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For people who are serious about mining

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- Komatsu eyes India as its next growth target
- Is global tin supply equipped to meet growing industrial demand?
- Predictive Discovery targets Bankan construction in 2026
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- Locally manufactured solvents
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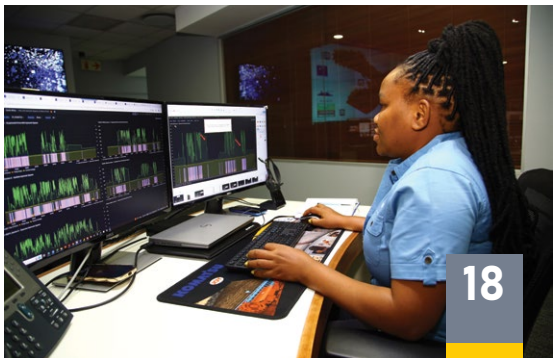

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Upskilling and reskilling for the future world of work

COMMENT

Gold: enticing all round

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That coveted commodity – gold – has eager chasers all round, especially at the Olympic Games Paris 2024, with South Africans also making a play for the top medal. Some 150 athletes represented Team South Africa at Paris 2024 in the country's 21st appearance at the Olympic Games, where athletes pursued gold, silver and bronze medals.

So how many ounces in those gold medals, do you reckon, are from Africa? Earlier this year, the World Gold Council's (WGC) senior market strategist, John Reade, revealed that Africa was the world's largest regional gold producer, accounting for some 27% of global gold production in 2022.

Interestingly, according to the latest news from the WGC, the second quarter gold demand hit record highs. The WGC's Q2 2024 Gold Demand Trends report revealed that total global gold demand increased 4% year-on-year to 1 258 t, marking the strongest Q2 in its data series. Total demand was supported by healthy over-the-counter (OTC) transactions, up a notable 53% year-on-year at 329 t.

Louise Street, Senior Markets Analyst at the World Gold Council, shared the following insight: "With a long-awaited rate cut from the US Fed on the horizon, inflows into gold ETFs have increased thanks to renewed interest from Western investors. A sustained revival of investment from this group could change demand dynamics in the second half of 2024. In India, the recently announced import duty cut should create positive conditions for gold demand, where high prices have hampered consumer buying. While there are potential headwinds for gold ahead, there are also changes taking place in the global market that should support and elevate gold demand."

Still on the topic of gold, Predictive Discovery's Bankan gold project, in Guinea, is readying for construction in 2026 and commissioning of its flagship asset in 2027. The Tier-1 Gold Project, located in the Siguiri Basin in Guinea, is regarded as the largest gold discovery in West Africa. The ASX-listed entity is also engaged in an intensive drilling programme, in and around the current reserve area, aimed at unlocking the project's full potential, Predictive Discovery's MD Andrew Pardey, tells *Modern Mining* (pg 12).

> "Tin has been touted as the best performing base metal in 2024, with its value rising 31% this year alone."

In this edition

In the September edition, our commodities focus is tin, the fundamentals of which remain positive with the metal price treading some highs. Tin has been touted as the best performing base metal in 2024, with its value rising 31% this year alone. "Possessing a wide array of applications, the metal is gaining significant attention due to its crucial role in modern electrical components and renewable energy sources." See page 8.

Our mining technology feature highlights initiatives by Murray & Roberts Cementation, which is applying a range of technologies for working in challenging conditions (pg 16) while equipment supplier, Komatsu, shared insights of its technology developments with the media during a factory tour of Joy's smart service centre in Emalahleni, Mpumalanga Province. Speaking to Modern Mining on the sidelines of the event, Simon Andrews, new Vice President Africa - Soft Rock for Komatsu Mining, said the company remained focused on growth and was eyeing India as its next growth target (pg 18).

Also of importance in this edition is mining insurance, with Africa Specialty Risks (ASR) noting that in Africa insurance penetration sits at under 3%, compared to the global rate of approximately 10%. ASR aims to bridge this insurance gap by offering innovative and comprehensive products, enabling businesses and communities to manage risks effectively and drive economic growth (pg 28).

The African focus is carried through in the article from drilling specialist, Capital, which is continuing to build on its African relationships. The company has established itself as a premier mining services provider across Africa, the Middle East and North America and now operates primarily on Tier-1 long life mining assets, having built long-term relationships with blue-chip international mining companies such as Barrick Gold, AngloGold Ashanti, Fortescue, Centamin, Perseus and Newmont (pg 36).

President signs Procurement Bill into Law

President Cyril Ramaphosa signed the much-anticipated Procurement Bill into law, ushering in a new era of efficiency, economic transformation, and support for local production and services. The new Procurement Bill is a comprehensive framework designed to streamline procurement processes, making the procurement and supply chain environment more transparent, efficient, transformative, developmental and accountable. By introducing standardised procedures and stringent oversight mechanisms, the law aims to minimise bureaucratic delays and reduce opportunities for corruption. Supply chain professionals will benefit from clearer guidelines and faster decision-making processes, enabling them to focus on strategic planning and execution. One of the core objectives of the Procurement Bill is to drive economic transformation. The law mandates that a significant portion of government procurement contracts be awarded to historically disadvantaged individuals and small, medium, and micro enterprises (SMMEs). This inclusive approach is expected to level the playing field, providing equal opportunities for all businesses to compete and thrive. ■

Supply chain professionals will benefit from clearer guidelines.

De Beers Sky Park Building.

De Beers Group's sorting building in JHB **awarded prestigious green rating**

De Beers Group's new rough diamond sorting, valuation, and sales building, Sky Park, located in Johannesburg, has received the prestigious 5-star interior green rating and two 4-star green building ratings from the Green Building Council of South Africa (GBCSA). The accolades were awarded for the innovative and sustainable design elements proposed and approved by the GBCSA, as well as the 'As-Build' rating that evaluates the use of green and sustainable materials during the construction phase. The comprehensive waste, water, and power management strategies implemented during construction were also recognised as part of these awards. The 5-star interior green rating reflects the sustainable choices made for the building's interiors, including the selection of eco-friendly materials for furniture and furnishings, advanced water consumption systems, and the integration of internal gardens. The assessment also considered the building's energy efficiency, highlighted by the installation of a solar plant and comprehensive water management systems. ■

Akobo Minerals commissions Segele gold processing plant

Akobo Minerals commissions Segele gold processing plant.

Akobo Minerals, a gold exploration company, has announced that the Segele processing plant is now operational. This milestone represents a significant advancement for the company's operations in Ethiopia. The commissioning process has successfully activated the majority of the Segele plant, allowing Akobo Minerals to process a substantial amount of ore efficiently and safely. The first phase of commissioning was completed, with Gekko Systems and Solo Resources overseeing the setup of the milling, grinding, Falcon concentrator, InLine Leach Reactor, and furnace in the gold room. The company anticipates an extraction efficiency of 76% from the concentrator and ILR system. Jørgen Evjen, CEO of Akobo Minerals, remarked, "This is a great achievement for our team and a testament to the quality and build of the processing plant. We have received solid feedback and are proud of the strong work from our team. We look forward to processing our first ore and moving forward with the project." The plant is designed with the capability to produce 4 000 ounces of gold per month, with an expected recovery rate of 96%. ■

An image of the 835 ct Emerald won by Gemstar LTD.

Grizzly Emerald auction **generates $32.5 million**

Grizzly Mining, one of the world's largest producers of emeralds, announced the results of its latest international emerald auction held in Dubai in July 2024. The auction saw the company offer its latest mid-to high-grade rough emeralds from its flagship Grizzly emerald mine in Zambia. Abdoulaye Ndiaye, Grizzly Chairman, commented: "I am delighted to see such robust bidding for our stones, and particularly for the 835 carats deep green, medium dark emerald, Bid 137, which saw stiff competition at the final auction. Ultimately, the winning bid went to Gemstar LTD., owned by Avraham Eshed, a long-term partner and client for over 20 years."

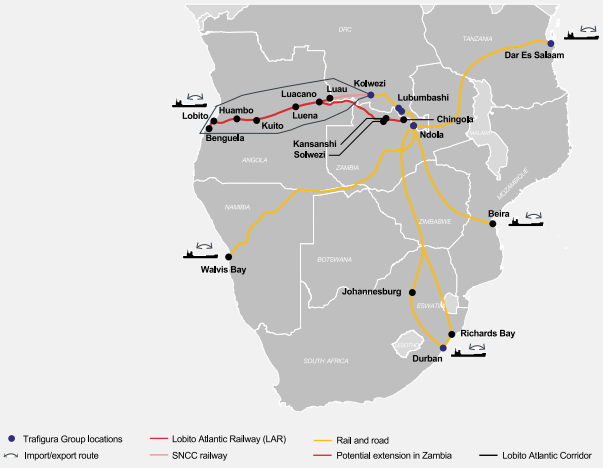
The auction generated strong revenue of $32.5 million and there were 96 clients in attendance from Europe, Asia and Africa. One hundred and forty two lots were offered for sale, of which 134 lots (94.36%) were sold, a total of 1.3 million carats. ■

Masoyise annual report published

The Minerals Council has announced the publication of the 2023 Masoyise Health Programme annual report which, thanks to multi-stakeholder efforts, shows continuing improvements in employee health. Masoyise was launched in 2016 as a unique multi-stakeholder programme to tackle the incidence of tuberculosis, HIV and occupational lung diseases in the industry. More recently, non-communicable diseases and, in 2023, mental health, have been added to the Masoyise focus. With Masoyise's initial goal of reducing the industry's TB incidence rate to below that of South Africa's as a whole having been achieved some years ago, the incidence rate has fallen further in the year under review to 223 per 100 000 population in 2023, from 236 per 100 000 population in 2022. ■

Masoyise annual report shows continuing improvements in employee health.

Lobito Atlantic Railway receives its first vessel at the Port of Lobito, Angola



Map illustrating the route of the Lobito Atlantic Railway.

The first vessel recently docked at the mineral terminal of the Port of Lobito, operated by the Lobito Atlantic Railway (LAR) consortium, the concession holder for the operation, management and maintenance of the railway linking Angola to the Democratic Republic of Congo (DRC). The MV Lindsaylou, a bulk cargo vessel loaded with 40 500 tonnes of sulphur, docked on Friday 12 July, marking the beginning of port operations for LAR. The vessel was loaded in Qatar and arrived in Lobito after a journey of around a month. The cargo will be placed on LAR international cargo trains bound for the DRC to support refined copper production by mining companies based in the Katanga area. The project to refurbish the railway line represents an investment of more than $800 million over the lifetime of the concession. ■

Orezone announces $105m financing **for Bomboré Phase II Hard Rock Expansion**

TSX-listed Orezone Gold has secured binding commitments totalling over $105 million to fully finance the construction of the Phase II hard rock expansion at its flagship Bomboré Gold Mine. With early works complete, engineering and procurement well-advanced, and major works expected to commence shortly, the Phase II expansion remains on schedule for first gold in late 2025.

Financing Package Highlights:

- $58 million senior secured term loan with Coris Bank International (Coris Bank), a leading West African bank and the Company's current senior lender.
- $47 million placement of 92 743 855 shares of Orezone at C$0.70 per share with Nioko Resources Corporation.

Patrick Downey, CEO stated, "We are pleased to announce that the Phase II hard rock expansion for Bomboré is now fully financed. We welcome Nioko Resources, a local Burkinabe and West African investment group, as an aligned and committed stakeholder, further strengthening our local base and providing another platform for regional growth. Orezone remains well-positioned to deliver this next stage of project growth, which will see annual gold production increase to over 170 000 ounces in 2026, an approximate 50% increase from current levels. The capital cost for the expansion is estimated at $85 million, and Orezone expects to deliver first gold from the expansion in late 2025." ■

Karowe underground project **progressing well**

United Mining Services (UMS) is gaining ground on the critical path to completion of the production and ventilation shafts for the Karowe Underground Project (UGP) in Botswana. Lucara Botswana (Pty) Ltd appointed UMS in 2019 to engineer and design the shafts for the UGP in preparation for the mine to transition from open pit to underground mining. The Karowe mine is world-famous for producing large, high-quality diamonds, including a 1 080-carat Eva Star diamond, recovered in August 2023.

The production shaft, at 8.5 metre internal diameter, and ventilation shaft, at 6 metre internal diameter, are being sunk concurrently and will both reach a depth of approximately 750 metres. The shafts are concrete lined, with the production shaft also acting as the main air intake and the ventilation shaft as the exhaust. The mine will have eight working levels (labelled according to metres above sea level), six of which will be accessed by a shaft station.

William Lamb, Lucara's CEO, offered his perspective on the ongoing project: "The shaft sinking development work spearheaded by UMS at our site marks a pivotal juncture in Lucara's strategy. This endeavour is focused on unlocking access to the deeper, more valuable part of the ore body. UMS's technical prowess and unwavering commitment to safety resonate profoundly with Lucara's core values.

"A key driver of our current success lies in our collaborative approach, harmonising the interests of all stakeholders across both immediate and long-term horizons. This synergy propels us towards a future of sustainable growth and innovation in the diamond mining sector."

UMS CEO, Digby Glover, reports that progress on the production shaft is ahead of the contractual schedule by almost two months. The development of 470 level has been completed and sinking is currently underway to 310 level, with just over 180 metres to go before reaching shaft bottom.

"This is an exemplary milestone, considering the challenges we encountered at the start of the main sink for the ventilation shaft that set our schedule back by approximately 42 days. Through a collaborative effort, the production shaft is now ahead of schedule, and we have reduced the contractual time deficit on the vent shaft to 20 days, which we aim to beat by the end of the project," says Glover.

