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JOHN DEERE MOTOR GRADERS

A Legacy of Excellence and Innovation

IN THIS ISSUE

- **Contango eyes** regional dominance
- **Omico targets Omitiomire** construction by 2025
- **Latest regulations drive demand for** Booyco's technology
- **Axis House scores** in all markets

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CONTENTS

ARTICLES

COVER

COMMODITIES OUTLOOK

COAL

COPPER

MINERALS PROCESSING

HEALTH & SAFETY

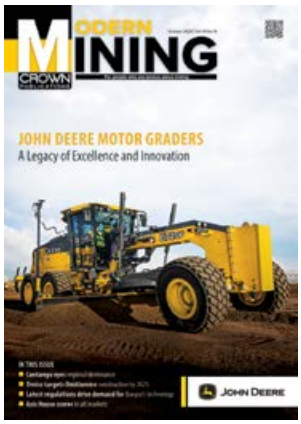
DIGITAL MINE

REGULARS

MINING NEWS

COLUMN : ROSS HARVEY

SUPPLY CHAIN NEWS



ON THE COVER

John Deere has been at the forefront of motor grader technology for decades and remains committed to innovation, efficiency, and user-centric design.
See story on pg 6.

COMMENT

Playing with my emotions

Nelendhre Moodley.

Nothing has the capacity for instant despair like the announcement by Eskom of the move to higher stages of loadshedding, with Stage 6 loadshedding (often up to 10 hours per day) once again being the case in early September. This ping-pong game of loadshedding stages has been wreaking havoc on citizens' emotions. While President Cyril Ramaphosa, who's safe from power-cuts, says its "short-term pain for long-term gain", it's only those who actually experience loadshedding, who know the full might of that despair.

On a more positive note, the South African economy has proved to be more resilient than its citizens. According to Statistics South Africa (Statssa), the country's real gross domestic product (GDP) expanded by 0,6% in the second quarter (April–June) of 2023. This follows a 0,4% rise in the first quarter.

Six industries on the supply side of the economy grew in the second quarter, with manufacturing and finance driving much of the upward momentum. On the demand side, the country benefitted from a sharp rise in investments in machinery and equipment, which included products related to renewable energy. The demand for machinery and equipment contributed to the 3,3% rise in imports.

According to Statssa, manufacturing production expanded by 2,2%, mainly pushed higher by petroleum, chemical products, rubber and plastic products. Manufacturers in metals, metal products, machinery and equipment also recorded a good quarter driven, in part, by increased demand for crude steel. Increased investment in South Africa's automotive sector helped lift the production of transport equipment and motor vehicles.

Renewable energy drive

Meanwhile, given the strong demand for renewable energy solutions, insurer, Discovery, has thrown its hat in the ring, announcing plans to enter the renewable power trading platform.

According to Discovery, the company's renewable platform, called Discovery Green, would be "in the middle of the market, creating a real model between buyers and sellers".

With Discovery soon to start work with power developers to set up wind and solar plants, its platform, however, will only supply power to consumers from 2026 onwards.

For those looking for a quick fix in the form of financial aid for renewable relief, Banking group FNB will soon offer government's Energy Bounce Back (EBB) Loan Guarantee Scheme to individual customers to assist them with financing rooftop solar and energy storage at their homes.

The scheme, announced by National Treasury earlier this year, is currently only available for commercial customers, but FNB said it will soon be extended to individual FNB and non-FNB customers alike.

The bank expects the loans to become available before year-end.

So, it's just a few more months wait before South African's can get the financial help needed for surety of power supply and peace of mind!

On the topic of the renewable energy, copper explorer, Omico Mining is advancing its Omitiomire project in Namibia, eyeing project construction by 2025. The company is looking to complete its bankable feasibility study by year-end, after which it will begin fundraising – targeting between $250- $350 million for project development. Copper is a critical mineral in the green movement and the global drive to achieve net zero emissions (pg 14).

Meanwhile, coal junior, Contango Holdings, which recently launched its flagship asset, the Muchesu Coal Project, in Zimbabwe, is eyeing regional dominance. The United Kingdom-based company is looking to displace a large chunk of coking coal supplied by Australian miners to regional mills with its own high-quality product as it targets industrial sectors in South Africa, Zambia, and the DRC (pg 10).

In our cover story for this edition, John Deere outlines its "legacy of excellence and innovation" in relation to its motor graders. With the evolution of the construction and mining sectors, the equipment supplier continues to invest heavily in product innovation, especially in its motor graders, and has been helping to set new standards and drive the industry forward, the company says (pg 6).

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Orion awards trial mining contract for Prieska Mine to Newrak Mining Group

JSE-listed Orion Minerals has awarded a 6-month trial mining contract to P2 Mining, a subsidiary of South African mining contractor Newrak Mining Group (Newrak) to undertake the early works trial underground mining programme at the Prieska Copper Zinc-Mine in the Northern Cape Province.

The trial mining will target the +105 Level Crown Pillar, using conventional and alternative underground mining methods. The trial mining will comprise 120 m of footwall ramp development, before accessing the high-grade supergene ore of the +105 block with ore development along strike for 150 m on either side of the primary access as the primary in a cut-and fill mining cycle.

Newrak will operate with a fleet of conventional load, haul & dump loaders and with an innovative continuous loading machine recently introduced to the South African market and secured by Orion on demonstration rental. The ITC120 continuous loader is expected to bring improved efficiencies to mucking operations and accelerate access tunnel development and ore drive development. ■

Newrak Mining to undertake trial mining at Prieska Mine.

Jørgen Evjen, CEO of Akobo Minerals.

Akobo Minerals begins process to trade on the OTC Markets platform

Ethiopian gold mining company, Akobo Minerals, has applied for trading on the OTC Markets platform in the United States. While Akobo Minerals already has a full listing on two markets in Europe, there are several benefits to having an additional US-based quotation for its shares.

The main benefit is having a freely tradeable security with a US ticker symbol and a USD share quote that will enable the Akobo share to become available to all US investors through their broker of choice. Over 12 000 US and global securities are already trading on the OTC Markets platform, including mining companies like Lundin Mining and Endeavour Mining.

Jørgen Evjen, CEO of Akobo Minerals, said: "As the company moves towards gold production from our boutique mine in Ethiopia, we want to ensure that new investors have greater access to trading of our shares. An OTC cross-trade in the US, to supplement our European listing on the Oslo and Frankfurt exchanges, will achieve this."

Evjen added: "We have seen that there is high interest from investors in mining shares in the US, and I am sure Akobo Minerals can capitalise on this as we expand our operations in Ethiopia. ■

Impala Rustenburg welcomes Moses Motlhageng as its new Chief Executive

Platinum miner, Impala Rustenburg, has appointed Moses Motlhageng as its new Chief Executive. A leader with an outstanding track record, Motlhageng joins Impala Rustenburg from his previous position as head of Implats' Marula operation. Known for his tenacity and visionary leadership style, Motlhageng brings a wealth of experience to his new role. His track record of enhancing operational efficiency and optimising performance will stand him in good stead as he guides the strategic direction of Impala Rustenburg, the company said. ■

DRDGOLD lists on A2X

Gold miner, DRDGOLD, listed its shares on A2X, a licensed stock exchange that provides a secondary listing venue for companies, on 5 September 2023. DRDGOLD retains its primary and secondary listing on the Johannesburg Stock Exchange and the New York Stock Exchange, and its issued share capital is unaffected by the additional listing on A2X.

DRDGOLD joins other companies from the mining sector trading on A2X including AngloGold Ashanti, Gold Fields, Harmony, Impala Platinum and Pan African Resources.

The listing of DRDGOLD will bring the number of instruments listed on A2X to 179 with a combined market capitalisation of over R10.6 trillion. ■

DRDGOLD lists on A2X.

Boss Mining signs Community Development Plan Agreement

Boss Mining signs five-year social development plan.

ERG Africa's Boss Mining entity has taken a significant step towards sustainable community development by signing its *Cahier des Charges* with its surrounding communities in Haut-Katanga.

The official signing of the five-year social development plan marked the culmination of consultation and dialogue between Boss Mining, local communities, and government stakeholders.

The *Cahier des Charges* outlines a comprehensive approach to addressing the pressing and long-term needs of the community in six priority areas – health, water supply, education, agriculture, commerce, and road infrastructure.

Under this agreement, Boss Mining will construct and equip four clinics, a health centre and solar-powered borehole systems to deliver reliable sources of water. The commitment extends to building a secondary and two primary schools, supporting local farmers through the establishment of associations, providing maize seeds, fertiliser and machinery to boost agricultural productivity and profitability, and address food security in the region. In addition, through the social development plan, Boss Mining seeks to invigorate commerce in Haut-Katanga by building a market and enhancing transportation networks through the rehabilitation of the Milebi-Swanepoel road to help bolster economic growth and prosperity for the region. ■

SAIMM appoints William Joughin as president

The Southern African Institute of Mining and Metallurgy (SAIMM) has sworn in William Joughin as the new president for 2023/2024. He currently serves on rockburst management advisory boards for El Teniente, Chile and Kiruna, Sweden.

Joughin has published over 50 articles on rock engineering and is the recipient of an SAIMM gold medal and the Alec Wilson Award (SANCOT) for outstanding papers. He has co-written two chapters on risk-based design in the book Ground Support in Underground Mines (Potvin and Hadjigeorgiou, 2020) produced by the Australian Centre for Geomechanics.

He is a past President of the South African National Institute of Rock Engineering, and a past Vice President for Africa of the International Society for Rock Mechanics. ■

Nolitha Fakude honoured with the Brigadier Stokes award

The Brigadier Stokes memorial award is the highest achievement in the South African mining and metallurgical industry. The Southern African Institute of Mining and Metallurgy has honoured Nolitha Fakude with this award in recognition of her service and contribution to the industry. Nolitha Fakude, the Chairman of Anglo American, was presented with the medal at the SAIMM Annual General Meeting on 18 August 2023. The medal is a symbol of her contribution to the mining fraternity. Fakude is the current President of the Minerals Council of South Africa, Non-Executive Director of the JSE and Vice President of the International Woman's Forum South Africa. On accepting the 2023 Brigadier Stoke Memorial award, Fakude quoted Maya Angelou saying, 'I come as one, but I stand as ten thousand' as she accepted the award on behalf of all the unknowns in the mining and metallurgy industry. ■

John Deere's motor graders represent world-class engineering

John Deere Motor Graders: A Legacy of Excellence and Innovation

John Deere, a name synonymous with agricultural and construction machinery, has been at the forefront of motor grader technology for decades. With a legacy that traces back to the launch of the JD 570 in 1967, the brand has consistently showcased its commitment to innovation, efficiency, and user-centric design. This article delves deeper into the evolution of John Deere's motor graders, highlighting their advancements, the brand's unwavering dedication to excellence, and the financial solutions they offer their customers.

The JD 570, John Deere's pioneering grader, was a testament to the brand's innovative spirit. Equipped with a scarifier positioned at the front, this model was designed for operators to sit or stand while operating, given the less stringent safety requirements of the time. This initial design laid the foundation for the advanced models we see today, emphasising the brand's focus on meeting industry needs and setting new benchmarks.

Fast forward to today, John Deere's motor graders represent world-class engineering. The 770G/GP and 772 G/GP, for instance, are powered by the John Deere PowerTech™ 9L engine, ensuring an eco-friendly yet powerful operation. With the 770G/GP boasting up to 187 kW and the 772 G/GP pushing an impressive 201 kW, these machines are designed for peak performance, even in the most challenging conditions.

Technological Advancements

John Deere's commitment to technological innovation is evident in its recent G and GP models. The 'GP' in the model names refers to John Deere's Grade Pro (GP) feature, a groundbreaking technology that enhances grader precision and control. This feature, combined with the brand's JDLink™ technology, provides real-time data about the machine's location, productivity, and idle time, optimising fleet management and boosting productivity.

Moreover, the Eco mode in models like the G and GP model range ensures remarkable fuel efficiency. By automatically adjusting the engine speed to the most efficient level under the current load, these graders minimise fuel consumption without compromising performance.

User-Centric Design and Financial Solutions

One of John Deere's standout qualities is its focus on operator comfort and convenience. The spacious, ergonomically designed cabs offer unparalleled visibility, with controls intuitively arranged for ease of use. Such designs not only enhance the operator's productivity but also reduce fatigue during extended shifts.

Recognising the financial challenges that customers might face, John Deere introduced John Deere Financial, a flexible financing solution tailored to meet the needs of each customer. This initiative ensures that customers can invest in the best machinery without being burdened by financial constraints.

South Africa, with its vast landscapes and infrastructural needs, presents a unique market for John Deere. The brand's South African dealers have been instrumental in driving the 'Rent to Own' initiative, understanding the local market's nuances and requirements. This programme has been particularly beneficial for small to medium-sized businesses that might find the upfront cost of machinery prohibitive. By offering a flexible solution, John Deere ensures that businesses of all sizes can benefit from their world-class machinery.

Global Reach and Local Touch

John Deere's presence is felt globally, but its strategies are always localised. Whether it's understanding the terrains of North America or the infrastructural challenges in Africa, John Deere has tailored its solutions to meet regional demands. This global reach combined with a local touch has been a cornerstone of its success, allowing it to penetrate markets and gain the trust of communities worldwide.

Conclusion

John Deere's motor graders, from the JD 570 to the latest G and GP models, encapsulate the brand's journey of innovation, commitment, and excellence. As the construction and mining sectors continue to evolve, one can be certain that John Deere will remain at the vanguard, setting new standards and driving the industry forward. With a blend of power, efficiency, advanced technology, and flexible financial solutions, John Deere's motor graders are not just machines; they are a legacy of excellence that continues to shape the future. Their adaptability to different markets, especially evident in initiatives like the 'Rent to Own' programme in South Africa, showcases their global reach and local touch. ■

The ergonomically designed cabs offer unparalleled visibility, with controls intuitively arranged for ease of use.

The brand has consistently showcased its commitment to innovation, efficiency, and user-centric design.

John Deere's commitment to technological innovation is evident in its recent G and GP models.

Navigating uncertainty: Current state and future prospects of the diamond industry

In recent times, the diamond industry has faced a series of challenges that have 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 amidst a transformation that demands careful analysis and strategic foresight, write Servaas Kranhold, Head of Natural Resources and Jacques Barradas, Partner: Natural Resources, at BDO South Africa.

Jacques Barradas: Partner: Natural Resources.

