberalist or 'sovereignty at bay' argument suggested that the fall of the Berlin Wall in 1989 ushered in a near-universal optimism for a new democratic liberal order that had been created in the minds of the West after 1945. Capitalism had crushed communism and would create economic interdependence between nations. Sovereignty would be increasingly less important and the proclivity for war ameliorated by the negative economic repercussions thereof.

African countries with fossil fuel resources want to be allowed to exploit them.

If one examines the geopolitics of oil and gas, as Daniel Yergin has done so brilliantly in his latest book *The New Map*, pipelines strewn across countries and new shipping routes appeared to have embedded the expectations of the 'sovereignty at bay' model. Except for a few minor hiccups: China and Russia, along with the speed at which energy markets started to change in the wake of the US shale revolution, along with the rise of renewables. The rise of post-Mao China infatuated many thinkers with the idea that 'state-led' capitalism could provide a model for development hitherto considered unworkable. But it was considered unworkable for good reason.

Germany transformed its energy system within a few months to receive US gas instead.

As Daron Acemoglu and James Robinson showed in *Why Nations Fail*, published in 2012, that China was in for a hard landing. It hasn't quite worked out that way yet, but I still reckon it's coming. The reasoning is simple: The quality of a country's institutions – the social systems that motive regular human behaviour – matter for development. Weak institutions – no separation of powers between the executive, the judiciary and the legislature; and no ability for citizens to hold their governments to

Scaling up renewables will literally empower local communities to take advantage of economic opportunities.

account – eventually collapse a state. In a 2019 book, *The Narrow Corridor* – the same authors refer to the perils of this dynamic as an unshackled Leviathan. What you need for sustained development is citizen power growing at the same rate as state power, which creates the narrow space in which economic dynamism can flourish.

Yasheng Huang argued in his 2008 book, *Capitalism with Chinese Characteristics*, that China's rise during the 1980s was a function of 'directional liberalism' – a *de facto* or unwritten respect for private property rights and a resultant burst of innovation and growth. This ended abruptly with the Tiananmen Square massacre in 1989, the same year in which global communism started to collapse and precipitated the disbanding of the USSR. China went in for urban-orientated growth, driven predominantly by state-sponsored manufacturing and export-led growth. Its re-entry into the World Trade Organisation was controversial and remains so, as subsidised goods give it a trade advantage birthed in an un-level playing field. At the same time, it exploited African countries which had been struggling for independence and became the site of proxy Cold War battles. For instance, in Angola, China extended the old arms-for-oil deals with Russia but turned them into oil-for-infrastructure deals. They built infrastructure that is highly unfit for purpose and has done nothing to move Angola out of being an oil-cursed petrostate. Since Xi Jinping's appointment, China has careened towards an outright dictatorship, as Xi has dismantled all power-sharing arrangements within the Chinese Communist Party (CCP). The innovation and dynamism of the 1980s is long-gone, and the country is starting to commit serious strategic errors on the international playing field. It will not be able to maintain its social contract at home – political monopoly in exchange for economic growth – and it will grow old before it grows truly rich.

One of China's most glaring mistakes has been to support Russia, though it is careful to use neutral diplomatic language. Talking of Russia, its invasion of Ukraine in February 2022 was unthinkable by advocates of the 'sovereignty at bay' theory. But Putin's resentment at the disbanding of the USSR was real, and he had no category for a Ukraine with a mind of its own. Other former USSR states like Belarus played the puppet perfectly. Putin thought that he could own Ukraine's foreign policy through paying rents for the oil and gas pipelines which connected Russia to Europe. But the world had changed. Germany transformed its energy system within a few months to receive US gas instead. And Putin did not bank on Ukraine receiving the kind of support it has from the west. He wanted its territory and its resources, and this gluttonous desire has destroyed the theoretical foundations of a liberal world order. The disincentive for war, through economic interdependence, was

Angola remains an oil-cursed petrostate.

While mining will not be a major direct employer again, it creates upstream and side-stream opportunities.

trumped by the promised riches of old-style mercantilism. China appears to have taken the gap, with the world's attention focused on the Russia-Ukraine war, to step up its aggression in the south China sea and towards Taiwan.

China also originated the Covid-19 virus that decimated the global economy in 2020. Supply chains have still not recovered. The energy map that supported global supply chains has also changed irrevocably with the Russian war. This has coincided with a rapid rise in the diffusion of renewable energy technologies and an associated decline in prices of solar and wind power. Where does that leave African countries?