He adds that shaft sinking at the ventilation shaft has also reached 470 level and lateral development connecting to the production shaft is being done on the level before the vent shaft returns to sinking the remaining depth.

Glover credits this achievement to a series of interventions from all stakeholders to turn things around, including technical modifications and workforce alignment.

The UMS on-site project manager for the Karowe project, Pieter Lombard, elaborates. "Additional engineering was required to accommodate the early challenges, and the project team, including the UMS design office, had resources to find solutions, fast, without relying on external suppliers. For example, the team proposed installing a retractable six-deck for the ventilation shaft stage to allow for greater workspace in the confined ventilation shaft.

> **"UMS's technical prowess and unwavering commitment to safety resonate profoundly with Lucara's core values."**

We had the skills available to develop simulations to prove viability, calculate the costings and cycle times improvements, design it, and then manufacture before installing on site.

"We also had a challenge with the lining and were able to solve it internally by analysing and modifying the design and installation method. The drilling length was changed to longer rounds reducing the cycle times by reducing the number of re-entries' charging cycles. Our sinking rate currently is over 60 metres per month including cover drilling to test for potential groundwater every 30 metres.

"We are now using smart technology, through our UMS 1Worx business, to monitor and manage almost all key parameters in the shaft sinking cycle. We can interrogate performance in detail from our head office, where a team of experienced engineers can look for trends and recommend improvements that result in significant time and cost savings. We are measuring shaft performance in milliseconds in many instances. The 1Worx intervention has resulted in savings because of: early alerts when things go wrong, increased performance in the winding operations, improved tipping and loading operation, the management of

Karowe mine is preparing for the mine to transition from open pit to underground mining.

services supply quality as well improved re-entry times through continuous gas monitoring – to name only a few examples. Comprehensive video overview of all shaft operations has also assisted greatly with analysis as well as interrogation and learning when things have not gone to plan."

Lombard adds that a major contributor to the turnaround was the alignment between the expat and local workforce regarding the project objectives, shift cycles and times to enable teams to work together more effectively, and ensuring that the workforce skill and capacity was sufficient for the workload.

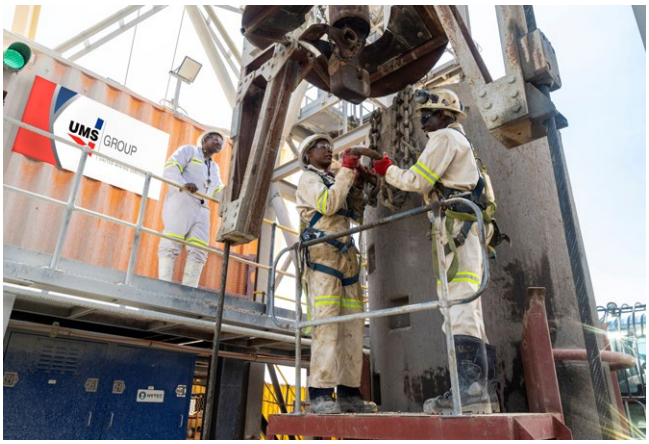
"We hold regular workshops to reinforce communication, quality and safety. There is a very strong drive on health and safety, and we focus on minute details to prevent any serious incidents. The results speak for themselves, and we are proud to have maintained a world-leading safety record of three and a half years without a serious safety incident on this project," says Lombard.

"UMS is not just a contractor doing the sinking and construction for this prestigious project. We have significant internal project, design and engineering capabilities that help us effectively deal with any required changes in an integrated, seamless manner to provide the solutions quickly."

Lucara's Neels Wolmarans, Karowe Underground Project Manager, says the project was confronted with major challenges which were overcome by a dedicated project team.

"Overall, the project reflects positively against the baseline schedule. Progress has improved due to a cohesive team and clear understanding of the work output required.

"As the project moves through the sinking phase, the lateral development, which is integral to reaching the ore body, is



The shaft sinking development work spearheaded by UMS marks a pivotal juncture in Lucara's strategy.

receiving the required attention to ensure safe and effective execution. Risk identification and controls play a major part in the project as it moves into different phases, and change management requires a strong and firm structure. At Lucara we believe in a positive work approach as a team to prosper in our work delivered."

"We promote a culture of collaboration and work as a team with the Karowe Mine personnel, the EPCM team, suppliers and other stakeholders. The value of working as a team is evident in the way the sinking project has been and is currently performing and the significant gains that are being made at this point," concludes Glover.

The next phase following shaft sinking will be to equip the production shaft with the shaft steelwork, pipes and cables, rock skips and personnel/material conveyance. ■

The Tin Dilemma: **Is global supply equipped to**

As the journey to net zero continues to gain momentum, global focus has shifted away from fossil-fuel derivatives towards energy metals and other critical minerals. Renewable energy solutions are becoming increasingly prioritised, and tin is emerging as a key player in this clean energy transition. A versatile and highly valuable metal, tin is establishing itself as a cornerstone in the shift towards sustainable, low carbon technologies.

Tin alloys are often used as solder - essential for fusing circuit board components together.

Industrial applications

It is no coincidence that tin has been the best performing base metal in 2024 with its value rising 31% in this year alone. Possessing a wide array of applications, the metal is gaining significant attention due to its crucial role in modern electrical components and renewable energy sources.

In 2017, researchers from Massachusetts Institute of Technology predicted that tin would experience remarkable growth as technology advances, and shift from something of a forgotten commodity to a crucial component of the green transition. As forecast, its applications now span various sectors including EV batteries, robotics, renewable energy, and advanced computing.

Tin applications

Highly malleable and resistant to corrosion, tin alloys are often used as solder – an essential constituent of electronic hardware that fuses components of a circuit board together. Beyond electronics, tin plays a pivotal role in items we use every day, such as tinplate – a component of food, beverage, and paint cans – and alloys used in aviation, brake pads, and roofing.

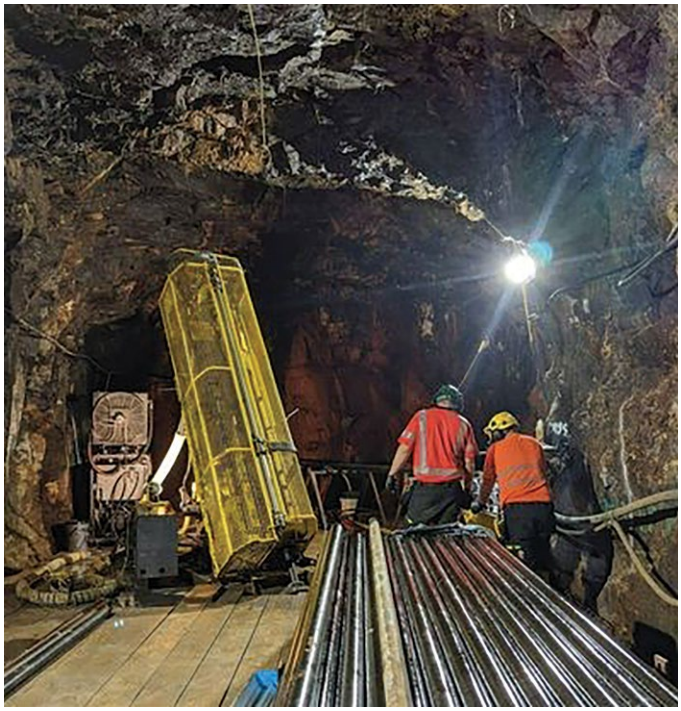
Although demand in this sector sees relatively static levels of global consumption, it is rising in other sectors where industrial applications are high, such as clean energy. The metal is attracting increased attention from investors for its use in solar ribbon – a copper wire coated in tin solder connecting solar panel cells – and its role in the composition of lithium-ion batteries used in electric vehicles.

These extensive applications across the spectrum of modern manufacturing are what secured tin its spot on the UK and US critical minerals list. The metal's evolving importance presents exciting opportunities for future growth in the market. However, production and demand constraints present unique challenges that pose a threat to supply chain stability.

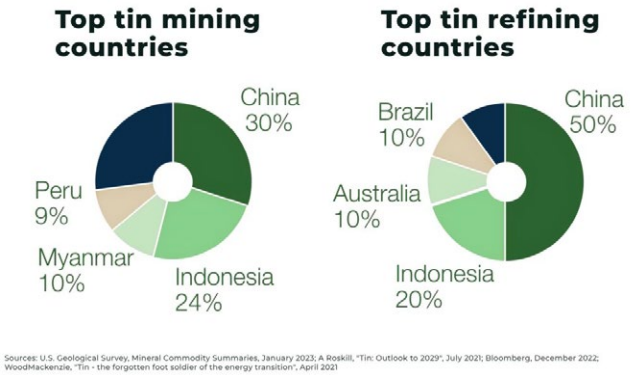
Is there a large enough tin supply to sustain the technological revolution?

Tin is a relatively scarce element, comprising only 0.001% of all mineral deposits in the earth's crust. However, despite the metal's

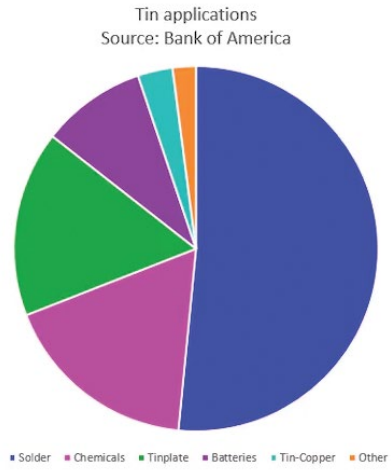
meet growing industrial demand?



Underground at South Crofty mine.



Top tin mining and tin refining countries.



rarity, it has seen a marked spike in demand as the technological revolution allows its applications to expand.

The first quarter of 2024 saw a 6.7% rise in Chinese tin consumption, driven by increased demand from the renewable energy and electronics markets. The positive growth forecasts for these sectors suggest the metal will remain highly valuable in the coming years; “Tin demand from the green sector could more than double by 2030, potentially topping 70 000 tons per annum, equivalent to a fifth of current consumption,” according to the Bank of America.

Despite these impressive figures, geopolitical conflicts, inflation rates, macroeconomic shocks, and supply chain disruptions are paving the way for global tin demand to exceed supply according to Project Blue, a research firm providing critical minerals market intelligence.

The majority of tin ore is mined in Southeast Asia with approximately 55% of the world’s supply coming from China, Indonesia, Myanmar, and Malaysia. China underpins 30% of global tin production but is also heavily dependent on other countries to meet its own demand, receiving 75% of its imports from sources in Asia. This intricate web of interdependence can thus have severe implications if there are disruptions elsewhere in the supply chain.

For example, export bans like those implemented by the Indonesian government in January can decrease a country’s shipments and create a large gap in the market. This was further exacerbated by the fact that the tin market remained in a deficit from 2017-2021, and production of the refined metal decreased 2.1% in 2023.The repercussions of reduced tin quantities entering the supply chain are compounded by the lack of investment into new projects across the globe. Approximately 90% of tin reserves are located in high-geopolitical-risk regions, particularly Indonesia and Myanmar. The associated risk makes investors cautious about committing significant capital to new projects, facilitating a stunted supply and persistent global shortfall. Lack of investment is a widespread issue facing the metals market, but tin is particularly affected, with global production set to grow just 0.6% until 2032, compared to a 3.2% year on year increase from 2013 – 2022. “[There is] currently under-investment in companies seeking to discover and develop [tin]”, according to the International Tin Association.

Top tin mining and tin refining countries.

However, demand remains at an all-time high, with prices rallying at near two-year peaks, according to Mining.com, and on track to increase further during the second half of 2024. The China Nonferrous Metals Industry Association predicts macroeconomic factors might cause prices to reach as high as $38 000 a tonne.

This paints a telling picture of the future of the market, and the short and long-term production challenges that highlight the need to bring more tin mines online.

Powering the UK tin market and strengthening global supply chains

These evolving supply and demand dynamics have significantly enhanced the value of tin producers who are actively

channelling funds into exploration, development, and production opportunities.

One such company is Cornish Metals, which is working towards re-opening its 100% owned and permitted South Crofty underground tin mine in Cornwall, UK; one of the highest-grade tin resources globally with the potential to become a new, low-cost global producer.

South Crofty boasts a rich history of metal production dating back to the 16th century. After closing in 1998 due to a collapse in the tin price, Cornish Metals acquired the project in 2016 and recommenced work to potentially re-open the mine, leveraging the existing infrastructure while integrating modern techniques and sustainable practices.

The strategic importance of South Crofty cannot be overstated. As it stands, there is no primary tin production in Europe or North America, meaning Cornish Metals' chief project is poised to become a leading supplier of tin in Europe. The 2024 Preliminary Economic Assessment validates the project's potential with approximately 4 700 tonnes annual tin production in years 2-6 and a total after-tax cash flow of US$626 million from start of production. The PEA places South Crofty's net present value at $201 million, with a 29.8% internal rate of return at a base tin price of $31,000/mt. All-in sustaining costs are expected to hover around $13 700 m/t, making South Crofty a low-cost producer and confirming South Crofty's economic viability.

At present, the UK is solely reliant on imports of technology metals, but the wealth of Cornwall's resources could empower the nation with a domestic supply of tin, reduce its dependence on other countries, and diversify the international supply chain.

Alongside the influx of demand for energy metals like tin, we are also witnessing a global push for environmental best practice when extracting critical minerals. Not only is Cornish Metals committed to sustainable mining practices, but the revitalisation of South Crofty is anticipated to impact the local economy significantly by creating jobs and fostering technological innovation in the region.