Servaas Kranhold: Head of Natural Resources.

Synthetic diamonds have contributed significantly to the volumes.

The diamond market has experienced a notable downturn of late.

The diamond market has experienced a notable downturn of late, largely attributed to a confluence of macroeconomic factors. The US market, for instance, is an historically robust consumer of diamonds that's been grappling with recessionary concerns, impacting the demand for Gem quality diamonds. In addition, China's economy, while recovering from its zero Covid policy, has not rebounded as swiftly as anticipated, leading to subdued demand. These factors have combined to create a complex environment for diamond traders, causing prices to stagnate and volumes to decline.

Coinciding with a contracting market is an increase in diamond supply. Notably, synthetic diamonds have contributed significantly to the volumes, posing a considerable challenge. The inability of current mining technology to consistently differentiate between synthetic and natural diamonds has led to further price suppression. This scenario has been compounded by the emergence of new mining operations, such as De Deer's Venetia underground mine and the return of Russian diamond sources. With softer demand and increased supply, the industry faces a formidable task.

In the face of these challenges, the diamond industry is undergoing a fundamental transformation. Mining companies are re-evaluating their operational strategies to remain competitive in a low-price environment. Many have shifted from open-cast mining to underground operations locally, embracing technological advancements such as remote mining to reduce costs. This shift in approach signifies the industry's resilience and willingness to adapt to changing circumstances.

Newly developed Venetia underground mine.

Prospects for recovery: Predicting the path forward

While the immediate future of the diamond industry remains uncertain, a glimmer of hope exists for recovery. The transition from open-cast to underground mining operations presents a potential catalyst for improved selling prices as costs increase and volumes decrease. As more mines delve underground, the scarcity of resources and increased operational complexities could drive prices upwards. However, this prospect hinges on the behaviour of diamond resources as mining goes deeper.

The viability of underground operations relies on the ability of resources to maintain their size and footprint at greater depths. Some mines face the challenge of diminishing resources as they go deeper, potentially rendering underground mining unfeasible. This poses significant considerations for larger listed diamond mines, which may need to weigh the feasibility of continuation against the backdrop of current prices and available resources. In cases where ongoing mining proves unviable, the spectre of large traditional mines closing looms, potentially leading to substantial impacts on local communities and economies.

Sustainable survival: The ESG imperative

As the industry navigates these challenges, the importance of environmental, social, and governance (ESG) considerations cannot be understated. Diamond mines are often integral to the economies of the communities in which they operate. The potential closure of mining operations due to macro-economic factors could have far-reaching consequences, including a mass exodus of inhabitants leading to further urbanisation and the transformation of thriving communities into ghost towns. Balancing the economic imperatives of the industry with its broader societal responsibilities is a delicate yet necessary endeavour.

The diamond industry is at a crossroads, grappling with a complex web of market dynamics and external pressures. The current state of reduced prices and increased supply poses difficulties, yet the industry's history of resilience and adaptation offers hope for the future. As the industry shifts its focus towards underground operations and embraces innovative technologies, it remains to be seen whether these measures will spark a recovery in diamond prices.

While the short-term forecast may be uncertain, the diamond industry's intrinsic value, both as a source of exquisite adornments and as a driver of economic growth, ensures that it will continue to shine, even in the face of adversity. As we navigate these uncharted waters, one thing is certain: the allure of diamonds, both natural and lab-grown, will persist, capturing the hearts and imaginations of generations to come. ■

While the short-term forecast may be uncertain, the diamond industry's intrinsic value, both as a source of exquisite adornments and as a driver of economic growth, ensures that it will continue to shine, even in the face of adversity.

Contango eyes regional dominance

Following the official launch of its flagship asset the Muchesu Coal Project – formerly known as the Lubu Coal Project – in Zimbabwe, coal junior, Contango Holdings, recently received its export permit from the Zimbabwean government, which allows the miner to sell its product regionally and internationally, CEO Carl Esprey tells *Modern Mining*. By *Nelendhre Moodley*.

CEO Carl Esprey.

Since Contango's acquisition of the Muchesu Coal Project three years ago, the company has delivered first production, a key milestone which underpins its strategy of expanding production by as much as 100 000 tpm within the next two years.

The official launch of the Muchesu Coal Project took place on 31st July, at a ceremony well attended by the political elites in Zimbabwe, including President Emmerson Mnangagwa, mining ministries and the local community.

"The project is a good story to tell, not only for Contango, but also for Zimbabwe and the local community in which we have invested heavily, in terms of community initiatives including the development of new houses" says Esprey.

Contango holds a 70% interest in the Muchesu Coal Project, with the remaining 30% held by supportive local partners.

The project covers 19 236 hectares of the highly prospective Karroo Mid Zambezi coal basin, located in the established Hwange mining district in northwestern Zimbabwe.

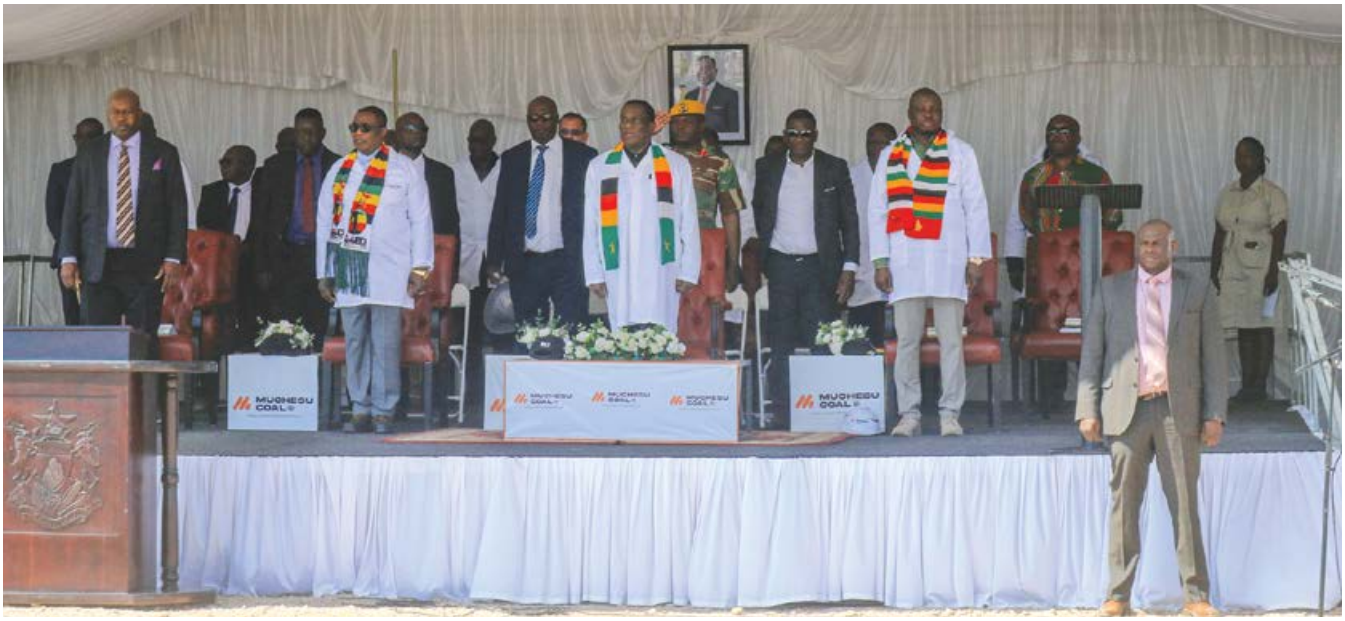
"The project is a good story to tell, not only for Contango, but also for Zimbabwe and the local community in which we have invested heavily, in terms of community initiatives including the development of new houses" says Esprey.

Advancing the Muchesu Coal Project

While there is a great need for coking coal to fire up steel mills and the like, investors with deep pockets are reticent to invest in the development of coking coal projects.

Metallurgical coal or coking coal is a grade of coal that can be used to produce good-quality coke. Coke is an essential fuel and reactant in the blast furnace process for primary steelmaking. The demand for metallurgical coal is highly coupled to the demand for steel.

While some investors are reluctant to fund coal projects, given the negative associations with being a 'dirty' commodity, Esprey explains that there is "currently no scenario where the world doesn't rely on coking coal for the production of steel, chrome or copper".



The official launch of the Muchesu Coal Project was well attended by the political elites in Zimbabwe.

Contango recently delivered first coal production.

"So, until there's a new technology, coking coal remains an imperative for the industrial sector and the global economy, which relies heavily on coal to drive it."

Contango was met with fund raising challenges ahead of developing the $10m Muchesu Coal Project.

"Fortunately, we have a combination of supportive shareholders, high net worth individuals and smaller-scale investors who believed in the attractiveness of the Muchesu Coal Project and invested in its development."

He explains that aside from the $10m dollars spent on upgrading the resource, the previous owners also invested more than $20m developing the Muchesu Coal Project, with the result that the company has a sizeable resource of more than 1.3 billion tonnes.

Currently, Contango is focused on mining from Block B2, where extensive work has been undertaken to define the specific properties of the coal. The coal seams within Block B2 are from surface down to a maximum depth of 47 m, thus ensuring operating costs are kept competitive.

The miner has an off-take agreement with TransOre International for the sale of up to 20 000 tonnes per month of washed coking coal.

The TransOre contract is priced at the prevailing Minerals Marketing Corporation of Zimbabwe (MMCZ) coking coal price, currently at $120/tonne.

"TransOre takes the coal currently being produced from the upper seams at Muchesu at the MMCZ price and handles all logistics and transport costs through its affiliate African Rail International, which has in place rail access, locomotives and port access for export. TransOre currently holds an allocation for exporting coal through the Dry Bulk Terminal at the Maputo Port, Mozambique. The company has also expressed its interest in taking any additional coal that becomes available, either in the event of mine expansion or if expected contracts with other offtake partners do not materialise," says Esprey.

He adds that once steady state production is achieved in Q3 2023, its operating costs will be lower, around $45 per tonne of washed coal. Aside from exploring options to further reduce its operating costs, the company expects larger volumes to deliver economies of scale.

Displacing Australian coking coal exports

The United Kingdom-based natural resource development company is looking to displace a large chunk of coking coal supplied by Australian miners to regional mills with its own high-quality product as it targets industrial sectors in South Africa, Zambia, and the Democratic Republic of Congo.

The LSE-listed coal miner is targeting key destinations mining chrome, copper and iron.

"We have a range of high phosphorus and low phosphorus coking coal – low phosphorus is suitable for the steel industry while high phosphorus product is suitable for copper and chrome smelters. Moreover, we wash our coal to meet the coal quality that customers require. But, with the washing and

Coking coal remains an imperative for the industrial sector and the global economy.

TransOre takes the coal currently being produced from the upper seams at Muchesu mine.

removal of impurities, much of the product is lost in the process – we are currently achieving roughly 50%- 60% yield, which is the norm for the Southern African region."

Given that there is a market for the run-off or fines (DRC and Zambia), the company is currently in talks with potential off-takers for its fines.

According to Esprey, South Africa currently imports vast quantities of coking coal at huge cost, from Australia.

"Essentially a customer looks at two important inputs when considering product sales – product quality and cost. If the customer can buy the same quality of product at a cheaper price, the customer will readily move to a new supplier. As a result, we will be looking to supply coking coal to the South African market at half the cost of that supplied by Australian coal producers."

Given this aspiration Contango, which is currently mining at a depth of 47 m, says as demand for its product grows, the company will look to mine across the "whole footprint of the deposit" and at depth.

"Should demand rise to 100 000 tpm, we will transition to underground mining. In fact, if a large steel producer inks an agreement for 100 000 tpm of coking coal, we are happy to mine underground on a dedicated contract for that client."

Coking coal and thermal coal

Metallurgical coal, also known as coking coal, is used to produce coke, the primary source of carbon used in steelmaking. Metallurgical coal differs from thermal coal, which is used for energy and heating, by its carbon content and its coking ability.

Moreover, given the closeness of Zimbabwe to South Africa, transport costs will be significantly lower when compared to shipping coal from Australia, which Esprey believes will be a game-changer for local mills.

Aside from its existing offtake agreement, Contango is keen to ink longer term agreements directly with big steel mills in the region.

"In order to have control of the product pipeline, big mills generally prefer to have a direct supply route from the mine. Following the award of the export permit, we have been engaging with a variety of large mills in South Africa and have already sent product for testing at their mills. Once potential customers are satisfied with the quality of the product, we will negotiate long term agreements with them."

But as a junior coal producer, does Contango have the capacity to deliver the requisite tonnages?

Esprey believes that the Muchesu Coal Project's 2 billion tonne resource is certainly up to the task.

"Our strategy is first to become cash flow positive and then we will use the cash generated to expand the mine, the capacity of the wash plant and our logistics fleet, amongst others. Given our massive resource, the plan is to increase our capacity by at least ten times that of our current production and become a regional player supplying product into the export market."

In line with its lofty aspirations, the miner, which currently owns two front end loaders, a tipper truck and a surface miner to produce 20 000 t of product, will certainly need to significantly increase its fleet.

"As we start expanding our rate of production, we will increase our fleet, especially our road maintenance fleet as we use a dirt road before we get to the National Road. With our plans to significantly grow our capacity, we will need to increase the number of graders, etc., to ensure road maintenance and plant capacity, amongst others," he concludes. ■

Local community members attending the official launch of the Muchesu project.

A view of the camp site.

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Omico advances Omitiomire DFS, eyes construction by 2025

With copper demand forecast to outstrip supply in the next few years, the future, according to Mark Sawyer, co-founder of Greenstone Resources, looks bright for Namibia's latest copper developer, Omico Mining, which is advancing its Omitiomire Copper project. By *Nelendhre Moodley*.

Omico Mining was formed in 2019, through a strategic partnership between Greenstone Resources (Greenstone) and International Base Metals, when they entered into an earn-in agreement over the Omitiomire Copper Project.

Through its Namibian subsidiary Craton Mining and Exploration, Omico holds mining licence ML197 and exclusive prospecting licence EPL8550 – a 30 000-ha licence area which makes up the Omitiomire Copper Project, located 120 km from Windhoek, in central Namibia.

To date, drilling has identified a measured and indicated resource of 95.8 million tonnes (mt) at 0.59% total copper (TCu) for 563 300 t contained copper (09+.25% Cu cut-off grade).

