

BMR

BOTSWANA MINING REVIEW



Complimenting Mining Companies' ESG Objectives

Cobre unlocks potential new copper deposits in Ngami ?

WMI Seminar – Innovating for the Future of Mining ?

Europe's coal price rises due to South African strike ?





Always
Visible

Improve your mining operation with dynamic Ctrack Solutions.

Features

-  **Driver Identification & Driving Behaviour Monitoring**
-  **Fuel Level & Consumption Monitoring**
-  **Onboard Weighing**
-  **Engine Performance Monitoring (RPM & Idling)**
-  **Iris Camera Solution**
Front-Back-Side Facing Camera Option
-  **Breathalyser**
-  **Collision Avoidance Sensors**
-  **Tip Sensor**



www.ctrack.co.za | sales@ctrack.co.za | Call Centre: +27 (0)860 333 444

BMR

BOTSWANA MINING REVIEW

Contents

Editorial Comment	:	4
Briefs	:	5
Cover Story		
Complimenting Mining Companies' ESG Objectives	:	6-7
General News		
Motheo Project Opencast Operation and Coal Processing...	:	6
Now's the time to Explore Uncharted Paths and Discover...	:	6
Cobre unlocks potential new copper deposits in Ngami	:	6
Debswana's Jwaneng Mine Leads in Safety and Health...	:	6
Culture, Protocols key to Blast Safety on Mines	:	6
Giyani Metals Announces Results of Life Cycle Assessment...	:	16
Specialised Exhibitions shelve Electra Mining Botswana	:	6
Kavango Resources to secure £3million for exploration	:	6
Industry Trends & Technologies		
WMI Seminar – Innovating for the Future of Mining	:	16
Securing Power Supply on the DRC's Inga-Kolwezi HVDC link	:	16
New Kobold process monitoring, control flowmeter hits market	:	6
Regional News		
Sibanye-Stillwater interested in buying Zambia's Mopani...	:	16
RioZim Acquires Namibia's Sperrgebeit Diamond Mine	:	16
Europe's coal price rises due to South African strike	:	16
Mozambique's Graphite to be used for U.S batteries	:	16



Publisher
Evans Mumba

General Manager
Arnold Chinyemba

Editor
+267 74 723 776
Ulla Setswalo
ulla_setswalo@yahoo.com

Associate Editor
Bheki Fayayo
bhekif@mtimedia.co.za

Editorial Contributions
Tsepang Mohlabane
Kotso Rametsi

Martin Sibanda
Jeffrey Kgathi

Advertising Sales
+267 74 799 855

Noah Maposa
noahm@botswanamingreview.com

Joshua Chibwe
joshuac@botswanamingreview.com

Jilowa Mwanza
jilowam@botswanamingreview.com

Mdu Sibizi
mdus@botswanamingreview.com

Elvis Tau
elvis.tau@botswanamingreview.com

Subscriptions
Loyce Zemeyi
info@botswanamingreview.com

Address
Plot 20691, Sediba House, Sekotlo Road,
Block 3 Industrial,
Gaborone, Botswana

P.O Box 404011 Gaborone Botswana

Botswana Mining Review
Tel: +267 74 799 855 | +267 74 723 776
Email: info@botswanamingreview.com
Website: www.botswanamingreview.com



Ulla Setswalo (Editor)

Editors Note

On this edition, we have featured Kal Tire’s John Martin, the Group’s Vice President for Southern Africa. Read about the company’s value proposition is to the mining sector and the plans on moving his organisation towards business growth whilst ensuring that mining companies get more than tyre services from his company through the incorporation of ESG.

Most of the articles in this edition highlight the incredible resiliency of the mining industry and the projects that are ongoing. This year, a lot of milestones were achieved especially with the resuscitation of the PNR Selibe-Phikwe copper mine.