In May 2022, Cornish Metals closed a £40.5 million financing deal to advance the project, including the construction of a Water Treatment Plant, and to commence dewatering the mine. £25 million of this sum came from a strategic investment by Vision Blue Resources, an investment fund managed by Sir Mick Davis focused on accelerating the supply of critical minerals enabling the energy transition.

Since Cornish Metals commissioned its state-of-the-art water treatment plant in October 2023 it has treated up to 25,000m^3 per day of mine water. The extracted water powers a hydro-turbine used at the water treatment plant itself, further underscoring the company's commitment to sustainable mining practices.

Cornish Metals is well positioned to bolster the supply of tin required for the global green transition, and its positive foundations position it as a strong prospect for investors looking to capitalise on the UK's re-entry into the tin market.

However, Cornish Metals is not the only company well poised to contribute to the growth of the UK energy metals industry. Tungsten West has recently emerged as a prospective player in the UK tin market, spearheading domestic efforts to fortify global supply chains and bolster the nation's industrial resilience.

Its flagship Hemerdon Tungsten-Tin Project in Devon has the potential to represent a major milestone in the revitalisation of UK mining, being the second largest tungsten resource globally that would also produce tin at lower quantities.

The site has good infrastructure in place including a partially developed open pit, a processing plant, an integrated mine waste facility, workshops, and associated mine site groundwork. With the final permit for the mineral processing facility being approved recently, once funded, the company is poised to begin producing tungsten, tin and aggregates.

The strategic visions of both Cornish Metals and Tungsten West ensure they are poised to serve as catalysts for growth in the UK's tin market and beyond. By fostering a more competitive domestic market, both companies are contributing to a diversified global supply chain less susceptible to disruptions, and encouraging a stable source of this indispensable metal for years to come. ■

Solar panel cells can be connected using a copper wire coated in tin solder.

Miners after working in the adit.

Second quarter gold demand hits record highs, **supporting rising prices**

The World Gold Council's Q2 2024 Gold Demand Trends report reveals that total global gold demand increased 4% year-on-year to 1,258t, marking the strongest Q2 in our data series. Total demand was supported by healthy over the counter (OTC) transactions, up a notable 53% year-on-year at 329 t.

Increased OTC demand, continued buying from central banks, and a slowdown in ETF outflows drove record-high gold prices in Q2. The gold price averaged US$2 338/oz, 18% higher year-on-year, reaching a record of US$2 427/oz during the quarter.

Central banks and official institutions increased global gold holdings by 183 t, slowing down from the previous quarter but still reflecting a 6% increase year-on-year. Our annual central bank survey confirmed that reserve managers believe gold allocations will continue to rise over the next 12 months, driven by the need for portfolio protection and diversification in a complex economic and geopolitical environment.

Global gold investment remained resilient, marginally higher year-on-year at 254 t, concealing divergent demand trends. Bar and coin investment decreased 5% to 261 t in Q2, due to a sharp decline in demand for gold coins. Strong retail investment in Asia was counterbalanced by lower levels of net demand in Europe and North America, where profit-taking surged in some markets.

Global gold ETFs saw minor outflows of 7 t during the quarter. Asian growth continued, sizable European outflows in April turned into nascent inflows in May and June, and North American outflows slowed significantly compared to the previous quarter.

Record high prices drove down jewellery demand by 19% year-on-year in Q2, but H1 demand remains resilient compared to the same period last year, thanks to a stronger than expected first quarter.

In addition, demand for gold in technology continued to increase, jumping 11% year-on-year, driven primarily by the AI boom in the electronics sector which saw an increase of 14% year-on-year.

Total gold supply rose 4% year-on-year, with mine production increasing to 929 t. Recycled gold volumes increased 4% compared to the same quarter in 2023, marking the highest second quarter since 2012.

Second quarter gold demand hits record highs.

Louise Street, Senior Markets Analyst at the World Gold Council, commented: "The rising and record-breaking gold price has made headlines as strong demand from central banks and the OTC market supported prices, which has been a consistent trend throughout the year. The OTC market has seen continued appetite for gold from institutional and high-net-worth investors, as well as family offices, as they turn to gold for portfolio diversification. On the other hand, demand from jewellery tumbled last quarter as prices continued to hit highs, which also tempted some retail investors to take profit. Looking ahead, the question is: what will be the catalyst to keep gold front and centre in investment strategies? With a long-awaited rate cut from the US Fed on the horizon, inflows into gold ETFs have increased thanks to renewed interest from Western investors. A sustained revival of investment from this group could change demand dynamics in the second half of 2024. In India, the recently announced import duty cut should create positive conditions for gold demand, where high prices have hampered consumer buying. While there are potential headwinds for gold ahead, there are also changes taking place in the global market that should support and elevate gold demand." ■

Louise Street, Senior Markets Analyst at the World Gold Council.

Bankan readies for construction in 2026

Predictive Discovery MD Andrew Pardey.

Coupled with its strategy of progressing the Bankan gold project in Guinea – its flagship asset – towards development, ASX-listed Predictive Discovery is engaged in an intensive drilling programme aimed at unlocking the project's full potential. "We are progressing resource drilling in and around the current reserve area to enhance our resource base," says Predictive Discovery MD Andrew Pardey.

The Bankan project is lined up for construction in 2026, with commissioning scheduled for 2027.

The Tier-1 Gold Project, located in the Siguiri Basin in Guinea, is regarded as the largest gold discovery in West Africa. With a resource base of 5.38 moz Au (4.14 moz Indicated and 1.24 moz Inferred), Predictive Discovery's (PDI) strategy is to sustainably bring Bankan into production whilst identifying and developing other deposits within the underexplored region.

"The Bankan project contains a current mineral resource of 5.38 million ounces at a grade of 1.66. The main ore reserve is 3.05 million ounces at a

PDI eyes construction on Bankan in 2026.

Drilling at the Bankan project in Guinea.

grade of 1.64 grams per tonne, " Pardey explains.

The project is well placed within the highly prospective Siguiri Basin, which is also home to AngloGold Ashanti's Siguiri gold mine, Robex Resources' Kiniéro Gold project, Hummingbird Resources' Kouroussa Mine and Nordgold's Lefa mine.

Advancing Bankan project development

In line with progressing the Bankan project, the company made key appointments to strengthen its Board and management team. Alberto Lavandeira, who joined as Non-Executive Director, brings with him more than 45 years of development and operating experience across gold, copper and industrial minerals in Africa and Europe, while Sandra Bates Executive Director – Legal and ESG, strengthens PDI's in-house legal, ESG and permitting expertise, and Henk Diederichs, Chief Operating Officer, is tasked with advancing the Bankan Gold Project through the Definitive Feasibility Study (DFS) phase and into development and operations.

Core samples at the Bankan Gold Project.

"The ongoing strengthening of the Board and Management Team is critical to our strategy of developing the Tier-1 Bankan Project in Guinea, currently the largest gold development project in Africa," says Pardey. "Diederichs' appointment adds considerable depth of expertise as PDI enters the permitting phase of the Bankan Project, as well as completing the Definitive Feasibility Study in 2025. Lavandeira also brings significant project expertise to the Board, and I look forward to his valuable contributions as we embark on the next phase of PDI's growth strategy."

Pardey himself is an experienced gold miner who having been involved in gold, nickel and copper mining for most of his career, remembers a time, some decades ago, "when gold traded at below $200/oz and gold miners worried whether they would still have a job the next day".

"I have been in gold mining for a long time," he says, "and have been through the boom-and-bust cycles. Over the years, we have learnt relevant lessons, with the most important being to maintain fiscal discipline, especially when gold prices are fantastic. Often, instead of continuing to focus on maximising returns when commodity prices are favourable, management becomes slack; which is why, even though the gold price has tracked some record prices to date and is currently trading at just over $2400/oz, we will remain vigilant in our spending."

Discussing timelines to project development, Pardey says that general earthworks and infrastructure development is scheduled to start in the first quarter of 2026, with construction of the processing plant earmarked for the second half of 2026 and commissioning in the second half of 2027, followed by commercial production in 2028.

Extensive environmental surveys being conducted near the Niger River.

Core samples at the Bankan Gold Project.

According to Pardey, the Bankan PFS study released in April highlights the combination of a large-scale open pit and underground project with robust economics and massive upside. The production profile of the Bankan project, which currently has a 12 year mine life with average production of 269 000 ounces per annum, is extremely strong.

Having recently submitted its ESIA, the exploration and development company is in the process of submitting its feasibility study to the government of Guinea.

"We expect to receive our mining permit by the second half of this year, which will allow us to begin developing the Bankan mine."

According to Pardey, the prefeasibility study on the Bankan project, which has a pre-production capex of $456 million, is inclusive of 2024 costing for both professional services and equipment.

"We went to mining contractors and suppliers of processing plants, reagents suppliers, etc, armed with the latest 2024 prices. In fact, we have also priced diesel at $1.36/litre, despite diesel currently trading at about $1.25, and received positive feedback from our institutional investors, particularly in light of the fact that projects are often under budget by some 30%."

Of the $456 million earmarked for the development of the Bankan project, $117 million is mining related capex of which $70 million has been allocated for the development of the underground decline. A 5.5 million tonne per annum processing plant is pegged at $129 million with infrastructure development set at $82 million. The Bankan project comes in at an all-in-sustaining cost of $1 130 an ounce.

"We will unlock much value by mining high grade ore from underground on day one. Mining high grade ore early on is a trade-off between how big one wants to extend the open pit versus minimising the footprint on the ground, given that an open pit mining operation takes up significantly more space and disturbs a much larger area."

Pardey explains that PDI's optimisation work scheduled for both the underground and open pit operations, offers opportunities to reduce some of the associated costs. "How we sequence the open-pit and underground mining will unlock different opportunities and offer further value add."

The underground mining area starts from a box cut outside the open pit area to a depth of 270 metres below surface, "which is relatively shallow by underground mining standards".

Moreover, the project is set to become a significant employer for the country and region, with the company scheduled to source a vast majority of its unskilled labour from local communities and skilled staff from the greater Guinea area. Importantly, as a country with a strong mining heritage, Guinea has the requisite technical skills-set readily available in-country.

Bankan will employ roughly 650 people directly and some 2000 people indirectly.

According to Pardey, just as development of the Bankan project begins, Africa's largest mining and infrastructure related project, Rio Tinto's Simandou iron ore mine, which is currently being developed, will be tapering off.

"Rio Tinto's plus $20 billion investment is advancing at a rapid rate with progress underway on the port and trans-shipment facility and the railway corridor, which runs from south of Conakry, passing close to where the Bankan project is located. The development of the Simandou project brings with it a massive amount of additional equipment into the country. Importantly, the timing of the Simandou project is significant for us because when much of the major construction starts to wind up, we will be moving into construction and development phase on the Bankan project."

Investor interest in Bankan

So great is the investor interest in the Bankan project that PDI raised A$50 m - A$10 m above the required amount of A$40m, which Pardey says illustrates the confidence the market has in the project.

"With both existing and new shareholders wanting to invest

in the project, we ended up raising A$50 million, instead of the A$40 million we initially set out to raise. Aside from strong support from some high net worth individuals residing in Australia, we have extremely strong institutional backing, including BlackRock, which has a 15% stake in the project, Capital with 9,6% stake, Franklin Templeton on 4,9%, Merc with 4,5%, T.Rowe Price with 4,3% and Vaneck with 4.1%. The shareholder base for a company at this stage of project development is phenomenal," says Pardey.

Firming up the Bankan resource

"It is important to note that the Siguri Basin is largely unexplored and therefore holds untold potential, especially for our asset, which has a 35-kilometre strike length of the Siguiri Basin margin within the permits. I strongly believe that there are more discoveries to be made. Our strategy is, therefore, to continue with drilling to unlock opportunity in and around the surrounding area. We believe that the Bankan project is only the tip of the iceberg in terms of the opportunities."

Predictive Discovery's 356 km^2 Bankan project consists of two key deposits – NE Bankan (NEB) and Bankan Creek (BC) – and several highly prospective deposits within the broader Bankan permit which have, to date, delivered highly encouraging results.

Speaking of his initial evaluation of the Bankan project, Pardey says he "was blown away" by the consistency of the grades in the NEB deposit, which remains open at depth.

The Australian-listed junior miner has a clear intent of lifting its 5.38-million-ounce Mineral Resource Estimate (MRE) to 6 moz before year-end.

Optimisation initiatives around its key areas of NEB, BC and Gbengbeden are expected to realise significant outcomes for the Bankan resource base.

"We are engaged in resource drilling in and around the Bankan area, and have drill rigs on the BC pit where we are looking to convert the lower half of the existing pit from Inferred to Indicated resource. Drilling is also on-going around 800 West. We are hoping to provide industry with an updated resource statement, which is closer to 6 million ounces, later this year."

Further to this, Predictive Discovery's regional exploration campaign is focused on the Argo area, located 15-20 km north of the NEB deposit.

"The latest exploration results from Argo have delivered positive intercepts at multiple targets across the permit area. Our most advanced targets, Fouwagbe and Sounsoun, continue to develop along strike and at depth, and the Sinkoumba and Sanifolon South targets, which are on the same trend as Fouwagbe, are showing excellent potential. Encouraging results have also been received from several new areas such as Sanifolon North and Sanikourou. Drilling at Argo will continue to follow-up the best results at depth and along strike, and expand early-stage drilling to untested areas with good potential. The exploration programme at Argo is advancing to the next phase, and we are excited to have commenced transitioning the Fouwagbe and Sounsoun targets into resource definition drilling programmes with the resource development team.

> "The latest exploration results from Argo have delivered positive intercepts at multiple targets across the permit area."

We believe this will ultimately deliver the first Mineral Resource estimates outside the NEB and BC area, highlighting the multi-deposit potential of the Bankan Gold Project."