According to Project Manager Mike Stuart, the company is looking to complete its bankable feasibility study (BFS) by year-end or during the first quarter of 2024 at the latest, after which it will begin fund-raising – targeting between $250- $350 million for project development.

Since taking a 51% shareholding in the project in 2019, London-based Greenstone Resources, which has built mines across the world including Africa, South America, North America and Australasia, has taken over the sole funding of all Omitiomire development costs.

To date, the company has spent roughly $10m to upgrade the resource and on the feasibility study – over and above the roughly $20m injected by the previous owners.

"Obviously, getting to the point of construction will be dependent on achieving the requisite project financing, but if all goes according to plan, we should start construction by 2025," says Sawyer.

Project construction is expected to take roughly 18 months, with initial production by 2026, and steady-state production by 2027.

Stuart notes that the minerals processing aspect of the project remains amenable to using chloride-curing, acid heap leach and SX/EW.

Project manager, Mike Stuart and team member inspecting the core samples.

Metallurgical tests suggest that Omico can expect 85% leach recovery of copper, with relatively low acid consumption, and a final cathode copper product of about 99.995% Cu.

"Development of the Omitiomire project is straightforward – the open-pit mine will produce 25, 000 tpa of copper cathode for the export market. Using solvent-extraction and electro-winning (SX/EW) technology, combined with optimised hybrid solar PV and grid power, the project will efficiently produce LME Grade A copper cathode that does not require any further smelting or refining prior to industrial use. The process creates a high-value and low-emission product that does not require tailing storage facilities that pose a risk to communities or the environment," explains Stuart.

Aerial view of the Omitiomire Copper project.

Progressing Omitiomire BFS

To advance its BFS, Omico has co-opted the skills of engineering and mining consultants in South Africa, who are working on project engineering, plant optimisation and pit designs while local consultants in Namibia are undertaking environmental, road and water studies.

Sandton-based METC, specialist in the design and building of metallurgical process plants, is the engineering consultant on the Omitiomire project, while mining consultancy firm, Bara Consulting, has been awarded the mining consultancy contract and local Namibian company, CREO Engineering Solutions Namibia, is tasked with transport, water and acid supply and support studies.

For the Omitiomire project, which is situated in a semi-arid savannah environment, this is both a blessing and a challenge for while there will be little need to dewater the pit, it is a challenge for plant processing activities to source sufficient water.

In seeking water sources for its operation, Omico Mining has been eyeing a relatively new aquifer located 70 km east of the Omitiomire project and has subsequently partnered with Namibia's Department of Water affairs to aid with studies on how to best access the water. According to Stuart, the aquifer is significant, accounting for roughly 3 billion cubic metres of water.

"In partnership with Namibia's Department of Water Affairs we are working to produce a regional hydraulic geological model of the new aquifer. Once the studies are completed and a new pipeline is built, we will be able to pump sufficient water to meet our processing plant needs. Currently, farmers are using the water from the aquifer for significant arable farming activities and providing water for livestock."

Omitiomire Copper Project – a highly attractive asset

In a market short on new copper projects, Omitiomire is a highly attractive option, which at BFS stage, is well on its way to becoming Namibia's newest copper mine.

Pegged at 0,6% copper, "an average grade by global standards", Omitiomire has a life of mine of more than 12 years on the current reserve with the company actively drilling around the mining license for an expanded resource.

"Since taking over in 2019, we have undertaken almost two years of detailed metallurgical tests work on the project and have completed another phase of resource drilling as well as additional infill drilling last year. There is certainly expansion potential on the asset and opportunity to expand the LOM. In fact, we are busy drilling to the north and west of the

Drilling underway at the Omitiomire project.

mine. We also have a large package of exploration land around the mine site itself," says Stuart.

Moreover, with copper being a critical mineral in the green movement and the global drive to achieve net zero emissions and given "a real scarcity of new copper projects coming online across the globe", Sawyer sees development of the Omitiomire project as crucial in filling the future supply gap.

"By 2035, the world is going to need an injection of a further 10 million tons per annum of copper, over and above the current global supply of 24-25 mtpa. This means industry needs to bring on-board a significant quantity of new copper production in a phenomenally short period of time. The timeline to discover new deposits, take them up the value curve and into construction and production is an extremely long-timetable, often taking decades, which is even more reason why the Omitiomire project, which is on the cusp of entering the construction stage, is all the more valuable to the macro arena," notes Sawyer.

He adds that whilst Omitiomire might be modest by global standards in terms of scale, the project is increasingly becoming of interest, given that extensive scale copper assets "just don't exist any longer".

"Fifteen to twenty years ago, when large scale copper deposits were the norm, Omitiomire would have been insignificant; however, now that the pipeline of copper projects is rather thin, Omitiomire from a global perspective, is becoming extremely important."

Further to this, given that investors are monitoring ESG credentials of copper assets more closely Omitiomire, which will be producing a relatively clean form of copper for the export market, will be welcomed by the industry.

"The final product will be 99.99% pure cathode, which means that our freight costs will also be extremely low as we will be shipping refined metal."

Moreover, Omico is planning on taking advantage of the Namibian sunshine environment and is investing in solar power.

Tenders for the development of a 25 MW solar power plant have already been issued with the project developer looking to source as much as 30% of its energy requirements from solar.

When built, the Omitiomire project will be the impetus for job creation in the area and an important contributor to the national economy.

According to Stuart, following the disruptions created by the Covid pandemic in 2019, the mining friendly jurisdiction has experienced chronic unemployment with the economy struggling to grow.

"Over the past five to ten years, few new mines have been built locally, which means there is a large number of skilled people that are unemployed.

Greenstone Resources

- Founded in 2013, Greenstone Resources is a private equity fund specialising in the mining and metals sector.
- Since setting up Greenstone Mining 10 years ago, the mining investor has targeted copper as its commodity of choice based on its strong belief in the long-term fundamentals of the metal.
- Copper accounts for as much as 74% of Greenstone's portfolio of assets with the remainder being bauxite, potash, zinc, and gold.

A core sample from the Omitiomire Copper project.

When built, the Omitiomire project will employ between 800 – 1000 people directly and more through indirect employment by service suppliers to the mine."

The South African connection

As a long-standing mining destination, South African expertise in mining engineering and consulting engineering is highly sought-after.

"South African mining engineering and consulting teams are highly experienced in building copper projects, especially plants in copper rich areas such as the Democratic Republic Congo and Zambia."

As such, aside from a strong reliance on the South African mining skills set, Omico is relying heavily on locally manufactured equipment for its SX/EW plant, with as much as 90% of equipment sourced from South Africa.

South African-based Bara Consulting and METC Engineering are among the companies involved in delivering Namibia's next copper mine.

"As an established mining jurisdiction, Namibia is close enough to South Africa to allow for spares to be flown or trucked-in overnight or bulk materials transported by sea through Walvis Bay," says Stuart.

Outlook for copper

According to Sawyer, the outlook for copper is extremely exciting, especially in terms of the medium-to-long-term supply/demand dynamics.

"Although most analysts point to a slight surplus of around 100 000 tonnes for this year and next year, from 2025 onwards, industry commentators are forecasting the start of a copper deficit that will grow to become quite sizable. As there are few new mines being developed, the projection is that supply constraints are imminent," explains Sawyer.

Copper is currently trading at over $8 000 per tonne, with Sawyer upbeat that the price of copper will improve markedly by the time the Omitiomire copper project comes online.

Impact of Namibia Investment Promotion and Facilitation Bill

The Namibia Investment Promotion and Facilitation Bill, which is yet to be finalised, continues to create investor uncertainty.

Since the announcement of the proposed Bill, there has been a slowdown in investment into the country, especially in the mining sector, with the copper developer keeping a close eye on government interactions.

"As a mining company and an investor, it's our responsibility to act prudently and de-risk the project as much as possible from an engineering and financing perspective, given that project development requires an injection of hundreds of millions of dollars. However, from a practical point of view, the project already has a mining license, which is valid till 2036 and we are in the process of applying for an environmental clearance certificate for construction, which we expect to receive later this year," says Sawyer. ■

Uses of copper:

- ❑ Copper is used extensively in manufacturing electric cables and other electric appliances.
- ❑ Because copper is a highly efficient conduit, it is used across the world in renewable energy systems to generate power from solar, hydro, thermal and wind energy.
- ❑ Copper helps reduce CO_2 emissions and lowers the amount energy needed to produce electricity.
- ❑ It is used for making utensils, containers, calorimeters, and coins.
- ❑ It is used in electroplating.
- ❑ Copper is alloyed with gold and silver for making coins and jewels.

Axis House CEO Justine Stubbs.

Axis House scores in all markets

Does a downturn in the global economy mean all businesses suffer? Not in the case of reagent specialist Axis House, which is experiencing a business boom. By *Nelendhre Moodley*.

The downturn in local and global economies has seen more mining houses calling for solutions driven results that target lower costs and improved production rates, Axis House CEO Justine Stubbs tells *Modern Mining*.

"Owing to the pressure on metal prices, an increasing number of our clients are looking at ways to improve their processes and thereby save money. In turn, this demand – and especially demand for further technical support – has led to growth in Axis House business, locally and in the territories in which we operate."

The reagent specialist, with branches strategically placed across the globe, has expanded its technical expertise team which is integral in meeting the growing demand for improved plant efficiencies.

Axis House operates as a lean business and recently lifted its skills base by 20%, with its South African operations employing some 65 people and the territories in which it operates employing 120 people in total. The company has also employed several senior managers including a number of extremely talented operational staff.

"It has been exciting getting to know our recently acquired operational staff who are passionate about their territories and keen to share their knowledge with us, which we in turn bring back to the sub-Saharan African segment of our business."

According to Stubbs, a benefit of keeping "a lean staff complement" is that it allows the company to maintain its key values.

"Regardless of who the client is, the territory in which we operate, what problems or metals or minerals the client is processing, as a team, we benefit from our values as they talk to being highly service centred and having a collaborative approach embedded in our company DNA."

Axis House beds down on its five-year plan

Having set out a five-year business plan last year, Axis House is focused on ensuring that it meets its stated objectives of guaranteeing that it offers best service in all its areas of operation, driving product enhancements and expanding its product offering beyond its traditional business lines.

According to Stubbs, as experts in reagent solutions in sub–Saharan Africa, the objective is to provide its offering to the territories in which it operates and the rest of the world.

"To date, we have been successful in achieving our stated ambition of geographical expansion and have a fully operational team in the Middle East, which currently services North Africa, the Middle East, and parts of Europe and, on the back of robust appetite for our product lines, our team in the Middle East continues grow. Moreover, our operations in Australia are also on a steep growth curve which has seen us employ more in-house staff and more infrastructure to meet the expanding needs."

A second component of its five-year plan has been a focus on expanding its product offering to different metals and minerals, including lithium, nickel, platinum, zinc, rare earths, phosphates, tin and gold.

"Our strategy to expand our offering to new minerals and metals sets has been exciting for everyone in our group, especially the technical department. With each new product line that we bring to the market, we have an opportunity for further cost savings, greener solutions and improved plant efficiencies;

Axis House Group continues to grow steadily, branching out into new markets and reaching greater heights.

hence improved margins for our clients."

As a case in point, Stubbs flags the platinum group metals sector which is increasingly encountering oxidised material and has been turning to Axis House for solutions to its latest challenges.

"In the past, platinum mines had a simple way of processing sulphides; however, they are increasingly encountering more oxidised material. Given that we offer unique technology solutions to copper and cobalt operations, we have been able to tweak these to meet the needs of the precious metals industry and have since been achieving exceptional results on the oxide flotation circuits for clients in the gold and platinum industries."

Last year the company undertook multiple projects related to oxidised PGMs and gold ores, which has resulted in "some really exciting outcomes at lab scale, pilot plant and at full scale". Following this testing phase, some of the oxide collectors and reagents used at platinum and gold mines have been fully commercialised.

Furthermore, since establishing an office in Turkey in 2019 to service the phosphate and fluorspar markets with its decadmiation product range, the company has expanded its footprint to encompass the Northern African and Middle East industrial metals market.

According to Stubbs, innovations have led to "big improvements" in cadmium removal from phosphoric acid and in cobalt leach solutions.

"Over the Covid period, for this market we developed a relatively new reagent range for polymetallic flotation, which we started rolling out last year. We commercialised the product range and have supplied it to clients in Turkey with copper, lead and zinc operations."

The company recently established satellite teams in Saudi Arabia, Lebanon, Jordan, Tunisia, and Morocco, offering these territories new opportunities in chemical developments, including shorter routes to market.

"We started holding products in Spain and Morocco to allow us to distribute our products much faster. Our objective for the short-to-medium term is to investigate opportunities for establishing manufacturing hubs to meet clients' needs in these new areas of operation. To date, our territorial growth efforts have been extremely successful and on the back of our growth in these markets, we continue to seek strategic alliances and new partnerships."

Holistic solutions provider

Axis House 's holistic approach focuses on how its products impact the entire mining value-chain.

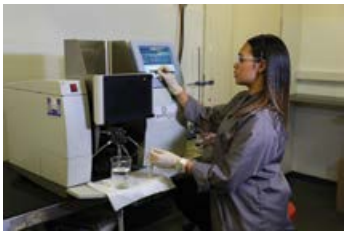
"Our specialist teams take pride in offering an all-inclusive solution, modifying reagents' suites and dosages to optimise a particular plant or situation. In addition, as a chemicals solutions provider, we offer clients our full supply chain service, including off-balance sheet stock holding, new routes to market and innovative storage solutions."

Hand in hand with providing a holistic solution, Axis House is committed to driving research for sustainable chemical alternatives. "We recognise the importance of aligning with our clients' ESG practices," explains Stubbs. The R&D team at Axis House works to reduce the environmental impact of the company's products. The company is also gaining traction in advancing developments related to cyanide replacement with products trialled last year being used commercially at two gold operations in South Africa. Stubbs expects the uptake of this cyanide replacement - D20M3 to soar within the next 12-18 months.

"Many mining operations overdose, and we are actively working to reduce the quantity of chemicals that go into minerals processing. Companies frequently believe that by using more product than necessary, they will achieve better results, which is not true. In fact, in some instances we find that clients overdose by up to 40-50%. Essentially, we look at our processes holistically – not only the chemical portion, but the entire value chain – to ensure we make a difference in lowering our carbon footprint and those of our clients," concludes Stubbs. ■

Above: The Axis House Group team embarks on an inspiring onsite visit, strengthening bonds, exploring opportunities, and ensuring excellence.