This issue contains genuine signs of optimism, for instance, showing growth and expansion despite the economic devastation such as Morupule Coal Mine’s Motheo Project, Sandfire Resources and Giyani Metals Corp. These companies have been progressing well as they bring more hope to the industry and the country’s economy. Read insightful articles such as the Op-Ed by Paul Bendall on exploring uncharted paths in terms of the net zero.

The regional news and technology sections also bring insights into what is happening in the region and globally. With all the deals that were made at the Mining Indaba, we will be bringing you updates from all the mining companies across the region in the next edition.

One can only imagine what next year’s Mining Indaba will bring to the African mining industry. Therefore, there is so much to look forward to in the new year. To everyone that we’ve had the pleasure of doing business with this year, and all of you who enjoy reading the fruits of our labour.

We heartily wish you a healthy, happy, and prosperous 2023.



As the end of the year is fast approaching, this is the time to reflect and strategise for the coming year. Even though this has been a trying year, most businesses have had a solid time. The mining industry has made great strides amid the challenges and market uncertainty. Since mining provides inputs for other industrial sectors that are vital for sustaining people’s well-being and the functioning of global economies, it is crucial for the industry to start implementing new technologies, ESG and other sustainability initiatives.

PRATLEY®

SINCE 1948



Electrical Termination Products



sales@pratley.co.za +27 11 955 2190

www.pratleyelectrical.com



Botswana Diamonds' Thorny River Mine plan underway

AIM-listed Botswana Diamonds has discovered additional kimberlites from its latest drilling campaign on its Thorny River diamond project in South Africa.

Some of the highlights for the project include the mine plan being finalised and 12 reverse circulation holes completed in recent drilling campaign. To add on 52 metres of kimberlite was found and the largest intersection being 22 metres. Further to that, two new blows discovered which will increase the mineable kimberlite. Moreover, the Company's mining permit application is being prepared.

Botswana Diamonds Chairman, John Teeling commented, "We have finished exploration and now move toward mine development. We already have a good understanding of how the mine will look. The recent drilling identified the entry point for a mine. The next stage is to refine the mine model and to apply for a mining permit."

The objective of the drilling campaign was to expand the mineable kimberlite for the purpose of mine planning. Twelve reverse circulation holes over five targets were drilled for a total of 536m. Analysis of raw data shows that two of the targets resulted in the discovery of new sub-surface blows which will be added to the inventory, whilst one shows promise (having produced kimberlitic indicators) but needs further definition work and the remaining two targets do not merit further work.

The in-hole kimberlite intersections totalled 52 metres, the longest being a vertical intersection of 22m. The two additional blows are on-strike and 200m and 700m east from the River and River Extension blows. The next steps are to finalise a mining plan and to apply for a mining permit. A further announcement will be made in due course.

SRK Global Appoints new Chairperson

Alejo Sfriso, Corporate Consultant and Practice Leader with SRK Consulting Argentina, has been appointed as Board Chair for SRK Global. Effective September 30, 2022, Alejo succeeds Mark Noppé, who is becoming Director of the W.H. Bryan Mining Geology Research Center with the Sustainable Minerals Institute at The University of Queensland.

"My becoming Chair of the SRK group of companies is a demonstration of our culture. I am a Geotechnical Engineer coming from a small consultancy located in a country with a limited mining footprint but with a lot of potential. I was given the opportunity to build my practice within SRK. In doing so, I was exposed to challenging projects worldwide, working with many SRK colleagues from whom I learned so much.

In this new role, I am now given the opportunity to be a contact point of trust for our clients, associates, and employees, helping the latter to keep striving for excellence and building their practices within the larger SRK consultancy, just as I was able to do," said Sfriso.

In 2009, Sfriso joined SRK and cofounded SRK's practice in Argentina, where he served as managing director until 2019. He served on SRK Global's board of directors from 2016 to 2019, returning in 2022. Sfriso is an expert in the application of numerical methods for design, analysis, and risk evaluation of geotechnical structures with an emphasis in construction procedures. He continues his professional practice through which he has contributed to projects in over 25 countries.