Apart from geotechnical work, PDI is finalising the appointment of a consultant to undertake the Bankan DFS.

"We have four drill rigs operating in parallel with the DFS work and the regional exploration work. Moreover, we have a strong team in place to take the project through to construction, commissioning and operation. There are not many assets left in the world of the quality of Bankan. Thus, the focus is around maximising its value, so that in the event of a transaction, shareholders will receive maximum value," concludes Pardey. ■

PDI board and management visiting the core conservation zone of the Upper Niger National Park with park officials.

Embracing range of technologies **for safe shaft sinking in all conditions**

In the demanding field of shaft sinking, leading global player Murray & Roberts Cementation is adapting and applying a range of technologies for working in challenging conditions – while maintaining its reputation for safety and environmental care.

Using a roadheader and caisson methodology with the right global partner leads to technological advancement.

Murray & Roberts Cementation recently completed a 950 m borehole for a ventilation shaft at Ivanhoe Mines' Platreef Project.

Graham Chamberlain, New Business Director at Murray & Roberts Cementation.

The company has been a pioneer in various methodologies, leveraging its depth of experience in varying conditions around the world. Graham Chamberlain, New Business Director at Murray & Roberts Cementation, highlights that much of the progress comes from knowing which technologies can be successfully employed in a given situation.

"Innovation in our business means being inventive and judicious in our choice of technology for each specific application," says Chamberlain. "Often the technology we employ is off-the-shelf and well-proven, but we can use it to great effect in achieving optimal project results for our clients."

In a recent contract at Ivanhoe Mines' Platreef project near Mokopane in South Africa's Limpopo province, for instance, directional drilling technology was used to guide raise boring equipment to meet exacting requirements. Murray & Roberts Cementation was able to complete a 5.1 m ventilation shaft to a depth of 950 m below surface, where it intersected precisely with an existing underground excavation.

"Directional drilling is certainly not new to the market, and is readily available to anyone," he explains. "By applying our expertise and knowledge gained over multiple projects, we know when and where to deploy technologies to enhance the solutions we design."

> **"With an in-depth understanding of how our equipment is performing, we can conduct component lifecycle management to reduce our unit costs."**

More recently, the company has been engaged in another contract to sink multiple shafts through very poor ground conditions to a depth of 280 m. There are also social and environmental impacts which must also be carefully mitigated, as the ground material is water-bearing and nearby villages use water from the same aquifer.

"In this case, the traditional techniques of cementation injection or chemical grouting were out of the question owing to the risks of groundwater contamination," he says. "We also wanted to avoid the noise and light pollution that would be associated with certain methods."

Among the solutions was an established

water-freeze method, where drilling would take place through frozen ground. Instead, Murray & Roberts Cementation opted for a modern version of the caisson method, using a road-header that is guided downwards, sinking under its own weight.

"A steel wedge is driven down under the weight of a concrete lining, which is applied from surface and prevents any risk of water contamination," he says. "We therefore operate in a flooded environment, proceeding until we reach competent ground – at which point the shaft can be dewatered."

He highlights that the company's capability has been built on decades of close collaboration with its clients and with original equipment manufacturers (OEMs) – both of whom make a vital contribution to every successful project. While clients will guide the scope and choice of solutions and technologies to be applied, Murray & Roberts Cementation works with OEMs to continuously fine-tune equipment designs.

"An important aspect of technological development in mining equipment is the feedback we give to OEMs on how we think their designs can be improved," says Chamberlain. "Our project knowledge gives them valuable insights into the operation of machines like drill rigs, for instance, and we have a formal 'post-mortem' with our supply partners after each contract."

By refining the design, Murray & Roberts Cementation is using a third generation of a certain drill rig, which now incorporates improvements to enhance safety, automation, performance and maintenance. He points out how every project delivers valuable learnings, which the company 'gives back' to the OEMs.

As the technology employed in shaft sinking operations changes, so must the skills capability of the teams. He highlights the role that the Murray & Roberts Training Academy plays in providing the skills of tomorrow across all the disciplines.

"Our learners and entry-level staff progress through multiple levels of training to safely bring them closer and closer to real working conditions – both for operations and maintenance," says Chamberlain. "This includes electronic phases, moving through virtual reality tools and into state-of-the-art simulation equipment. Finally, we put them through our mock-up facilities, which realistically emulate underground environments."

The digital age has lent itself to significant advancement of operating and management control systems, which today can gather and analyse vast quantities of data in any shaft sinking project. This includes performance and condition monitoring of equipment, to help pick up early warning signs and avoid unplanned breakdowns.

"This technology assists us in making our maintenance practices more streamlined and cost effective," he says. "With an in-depth understanding of how our equipment is performing, we can conduct component lifecycle management to reduce our unit costs."

Combined with its safety culture, technology has been successfully embraced in Murray & Roberts Cementation's safety performance. It has operated for almost nine years with no fatalities, recently earning a coveted award for seven million fatality free shifts. This landmark comes after the completion of five shaft sinking projects and many thousands of development metres achieved.

Sustainability is another strategic priority for the mining sector to which technology has been able to contribute, says Chamberlain. Increasingly, attention is being paid to reducing the carbon footprint of the company, including carbon emissions associated with inputs.

"In our work we often use large quantities of concrete, and are cognisant of the energy-intensity of cement," he says. "We therefore look for opportunities to use recycled material like fly ash as an extender in cement, to reduce the volume of pure cement in concrete for shaft linings."

There are also carbon impacts related to the manufacture and detonation of explosives, he notes, so there is a trend towards the use of technology to bore rather than blast excavations – where ground conditions allow. ■

Murray & Roberts Cementation is sinking a 5,1 metre ventilation shaft at the Ivanhoe Mines Platreef project to meet horizontal development at 950 metres below surface.

Close collaboration with clients and OEMs facilitates finetuning of equipment such as scraper arms.

Komatsu eyes India as its next growth target

Simon Andrews, new Vice President Africa - Soft Rock for Komatsu Mining.

Equipment manufacturer, Komatsu, is eyeing the Asian market, India and China in particular, as its next growth target, says Simon Andrews, new Vice President Africa - Soft Rock for Komatsu Mining.

Speaking to *Modern Mining* on the sidelines of a factory tour of Joy's smart service centre in Emalahleni, Mpumalanga Province, the specialist in underground mining equipment explained that demand for fossil fuels to fuel power stations, remained robust.

According to the International Energy Agency, in 2022, coal demand reached a new record high of 8 415 mt, increasing by 4%. "The increase was backed mainly by growth in countries that rely heavily on coal, such as China and India. Coal demand for power generation rose by 4% to 5 687 mt. Coal use for non-power purposes rose by 3.7% to 2 728 mt. Accounting for more than half of global coal demand, China is by far the world's largest coal consumer. In 2022, the country's overall coal demand rose by 4.6% to a total of 4 520 mt, with coal taking a share of more than 60% in power generation. India, the world's second-largest coal consumer, comprising about 14% of global coal demand, recorded an increase of 9%, totalling 1 162 mt." Global coal demand for 2023 was scheduled to increase by 1.4%, reaching a new all-time high of about 8 536 mt.

The driver for robust coal demand is India's population of 1.45 billion, forecast to grow to 1.47 in 2026, which is reliant on coal as a power source.

It has long been the policy of India to save its own coal reserves for the future and import from other countries for its present use; however, this sentiment is changing.

Joy 12HM37 Continuous Miner.

> There is a huge drive from the Indian government to become self-sufficient in coal production going forward.

"India is a significant importer of coal. Pegged as the second largest coal producer in the world, India is currently engaged in surface mining. However, with surface resources diminishing, more viable underground opportunities exist – an area where South Africa leads the way with original equipment manufacturers, such as Komatsu, being integral to local coal output. There is a huge drive from the Indian government to become self-sufficient in coal production going forward, and this translates to the need to co-opt expertise from industry leading equipment manufacturers with innovative products for increased productivity."

South Africa, which has been engaged in underground mining for many decades, is a leader in the field and home to some of the world's deepest mines, including Harmony Gold's Mponeng gold mine in Gauteng province, which has a depth of 3,8 km.

According to Andrews, India is eager to mine its readily available coal and, as such, is seeking partnerships with key experts in the field, including Komatsu, which has a long history of underground coal mining.

"We are currently supporting our colleagues in India in many different roles and ways, including remote monitoring support and automation and data analysis, amongst others. We are already in talks with coal miners in India that are keen to acquire fleets of equipment relevant to underground coal mining."

Komatsu's Joy product range for underground coal operations includes the continuous miner, shuttle cars, longwall shearers, powered roof supports and continuous haulage systems, amongst others.

The Japanese-engineered mining, construction, earthmoving and utility equipment supplier, relies on its Joy Smart Solutions platform to support its machines across the globe.

Training and skills development

Following India's decision to lift local coal production, an increasing number of Indian miners have started to fast-track development of their coal operations. Being relatively new to underground mining, India is facing challenges related to underground infrastructure development and skills and training development.

"South Africans understand the challenges associated with skills attrition, unlike Australia, the US and countries in Europe that are equipped with high skills sets for their underground operations," Andrews explains.

According to him, from an underground coal mining industry skills development perspective, the Indian coal market is in its infancy and lagging behind the rest of the established coal sector, including South Africa.

"Underground coal mining is quite a new game for the Indian market, which is seeking partnerships with experts

Smart Services include, Integration of Smart Products and Systems, Advanced Analytics, Customised Solutions and Direct Customer Engagement.

in the field to help them unlock local potential. At Komatsu, we are well equipped with the relevant skills set required for underground mining, and moreover, our training department upskills mining personnel on how to be effective. Over and above our competency and training programmes, we have technology and state-of the art equipment to monitor and support our underground mining initiatives. In fact, we have already sent our technical experts to assist coal miners in India."

Aside from offering in-house training and skills development for its clients in the mining sector, Komatsu offers technologically advanced equipment that helps to compensate for the general skills attrition.

"Our machines are extremely advanced and, in some instances, too technical for the existing skills set, which is why we also offer in-house training for, amongst others, machine operators," says Andrews.

> Our machines are extremely advanced and, in some instances, too technical for the existing skills set, which is why we also offer in-house training for, amongst others, machine operators.

Going green

Driven to meet the need for consistency of power supply for its smart solutions office, a cleaner environment, lower costs, and circumventing the challenges associated with loadshedding, Komatsu is in the process of rolling out a renewable energy programme for both its Wadeville office, which employs 550 people, and its Emalahleni operations with130 people.

According to Andrews, an important consideration for the company, which operates 24 hours a day, is the need to have consistency of power supply, and installing solar to run the office during the day will reduce reliance on the Eskom grid.

"We have proposed that both the Wadeville office and the Emalahleni operations run off solar power during the day and have already made requests for capital allocation for installation of solar for both operations. In fact, we are fast-tracking the project and aiming for the solar power projects to be operational before the end of February next year. By the end of January 2025, the system will be fully installed and entering the commissioning phase."

Komatsu's smart service solutions

The mining industry is changing rapidly and driving the need for improved efficiency, reduced costs and increased safety.

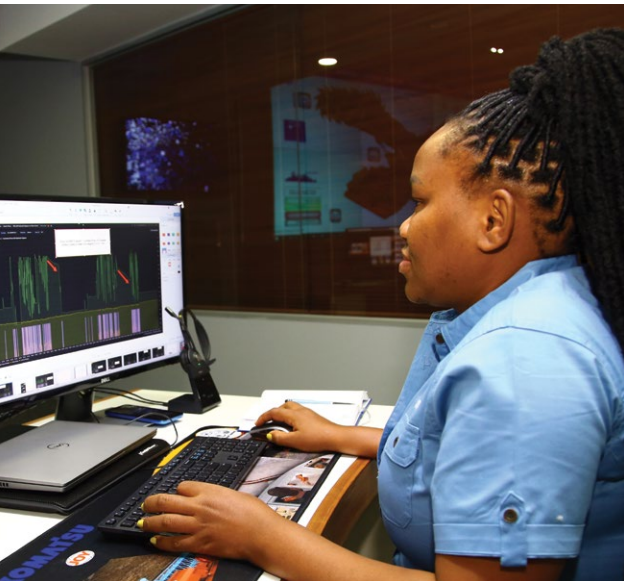
With these challenges in mind, Komatsu is partnering with its customers to understand their unique requirements and utilise its Joy Smart Solutions capabilities to assist in solving their challenges and to take mining performance to the next level.

"Joy Smart Solutions represents a comprehensive approach to addressing the mining industry's most challenging problems," he says. "By integrating smart connected products and systems with advanced analytics, we deliver customised solutions that go beyond mere data and analytics. These services involve direct engagement with customers, focusing on helping them realise tangible value from their operations."

Key features of Smart Services include, Integration of Smart Products and Systems, Advanced Analytics, Customised Solutions and Direct Customer Engagement.

"By combining these elements, Smart Services help mining companies to optimise their operations, improve safety, increase productivity, and reduce costs. The focus on direct engagement ensures that customers receive not just data, but actionable insights and support that leads to significant improvements in their mining activities," explains Andrews.

April 2023 saw the launch of Komatsu's "Good to Excellence" programme. The programme seeks to maximise the impact that can be made on customers' sites by combining Joy Smart Solutions and in house capabilities with the customer's operation



Joy 10SC32 Shuttle Car.

expertise, thus "Setting a common goal, managed by specific actions, and supported by both parties proves to be a winning formula."

The programme kicked off by identifying the critical few success factors, technical skills upliftment and equipment operational awareness.