Understandably, African countries with fossil fuel resources want to be allowed to exploit them. And despite a strong divestment movement – disinvesting from fossil fuels in the light of climate change realities – from international investors, the oil price shows no sign of imminent collapse. Oil majors also show no sign of slowing down on exploration activity either. A growing African lobby goes by the slogan 'drill baby drill', arguing that African countries should not be denied the opportunity to electrify and industrialise through their own sovereign energy choices, especially given that they shoulder a miniscule share of global carbon emissions. The problem with that view, of course, is that it risks locking those countries into a fossil-laden development trajectory littered with stranded assets. An alternative is to step up investments into decentralised renewable energy options, which sidestep the need for large grid infrastructure investments and deliver power at speed. This would allow for much faster rates of electrification and reduce indoor air pollution, currently a major killer. It would also reduce deforestation. The idea that oil-rich African countries will suddenly start benefiting in a broad-based way from oil and gas rents defies the historical record. Oil wealth remains, empirically, a curse for weakly institutionalised countries.

The oil price shows no sign of imminent collapse.

Scaling up renewables will literally empower local communities to take advantage of economic opportunities from which they are currently excluded. Resultant broad-based development will help to address growing youth unemployment and grow a middle class, which typically strengthens political order through citizen-based demands for reform.

Even in the midst of the re-emergence of Mercantilism as the most adequate theory for explaining nation-state behaviour, and even with the growth of populism and democratic backsliding, renewable energy technologies carry the potential to change the landscape. Take, as a final example, the demand for critical raw materials to feed renewable energy tech; it could lead to a core-periphery exchange of raw materials for final products, or it could provide an opportunity for African countries to negotiate on new terms.

Battery minerals like lithium could be extracted in exchange for a place in the global battery value chain. Many of the technologies involved in processing these new critical minerals are not energy-intensive, which again raises the prospect of being able to accomplish it with small-scale renewables. While mining will not be a major direct employer again, it creates upstream and side-stream opportunities that may yet enable African countries to prosper in the way we so eagerly desire. ■

Redpath Mining South Africa partners with Sandvik for digital training

Sandvik Mining and Rock Solutions recently provided its state-of-the-art digital trainers to leading mining contractor Redpath Mining South Africa.

"Our digital trainers offer a range of advantages that are set to transform the way mining personnel acquire skills and knowledge," says Vusi Thobela, Key Accounts Manager at Sandvik Mining and Rock Solutions. "These cutting-edge training tools provide an immersive and realistic simulation of mining operations, empowering trainees to gain practical experience in a controlled environment."

The innovative technology provides trainees with interactive interfaces that closely resemble the controls and displays found on real mining equipment. This ensures a seamless transition from training to on-site applications for trainees. It also enables them to learn and practice safety protocols and emergency procedures without exposing them to the risks associated with real-life mining activities.

According to Sudesh Deonarain, General Manager Engineering at Redpath Mining, the high-fidelity simulations offered by Sandvik's digital trainers enhance the training experience.

"Our trainees can familiarise themselves with a range of mining environments, equipment behaviour and tasks, allowing them to hone their skills in a life-like setting," says Deonarain. "From equipment operation and maintenance to troubleshooting and teamwork, they can practice various scenarios, ensuring they are well-prepared to tackle real-world challenges."

Thobela adds that the accurate simulation of mining equipment and processes allows trainees to develop a deep understanding of the intricacies of operating and maintaining the Sandvik machines.

Redpath Mining South Africa recently took delivery of Sandvik simulators for the Sandvik DD422iDC and the Sandvik LH517i to deploy at current projects.

"This supports increased productivity and reduced downtime, ultimately optimising operational efficiency in mining operations," he says. ■

Booyco Engineering raises the bar in air filtration on dusty sites

Well known for its specialised mobile HVAC solutions, Germiston-based Booyco Engineering is now a distributor for Sy-Klone International's air filtration technology. According to Booyco Engineering's Field Services Sales Manager Gordon Postma, this brings a range of exciting products to its local customers. The Sy-Klone offerings include enclosed cab filtration, air precleaning for engines and high efficiency air filtration for heavy equipment.

"We can offer customers a complete cab air quality system that includes fresh air and recirculated air systems combined with high-efficiency HEPA and EPA filtration as well as real-time CO2 and pressure monitoring," says Postma.

"Tighter international standards – embodied in the ISO 23875 global standard for cab air quality – are leading the world's major mining companies to adopt better air quality control systems for their heavy machinery cabs and other operator enclosures," he explains. "The trend is also being felt in southern Africa, as mining and construction companies look for more effective dust control solutions."

The new ISO standard will require machine cabs to have a fresh air pressurisation solution, a recirculation system, and a monitoring device, he points out. They will also need to be fitted with filtration that exceeds 94% efficiency at 0.3 microns, such as Sy-Klone's EPA and HEPA filters. Many mining and earthmoving vehicles and equipment are imported with filtration systems that are not suited for the region's dry and dusty conditions. ■

Booyco Engineering is now a distributor for Sy-Klone International's air filtration technology.