Left: Within the heart of Axis House Group's success lies a wellspring of innovation and efficiency.



One of Axis House Group's chemists delves into the world of precision with ICP Analysis.

The Froth Column - A pivotal innovation in industrial separation and mineral processing.

Latest regulations drive demand for Booyco's technology

Following the promulgation of the Mine Health and Safety regulation on trackless mobile machinery, which came into effect in December 2022, mining houses have actively been seeking service providers to help them align with the requirements. The regulation looks to prevent collisions involving diesel-powered trackless mobile machinery and thereby reduce fatalities and related injuries in the sector. By *Nelendhre Moodley*.

Anton Lourens, CEO of Booyco Electronics.

A decade ago, mining fatalities stood at a staggering 270 deaths per annum. Today, with the sector's firm focus on reducing mining fatalities by 20% per annum, the industry has succeeded in dramatically lowering lost time injury rates (LTIR) and fatality rates.

Although the mining industry's safety performance deteriorated in 2021, with the number of fatalities and injuries increasing from 60 in 2020 to 74 in 2021 – and injuries increasing by 11% – from 1 814 in 2020 to 2 014, last year, the sector recorded 49 fatalities.

According to Booyco Electronics CEO, Anton Lourens, South Africa's mining industry is one of the world's most proactive when it comes to driving the agenda towards zero harm.

PDS technology will continue to develop, particularly leveraging advancements in areas such as the Internet of Things (IoT) and other technologies.

He explains that the South African mining industry has long been implementing technologies, adopting innovative products and undertaking key training initiatives in an attempt to achieve behavioural changes.

Following the promulgation of the recent regulation, the South African-based original equipment manufacturer of mine safety equipment has been inundated with requests for the implementation of its Proximity Detection Systems (PDS) and Collision Prevention Systems (CPS), which offer vehicle-to-pedestrian and vehicle-to-vehicle detection.

"With mine safety legislation getting progressively tighter we continue to ensure compliance with our South African proximity detection and collision prevention systems. We are geared to meet Level 7, Level 8 and Level 9 requirements," explains Lourens.

Since 2015, the Minerals Council South Africa has undertaken intense discussions, tabled scenarios and provided guidelines based on research to motivate for the adoption of the regulation.

Lourens explains that the industry body also flagged three key concerns that emanated from the think tank, including the question of service providers' ability to supply equipment given the global supply chain challenges, and concerns around equipment installation and equipment maintenance.

"What is evident is that some mining houses are keen to implement PDS related technology and envisage taking ownership of the product workings and maintenance, which means relevant mining personnel will have to be properly trained to carry out the associated tasks."

As such, clients are looking to Booyco Electronics for training and support on its product range, which means the company is set to expand its workforce exponentially.

In fact, the East Rand-based technology expert expects to double the number of field service employees, from its 2022 headcount, in the next 12 months. The company is gearing up to train tradesmen on its product range and equip them with the necessary skills-set so they are proficient in product installation and maintenance. As part of its CSI programme Booyco Electronics will source workers from its local community.

The road to product adoption

According to Lourens, South Africa is the first country in the world to regulate the deployment of PDS in mining, with the result that the industry has seen a sharp uptake of the technology across all mining houses.

"We are also experiencing engagement from the international mining community, including enquiries around PDS technology and lessons learnt locally. Interestingly, the International Council on Mining and Metals (ICMM), is already promoting the adoption of the PDS and has established formal task teams dedicated to PDS related research as it drives the adoption of advanced technology for mines."

All mining operations must observe strict health and safety regulations to mitigate the risk of collisions between pedestrians and vehicles, and between vehicles.

The Booyco PDS has become synonymous with ensuring safety on surface mining sites.

The ICMM is a leadership organisation working for a safe, sustainable world and is focused on responsibly produced minerals and metals.

Given that international miners operating in Africa rely heavily on South Africa for their mining skills set, the uptake of the Booyco PDS and CPS continues to gain traction as South African mining personnel are familiar with Booyco Electronics' product range.

"There are numerous projects in Africa run by South Africans who already have a relationship with Booyco Electronics or, at the very least, have knowledge of our product line and are eager to deploy the technology. Moreover, we are finding that global mining houses that have seen PDS adopted at

Booyco Electronics has an extensive footprint of customers facilitating harnessing of technology for digital twin modelling.

neighbouring mines, are keen to adopt our technology, given its rave reviews."

Established in 2006, Booyco Electronics has been in business for over 17 years and has garnered a vast number of clients. The product manufacturer is already on its fourth iteration of product evolution and deployment.

"In addition to several enquiries from new clients, some of our very first clients, who acquired products more than a decade ago, are reaching out for installation of the latest generation of equipment as they wish to comply with the regulation on trackless mobile machinery."

Ensuring fit-for-purpose equipment

Given that the acquisition of PDS is a highly capital-intensive purchase and a long-term commitment, Lourens advises that clients have a proper understanding of their product needs as aligned to the specific mining requirements.

"It is imperative for clients to understand the capabilities of each technology and which technology is most suited to their operational needs. Mining operations, including coal mines, surface mines, underground and the hard-rock narrow reef mining environments, have different PDS requirements. Currently there are four or so key technology offerings in the PDS market and we often find that clients purchase equipment that is not necessarily best suited to their specific applications. At Booyco Electronics, we partner with our clients to help them define their product needs so they purchase the product most suitable to their operational requirements."

Lourens adds that owing to robust demand for people and vehicle tracking systems, there has been a rapid rise in the number of product suppliers entering the market space.

Booyco Electronics, which has invested millions of rands refining its technology and today has PDS suitable for "every single mining operation", remains unfazed, and says that as a long-standing technology specialist to key mines in Africa, it has a definite advantage as an industry leader.

"Where our peers specialise in technology for specific operations, Booyco Electronics has, over the years, developed a suite of PDS products to meet various operational needs."

While the technology is an essential tool in helping save lives, Lourens cautions that PDS are not a quick fix or a silver bullet that automatically improve safety at mines.

"PDS and CPS require buy-in from key stakeholders who must be willing to make the necessary behavioural changes and focus on continuous improvement. The greatest success stories emanate from the successful adoption of an integrated approach, where all stakeholders buy into the implementation of PDS; but, in the same vein, when the integrated approach is lacking, the benefits to clients are minimal.

Technology trends

Given the advantages associated with advanced technology systems, more and more companies are acquiring the latest technology to unlock business improvements.

"Although the expectation is that mining houses are aggressively adopting technology at their operations, the reality is that the speed of technology uptake varies between mining operations. At mining operations headed by tech savvy leaders, there is a desire to acquire the best technology available to assist in the day-to-day running of operations, while some businesses headed up by more mature personnel have a lower appetite for technology adoption. Generally speaking though, and given the technology gains, the bulk of the mining industry has been quick to adopt advanced technology systems."

Coupled with the rapid adoption of PDS and CPS technology is the push from industry for better connectivity to ensure improved data collection and better management of information.

"We have seen a big drive from mining houses for data management as a tool to innovate and improve aspects such as safety, efficiency and productivity. Data management is playing a key role in aiding

Digital twin

A digital twin is a virtual representation of an object or system that spans its lifecycle, is updated from real-time data, and uses simulation, machine learning and reasoning to help decision making.

leaders to have a better handle on the working environment as they use data to track work progress and pinpoint the workers from the shirkers, amongst others. Essentially miners are using information to optimise their operations and thereby increase efficiencies," explains Lourens.

Customers are also using PDS technology to identify hotspot areas and flag personnel and vehicle operators who are not behaving appropriately and, as a result, are recording a significant reduction in operational vehicle-to-person and vehicle-to-vehicle interaction.

Another component of advanced technology that has gained traction is digital twin technology, which allows mining operators to run different scenarios based on real time data. Digital twin technology aids with risk mitigation, improved traffic management and traffic flow analysis.

From a safety and risk management perspective, digital twin simulations can be used to create detailed, 3D models of the mine, including the locations of personnel and equipment. This can be used to track the movement of workers and vehicles, ensuring that they are in safe areas and avoiding unnecessary interactions.

New growth opportunities

Strong demand for its product offering sees the proudly South African OEM expanding internationally with recent entry into the Australian and Chilean markets. The company, which is also growing its African footprint and already has a presence in Congo, Ghana and Zambia, has been appointing collaborative partners in areas that have a similar mode of operation to that of South African mines.

To date, Booyco Electronics has appointed five global technology partners who understand the specific nuances of the mining industry, overall technology focus, and who are based locally in the areas of global operation.

The Booyco CXS solution provides a comprehensive and integrated response to Level 7, Level 8 and Level 9 safety levels – as defined by the Earth Moving Equipment Safety Round Table (EMESRT).

The company is also diversifying into key sectors, such as harbours, forestry and warehousing, with Lourens explaining that Booyco Electronics continues to be inundated with enquiries from these sectors seeking to improve their safety measures.

"The number of forklift and factory related incidents in this country is alarming, which is why these sectors are looking to Booyco Electronics' technology to help them save lives and their personnel from injuries," concludes Lourens. ■

Booyco Electronics

Established in 2006, South African based Booyco Electronics specialises in the development and supply of electronic safety products. With more than 17 years of experience in Proximity Detection Systems (PDS) solutions, the company has supplied over 6 500 sets of mining vehicle equipment installations across southern Africa, and more than 56 000 pedestrian equipment installations.

Tony Pretorius, ETD Executive at Murray & Roberts Cementation.

Trevor Schultz, Risk Executive at Murray & Roberts Cementation.

MRTA's Licence to Supervise programme in high demand

The underground mining landscape has changed dramatically in the past 15 to 20 years, and this is even more evident within the mining contracting sector. Large portions of the workforce are now drawn from local communities around a mine or a contract mining project and, in many instances, these individuals have had little to no experience in an operational environment. This brings its own challenges in terms of achieving productivity but doing so safely and mitigating the risks. It is all very well to provide training to ensure these persons are proficient and meet the necessary compliances, but there is another less obvious need. One that is of equal importance. By *Nelendhre Moodley*.

This is according to Tony Pretorius, ETD Executive at Murray & Roberts Cementation, who spoke to *Modern Mining* when we recently visited the Murray & Roberts Training Academy (MRTA) at its Bentley Park facility just outside of Carletonville.

He explains that of critical importance is the need to provide a supervisory levels skillset to navigate the changing landscape within the underground mining sector, with the License to Supervise programme, which is exclusive to Murray & Roberts Cementation, being specifically designed to upskill supervisors working within the contracting and mining environment.

"Supervisors are people who come up through the ranks and are appointed to the position because they have either the required technical or practical competence. But they don't necessarily have the leadership capabilities, which is why mining houses send newly appointed and, even seasoned, supervisors for training to the MRTA. Our programmes are linked to the specific customised requirements our clients would like to include within the programme, such as the License to Supervise programme for employees and supervisors and a production supervisory programme we developed as a result of the MC mechanised mining specifics. Our programmes are flexible, and scalable, and aligned to industry's training needs," explains Pretorius.

Licence to supervise programme

The *Licence to Supervise* programme offers a holistic understanding of how to supervise, with tools to help navigate the myriad challenges that supervisors face on a daily basis.

"We provide supervisors with a 'toolbox' to handle the areas of leadership they encounter in this highly challenging environment. The programme has three parts – technical, supervisory and neuroscience. As trainers, we put our supervisors in an immersive workplace environment, progressing them through the entire cycle, where we teach them to identify and solve workplace issues."

The MRTA offers a blended learning methodology environment of virtual reality (VR) combined with 2D and 3D modelling and simulation, and workplace integrated learning. The offering has vastly improved from the traditional classroom only style of teaching and today combines classroom and workplace environment teaching.

"As a leading underground mining contractor, Murray & Roberts Cementation is committed to zero harm and has thus incorporated an extended reality framework which combines the use of Computer Based Training, 2/3D modelling, VR, simulation and extensive workplace coaching to address all areas of applied competencies to ensure our learners are equipped with the necessary means to identify and respond to

Murray & Roberts Cementation has invested extensively in its training facility outside Carletonville.

Above: The blended learning environment at MRTA, including the use of VR.

Left: E-learning is a foundational building block of the MRTA programmes.

hazardous situations in the workplace. Moreover, these teaching methodologies extend to our supervisors and operators of trackless equipment and engineering support services, and cover all main and sub activities across the full mining cycle of work," explains Pretorius.

Speaking of the technical and supervisory aspects of the programme, Pretorius explains that the focus is to upskill supervisors on how to oversee people and operators, especially in caring for equipment and managing traffic flow between equipment, material and personnel, in heavy traffic areas.

As part of the training, MRTA monitors operator competencies across three levels: foundational, reflexive, and practical.

"Our extended reality framework was designed against the backdrop of the situational leadership model and ensures all areas of competencies are addressed, namely foundational, reflexive, practical and workplace experience."

Reflexive competencies refer to the "what if" aspects of the job and deal with potential risks that may be faced. There are three facets to reflexive competencies, namely, health and safety considerations of an operation, machine appreciation to ensure that equipment doesn't suffer premature failure, and workplace productivity enhancement to determine whether an individual is able to meet the demands of the workplace.

The programme also aligns to the recently promulgated Mine Health and Safety regulation on trackless mobile machinery, which requires supervisors to effectively manage the smooth flow of man and machine.

"It is paramount that operators know how to maintain their equipment and how to respond and behave when warning signals are issued. Equally important is that pedestrians at mine sites (workers) know the areas to avoid in high traffic or hazardous zones."

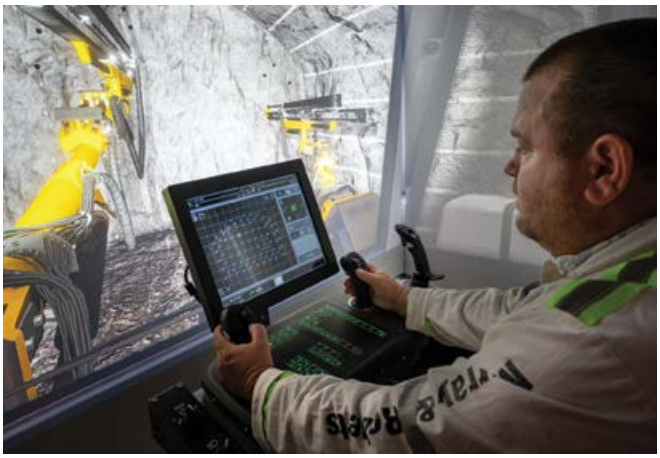
Following the enforcement of the regulation, which came into effect in December 2022, MRTA is tracking a significant demand for training related to mining equipment and product maintenance.