"By applying Joy Smart Solutions and working closely with the teams on site, we were able to customise a fit-for-purpose strategy specifically for our customers. The agreed milestones, such as establishing an engagement model to set the framework for collaboration, having dedicated champions onboard to ensure effective coordination and agreeing on short and long-term KPIs, were all essential to measure progress and success."

In mid-March 2024, the first section at a customer site achieved 1 million production tons, followed by the second section at the end of March 2024. "We anticipate between 8 and 10 millionaire sections in a 12-month window," says Andrews.

This is a significant milestone and testament to the effectiveness of working to continuously improve on technical skills and operational excellence.

According to Andrews, the campaign proved that by partnering with its customers and providing holistic mining solutions through using Joy Smart Solutions and onsite support, operational excellence can be achieved. ■

Underground mining

Underground mining is used to extract ore from below the surface of the earth, safely, economically, and with as little waste as possible.

Joy Smart Solutions

Joy Smart Solutions' smart connected products and systems, advanced analytics and direct services are customised to solve customers' toughest challenges. (unclear)

The Tru-Trac Rip Prevent+ system offers mass flow calculation, condition monitoring, and drive monitoring to enhance conveyor performance.

Revolutionising conveyor belt monitoring

Given that conveyor belts are the lifeblood of production in mining, it is critical to keep the conveying system running and diagnose potential hazards well before they occur. That being the case, Tru-Trac is launching its Rip Prevent+ system, a sophisticated monitoring technology designed to detect and mitigate anomalies and damages to conveyor belts, reducing downtime and enhancing overall efficiency and productivity.

The importance of a dependable and fully functional conveyor system to the production process of a mine or any other industrial plant cannot be reiterated enough. Mining operations are well aware that unexpected conveyor downtime can result in million-dollar losses. With the arrival of the Tru-Trac Rip Prevent+ system, mines in Africa are now able to maximise the efficiency and productivity of their conveyor lines by preventing costly workflow interruptions through rip events.

Having already proven its mettle on several mining operations across the world, the Rip Prevent+ system made its official local debut at Electra Mining Africa in September this year. The system – which uses a data-driven calculation model of the conveyor and artificial intelligence (AI) to detect anomalies or rip events – can be deployed on any kind of conveyor belt, including metalcord belts, pipe belts and fabric belts.

From the onset, says Dustin Schiller, co-founder of the Rip Prevent+ system, the idea was to develop a system that does not use sensor elements inside the belt and that is applicable for any type of conveyor system. In fact, Rip Prevent+ is the first rip detection system of its kind available for fabric belts.

“The only other detection technology available for fabric belts are laser-based systems. The downside of these systems is that they are expensive and customers can expect an initial capital cost of between US$170 000 and US$200 000. This is in direct contrast to our approach. With Rip Prevent+, we have adopted a subscription model that allows customers to pay either a monthly or an annual licencing fee, depending on their

Dustin Schiller, co-founder of the Rip Prevent+ system, and Tinus Ludik, Sales Manager Bulk Materials Handling Division at Tru-Trac, discuss the groundbreaking technology of the Tru-Trac RIP Prevent+ System.

Rip Prevent+ is the first rip detection system for fabric belts, designed without sensor elements inside the belt for universal conveyor application.

needs, thus minimising capital investment risk for the customer," explains Schiller.

How it works

The Rip Prevent+ system analyses data from the conveyor belt using an AI-based calculation model. The AI, coupled with an innovative algorithm, makes it possible to detect anomalies and rips. In case of an anomaly or rip, the system generates data based on conveyor-specific thresholds and output signal which customers can implement in their Programmable Logic Controller (PLC) to automatically stop the conveyor line even before the critical rip event starts. The calculation model computes data 50 times per second and it is able to generate a signal to the PLC system in about 0,2 seconds to minimise the impact of the rip event.

"By stopping the conveyor belt upon detection of a longitudinal rip event, the system limits the damage associated with the event and can therefore save the mine millions of dollars which could potentially be lost through downtime, conveyor belt replacement and clean-up efforts," explains Schiller. "The data-driven calculation model of the system also has a huge advantage over inducive, magnetic and laser-based systems because it has no risk of wear, is suitable for all types of conveyor belts and has a low investment cost."

Jonathan Rogoff, CEO of Tru-Trac, says the ability to detect rip events before they actually happen sets this technology apart. "Every other rip detection system in the world has to wait for the event to happen and for the belt to be physically damaged before it can report. In many cases, that might be too late if the damage is extensive."

The system, explains Schiller, is web-based and can be accessed via an Ethernet network connection, making it available to multiple users if necessary. However, it is completely offline to fortify it against possible cyberattacks. The user-friendly interface features an easy-to-understand dashboard showing the most important information.

Key competitive edge

One of the key competitive edges of the Rip Prevent+ system is that it is more than just a rip detection system. In fact, it is a comprehensive monitoring system that has, based on customer feedback, added several other functions to ensure that it fully complies with the predictive maintenance approach. These functions include mass flow calculation, condition monitoring, drive or motor monitoring, energy efficiency and electrical network analysis.

"Based on available data, we are able to calculate mass flow with an averaged bulk density so that the rip event can provide the customer with the mass flow. Furthermore, overloading and underloading of the system can also be detected," explains Schiller.

When it comes to drive monitoring, based on electrical parameters, the system is able to check the 'brain' of the conveyor system – the motor. Here, the system analyses high-resolution electrical parameters through the installed sensor technology and performs complex calculations in the background so a potential motor failure can be detected at an early stage.

One of the major trends in the mining sector, says Schiller, is the growing focus on energy efficiency. Based on customer feedback, the Rip Prevent+ system now incorporates an energy efficiency improvement function, which is aimed at realising the optimal power requirement per conveyed tonnage.

"Optimising the energy efficiency of the conveying system not only reduces costs, but also minimises carbon CO_2 emissions. With this function, we can precisely show the cost per tonne, CO_2 emissions per tonne and the efficiency grade of certain components," says Schiller.

The electrical network analysis is an important function for every plant operator. Through a near real time analysis of the network, anomalies can be detected and corrected through targeted measures so that the components are optimally loaded every time. "In the mining industry, when a large crusher or mill, for example, starts up, it can exert stress on the electric network. When the harmonic distortion is too high, the wear of the electrical components increases. This can result in damaged PLCs or blown-up transformers, which increases the risk of fires," explains Schiller.

Another key competitive edge of the Rip Prevent+ is its ease of installation. It is a 'plug and play' system that takes between 30 minutes to an hour to install. In addition, the conveyor system is de-energised for approximately five minutes to allow for electrical connections. Commissioning of the system takes some two to five hours depending on the preparatory work and available system parameters.

In conclusion, Rogoff is excited to roll out the system in the local market. "We are in the process of introducing it to our customers and have already seen initial interest. We are confident in the technology because it has already proven itself in multiple applications across the world," concludes Rogoff. ■

Crushing challenges **in the Gold Mining Circuit in Tanzania**

The Shinyanga Region in Tanzania holds significant importance in the context of mining due to its rich mineral resources, particularly gold. The Tanzanian gold mining industry has played a vital role in bolstering the country's position as one of the top gold producers in Africa. This region, situated in the northwestern part of Tanzania, is home to several key gold mines.

In this article, we'll delve into the challenges encountered at one of these gold mines, more specifically in its slurry and thickening tanks. The positioning of the rake drives is critical because breakdowns can grind the mineralisation and beneficiation processes to a costly halt, resulting in millions of dollars in revenue loss daily. Let's examine the challenges faced by a gold mine in the region's processing plant and explore the solutions provided by VEGA.

Most engineers would agree that the mining environment in Africa is undeniably one of the most demanding and challenging workspaces. Factors such as resource distribution, geological complexity, infrastructure development, environmental challenges like mine water acidity, dust and the considerable distances equipment must be situated to ensure its uninterrupted and damage-free operation, make it a highly complex setting. Innovation and unconventional problem-solving are essential in this context, alongside the reliance on dependable measurement and control equipment.

> The majority of the focus in the processing sphere is on maintaining everything in perfect working order with precision close to a military operation

The majority of the focus in the processing sphere is on maintaining everything in perfect working order with precision close to a military operation, as inaccuracies in measurements can have dire consequences, endangering both equipment and human lives.

"Our previous level sensors experienced significant issues, leading to their failure. This specific failure resulted in a 5-day downtime and incurred a substantial cost," the plant instrumentation supervisor noted.

Delving deeper into the process

The gold mining process at the mines situated in the

The Tanzanian gold mining industry plays a vital role in bolstering the country's position as a top gold producer in Africa.

VEGA sensors are typically straightforward to install and configure, making them user-friendly for operators.

Shinyanga region starts underground, where the gold-rich ore is extracted. After the extraction process, the ore is loaded onto trucks and transported to the surface for processing. Once at the surface, the ore is sent to a processing plant. Here, various processes such as crushing, grinding, gravity concentration, and flotation are used.

The extracted ore is first crushed into smaller pieces and then ground into a fine powder. This process increases the surface area of the ore, making it easier to extract the gold. The ground ore is mixed with water and chemicals, creating a slurry during a process referred to as "thickening". Air is then bubbled through the slurry, and the gold particles attach to the bubbles and float to the surface as a froth. This froth is collected as it contains the gold concentrate.

The gold concentrate obtained from the flotation process typically contains impurities. To refine the gold, the concentrate is further processed to produce gold doré bars. The impurities are removed through processes such as smelting and refining. The resulting product is a gold doré bar with a high gold content, something that the region is known for.

VEGA is a trusted partner in the pursuit of operational efficiency and accuracy in liquid-level management for industrial applications.

The plot thickens

Thickening is a procedure that involves the separation of a slurry, or a mixture of solids and liquids, into a concentrated slurry that retains most of the solid particles and an overflow consisting of largely clear water. Gravitational force serves as the primary mechanism for this separation, as the variations in phase densities compel the solids and liquids to separate. In most mining operations, sedimentation-based thickening is employed for both product and tailings streams to reclaim water, which is subsequently recycled within the process.

As the rake arms rotate or move through the settled solids, they help in the separation of solid particles from the liquid in the slurry. The motion of the rake arms assists in pushing the settled solids towards the centre of the tank, where they are collected

and removed. The position and movement of the rake drive can be adjusted to optimize the thickening process. The rake drive's speed and angle can be controlled to achieve the desired level of solid-liquid separation. This is crucial in gold mining, where the concentration of valuable minerals in the slurry needs to be maximised.

The rake drive's position and operation are often monitored and controlled using sensors and control systems. This allows for real-time adjustments to ensure that the thickening process operates efficiently. Regular maintenance of the rake drive mechanism is essential to ensure it continues to function correctly. Any issues with the rake drive, such as mechanical wear or malfunction, can impact the thickening process. This can result in costly breakdowns and massive revenue loss, which all mines try to avoid at all costs.

Separating the challenges

Thickening tanks in mining pose several challenges for measuring equipment due to the nature of the materials and processes involved. The materials processed in thickening tanks often contain abrasive or corrosive elements that can damage sensors and equipment over time. The slurry inside these tanks can be very thick and dense, making it challenging to obtain accurate level and density measurements. The density of the slurry can change often as more material is added or as water content fluctuates. Accurate monitoring of these variations is essential.

Thickening tanks can be difficult to access for maintenance, which can complicate the installation and replacement of measuring equipment. The mining environment itself can be harsh, with factors like vibrations, temperature extremes, and high-pressure conditions that measuring equipment must withstand.

To address these challenges, one gold mine in particular had to find a reliable and robust solution where measurement is concerned. And VEGA had the perfect solution.

Levelling up on the solutions

The sales professionals at VEGA INSTRUMENTS suggested the use of VEGAPULS RADAR SENSORS after establishing the exact needs of the mine and the solution that was required.

The VEGAPULS instrumentation faces specific challenges due to its installation in an open slurry tank, leaving it exposed to environmental elements. Its primary role is the monitoring of the rake drive, a task of the utmost importance. The rake drive stands as a crucial component, directly influencing the efficiency of the thickening process. Any malfunction in these rake drives can have a detrimental effect on the thickening process, ultimately impacting the quality of the final product.

The Instrumentation Supervisor explained: "One of the most significant challenges we were sitting with was identifying the appropriate solution for this particular challenge. Our previous use of level sensors proved to be highly ineffective, the plant was plagued by frequent failures that disrupted the process and adversely affected our production. Moreover, the measurements obtained from these sensors lacked the necessary accuracy."

The VEGAPULS is a series of radar-level sensors manufactured by VEGA, a company known for its expertise in level and pressure measurement technology. In an open slurry tank, the VEGAPULS is a reliable and versatile tool for process control and automation, providing valuable data that contributes to efficient and safe industrial operations. It can be used to accurately measure the level of the slurry within the open tank. It emits radar pulses that travel to the surface of the slurry and back to the sensor, providing real-time data on the slurry's level. This is essential for monitoring and controlling the amount of slurry in the tank. By installing the sensor near the rake drive, it continuously measures and reports the level of the slurry. The level data collected by the VEGAPULS radar sensors can be integrated into the control system of the thickening process.

The data collected by the VEGAPULS can then be integrated into the control system of the slurry tank. This allows for real-time

VEGA's range of sensors.

monitoring and control of the slurry level, which can be critical in maintaining the efficiency of various industrial processes.

Safeguarding equipment and optimizing processes

The VEGAPULS can be set to trigger alarms if the liquid level deviates from the desired range. This early warning system can help prevent issues and facilitate timely maintenance. It also offers remote monitoring capabilities, which allow operators to access real-time level data from a control room or remotely, enhancing operational efficiency and safety. The VEGAPULS can provide early warnings of any abnormal process conditions or potential issues that may require maintenance or adjustments. The sensor data can be logged and analysed to identify trends and patterns in the thickening process. Historical data can be used to improve process efficiency and optimize the use of resources.