Multotec's Learnership Programme empowers 46 individuals

Metallurgy and process engineering company, Multotec's group of learners recently completed the company's 12-month learnership programme, underscoring its commitment to skills development, continued development, and job creation. According to Janine James, Organisational Development and Learning Manager at Multotec, a total of 46 learners, including nine females, graduated at the beginning of June 2023. The individuals completed Multotec's comprehensive range of programmes, namely Production Technology, Supervisory, Polymer Compound Manufacturing, and Stores and Warehousing.

James explains that the annual learnership programme is deeply rooted in the company's dedication to skills and development. The primary objective of the programme is to equip participating learners with qualifications and foster their ongoing growth and development. "The learnership is aimed at previously unemployed learners – individuals who are unemployed at the start of the programme. Bringing them into the learnership programme gives them skills and makes them more marketable. This also creates a pool of potential employees for Multotec." ■

Multotec empowers 46 individuals.

Kamoa-Kakula power pack order is among many for SEW-EURODRIVE

With well over 100 units already delivered, SEW-EURODRIVE in South Africa is set to continue supplying Ivanhoe Mines' prestigious Kamoa-Kakula Copper Complex in the Democratic Republic of Congo (DRC), a joint venture with Zijin Mining of China, with a wide range of its X.e-series power packs.

Kamoa-Kakula is one of many projects in Africa to request the installation of SEW-EURODRIVE's monitoring equipment on the supplied product.

According to Willem Strydom, Business Development at SEW-EURODRIVE, the power packs – which are integrated units comprising gearbox, coupling and motor – will be part of Kamoa-Kakula's Phase 3 expansion. Since the mine's first phase of development over five years ago, SEW-EURODRIVE has worked closely with both Ivanhoe Mines and the engineering, procurement and construction (EPC) contractor.

"As in previous phases of the mine's development, our robust high quality power packs will provide reliable solutions in on-site applications such as conveyors, agitators, and slurry pumps," says Strydom. "The size range in the order makes use of our wide capability range to provide a total solution, ranging from 55 kW units to 500 kW units."

The latest order includes several X.e Series power packs for conveyor applications, planetary gearboxes for feeder applications, and spare gearboxes. The equipment will be delivered in staggered shipments this year. While the mine typically undertakes the installation of the equipment, SEW-EURODRIVE sends technical teams to site to check final alignment and overall installation parameters.

The company has expanded its after-sales service teams considerably in recent years, allowing it to support the growing base of equipment throughout Africa. Its projects and engineering teams have also grown – developing a depth of experience to assist customers right from design phase onwards. ■

Tribe Technology and Anglo American sign agreement for drill rig

Tribe Technology (Tribe Tech), a manufacturer of autonomous drill rig and sampling technology, has inked an agreement with global mining company Anglo American for the deployment of its first generation autonomous Reverse Circulation (RC) Drill Rig. The TTDS GC 700 RC Drill Rig will be manufactured at Tribe Tech's facilities near Belfast, Northern Ireland, with the sample system to be built at the company's facility in Perth, Australia.

Tribe Tech is developing an autonomous RC Drill Rig, capable of removing the workforce risk and projected to be able to significantly increase drilling productivity.

Tribe Tech CEO, Charlie King, commented: "We are excited to announce our partnership with Anglo American to deploy our game-changing equipment. I have no doubt that in the future, autonomous drilling will become the norm in the mining industry as responsible management teams now have a commercial technology available to them to ensure minimal harm in the exploration drilling sector. Tribe Tech was born from a real desire to improve safety and efficiency in the mining industry, and we are proud that Anglo American is the first miner to embrace our autonomous RC drilling technology." ■

Customised crane commissioned at Angolan Mine

An overhead crane, manufactured by crane manufacturer Condra, is assisting with the construction of a milling plant in Angola before assuming its primary role of mill maintenance. The project is being managed by specialist engineering company Consulmet. Condra designed the overhead crane and gantry specifically to overcome functionality constraints of portal crane alternatives tendered by rival firms. Portal machines would have been limited in operation to this mill only, unable to service planned units because of conveyors interrupting their passage.

Condra supplies customised crane for project in Angola.

By contrast, the Condra design has an overhead crane mounted on a gantry with legs situated between the conveyors, allowing uninterrupted crane movement as well as later gantry extension to service future mills when they are built. The 28-metre-span crane and gantry incorporated special design to allow for delivery by road. Access routes to the site cannot be navigated by conventional tractor and dolly, so box girders and gantry legs had to be designed to fit within standard 12 metre containers. The girders were manufactured in three sections to fit these containers. After delivery, they were spliced, the steel plates welded to the four inside faces of the male box sections delivering a friction grip at the splice that reinforces girder strength beyond that delivered by the splice bolts alone. Bolt holes were reamed during manufacture, and the bolts themselves machined for an exact fit to retain camber. ■

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