Speaking of the third key component of the *Licence to Supervise* programme – neuroscience – Pretorius says these days supervisors are faced with a completely different set of challenges from those of a decade ago, when the focus was on technical production and related safety issues.

"The supervisor in today's world has to understand the nuances of diversity, culture and customs, amongst others, to effectively lead his or her team. Our neuroscience programme is specifically designed to teach supervisors how the brain receives and interprets information and that emotions triggered by our thoughts are a predominant driver of behaviour. We provide our supervisors with the toolkits and an understanding of how to deal with and influence what they are saying and how they say it," says Risk Executive, Trevor Schultz.

Left: Training at MRTA incorporates an extended reality framework.

Below: An investment in simulators provides an immersive learning environment at MRTA.



Above: Technical training is also given priority.

Right: Training for technicians also important.

Explaining the reason for incorporating neuroscience into the supervisor programme, he states that while undertaking a pilot programme for a client three years ago, MRTA came across what it perceived to be an unacceptably high level of lost time injury rates (LTIR) and subsequently began to explore the root cause of the incidences and how best to reduce them.

"We determined there was a gap in our training approach to supervisors, for which Pretorius and I were mandated to investigate the topic of neuroscience. Following extensive research, we developed the neuroscience programme, which we launched two years ago," says Schultz.

Meanwhile, following the push towards mechanised mining, MTRA is also developing a programme to meet this need and, according to Pretorius, "with mechanised mining, 80% of the business is engineering 20% mining".

"Given the push for mechanical and automized mining, the industry has evolved from being mining focused with a small engineering support base to being engineering driven with a small mining element. To equip our trainees for safe engineering software services, we offer several new programmes that are designed to deal with technology advances, but predominantly in the apprentice space. Having identified engineering supervision as a big gap in training, MRTA is in the process of developing the engineering license to supervise programme. We have noted the successes in training in mining and are looking to replicate this in the engineering space."

MRTA's fit-for-purpose programmes

Pretorius adds that the changing environment means MRTA's training curriculum is also evolving to align with latest regulatory and client needs, and training programmes are being meticulously developed to focus on the right technology to support the training.

"For instance, we address low risk areas through CBT, moderate risk areas using 2/3D modelling and for high potential risk areas, we use VR. Our investment provides learners with an uncanny sense of the realism of experiencing workplace and work-related hazards and risks, coupled with the initiative we adopted of using experienced miners and operators to test the technology to ensure a realistic look, feel and haptic playback to support muscle memory. Our advanced mock-up environment offers major advantages for learners as this is where they can apply the theory and skills learnt and prove their capabilities in a low-risk environment. Providing realistic environments to simulate safety protocols in mock environments prepares learners for real-world safety related challenges."

Importantly, and as a gauge to determine the effectiveness of the curriculum, MRTA requires learners to complete evaluation forms at the end of their training cycle which ensures that the trainers themselves align with, and improve, their training methodologies.

"As a contracting company, we are well positioned to learn from incidents experienced at the sites of our widespread projects and we incorporate the lessons learned into our training programmes. This, coupled with our participation in committees such as the Education Advisory Committee, ensures that we remain at top of our game. Moreover, we understand that in terms of the existing mining skills base, we are fishing in the same pond as mining houses, so the skills we can attract need to be developed to ensure we have effective contracting supervisors able to handle issues of diversity, neuroscience and leadership, coupled to the diagonal life technical aspects," concludes Pretorius. ■

MRTA programmes

The entity offers a suite of full and part qualifications in occupational health, safety and environment, coupled to in-house customised programmes, in pursuance of reducing workplace and work-related hazards that may give rise to unwanted events in the business.

These are predominantly:

- ❑ The National Certificate in OHS NQF Level 2
- ❑ The SHE Representative Skills Programme
- ❑ Working @ Heights & Basic Fire Fighting
- ❑ A 1 & 2 Series in HSE Risk Management
- ❑ Neuroscience & Safety Leadership

stenchGAS

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mineARC SYSTEMS

Mitigating fire risk with Multotec's robust flame-resistant rubber screen panels

Shawn Faba, Screening Support Product Manager, Multotec.

Metallurgy and process engineering company, Multotec, has developed a range of flame-resistant rubber screen panels that self-extinguishes in under 60 seconds, thereby significantly reducing the risk of fire and the associated loss of valuable production time, plant, and staff safety hazards.

Multotec responded to a challenge facing iron ore producers in Australia by developing a rubber screen media solution that negates the risk of fires associated with hot work on screen decks.

Shawn Faba, Product Manager: Screening Media at Multotec, explains that while the solution was developed to meet the stringent performance and safety requirements of the Australian mining industry, other mining operations across the world would also benefit from its adoption.

Multotec's flame-resistant panels have been scientifically developed in collaboration with international academic institutions and raw material suppliers. The product has been tested under controlled laboratory conditions, certified accreditation trials and, in real world conditions, on a number of sites.

Significant potential benefits

"When we consider an interruption to any production environment, the downtime could easily translate in revenue losses that run into millions of dollars. For example, in Australia, mining houses are tonnage-driven, meaning when you have unplanned downtime of two hours, it could translate to the loss of millions. Fires in the plant can shut down whole modules for weeks at a time. Australia's miners operate in campaigns – for instance, they'll operate for three months and then they'll do maintenance. They don't stop haphazardly.

"Our product has undergone rigorous testing and has been confirmed to operate continuously to fit existing shutdown campaigns, meeting the mining industry's stringent requirements. Ensuring high-quality equipment is essential to minimise downtime. This is especially beneficial for plants that operate around the clock, as interruptions can be costly and disruptive," says Faba.

Multotec's flame-resistant rubber screen panels are available in hard (PD70) and soft (PD45) durometer rubber.

Developed with safety in mind

"To make the rubber screen panels flame-resistant, we modified the chemical composition of the raw materials used to manufacture the panels. However, compared to conventional rubber screen media, the flame-resistant screen panels can be used without compromising on efficiency," adds Faba.

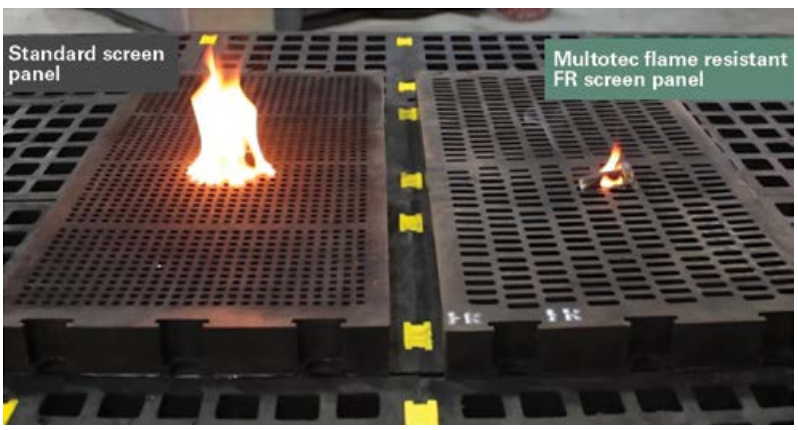
He notes that Multotec is proud of the fact that its flame-resistant rubber screen media has received international acceptance and is in use at the processing plants of some of the world's leading iron producers. The flame-resistant screen panels can be used in all screening applications for a variety of duties, both wet and dry.

Fit for any screening-related application

"While we currently supply the flame-resistant rubber screen panels for iron ore screening applications in Western Australia, these panels can also be used in any screening-related application. They can be used extensively in all mineral processing applications, such as coal, iron ore, copper, platinum, diamonds, manganese, and zinc, among others.

In addition to providing the greatest level of fire safety, Multotec's flame-resistant panels also increase optimal screening performance and plant availability; are available in hard (PD70) and soft (PD45) durometer rubber; and remain robust and extremely reliable under the toughest mining conditions. ■

Multotec has developed a range of self-extinguishing flame-resistant rubber screen panels to mitigate the risk of fire.



AUTOMINE® MAPPING SOLUTION
NEXT GENERATION AUTOMATION SOLUTIONS

AutoMine® Mapping Solution is the first solution from the Next Generation program at Sandvik. It brings together two of the Next Generation technologies to make one state-of-the-art solution to enhance mining operations.

This innovative AutoMine® solution is designed to maximize productivity and improve safety of autonomous vehicle navigation in underground mining operations by utilizing mapped data. It enables a vehicle to map an automated underground environment with a 3D Mine Mapping Tool and then uses the information to generate 3D maps of the mine. The data can then be used by 2D underground equipment to operate safely during mining operations.

EXPLORE NEXT GENERATION AUTOMATION SOLUTIONS
ROCKTECHNOLOGY.SANDVIK

SANDVIK

Christiaan Liebenberg, BME Product Manager: Software Development.

BME's Xplolog underpins digital journey in blasting

Proving itself as a leading provider of digital eco-systems and services to the mining industry, mining solutions specialist BME recently updated its popular Xplolog system for capturing and analysing data on blast holes and decks.

The Omnia group company has been driving its technology roadmap through its Blast Alliance brand, in which Xplolog is a key digital enabler, according to Christiaan Liebenberg, BME Product Manager: Software Development. Xplolog is the 'connector' between BME's blast design application Blastmap and its explosives trucks that are fitted with smart control panels.

Xplolog provides the ability to capture the actual data for drilling, charging and stemming.

Actual vs planned comparison

"Xplolog provides the ability to capture the actual data for drilling, charging and stemming – which is compared on a dashboard view with the planned data," explained Liebenberg. "The actual versus the planned comparison is important to improve our customers' blasting practice and to hold suppliers accountable for irregularities in the services they have to deliver."

In developing this next-generation Xplolog, he said, the focus was on the detailed guidance by users. This has helped make the system more user friendly, scalable and streamlined with other BME digital solutions – while also benefiting from improved data security.

"By engaging our Xplolog users in a highly systematic way, they were able to inform our direction at every step of our upgrade process," he said. "For instance, we developed mock-ups and wireframes after our first interviews with users, and took those back to the user group for further testing. We took this approach through into the design and prototype stages, so the users were central to the building of the system."

By decreasing the pause period – or idle time – between holes, the smart MMU can increase performance.

From the ground up

The performance of Xplolog was enhanced through the design and application code being built from the ground up, and with a new and upgraded database using Google's Cloud Services. Scalability is better, with the capacity of the system being able to be rapidly increased.

Security has been improved through a more robust log-in and registration process. With different user access levels in the new version, customers have more control over who can access information related to their role in the organisation.

"Xplolog also ensures that the data integrity is not compromised," said Liebenberg. "By using a reputable cloud platform provider, data

is synced to view real-time progress as part of the block preparation."

Smart MMUs

Quick data access allows a seamless integration with BME's explosives trucks – or mobile manufacturing units (MMUs) – as well as capturing driller data and providing a real-time view of block progress. Xplolog has been integrated with BME's Smart MMU digital control system Xplocharge.

"What drove the integration between these two products was the opportunity to digitise a manual process," he said. "This has included automating labour-intensive tasks, gathering sensory data to make informed decisions around the safety of the operator and equipment, and indicate predictive maintenance requirements."

The Xplocharge digital control includes a safety system with predefined conditions that need to be met before the equipment will trip automatically. The digital control panel also caters for third party integrations to monitor the location of the fleet, and to report on the availability and utilisation of MMUs at a customer site.

Vital feedback

"This feedback is vital for management, as it can facilitate informed decision-making about allocating the MMU fleet," he said.

The features of Xplocharge enable automation by anticipating what needs to happen next, and thereby removing human input wherever possible. Easily configurable for different sizes of mining or quarrying operations, the system achieves faster turnaround time between charging holes.

Benefits

"By decreasing the pause period – or idle time – between holes, the smart MMU can increase performance," said Liebenberg. "At the same time, there is more accurate control of how much charge mass is being pumped per hole.

Another improvement in the latest version of Xplolog, he explained, is the appearance and centralisation of different aspects of the system, as well as improved workflow for third party blast design uploads.

"The look and feel of Xplolog has been revised in line with the progressive standardising of design across BME's Blast Alliance digital solutions," he said. "This makes users feel familiar with the BME offering, through increased brand identification and continuity of the customer experience with Blast Alliance."

Customised dashboards

The upgrade also allows users to easily customise their dashboards, creating a personalised view of block information that is important to the user. Customised reports can be created and saved, allowing users to return to their recurring daily, weekly or monthly report each week or month as required. The user has a summary view of block data at a quick glance – to track progress.

"We have also given users the ability to better visually track block progress, with the creative use of colours and iconography," said Liebenberg.

The process of inputting data has been optimised by rationalising the number of steps or actions wherever possible. Importantly, he pointed out that Xplolog's integration with BME's MMUs has taken account of different regional preferences and conditions around the globe.

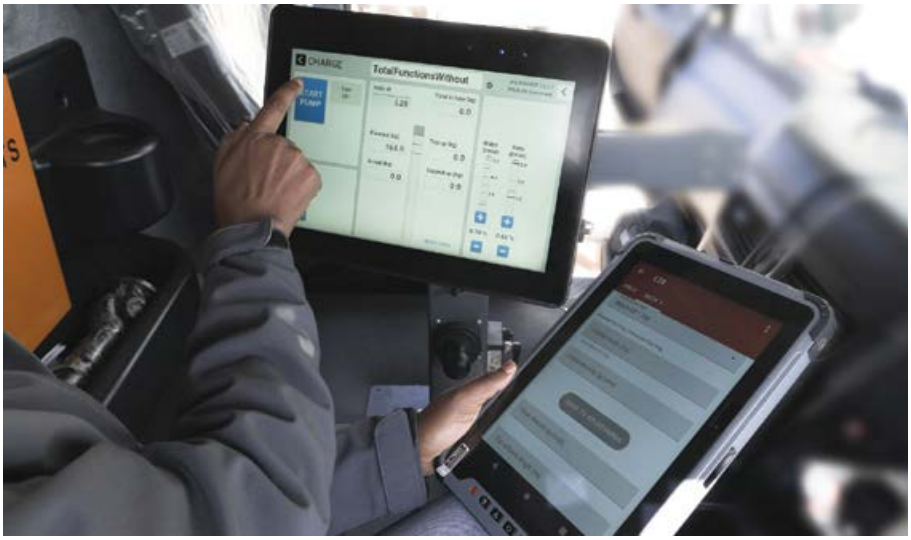
Audit trail

"The system also provides mines with a digital audit trail, so that they can track operator performance during the drilling and charging phases, and provide hole loading information per truck," he said.