The gold standard in process control

VEGA's measuring instruments are an invaluable tool for continuously monitoring the level of settled solids in a thickener tank, which indirectly provides information about the rake drive position and its impact on the thickening process. The VEGAPULS assists in better process control, automation, and optimisation, leading to improved efficiency and productivity in mining and mineral processing operations at the gold mine in Tanzania.

The VEGAPULS stands out as an indispensable instrument for achieving precision in liquid-level measurement and control within various industrial processes. VEGA's leadership in the mining industry testifies to the company's expertise and commitment to excellence.

The final step of the process

VEGA sensors are typically straightforward to install and configure, making them user-friendly for operators. The seamless installation process empowers instrumentation technicians to handle the setup themselves and, in times of need, VEGA's dedicated technicians are just a phone call away. The VEGA technicians offer valuable guidance, readily addressing installation inquiries, and providing troubleshooting support when necessary.

This combination of reliable technology and accessible expertise makes VEGA a trusted partner in the pursuit of operational efficiency and accuracy in liquid-level management for industrial applications.

"For more than 16 years, our gold mine has maintained a steadfast partnership with VEGA. Our confidence in VEGA Instruments is underpinned by their accuracy and durability. During this installation, we took charge ourselves, although VEGA's technicians offered their assistance on multiple occasions. The sensors proved easy to install, and expert technical support was just a phone call away," the client concluded. ■

Head of Sibanye Stillwater Digital Mining Laboratory **graduates with a PhD in engineering from Wits**

Dr. Muhammad Ahsan Mahboob, the Head of the Digital Mining Laboratory (DigiMine) at Wits University.

In a celebratory ceremony held at Wits Great Hall on 8 July 2024, Dr. Muhammad Ahsan Mahboob, the Head of the Digital Mining Laboratory (DigiMine) at Wits University, was awarded his PhD in engineering from the School of Mining Engineering, Wits University.

Mahboob's PhD thesis, *A Data Science Framework for Mineral Resource Exploration and Estimation Using Remote Sensing and Machine Learning*, merges data science, satellite imagery, and machine learning to revolutionize mineral exploration. By swiftly identifying mineral-rich sites, especially in remote areas, it accelerates critical mineral extraction, contributing significantly to green technology production and advancing global sustainability and climate change mitigation.

"This PhD has a big positive impact on society, and it will truly add more value to the DigiMine facility to accelerate the research and innovation that is currently underway. It will also have a long-term positive impact on both my personal and professional goals at Wits," said Mahboob.

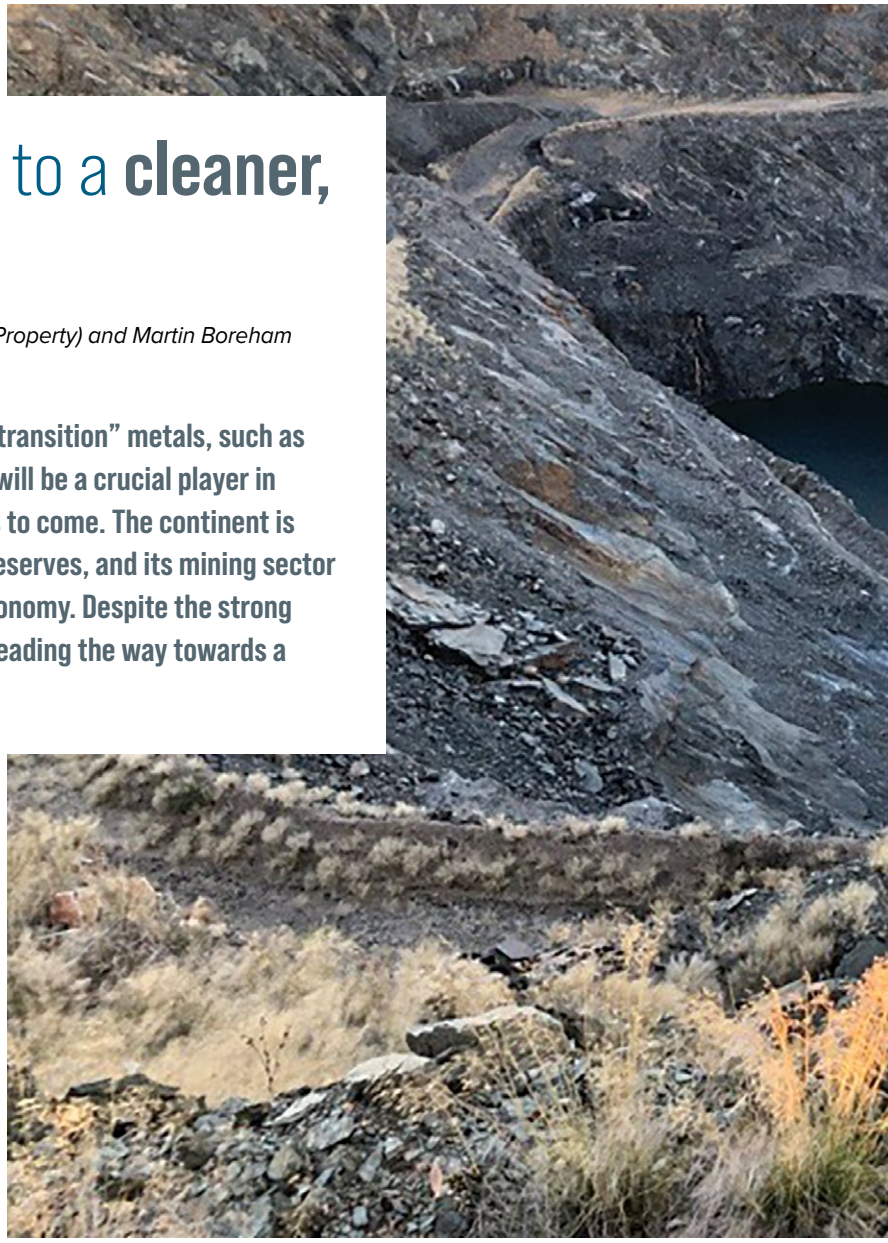
Mahboob has led the Sibanye-Stillwater Digital Mining Laboratory (DigiMine) at Wits University since 2019, driving research and innovation in the application of digital technologies in the mining industry to enhance safety, security, and sustainability. His research interests include geoinformatics, spatial data analysis, data sciences and modelling, and cyber-physical systems integration.

The DigiMine laboratory aims to make mining safer and more sustainable through digital technologies that enable a mine's control system to autonomously observe, evaluate, and respond in real-time. Under Mahboob's leadership, the DigiMine team collaborates with commercial, academic and industry partners to transfer surface digital technologies into the underground mining environment. ■

Africa leads the world to a **cleaner, greener future**

By Brian McGregor (Director of Underwriting & Head of Property) and Martin Boreham (Director of Underwriting & Head of Liability)

With large reserves of so called "green energy transition" metals, such as copper, cobalt and rare earth elements, Africa will be a crucial player in the global decarbonisation journey for decades to come. The continent is home to almost a third of the world's mineral reserves, and its mining sector represents a cornerstone of the continent's economy. Despite the strong growth in African industrials, the continent is leading the way towards a cleaner, greener future.



Africa's mining industry however stands at a pivotal juncture. Whilst the continent is experiencing a significant surge in attention for its rich deposits of minerals and metals, global insecurity and fluctuating commodity prices are diverting investments away from what are perceived as "riskier", more complex, jurisdictions. The continent has seen challenges, particularly in the form of political and regulatory uncertainty, infrastructure deficits and commodity price volatility, as well as the ever more stringent ESG standards that mining companies must adhere to.

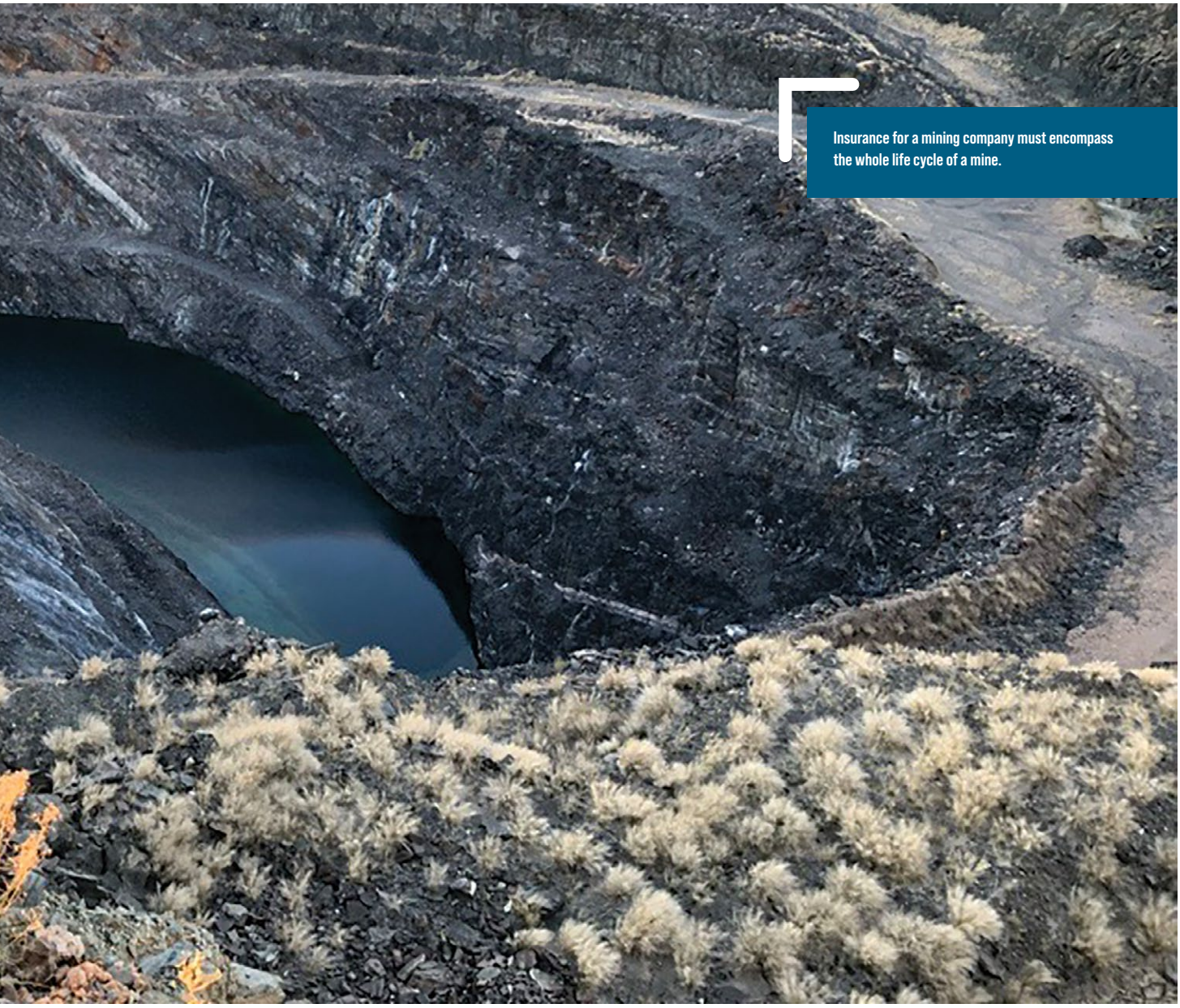
In 2023 foreign direct investment (FDI) into Africa declined by 3% to $53 billion, however, it is expected that Africa will benefit from a surge in FDI in the mining sector in light of the global energy transition. In comparison, Latin America and the Caribbean received over $190 billion in 2023, whilst Asia saw over $600 billion.

Insurance has long been a way to manage risk, which is why closing the insurance gap is crucial. In Africa insurance penetration sits at under 3%, compared to the global rate of approximately 10%.

Africa Specialty Risks (ASR), aims to bridge this insurance gap by offering innovative and comprehensive products, enabling businesses and communities to manage risks effectively and drive economic growth.

Over the past three years, ASR has seen exponential growth, driven by a robust understanding of the unique challenges and opportunities within the African continent. ASR started writing business in 2021 and has now participated in the de-risking of $28bn of projects and assets across 66 African and Middle Eastern countries. ASR derisks investment from initial investment (i.e. political risk & trade credit) through to construction of those assets, hence Construction and Political Risk & Violence (PVT) covers apply, through to the operation of those activities (Liability, Energy, Property, PVT and Parametric).

From the outset, ASR's mission has been to increase insurance coverage in Africa through collaborative partnerships with local and international (re)insurers and brokers to secure additional capacity for the continent. This collaborative approach has enabled ASR to underwrite larger, more influential lines and be at the forefront of insurance innovation on the continent, providing



Insurance for a mining company must encompass the whole life cycle of a mine.

and creating insurance products which are specifically designed to meet the needs of the risks faced by Africa.

ASR places a strong emphasis on local engagement and relationship-building, with its unique co-reinsurance model calling for collaboration between local insurers and brokers, alongside the Capacity Providers they bring to the Continent. ASR's underwriters and business development teams invest substantial time and effort in being engaged and present in the local markets they serve, thereby helping them to gain valuable insights into the unique needs and challenges faced by local markets. Local cedants traditionally lack the experience and the balance sheet to support larger risks. ASR has both, and thus support the local insurance companies to retain as much premium as possible, enabling local insurers to better support the mining industry, whilst keeping the business within the continent.

Launch of ASR Syndicate 2454, the first African focused syndicate writing business at Lloyds.