"Alejo's long history of leadership in SRK exemplifies the positive contribution and opportunities he and his team have made through development of the Argentinian practice and ongoing involvement in the Latin American practices—as well as technical teams globally. I am looking forward to working with Alejo, helping to bring his natural team building and collaboration abilities to support further collaboration and growth in our global teams," said Tim McGurk, Group CEO of SRK Global.

In addition to his work at SRK, Sfriso belongs to several professional associations including the International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE) where he served as vice president for South America from 2017 to 2022. He served as an executive committee member for the Argentinean Society for Geotechnical Engineering from 1997 to 2015 and as president of the society from 2011 to 2015. Alejo has been professor of soil mechanics and geology at the University of Buenos Aires since 1989. He has authored or coauthored over 90 publications.

Advancing Sandfire's Mine Construction

Sandfire has recently released its development and construction pictorial update for the Motheo Copper Mine.

Development of the 3.2 Mtpa Motheo Copper Mine is proceeding on time with first production scheduled for the June 2023 Quarter. The Motheo mine village now has 752 rooms completed and in use. Additionally, the village buildings are all completed, with a gym, pool and continued landscaping. Construction activities are also well advanced with over 1,800 personnel on site and the overall project now more than 65% complete.

BOD, Petra signs data agreement deal

Botswana Diamonds (BOD) has inked a data licence agreement with Petra Diamonds, to

have access to a full library of files on the Reivilo kimberlite cluster. The development comes after the company was awarded a prospecting licence over the Reivilo.

"Once Petra gave up the Reivilo ground as part of their restructuring we applied. Having won the licence, we then negotiated with Petra to obtain their exploration data.

"This is the agreement announced today. Having access to this information will save BOD time and money. The Reivilo cluster of kimberlites is a priority target for BOD," John Teeling, BOD Chairman.

Meanwhile the data licence agreement grants Petra Diamonds a three percent royalty on any production revenue generated from the Reivilo prospecting licence in return for access to all of the Petra Diamonds data accumulated during their work on the licence.

Authorities at BOD said it will review the data prior to finalizing its own exploration programme.

Tlou Energy support gov't energy mix

Tlou Energy has reached significant project milestones, as the company participates in the country's rapid renewable energy efforts to rebalance the national power mix.

The company is now working towards feeding power to the national grid, and sees rapid expansion potential.

"We continue to make excellent progress towards establishing ourselves as a key power player in Botswana and Southern Africa through the exploration and development of gas and solar," said Thou Energy Chairman Martin Mclver.

The company applauds government support for its Lesedi Power Project which, once finalized, will generate 10MW of gas-fired and solar power.

"We are privileged to have the continued support of the government of Botswana and the inclusion of coal bed methane (CBM) as part of the country's forward plan to combat power deficiency," Mclver.

The merging plans between government and Tlou Energy are cemented by signing of an initial five-year 10MW power purchase agreement (PPA) between Botswana Power Corporation (BPC) and Tlou.

The development has seen the company embark on sustained gas flows, commencement of construction of the 100km overhead powerlines to connect Lesedi to the BPC grid and acquisition of land in the Lesedi project area, where work is underway on developing a new purpose-built operations facility, including accommodation and associated infrastructure.

Complimenting Mining Companies' ESG Objectives

The Southern African mining sector has been positive in recent times. While some commodities, such as platinum, have not been at the bullish levels that were hoped for, other commodities being mined in the Southern African region have held a positive outlook for quite some time already. The concept of a more-intelligent tyre has been gathering traction over the past several years as major suppliers introduced and refined their embedded Tyre Pressure Monitoring Systems (TPMS) while keeping an eye on additional developments in Industrial Internet of Things (IIoT) technologies to incorporate big-data class predictive-analytics capabilities into their product and service lines.



Canadian company, Kal Tire has been operating in the Southern African region for more than 10 years. It currently supports customers in four countries in this region. In all of these countries, business has grown and developed in a managed and deliberate manner, in line with the growth and development expectations of the market.