The new version of Xplolog raises the bar in leveraging digital technology, he argued. BME's software engineering team continues to add new features and implement improvements as feedback is received from users of the system in the field. These updates are released to all existing customers of Xplolog every quarter at no additional cost.

"BME is determined to remain at the forefront of technology, and to continuously improve customer and partner experience," argued Liebenberg. "We live and work in a digital world where safety, accountability and efficiency are key drivers of success; we believe Blast Alliance offers our customers a centralised solution to manage these outcomes."

He reiterated that data management is central to achieving more sustainable mining, and inspires the next innovation. BME's curiosity and expertise in embracing and adapting innovative technology are improving the mining process and delivering a greener blasting outcome. ■



Xplolog has been integrated with BME's Smart MMU digital control system, Xplocharge.

"The system provides mines with a digital audit trail, so that they can track operator performance during the drilling and charging phases, and provide hole loading information per truck," Liebenberg said.

Edward Jansen, Weir Minerals Africa Sales Director South Africa.

Synertrex® feeds growing demand for digital insights

According to Edward Jansen, Weir Minerals Africa Sales Director South Africa, the past five years have seen rapid changes in mines' appreciation of digital platforms like Weir Minerals' Synertrex® digital solutions.

The Synertrex® intelligent platform captures, monitors, and converts equipment performance data into insights to optimise processing circuits.

"When we introduced Synertrex to South Africa in 2018, customers were content to install it only on their critical equipment," says Jansen. "Today, that has changed completely with our mining customers now looking to digitally enable all their equipment."

This trend is driven by the demand for insights based on more accurate operating data that can improve decision making. He explains that the Synertrex® cloud-based system gathers real time measurement data on key variables like vibration and temperature. By analysing and reporting on these parameters, it provides operators and managers with improved understanding of a machine's condition and performance.

360° actionable insights

"Synertrex technology provides a holistic view of the equipment from a performance and health perspective to all the documentation needed when you stand in front of the machine," he explains. "It integrates multiple data sources, from the IIoT sensors on the equipment and process around it, as well as back-end data sources, such as our ERP (Enterprise Resource Planning) digital service solutions and product master data systems. It allows us to build intelligent formulas that provide actionable insights and event intelligence beyond what any typical condition monitoring system can do."

This represents a continuous health assessment, allowing an opportunity for optimisation and early warning of any maintenance intervention that may be necessary. By applying this level of close condition monitoring, Synertrex® digital solutions help customers to extend component and equipment life.

"Many mines take a time-based approach to equipment maintenance, which often requires replacing equipment when it is still in fairly good condition," he says. "We use Synertrex digital solutions to provide assurance that the equipment is still fully functional – thereby optimising its useful lifespan and ensuring lowest cost of ownership."

Differentiator as OEM

He acknowledges that there are many digital monitoring systems available on the market but highlights a key differentiator for Synertrex®: it was developed by Weir Minerals for its own equipment, so it brings a much higher level of technical understanding and focus.

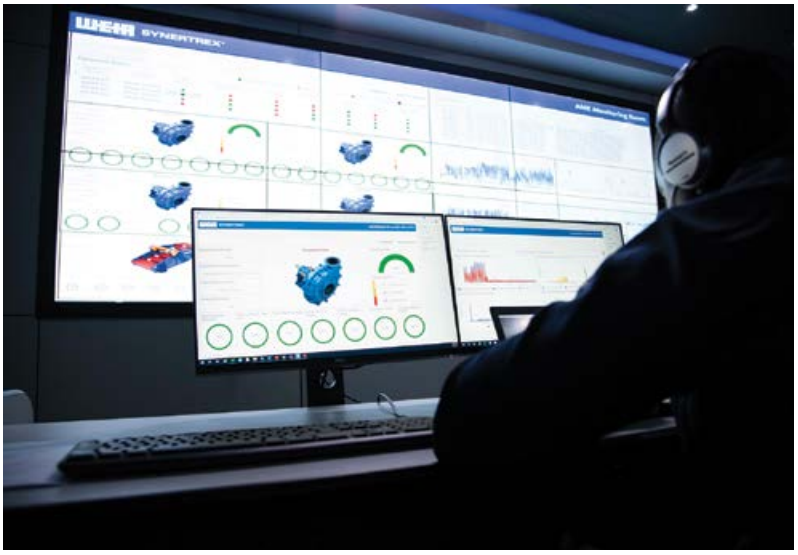
"As an in-house bespoke solution, Synertrex has been designed with the specifics of Weir Minerals' original equipment in mind," explains Jansen. "The analytical functions of the platform are therefore informed by Weir Minerals experts, in their specific fields, who design the equipment itself."

This intelligence-led approach puts Weir Minerals in an ideal position to design algorithms that address the precise characteristics of the OEM products. Importantly, the system includes modules that are bespoke to the type of equipment from pumps and screens to cyclones and high-pressure grinding rolls (HPGR).

Range of measurements

In the case of a pump, for example, the vibration and temperature levels are just two of several aspects measured. The system also monitors factors such as the pump speed, the suction pressure, the discharge pressure and the amperage drawn.

The value of continuous monitoring cannot be overstated, he argues, and was recently demonstrated at the site of a mineral sands mining operation in Mozambique. Following maintenance where the mine replaced the motor on a pump, the



Synertrex allows Weir Minerals to monitor key variables like vibration and temperature in real time.

Above: Weir Minerals staff in the local Synertrex monitoring room showcasing the capability.

Left: Synertrex can be installed on a range of equipment such as pumps, screens, hydrocyclones and HPGR.

Synertrex® monitoring system immediately detected excessive vibration levels. The vibration pointed to a slight misalignment between the pump and the motor.

Save on damage and downtime

"Having a full-time technician on site meant that the alerts from Synertrex were quickly actioned and we were able to stop the pump and realign the motor with the pump's shaft, saving the mine about half a million Rand in potential damage," he says. "This kind of problem is not easy for an operator to identify, but it can cause catastrophic failure – which can also lead to costly downtime."

Synertrex® digital solutions also allow Weir Minerals to verify the performance claims it makes on its equipment, explains Jansen. With the company's innovative WRT® technology, for example, tests show that power consumption can be reduced by between 5% and 12% using the impeller and throat bush combination.

"This is a strong claim to make, with significant benefits to users, so we want customers to be assured of its validity," he says. "By fitting Synertrex technology to two different pumps on a South African mine – one with WRT parts and one with standard parts – we were able to confirm an 11% improvement."

For customers who have power saving initiatives in place and who want to monitor their results, Synertrex® digital solutions is a valuable tool to track actual savings over time. He notes that sensors gather operating data from Weir Minerals equipment and transmit this data to a central collection point – or gateway – in an encrypted format to safeguard its security. The information is uploaded to the cloud and processed by algorithms so valuable results can be reflected in a digital toolkit.

"Customers have access to their own data and can overlay it over previous weeks and months to generate trends," he says. "This means they can compare the performance of their equipment on the same on site or at their other locations, if relevant."

Weir Minerals' global presence means data can be gathered from machines in similar applications across the world. For instance, Synertrex® technology can look out for pre-failure trends and offer these vital insights to users everywhere. While all customers' detailed operating data is kept confidential and secure, the system can alert users to trends it identifies.

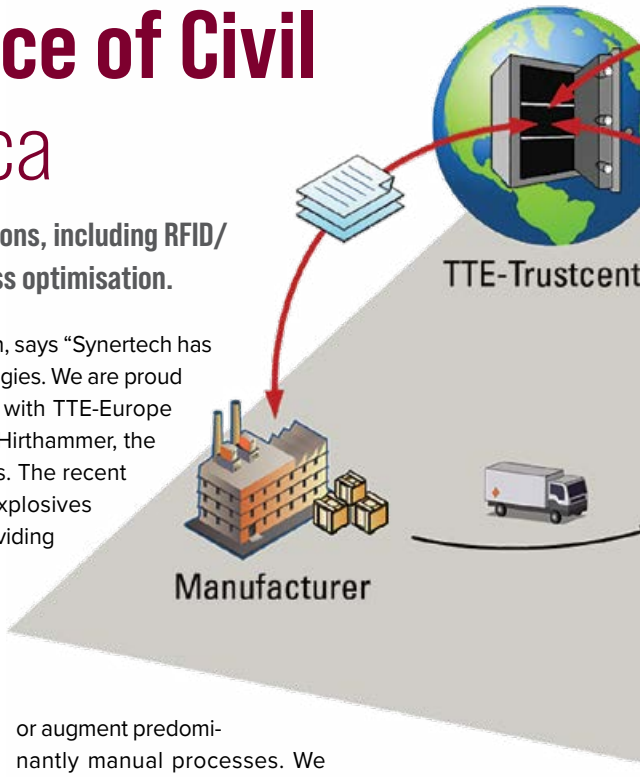
"This means that when our customers use Synertrex digital solutions, they benefit not only from deeper insight into their own equipment's performance," concludes Jansen, "they also leverage the global experience of Weir Minerals customers everywhere and share in our continuous improvement process." ■

Left: A replica of the Synertrex control room displayed at a recent exhibition.

Below: A Synertrex system installed on Warman pumps at a tailings facility.

Digitising the Track & Trace of Civil Explosives for South Africa

With highly versatile Automatic Identification and Data Capture solutions, including RFID/IoT, Synertech focuses on innovation technologies for industry process optimisation.



Johan Weenink, the Managing Director of Synertech, says "Synertech has always been at the forefront of digitisation technologies. We are proud to have established a great working relationship with TTE-Europe GmbH, where we have been working with Frank Hirthammer, the Senior Partner Manager and his team of professionals. The recent adoption into our digitisation portfolio of the TTE Explosives Track and Trace solution is our most recent step in providing a greater scope of services for our customers".

Unique identification of explosives is essential if accurate and complete records of explosives are to be kept at all stages of the explosives supply chain. This should allow the identification and the traceability of an explosive from its production site and its first placing on the market, right up until its final use. Such unique identification is required with a view to preventing misuse and theft, and to assist law enforcement authorities in tracing the origins of lost or stolen explosives.

As with any business process, there will always be various pertinent information that needs to be captured, stored and made available for reporting and compliance purposes.

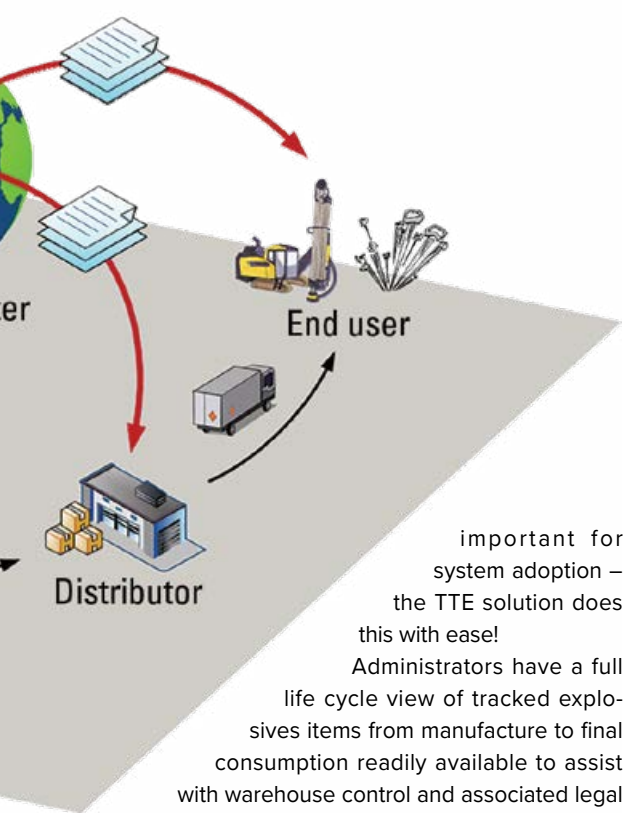
In order to achieve this, we envisage that organisations and companies will need to adopt digitisation in one form or another either to replace or augment predominantly manual processes. We have been in the track and trace business using automation technology for many years, with 2023 being Synertech's 20th year in business. We selected to work with TTE because they have a tried and tested solution, based on legislative requirements for explosives track and trace. The TTE solution is well suited to this purpose with many years of international operational deployment (internationally by explosives manufacturers and end users). The TTE Track and Trace of Explosives system was designed and developed primarily on the European Union directives, and has evolved into a highly efficient piece of technology.

TS Initiation systems manufacturing detonators.

Based on user experience, we believe it is the most widely used system internationally for the track and trace of explosives, with over 500 companies in Europe, Asia and America having adopted and entrenched the system. Some early adopters in Africa are in the implementation phase of their digitisation projects associated with explosives track and trace.

In terms of exposure in South Africa, there have been engagements that started a number of years ago and these discussions are still ongoing with key stakeholders in industry and governance. We recently exhibited the solution at the A-OSH 2023 Expo where we received an overwhelming level of interest at the presentations made and subsequent demonstrations with several parties indicating their commitment to implementation projects.

Key advantages of organisations going digital for explosives track and trace go far beyond the legislative obligations. The ability to improve the day-to-day efficiency of staff at the place of explosives manufacture, collection, storage and deployment are crucially



important for system adoption – the TTE solution does this with ease!

Administrators have a full life cycle view of tracked explosives items from manufacture to final consumption readily available to assist with warehouse control and associated legal reporting obligations "at the touch of a button". Naturally the system can be used for non-explosive items that the organisation deems important to be associated with the explosives track and trace business processes.

The system provides for:

- An **electronic stock book**, indicating the handling of stored items for an unlimited number of warehouses.
- A **process book** with an overview of all processes associated with the handling of the items.
- A **location summary**, giving an overview of all items sorted by control codes and organisational heirarchy.
- Control of the full supply chain by being able to search the user specific organisation for accurate **inventory overviews** of all storage locations.
- An **order management overview** by means of either manual order handling or ERP interface.
- Comprehensive set of master-data, including transaction records of the explosive item's life-cycle are available for **quality management** purposes.
- Flexible system **user roles and rights**.
- Comprehensive standardised **reporting capabilities** with the option to order customised reports.
- System data is secured by means of **data encryption**.
- A **printing capability** is offered as part of the system for the generation of additionally required barcodes to assist customers who need such a capability.
- The **Mobile Device Software** provides all necessary processes for the uncomplicated execution of all blasting-relevant work processes in the mine, in opencast mining and in all working areas that use explosives. Of course, it can also be used to carry out all warehouse-specific processes such as goods receipt, dispatch, picking, stock transfer, etc. In addition to the work and logistic processes, information about packaging contents (pallet structure), barcode validation, warehouse stocks, and locations is also available.