Martin Boreham, ASR's Director of Underwriting & Head of Liability at Lloyds and Brian McGregor, ASR's Director of Underwriting & Head of Property.

Mitigation against volatile commodity prices ensuring that miners have the necessary coverage to protect their investments.

The company launched ASR Syndicate 2454 at Lloyds in late April 2023, which is the first African focused syndicate writing business at Lloyds. With only 2% of Lloyds' business currently coming from Africa, ASR Syndicate 2454 is strategically placed to expand this. ASR expect its presence in Lloyds will encourage other markets to grow their business in the continent and help ASR in their mission to close its insurance gap while facilitating international investment. Whilst ASR's extensive network and experience in Africa will bring locally sourced, high quality African business to the London market, Lloyds' global brand and licences will help to close the corporate and specialty capacity gap for clients across Africa.

ASR supports the mining industry, and allied industries, in shaping ESG discussions, ensuring that social matters are considered alongside environmental concerns. The global push towards ESG compliance presents new challenges and opportunities for leaders to foster sustainable and inclusive growth. There is a need for balance and a more targeted ESG approach when it comes to Africa, as a blanket application of ESG standards and policies may not align with local realities and development targets.

Africa has contributed only 3% to global emissions which is vastly less than other continents, and so it is crucial to recognise that the same ESG standards applied globally may not always be suitable for Africa's unique developmental context. Whilst ESG frameworks are critical tools for promoting sustainable development and responsible investment worldwide, it is important to understand the social and developmental stages of the different economies within the continent and take this into consideration for ESG agenda, as a one-size fits all approach isn't applicable with 54 jurisdictions all at different stages of development.

The increased severity of natural disasters have highlighted the vulnerability of African nations. Recent events like Cyclone Freddy and the Moroccan earthquake underscore the propensity to natural disasters which Africa faces; it is too often the case that these events disproportionately affect the lower-income populations who often lack insurance. With innovative solutions such as parametric insurance, ASR helps to ensure timely pay outs that help governments re-build quickly post event or disaster.

Insurance for a mining company must encompass the whole life cycle of a mine, from the early stages before construction has started, to the development of the mines themselves, to the continuous operation of the project and the associated risks that might arise.

Mining companies should continue to design and implement robust risk mitigation strategies: this can include addressing risks associated with underground fires to design and rigorously implement hot work procedures; mitigation against volatile commodity prices ensuring that miners have the necessary coverage to protect their investments; or events such as riots, strikes, and terrorism, which can lead to significant operational downtime and damage to property and equipment.

Companies must also consider political risk, trade credit, and political violence and terrorism covers, amongst others, as well as how insurance solutions are a necessity. These solutions are invaluable in offering investors assurance when committing capital to regions which experience such events. This assurance can make the mining sector even more attractive to foreign and domestic investors, facilitating the flow of capital into exploration and development projects.

Insurance plays a pivotal role in the mining industry by mitigating the inherent risks and uncertainties associated with mining operations. By transferring these risks to (re)-insurers like ASR, mining companies can increase their financial resilience and ensure continuity in the face of unexpected disruptions. Insurance enables mining companies to navigate the complex landscape of regulatory requirements and operational challenges by offering coverage for property damage, liability, environmental impacts, and business interruptions. By utilising locally licenced insurance companies supported by strong international reinsurers, miners can confidently run their operations without the fear of significant financial loss.

As global demand for minerals continues to rise, particularly those essential for new technologies and renewable energy, Africa's mining sector is poised to play an increasingly important role in the global economy. As an essential component of the mining industry, insurance fosters resilience whilst providing a safety net that not only protects the financial stability of mining companies but also ensures the welfare of their workforce and the communities in which they operate. As the mining sector continues to face new challenges and opportunities, the importance of insurance will only grow. ■

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Mining: Why widespread adoption of ventilation on demand remains elusive

By Hannes Potgieter, Specialist Ventilation Consultant at BBE

Ventilation on Demand (VoD) is an innovative technology designed to optimise airflow within underground mining operations. While this strategy can help to reduce operating costs in existing mines, it holds even greater potential for new mines. Moving air through a mine is expensive, and insufficient air quantities can constrain mining activities and reduce a mine's ability to extract ore and generate revenue.

Ventilation on Demand (VoD) is an innovative technology designed to optimise airflow within underground mining operations.

Hannes Potgieter, Specialist Ventilation Consultant at BBE.

Production losses alone, however, are insignificant when considering the overall impact of an inadequate ventilation system. The primary purpose of ventilating mines is to supply oxygen and protect thousands of miners from inhaling airborne pollutants. Short-term high-level exposures can be fatal within minutes, while long-term exposures over a career can lead to lung diseases, cancer, or a reduced quality of life in retirement. Mining companies that value their workers understand that a healthy workforce is a productive one. Health-related litigation claims have far-reaching consequences beyond occasional production losses, including reputational damage, reduced worker productivity, and legal repercussions that can jeopardise the license to mine.

So, what's the big deal - can't you just send in more air if needed? Ideally, yes, but it is not always that simple. Planning a mine and its ventilation system requires careful consideration. Although larger fans are an option and their initial costs are manageable, their operating expenses can be significant. In addition, increasing the volume of air circulated through a mine does not always ensure the desired outcome.

In today's world where sophisticated technology is available to measure anything in real-time accurately, the mining world largely still relies on production personnel to 'choke' a flexible ventilation duct or to set a damper to an approximate position and measure velocities without considering the actual area of the tunnel. Since miners are primarily production-orientated, they often assume everything is fine as long as temperatures remain within acceptable limits.

The ideal ventilation system is one where technology identifies requirements and responds accordingly, with humans overseeing operations and identifying abnormalities. However,

implementing such a system is easier said than done. It is often perceived as expensive, shifts the responsibility from production personnel to maintenance personnel, and can be viewed by production personnel as restrictive.

So, where are the savings for new mines? By minimising airflow, the number of shafts needed to carry air is reduced, making the operating costs of fans more manageable and decreasing the overall cost of mining. Shafts are expensive and take a long time to establish. VoD offers a convenient solution to minimise airflow and, by extension, the required number of shafts. Depending on the orebody and mining method, vertically equipped shafts are used to convey personnel and materials, with their primary purpose being to provide sufficient air to the mine to support mining activities.

From a design perspective, VoD has been widely accepted, and many mines using massive mining techniques assume VoD will be implemented. It seems like a great technique to reduce costs and ensure the right amount of air. So, where are we going with this? Well, VoD is often perceived as a fully automated system that adjusts airflow as needed, similar to lights coming on when you enter a room. The assumption is that when a Load-Haul-Dump vehicle (LHD) enters a development end, the fans automatically activate. While this is possible, there are complexities to this assumption. To begin with, we have to ensure the conditions in the development end are suitable for both personnel and machinery. Mining equipment is not designed to operate under extreme conditions, so they have operational limits.

> The ideal ventilation system is one where technology identifies requirements and responds accordingly, with humans overseeing operations and identifying abnormalities.

When driving an LHD into a development end, it is possible to achieve similar conditions as with an automated VoD system by manually switching on a fan or opening a damper a little more. However, this approach has its limitations and challenges compared to an automated VoD system. Manually adjusting ventilation can be effective in achieving the desired conditions, but it requires significant effort and time. The human factor plays a crucial role in this method, and it is often the reason for its downfall. Manual VoD systems in comparison are set up once, usually at the beginning of a shift, and cannot react to system changes, like other fans being started or fan trips. Implementing remote monitoring of ventilation flows within secondary ventilation systems would be a significant initial step in

ensuring that miners are working in healthy environments.

Suffice to say, automation has a lot to offer when it comes to VoD. If correctly implemented and maintained, VoD can provide significant benefits such as improved safety, enhanced air quality and reduced energy consumption. But, despite these advantages, several factors contribute to the slow adoption of VoD in the mining sector:

High Initial Costs

The implementation of VoD requires substantial upfront investment in sensors, control systems, and integration with existing infrastructure. For many mining companies, particularly those operating on tight budgets, this capital expenditure can be a significant deterrent.

Complexity and Reliability

Mining environments are notoriously harsh, with dust, moisture, and vibrations posing challenges to the reliability of electronic systems. The complexity of VoD systems requires robust and resilient components, which can be difficult to ensure consistency.

Integration with Existing Systems

Many mines rely on legacy ventilation systems that may not be compatible with modern VoD technology. Retrofitting these systems can be complex and costly, creating additional barriers to adoption.

Skills and Training

Effective implementation and maintenance of VoD requires specialised skills. The shortage of trained personnel familiar with VoD technology can impede adoption, as mining companies may be reluctant to invest in extensive training programmes.

Safety Concerns

VoD systems have to be used with care, especially if the mine is at risk of rock strata gas ingress into the mines ventilation system. Stagnant air must be avoided to prevent a build-up of harmful gases like sulphur dioxide, hydrogen sulphide, methane or radon, for example. Navigating regulations and best practice for managing these gases can be a challenging process.

It's important to note that VoD is not universally suitable for all mining methods. VoD is particularly well-suited to massive mining techniques such as sub-level caving, blast hole stoping, or long hole open stoping. These methods benefit significantly from VoD due to their large, open spaces and extensive ventilation requirements. In these environments, VoD can efficiently regulate airflow to match the dynamic needs of different sections of the mine, thereby maximising energy savings and improving air quality. Conversely, for smaller-scale or more intricate mining methods, the complexity and cost of implementing VoD may outweigh the potential benefits, making traditional ventilation methods more practical.

> "Stagnant air must be avoided to prevent a build-up of harmful gases like sulphur dioxide, hydrogen sulphide, methane or radon"

Despite these challenges, some mining operations have successfully implemented fully automated VoD systems, demonstrating their feasibility and benefits.

VoD holds great potential for transforming ventilation practices in mining. However, overcoming the barriers to its adoption requires a concerted effort from industry stakeholders, government bodies, and technology providers to fully realise the benefits of this innovative technology and pave the way for safer and more efficient mining techniques. The saying "You can only manage what you can measure" forms the basis for VoD, but it is also important to remember that "Rome was not built in a day". Mines with successful VoD systems generally start small and then build on them. ■

AECI shares advances in collector application at IMPC

By Brian McGregor (Director of Underwriting & Head of Property) and Martin Boreham (Director of Underwriting & Head of Liability)

Dr Natalie Shackleton, Metallurgical Consultant to AECI Mining Chemicals (formerly Senmin), will be presenting her research on 'Advances in Collector Application: Chemistry Versus Mineralogical Characteristics During PGE And BMS Flotation' at the XXXI International Mineral Processing Congress, taking place from 29 September to 3 October 2024 in National Harbor, Washington, DC.

The conference is an opportunity for AECI Mining Chemicals to showcase its innovative approaches and advancements in reagent technology. The company focuses on developing high-performance flotation reagents and flocculants to improve the efficiency and effectiveness of mining processes. With a strong emphasis on research and development, AECI Mining Chemicals collaborates closely with clients to tailor chemical solutions that meet specific operational challenges.

Dr Shackleton will share information on the new-generation collectors that have been developed by AECI Mining Chemicals, designed to improve the recovery and selectivity of valuable minerals during the flotation process. The research has shown that customising the collector components based on the specific minerals present in the ore being processed has the potential to improve efficiency and profitability for mines dealing with platinum group metals (PGMs). Dr Shackleton's paper discusses how the mineral composition of ore influences the effectiveness of these collectors.

"The focus of the paper is on PGM bearing ore case study during primary and secondary rougher flotation, collector composition and ratios of those components in the collector," explains Dr Shackleton. "To gain an understanding of the link between mineralogy and collector chemistry, batch flotation tests were performed and the concentrates were mineralogically characterised for PGM and BMS using QEMSCAN and FEG MLA. The results showed a strong correlation between PGM mineral type and AECI Mining Chemicals collector chemistry, clearly demonstrating that one reagent type does not fit all flotation applications. What the study has shown is that the makeup of the collector is the overriding factor and that's why we've got the improved grade and recovery."

Although the research to date has been lab-based, Dr Shackleton expects real-world PGM recovery to be similar, with up to 6% improvement.

The research has shown that customising the collector components has the potential to improve efficiency and profitability for mines dealing with PGMs.

Dr Shackleton says that the congress is an opportunity to connect with other researchers in the minerals processing world and to forge collaborations, learn and add to the knowledge base. Additionally, it's an opportunity to showcase AECI's R&D prowess to potential clients. "We want to show customers or potential customers that we're not just a reagent supplier – we can be a partner," she says. "We put a lot of effort into the development of our products; we understand what the challenges are; and we will try to accommodate clients' needs."

While Dr Shackleton's research focuses on PGMs, she says there is also application when it comes to other minerals, such copper and nickel (also found in the PGM ores), as well as phosphate flotation.

Dr Shackleton has over 40 years of R&D and management experience in analytical chemistry, PGM and base metal hydrometallurgy, PGM and BMS mineral processing and mineralogy.

Dr Natalie Shackleton, Metallurgical Consultant to AECI Mining Chemicals.

She is the co-inventor of an Anglo Platinum Chromatography patent titled "Refining of Pt Group Metals", a method of inter-separation of PGM metals from a feed solution with particular application in the production of high purity PGMs, and was awarded the Joseph Arenow prize for the best M.Sc. thesis in the Chemical Engineering Faculty at UCT in 2003. ■

Capital Limited continues to build on its African relationships

Over the past two decades, Capital Limited has evolved and established itself as a premier mining services provider across Africa, the Middle East and North America. The company now primarily operates on Tier-1 long life mining assets having built long-term relationships with blue-chip international mining companies such as Barrick Gold, AngloGold Ashanti, Fortescue, Centamin, Perseus and Newmont.