The TTE-Trustcenter enables the transmission of the required XML files from manufacturer to customer and from the customer back to the manufacturer without manual effort. When the shipping process is triggered, the XML files are sent automatically to the correct recipient. Alternatively users may chose to use other conventional means of sharing information, such as emailing.

"We are excited to bring digitisation to the explosives and legismarket in South Africa and look forward to further customer engagements," concludes Weenink. ■

Administrators have a full life cycle view of tracked explosives items from manufacture to final consumption readily available to assist with warehouse control and associated legal reporting obligations "at the touch of a button".

Left: The TTE system is well proven in the explosive track and trace industry.

Centre: Synertech has been in business for 20 years.

Below: Laser scanning equipment.

How technology is aiding miners to achieve improved safety and efficiency

In the rugged and perilous environment of mining, technological advancements have emerged as invaluable allies in the ongoing quest for improved safety and efficiency. Two noteworthy innovations, Connectivity solutions and Smart enhanced Personal Protective Equipment (PPE) garments, also known as Smart Digital Personal Garments, stand at the forefront of this transformation, revolutionising the mining industry and redefining the way mines and mining organisations operate.

Connectivity solutions (which should include the prior utilisation of a proper mine specific, RF spectrum Planning tool) leveraging the power of the Internet of Things (IoT) and advanced communication networks, have ushered in a new era of real-time data gathering and analysis. Mines are getting more and more equipped with an intricate network of sensors and devices that monitor various aspects of operations, from equipment performance and environmental conditions to the location, well-being, and safety of personnel. This data-rich environment enables mining companies to proactively identify potential hazards, such as equipment malfunctions or toxic gas leaks, and take swift corrective action, thus preventing accidents and ensuring the safety of miners.

In addition, Mobile/Man Portable - real-time data feeds aid in predictive maintenance, optimising machinery performance and minimising downtime. This not only extends the lifespan of equipment but also enhances overall operational efficiency, contributing to higher productivity and reduced operational costs. Furthermore, connectivity solutions enable remote monitoring, allowing experts to oversee multiple sites from a centralised location, reducing the need for personnel to be constantly exposed to hazardous conditions. Another remarkable advancement is the application of artificial intelligence (AI) and machine learning (ML) algorithms. These technologies enable the analysis of vast datasets to identify patterns, optimise workflows, and make informed decisions.

Enhanced PPE garments represent another pioneering leap in mining safety. Traditionally viewed as a last line of defence, PPE has evolved into a dynamic arsenal of technologically advanced gear designed to safeguard miners in the most extreme environments. Modern PPE integrates innovative materials, ergonomic designs, and intelligent features to provide superior protection and comfort. These wearable devices can monitor vital signs, environmental conditions, and exposure to toxic substances. If a miner's health is compromised or the miner encounters dangerous levels of gases, immediate alerts are sent to control centre portals, allowing for rapid response and intervention. This technology not only safeguards the health of miners but also minimises the occurrence of accidents and can also, via its AI capabilities, alert Mine Health and Safety groups of potential dangerous hot spots (by measuring continuous Fall/Man-Down, heat spots, low ventilation areas, etc.).

For instance, smart helmets and/or smart garments, equipped with sensors and augmented reality (AR) displays or PDAs, provide miners with crucial information about their surroundings, including real-time gas readings, navigation guidance, and emergency alerts (such as connected Collision Avoidance Systems). This real-time data empowers miners to make informed decisions while navigating complex and potentially hazardous terrains, and allows for swift evacuation and targeted response efforts.

The enhanced PPE garments also contribute to efficiency gains. Lightweight and ergonomic designs reduce strain and fatigue for miners. Advanced garments with built-in or add-on sensors can monitor body temperature and humidity, helping prevent heat stress and exhaustion, enabling miners to work more comfortably and effectively. This, in turn, boosts productivity and reduces the likelihood of human error, a significant factor in mining accidents.

In conclusion, the convergence of connectivity solutions and advanced PPE garments can undeniably transform the mining landscape, ushering in an era of improved safety and efficiency. As integrated intelligent lighting (fibre optic strips) systems improve visibility in dimly lit tunnels it aids in reducing the risk of accidents. The integration of IoT-enabled sensors,

SoothSayer by CloudRF RF Planning Tool.

COFDM Body Worn Radio Solutions by Domo Tactical Communications Ltd.

CAVEX® 2

WE INNOVATE. OTHERS IMITATE.

Brief

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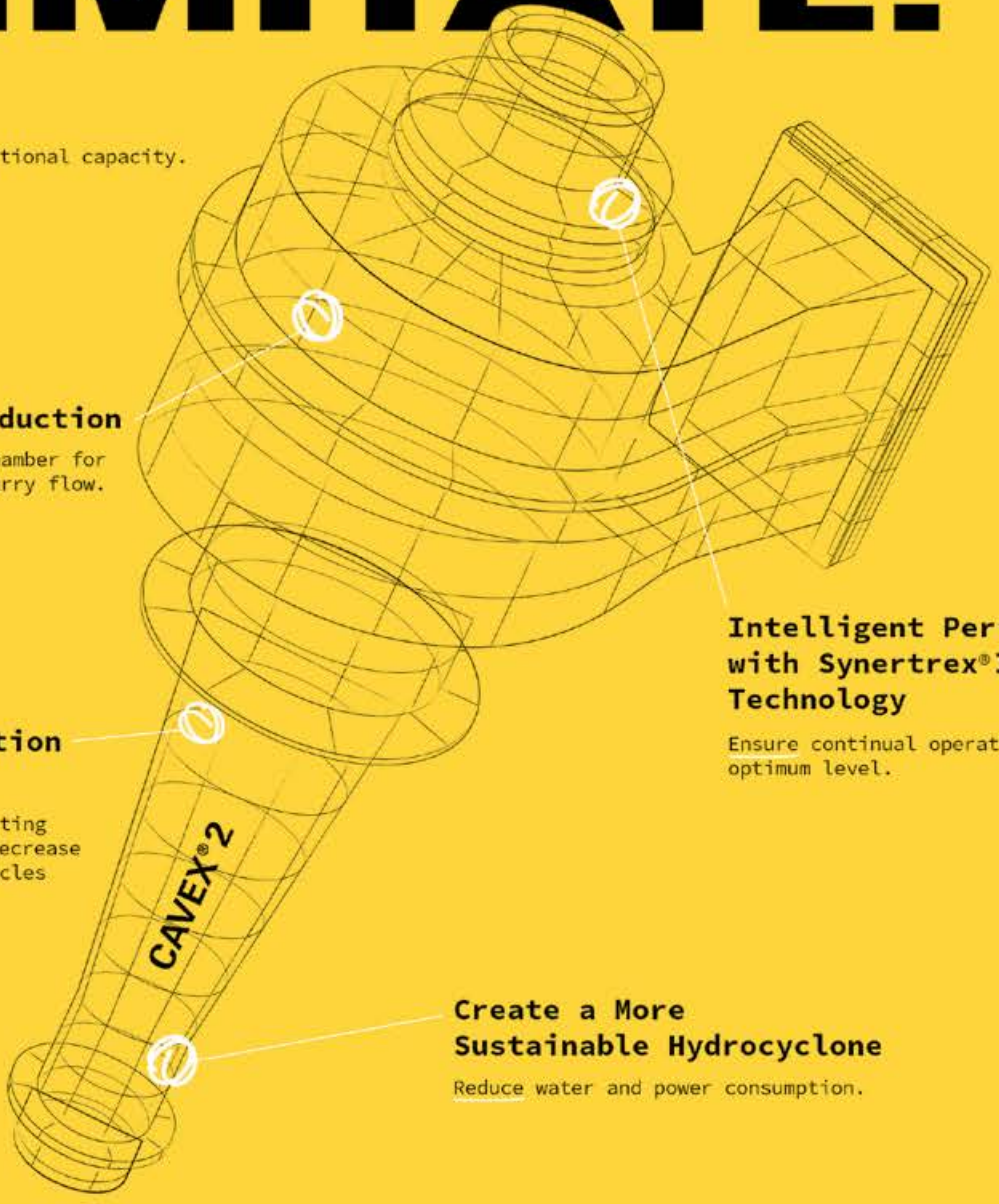

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Reduce water and power consumption.

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Request a trial of the Cavex® 400CVD today at cavex2.weir

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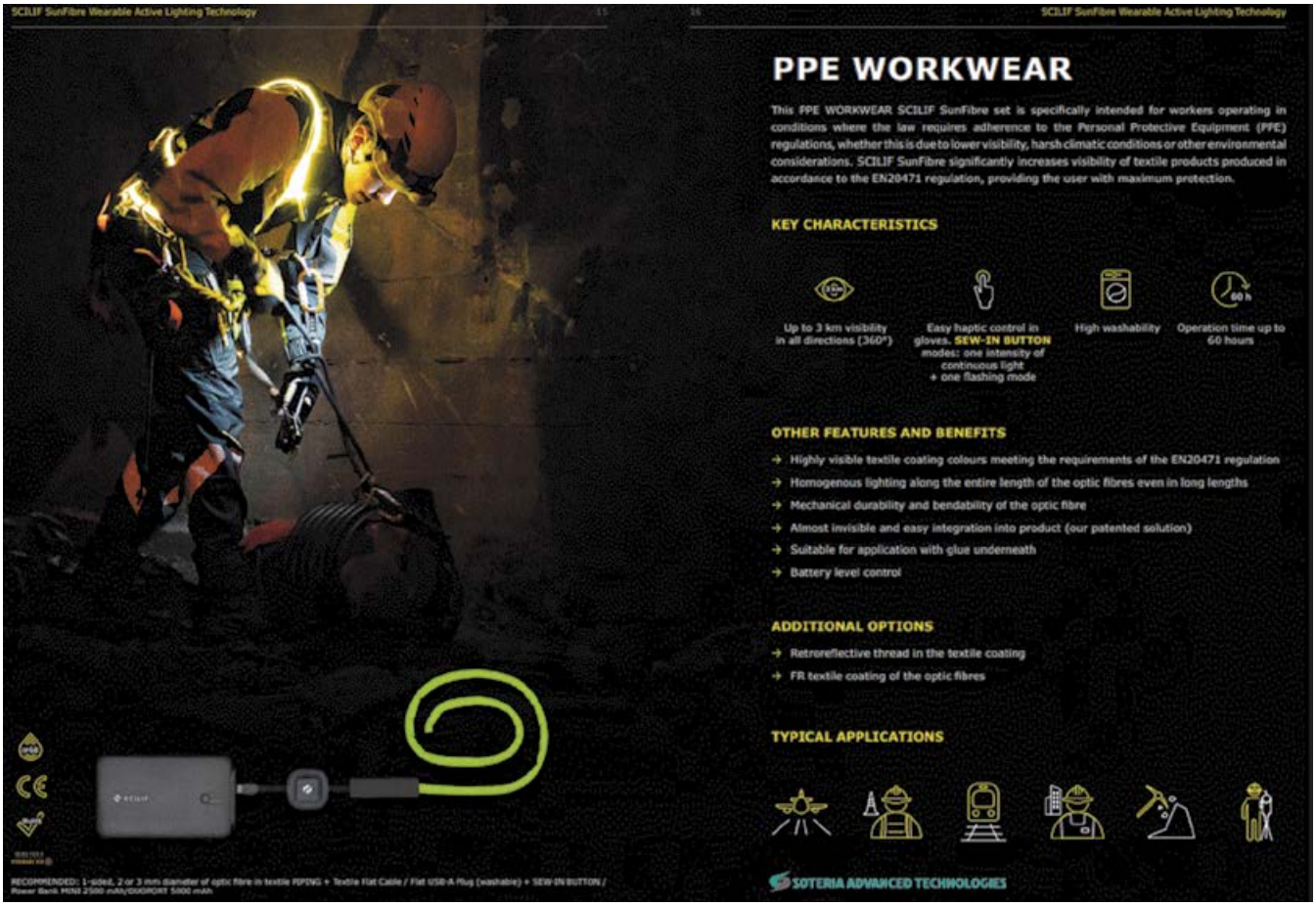


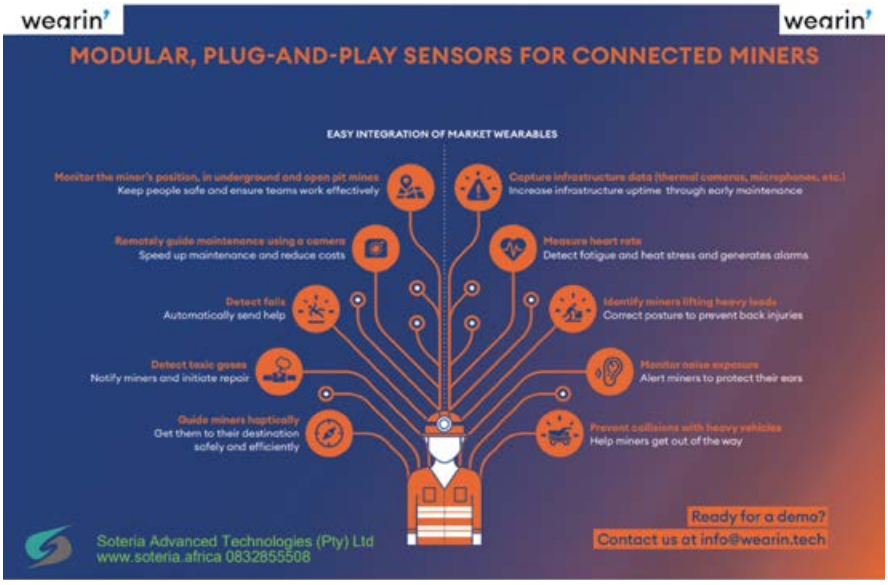
High visibility mining garments by SunFibre.

real-time data analysis, and remote monitoring empowers mining companies to pre-emptively mitigate risks and optimise operations.

The integration of technology in mining is not limited to personal safety; it extends to the optimisation of complete mining operations. Data collected through connected devices can be analysed to identify patterns and trends, enabling predictive maintenance of equipment.