Sukari is Egypt's first large-scale modern mine.

Capital offers a complete range of drilling, mining, maintenance and laboratory solutions. The company's services include end-to-end drilling solutions for exploration and production projects, mining and earth moving services and a full range of geochemical analysis services that uses some of the most advanced technology in the industry. This comprehensive service offering combines the latest technologies with the highest standards of safety, and positions Capital as a trusted partner in the mining sector.

Capital's strategic beginnings in Africa

Since the company's inception, Africa has served as a cornerstone of Capital's operations. Capital has firmly positioned itself as a leading partner for both exploration and production activities on the African continent with a robust presence.

The company's extensive regional footprint spans multiple African countries stretching from West Africa (Guinea, Côte d'Ivoire and Mali), to Northern and Eastern Africa (Egypt, Zambia, DRC and Tanzania) and Central Africa (Gabon). The company has been delivering its services in Africa for nearly 20 years, from an initial exploration drilling contract in Tanzania in 2005, to now operating on some of the continent's major operations, including five of the ten largest gold mines. Capital has established a very strong presence with African gold producers, developers and explorers and has expanded its operational base to copper, nickel and iron ore assets across the continent.

The reputation built by Capital in Africa, with long-term blue-chip clients particularly, for delivering the highest safety standards in the industry, has led to a customer-led geographic expansion outside Africa into the Middle East and more recently North America. For instance, Capital has operations at Barrick Gold's Bulyanhulu and North Mara mines in Tanzania and Kibali in the DRC, but also operates other Barrick operations such as Reko Diq in Pakistan (one of the largest known copper/gold deposits globally), Jabal Sayid in Saudi Arabia (50/50 joint venture between Barrick and Ma'aden producing copper), and the Nevada Gold Mines Complex (a joint venture in the US between Barrick and Newmont in what is the single largest gold-producing complex in the world). Capital's drilling and geochemical analysis services are now being used by Barrick on seven mines across five countries.

Drilling

Capital is one of Africa's premier drilling services companies, with a fleet of 127 drill rigs at the close of H1 2024. It offers its drilling services to some of the globe's top mining companies that have significant reserves, long mine lives and low operating costs, ensuring

Capital Limited engaged in drilling activities at Geita mine, which is owned by AngloGold Ashanti.

activity will continue through the cycles.

Long term contracts provide Capital with significant visibility of earnings and revenues, allowing the Company to invest in its infrastructure, its people and its broader capabilities. "Owing to Capital's industry-leading performance, we have seen numerous contract renewals and expansions. Notably, we recently signed a 5-year open pit drilling services contract extension with Centamin, starting from January 1, 2025. This will extend our activities on site out to the end of 2029, 25 years after we commenced operations in 2005," noted Peter Stokes, Chief Executive Officer of Capital Limited.

In addition to its current operations, Capital is also committed to exploration projects to find the mines of the future. This includes Predictive Discovery's Bankan Gold Project in Guinea, regarded as Africa's largest gold discovery in the past decade.

Mining

In 2023, Capital Mining, the mining and earth-moving division of the company, demonstrated significant growth, achieving 30% year-on-year revenue growth in its mining business, and generating $65 million. This success underscores the company's proven capabilities, particularly in the load and haul segment, which has been bolstered by key contracts with Tier-1 clients.

The transformational Sukari 120 mt waste mining contract marked Capital's entry into a large-scale service offering, which completed 6 months ahead of the contract term and has now been extended for an additional 10 mt. The subsequent award of a second major contract with Ivindo, Fortescue's iron ore project in Gabon, further attests to Capital's expertise and reliability in load and haul operations. These milestones are part of Capital's strategic initiative to diversify its revenue streams and risk profile through an expanded range of services.

MSALABS: A global geochemical assay provider

Capital enhanced its offering with an investment into MSALABS, a dedicated laboratory business offering mineral assaying and geochemical analysis for both exploration and production purposes. MSALABS has since grown to operate 28 laboratories worldwide, with 13 in Africa. The offering of the revolutionary PhotonAssay™ technology, which provides assay results using X-ray technology, to its clients is a far faster, more efficient and environmentally friendly solution compared to the industry-wide fire assay process, and provides clients with assay results within minutes. MSALABS now has the largest international network of Chrysos PhotonAssayTM technology. The roll-out of laboratories is looking to gather further pace in H2 2024 and into 2025 with the business planning to deploy 21 PhotonAssayTM units globally. The ability for Capital to provide rapid turn-around times for assays allows its clients to improve their understanding of the assets significantly, whether for exploration, definition or grade control/production drilling.

Capital Investments

In addition to mining services Capital Investments provides equity financing for a highly focused portfolio of predominantly exploration-led companies. The investments made to date include fast growth companies that have made some of the most exciting gold discoveries in Africa, including Predictive Discovery's Bankan Gold Project in Guinea and WIA Gold's Kokoseb Gold Project in Namibia, where Capital has a stake of over 19%. The provision of financing for smaller mining companies is essential for discovering the mines of the future, with Capital applying rigorous due diligence under an Independent Investment Committee (engaging with external consultant and industry specialists). To date, this strategy has been highly successful, with a current equity portfolio valued at $48m, following a net total of ~$16m invested to date.

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Building on its African relationships

Capital's expansion into North America, Middle East and Asia builds on its strong relationships and proven expertise developed through successful African operations. This strategic expansion extends the company's geographic reach into a new jurisdiction, leveraging established partnerships and a reputation for excellence.

Supported by North America's stable economic and political environment, Capital Limited's entry into this market, including its collaboration with Barrick Gold at the Nevada Gold Complex, underscores the trust earned through its African operations.

Aligned with its African operations, Capital prioritises innovation and sustainability in North America, investing in advanced technologies to optimise efficiency and minimise environmental impact.

This strategic expansion positions Capital Limited for continued success, reinforcing its reputation and delivering value-driven solutions as a trusted leader in the global mining industry. ■

Upskilling and reskilling **for the future world of work**

By Anton Visser, Group COO of SA Business School

Anton Visser - Group COO SA Business School.

The rapid pace of technological advancement, globalisation, and changing market dynamics is reshaping the world of work and the skills needed to remain relevant. What's the most important skill right now? It is, the ability and willingness to adapt to changing rules, and includes the ability to think differently, to do differently and to connect and engage with others differently.

Employees and businesses have a role to play

Experts suggest that the key to individual success will be continuous learning and adaptability, while leveraging the power of technology and AI to augment skills and capabilities in virtually every job role.

To stay competitive, businesses need workforces that are dynamic, resilient and equipped with future-fit skills. Reskilling and upskilling your people, while fostering a culture of innovation and continuous learning, is the difference between business survival and obsoletion.

Anyone remember Kodak, Blackberry, Nokia or Blockbusters? They were big - in the 2000s.

When you look at the rapid pace of change and the monumental shifts in industries, you'll understand how critical it is to have an upskilling and reskilling strategy for your employees – that is, if you're serious about business competitiveness and innovation.

For example, predictive analytics is used in finance, healthcare, and marketing to anticipate trends and behaviours, which means human beings must understand data science and analytics tools. Logistics and procurement professionals must learn how to implement and use blockchain solutions. Augmented Reality and Virtual Reality are changing the nature of training across industries, from medical simulations to manufacturing processes, which demands completely new skills from training providers and developers. Biotechnology is improving crop yields and resistance – so different biotech applications and abilities are needed in agriculture.

Planning your upskilling and reskilling strategy

Given the rapid pace of change and the consequent need for reskilling employees, we at SA Business School believe that commitment to continuous learning is a key performance indicator.

Here is some guidance on how to approach your reskilling/upskilling strategy as a continuum, rather than as a once off-event:

Create customised training modules that address the specific needs of employees and the business.

Thungela Resources

Thungela Resources

Pair employees with mentors, coaches or guides who can provide direction and share expertise.

1. Assess skills gaps: Work with your L&D training provider to conduct skills audits and gap analyses. These will help you to identify current and future skills in the context of your organisation's strategic goals. A data-driven approach is useful because it yields L&D initiatives that support growth and success for both your business and your people.

2. Develop tailored programmes: Based on the skills gaps you identify, create customised training modules that address the specific needs of employees and the business. These could include technical training, soft skills development or leadership training. Collaborate with accredited learning and development specialists to ensure quality, relevance and alignment with business objectives and individual career ambitions.

As your workforce develops and grows, and your people need to diversify their skill sets and skills programmes become invaluable tools in providing short, focused learning interventions to close identified skills gaps. For example, you might offer finance for non-finance managers, customer service, conflict management, change management, team management, or ethics training.

SA Business School is currently seeing a significant demand for programmes that develop power skills such as resilience, adaptability, creativity, collaboration and problem-solving. Because they enable people to navigate the complex work environment, these skills are becoming more and more important as our world becomes increasingly tech-driven.

3. Encourage continuous learning: Promote a culture of ongoing improvement by supporting employees in pursuing formal and informal education, professional development and training. A robust and flexible learning culture also helps employer brands to attract and retain top talent.

4. Commit to mentorship: Pair employees with mentors, coaches or guides who can provide direction and share expertise. Establish internal programmes to help employees transition into new roles - and you'll build their confidence as they take on new challenges.

5. Leverage technology: Use e-learning platforms and blended learning models to create interactive and flexible learning experiences. Blended learning methods such as online modules, webinars, Augmented Reality and video tutorials can overcome geographical barriers, allowing companies to train employees across diverse locations, time zones and work schedules.

It is also important to allay employee fears about technology. While AI will make some jobs redundant, employees have an opportunity to acquire new and essential skills that are unlikely to be replaced by AI anytime soon. However, those humans who refuse to embrace and leverage tech may very well be replaced by another human who leans in.

6. Create career pathways: Develop clear pathways that outline the progression from current roles to new or advanced positions. Communicate these pathways to employees and offer the necessary support and resources to help them navigate the journey. By designing people-centric L&D solutions that cater for individual preferences, motivations and goals, you empower employees with choice, autonomy and feedback that boosts engagement and impact.

7. Return to Step 1: assess skill aps
Your L&D strategy should help your organisation to cultivate a space where everyone is enthusiastic about continuous development and learning; where every employee can realise their full potential and your workforce is prepared for the future. Enhancing the skills and capabilities of your workforce is a springboard to increased innovation, productivity and competitiveness in an ever-evolving market.

Look to work with a learning and development partner that builds bespoke learning and development solutions which meet the specific needs of your business and its people, considering human capital, capacities and budget allocations – laying powerful foundations for your people to fill meaningful, sustainable, future-fit roles. ■

Enter the 2024 Pan African Supply Chain Awards

The 2024 Pan African Supply Chain Awards is now open for entries. Taking place on 9 October 2024 at the Maslow Hotel in Sandton, Johannesburg, the awards celebrate the best-in-class individuals and organisations on the continent, honouring exceptional achievement and innovation in the procurement and supply chain industry. Since its inception in 2014, the awards have become a cornerstone event. Now in its tenth year, the occasion celebrates the profound impact of supply chain professionals in Africa, bringing together the industry's top talent to honour their remarkable achievements. Kamogelo Mampane, Chairperson of the Pan African Supply Chain Awards, encourages individuals and organisations to enter - with a total of 14 awards to be had. ■

The 2024 Pan African Supply Chain Awards is now open for entries.

AZIZE Equipment to showcase its new surface drill rig offerings at Electra Mining 2024

Founded in 2019, Azize Equipment markets, services and supports a comprehensive range of SUNWARD DTH and Hydraulic surface drill rigs to customers across Southern Africa.

More than eighty SUNWARD drill rigs are in daily operation in South Africa and surrounding countries, drilling in all typical rock formations and geologies, and covered by a comprehensive stockholding of spare parts and back-up service. Azize will showcase two new drill rig models - The SUNWARD SWDE165B DTH crawler drill and the new SUNWARD model SWDR138B and, for the first time, Azize will display a full range of SUNWARD drill tools. DTH hammers, bits and adaptors covering all popular hole sizes will also be showcased. ■

New kid on the block Astron Energy celebrates 300th site

Astron Energy marked the rebrand of its 300th service station forecourt with the official opening of the Astron Energy Mageza Sweetwaters retail site, in Sweetwater Mpumuza in Pietermaritzburg, on 11 July. Astron Energy Mageza Sweetwaters is a 100% black-owned and managed enterprise, situated in Kwa Mpumuza. Co-retailer Zibusile Mbambo said: "To operate a site featuring the vibrant new Astron Energy brand is a perfect fit for us as a forward-thinking business and we are delighted to be the 300th site to be rebranded to Astron Energy." Astron Energy has set its sights on rebranding 400 sites before the end of 2024. ■

VEGA: Level and pressure measurement solutions for all industries

Production processes are becoming ever-more complex, making it extremely important that the measurement technology used to control and monitor processes is even more understandable and intuitive. VEGA has set itself the goal of developing innovative measurement technology that is easy to install and operate, and offers maximum safety and reliability.

VEGA employs over 2 100 people worldwide, 1000+ of whom work at its Germany-based headquarters in Schiltach in the Black Forest. For over 60 years VEGA has conceived, and brought to realisation, a range of solutions to demanding measuring tasks for chemical and pharmaceutical plants, the food industry, drinking water supply systems, sewage treatment plants, landfills, mining, power generation, oil platforms, ships and airplanes.

With its globe-spanning network of subsidiaries and distributors, VEGA is active in over 80 countries. The company and its products have all the necessary certificates and approvals for worldwide application, and this pertains to technical safety as well as the quality of its products and services.

As a global leader in level, switching and pressure management, VEGA continues to focus on the development of innovative, trend-setting products and solutions that inspire. ■

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