As technology continues to evolve, the mining industry is poised to reap greater rewards. The ongoing development of artificial intelligence (AI), machine learning (ML), and robotics promises to further revolutionise mining operations, making them safer and more efficient than ever before. By embracing these technological advancements, miners can confidently navigate the depths of the Earth while simultaneously ascending to new heights of productivity and well-being.

Soteria provides RF Spectrum Planning solutions along with specialised *ad hoc* rugged, modular and scalable meshed COFDM Network (Video/data/audio) streaming solutions, with enhanced visibility PPE Smart Miner garments / vests to ensure Miner Safety and real-time connectivity. ■



Smart Miner Vest by Wearin' Tech.

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Dr Ross Harvey, director of research and programmes at GGA.

What does a BRICS+6 mean for South Africa?

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

On 24 August, the latest BRICS summit concluded in Johannesburg. The BRIC acronym was originally coined by Goldman Sachs economist Jim O'Neill in 2001. Original member countries developed a formal bloc comprising Brazil, Russia, India, and China in 2008 on the side lines of a G8 meeting. Russia was subsequently expelled from the G8 after its invasion of Crimea in 2014. South Africa was invited to join BRICs in 2010 and formally ingratiated by 2011. In a 2017 piece for the Council on Foreign Relations, Alyssa Ayres indicated that the group encapsulated the rise of emerging markets but that it was "less clear whether this grouping also provides durable common interests for a multilateral organisation, especially given the vast economic differences among the five". Ayres went on to note that the political differences between members were also sharp.

By 2017, the bloc could claim some significant achievements, including its own institutions such as the New Development Bank. The original impetus was – and remains – to ensure more of a voice for emerging economies in a US-dominated world; a voice in governing the institutions that affect the whole world. Earlier this year, for instance, Brazilian president Luiz Inácio Lula da Silva demanded to know why the BRICS countries were hinged to the US dollar and strongly suggested a move towards trading in countries' home currencies instead.

Michael Pettis, writing in *Foreign Affairs*, concurred that there is a downside to a dominant US dollar. Nonetheless, "adopting an alternative global reserve currency will not necessarily benefit surplus countries such as Brazil. Rather, it will force them to confront the reasons for their surpluses – persistently weak domestic demand based on a very unequal distribution of domestic income – and address them by cutting back on production and redistributing income." Jim O'Neill himself, writing recently for Chatham House, indicated similar concerns and wrote that what the world needs instead of an expanded BRICS is "a resurrected G20, which already includes all the same key players, plus others…"

South Africa must guard against the temptations associated with quick extraction by irresponsible partners.

Aside from the economic difficulties of moving away from a dollar-dominated world, the political differences between the bloc are glaring. This BRICS conference was marred in advance for South Africa as to whether the government would have the courage to arrest Vladimir Putin, the Russian dictator, if he attended the conference in person. South Africa remains a signatory to the Rome Statute, which governs the International Criminal Court (ICC), despite comments from some quarters about its illegitimacy. The ICC has issued a warrant for Putin's arrest, given evidence of war crimes committed by Russian troops in Ukraine. South Africa failed to arrest Al Bashir, another wanted war criminal, back in 2015. In the end, after careful diplomatic manoeuvring, Putin stayed at home.

The BRICS countries concluded the August summit by formally admitting Argentina, Egypt, Ethiopia, Iran, Saudi Arabia and the United Arab Emirates to join the group from the beginning of 2024. This raises a question,

politically, of shared and common values. Xi Jinping would like to see the expanded BRICS group become a substantial challenger to the G7, but the G7 is likely to retain its dominance for the foreseeable future because of its shared and common values, and individual economic clout despite US dominance. Relatively equal income distribution and the sheer strength of the G7 economic engines mean that the BRICS+ challengers have a mountain to climb.

Within the BRICS+6, there are countries that still require significant raw materials from African countries to power their economies.

Politically shared values really matter in climbing this mountain, because the economics literature has arrived at as near a consensus as economists ever will that institutions matter for development. Institutions are the social systems – norms, beliefs, and values – that motivate regular human behaviour. If they are strong, they drive economic growth sustainably. To be strong, government effectiveness must grow in strength and sophistication alongside citizen power. Citizens must be able to hold their governments to account, lest Leviathan become unshackled. China is likely in for a hard landing because its citizens don't have a voice, and income distribution remains highly unequal.

There is little economic dynamism driven by the private sector. Moreover, rapidly declining fertility rates are a problem for future economic productivity (a problem the G7 also faces). State dominance also means that the information officially released is untrustworthy, or at least at odds with private sector data. I draw attention to this because China is clearly the dominant political partner in BRICS, by far the biggest economy, and scholars warning of the other members being subject to Chinese ambitions should be heeded. Moreover, countries hoping for economic salvation through banding to China should be careful. Its 'economic miracle' will likely prove short lived, as extraordinary as it has been.

This brings us to what South Africa is thinking. Our ruling party has hooked the country's wagon to a set of countries with whom it officially has little in common. Aside from Ethiopia and Argentina, the other additions to BRICS+ are high on oil-fuelled liquidity and low on sustainable economic engines for diversified growth. None of them have an honourable human rights record. The Preamble to South Africa's constitution states the following:

"We, the people of South Africa, ... through our freely elected representatives, adopt this Constitution as the supreme law of the Republic so as to - ... Lay the foundations for a democratic and open society in which government is based on the will of the people and every citizen is equally protected by the law;... Build a united and democratic South Africa able to take its rightful place as a sovereign state in the family of nations."

On a values level, this is fundamentally at odds with China, Russia, Egypt, Iran, Saudi Arabia and the UAE, all of which score extremely poorly on citizen voice and accountability, which the World Bank defines as "perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media". These are all crucial civil liberties that ultimately sustain broad-based development. In the absence of structural

There is a risk that Chinese firms will increasingly gain access to resources – chrome, manganese, iron ore – over its competitors.

conditions that support these values, economies can only benefit a narrow elite. From a geostrategic perspective, it therefore makes little sense to partner with countries like these.

South Africa's geostrategic objectives should be informed by our constitutional values and our national interest should be defined in terms of optimising our natural resource endowment to catalyse broad-based development. Within the BRICS+6, there are countries – like China – that still require significant raw materials from African countries like ours to power their economies.

Our government's fraternising so heavily with China raises the risk that Chinese firms will increasingly gain access to these resources – chrome, manganese, iron ore – over its competitors (the EU and the US in particular). That is a risk because Chinese firms are not constrained by the same kind of rules of the game that US or London-listed companies are. By design and definition, then, Chinese firms are less likely to take their environmental and social responsibility seriously in the process of resource extraction.

South Africa must guard against the temptations associated with quick extraction by irresponsible partners. Moreover, it is unlikely to gain from partnerships with players like Saudia Arabia, Iran and Russia, for if the country chooses to import oil from Iranian or Russian sources that are under extensive US sanctions – and that for arguably good reason – then we further jeopardise our international standing among the G7. That is not sensible. It is more sensible to forge serious partnerships with G7 countries and other middle-income countries such as Argentina, Brazil (which are both now at least in the BRICS+ group) and Chile, with similar structural challenges to ours, but at least with shared values.

Ultimately, BRICS+6 seems to have a fundamental problem, well-articulated by Jim O'Neill: "ever since the Brazilian and Russian foreign ministers proposed the idea of creating a formal BRIC political grouping in 2009, I have questioned the organization's purpose, beyond serving as a symbolic gesture. Now that the BRICS has announced that it will add six more countries – Argentina, Egypt, Ethiopia, Iran, Saudi Arabia, and the United Arab Emirates – I pose the question again. The decision, after all, does not appear to have been decided on any clear objective, much less economic, criteria."

South Africa should engage in this new partnership with a clear-eyed strategic sense of its limitations and try to steer the bloc in the direction of calling for a revived G20. ■

TOMRA Mining XRT technology exceeds expectations at Kunwarara deposit

QMAG, part of the Refratechnik group, owns the Kunwarara deposit of crypto-crystalline magnesite – one of the world's largest – located in Central Queensland, Australia.

QMAG was an early adopter of sensor-based ore sorting, having installed its first Ultrasort laser machine in 1994 and a second one a few years later. After over 22 years in operation, the Ultrasort sorters were becoming antiquated and, in 2016, a TOMRA XRT sorter was installed as a stand-alone plant on site. "It was a trial that, at the time, got management very excited: they could see this could be the future," says Josh Dawson, Production Superintendent at the QMAG mine. "It was a success story: we could now process very high calcium content material that we could not do as effectively with the DMS or laser sorting equipment."

In view of these results, in 2018 the XRT machine was moved into the sorting plant.

The TOMRA XRT sorter has exceeded expectations, as Josh Dawson explains: "By collaborating with TOMRA to optimise the performance of the XRT unit, we can now turn agricultural products into much higher grades required by the Parkhurst processing plant."

TOMRA's XRT sorter has also extended the life of QMAG's deposit: "We were at the point where we thought a lot of our ore body wasn't going to achieve the grade for some of our lower end products. The TOMRA XRT machine proved that we could now mine those deposits and turn them into useful product for the higher end applications." ■

TOMRA Mining XRT technology exceeds expectations.

WEG partnership with Panaco boosts growth in the DRC

The strengthened presence of WEG in the Democratic Republic of Congo (DRC) through its strategic alliance with Panaco, its Value-Added Reseller (VAR), has proven to be highly successful. The company's established operations in the key mining centres of Lubumbashi and Kolwezi ensure efficient stockholding allowing easy access to WEG products. This significantly reduces lead times for complete motors and drives, as well as spare parts in case of breakdowns.

Thierry Kakese, WEG's Regional Manager – Central Africa, attributes this success to the alignment of business models between the two companies. "As a major player, WEG has long been dedicated to establishing and nurturing a robust VAR partner network in the Central African region, ensuring sustainable growth and expanding our installed base of products and solutions," he says.

Panaco, appointed as WEG's VAR in the DRC four years ago, plays a vital role in the region. The company was one of the first electrical subcontractors operating in that country and today, with more than 40 years' experience, Panaco possesses the experience and capability to meet the escalating demand for WEG motors, drives and other products in the country. ■

WEG partnership with Panaco boosts growth in the DRC.

Bell provides PDS/CAS flexibility

South African equipment manufacturer, Bell Equipment, has reported an influx of enquiries from local mining customers wanting articulated dump trucks (ADTs) that can be fitted with proximity detection systems (PDS) and collision avoidance systems (CAS) following new mining regulations that came into effect in December 2022.

In terms of the regulations, diesel-powered, trackless mobile machines must be able to automatically detect the presence of pedestrians and other diesel-powered, trackless mobile machines in the vicinity, and provide an effective warning.

Bell Equipment OEM Product Manager, Jeremiah Mokhomo, says: "Our Pin 3 E-series ADTs, introduced towards the end of 2020, are built ready to integrate with a wide range of proximity detection systems (PDS) or collision avoidance systems (CAS) up to Level 9. This was a natural progression for Bell because our earlier E-series trucks introduced huge advances in automation to offer industry-leading levels of driver and machine protection. Standard features such as starting, daily checks, bin tipping, and switch off/turn spin down have been automated, and the horn is automated to sound upon vehicle start-up and when selecting forward or reverse. In addition to automatic speed control and retardation, the ADTs are fitted with automatic traction control."

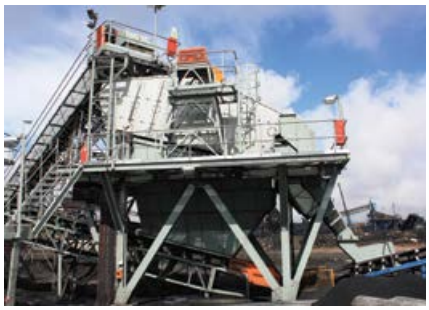
According to Mokhomo, because Bell Equipment's ADT innovation has been steadily moving towards PDS/CAS, older trucks from the D-series Pin 4 can be retrofitted with a PDS aftermarket kit. This enables customers to fit a PDS or CAS into an existing truck at a fraction of the cost of a new PDS/CAS-ready machine. ■

Bell Equipment reports an influx of enquiries for installation of PDS and CAS.

Sandvik Rock Processing screening solutions builds on African footprint

Proximity to customers is a cornerstone of Sandvik's global support strategy, and Sandvik Rock Processing is leveraging this footprint in Africa to support the crushing and screening market. Lifecyle Service Manager, Gavin McLaggan, says this includes Sandvik, Kwatani and Schenck screening products, which are now all supported by Sandvik Rock Processing.

According to McLaggan, customers in the crushing and screening markets can now have quicker access to support within the region or country. This allows the same high standard of support for all its products, including the Sandvik, Kwatani and Schenck screening products – which are all now supported by Sandvik Rock Processing.



Sandvik Rock Processing is leveraging its footprint in Africa to support the crushing and screening market.

"We recognise the importance of being close to our customers and aim to establish long term relationships with them," says McLaggan. "Having facilities that are close to our customers throughout Africa is crucial for our support-driven strategy, and we believe this differentiates us significantly from competitors." For instance, he explains there are regional Sandvik offices in South Africa for the Southern African area, in Zambia for Central Africa and in Ghana for West Africa – as well as country offices in nine other countries. The presence of existing workshop facilities and spares warehousing is a real gamechanger for growing Sandvik Rock Processing's screening business. ■

Astec Industries South Africa hosts IQSA and ASPASA young professionals

Reflecting its commitment to skills development and to building a pipeline of talent in the minerals industry, leading global equipment manufacturer Astec Industries recently hosted a factory tour and meeting of young professionals from the Institute of Quarrying South Africa (IQSA) and the Aggregate & Sand Producers Association of South Africa (ASPASA).

Speaking at the event, which took place at Astec's manufacturing facility in Elandsfontein, Gauteng, Vinesh Surajlall, Director – Material Solutions at Astec Africa and Middle East, said that it was encouraging to see the skilled young professionals coming into the industry. Astec Industries recognises the mining and quarrying industries as major economic drivers and was honoured to host the gathering for young professionals who will forge the path to new innovations and sustainability in the South African minerals industry.

The event also gave the young professionals a valuable opportunity to meet, learn from and network with peers and industry experts, to establish important professional relationships that will enhance their careers, and the industry as a whole. ■

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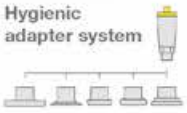

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