For John Martin, Kal Tire Mining Tyre Group's Vice President for Southern Africa, the company continues to see new investment into both green field and brown field projects in several countries. He revealed that Botswana and the Southern DRC are seeing tremendous levels of investment. Moreover, with the new Zambian government, it has created enormous optimism and expectation in the region, with the much-needed changes to the mining legislation, while the new business relationship between government and miners in Tanzania is permitting much needed FDI into East Africa.

This year, Kal Tire participated at Electra Mining Exposition in Johannesburg, South Africa. Martin explained the participation, "Electra Mining is the best frequented mining exhibition on the African continent, and our presence at the show was a great opportunity to consolidate our network with existing customers

and supply partners and showcase the value Kal Tire brings to the mining services industry. Our main objective of our participation this year was to practically demonstrate how Kal Tire's competence and capabilities both compliments and supplements the ESG objectives of our mining customers. Furthermore, it is important to establish the mindset within the industry that Kal Tire is more than a provider of tyre services and tyre related products."

Moreover, he reiterated Kal Tire's value proposition as being multi-dimensional, incorporated in every aspect of its service offering that it presents to its customers. "Starting with our world-class training and development program that elevates all our team members to levels of competence and capability and to a global standard as defined by the Tyre Industry Association of North America. Our operational efficiency and safe working practices are complimented by our in-house innovations that have as their primary purpose the need to improve safety and working efficiency through the services that we offer. With the more recent focus being placed on the industry's commitment to ESG, Kal Tire's contribution and support of our customer's ESG targets can be witnessed in every aspect of our value proposition," noted Martin.

Although Covid-19 has severely affected the global economy, Martin believes the mining sector remained relatively unaffected compared to other service industries. He said that the mining industry is an enormous employer globally, and a massive generator of hard currencies for many African economies, and a corner stone of prosperity and livelihoods for many communities. Additionally, Martin explained, "Thankfully, due to the rapid and efficient response of all the mining companies to counter the threat of Covid, the industry was able to remain productive throughout, and as a result, become the bedrock of the post Covid economic revival in many countries. Our key focus areas through the pandemic were basically to ensure our services to our customers remained uninterrupted with adequate means to protect the health of our team members and contain the spread of Covid. Furthermore, with Kal Tire's global reach and alliances with supply partners, our supply chains remained intact, with the regular supply of tyres and its related products."

Apart from the sanctions being imposed on the Russian mining industry, the global mining industry is in a relatively good space. All the OEMs have acknowledged that they are all extremely busy, with lengthening lead times for new equip-

ment for both underground and surface mining projects. This is a clear indicator of a healthy pipeline of new mining projects, as well as additional resourcing for the brown field expansion of existing mining assets. The industry's drive towards automation is certainly reviving significant interest as a new frontier for much needed technology, attracting much needed young talent to an industry previously perceived as quite mundane.

However, Martin shared that Kal Tire experienced some challenges with regards to the sustainability of ongoing business in some geographies where both country risk and currency risk have forced a strategic review of the new business risk profile. He highlighted that ongoing transformation is needed in any business, and as part of this transformational process, Kal Tire has invested heavily into new technology and in-house innovations. Automation remains topical and relevant to the mining industry, where one of Kal Tire's service offerings includes an innovative AI application that allows for autonomous tyre inspections to be conducted in real-time. Any AI solution that adds significant value to a customer's operational efficiency will certainly facilitate the business process between all parties, as the value extracted compliments and supports operational safety and efficiency. "From a Kal Tire point of view, we consider ourselves to be in partnership with

all our customers through our contractual agreements. Our collaborative mindset and approach to our business allows Kal Tire to maximise the value proposition that we bring to our customer base. With regards to the tyre recycling plant, there is a significant need and demand for an ethical and sustainable means of dealing with end-of-life tyres across the entire African continent.

The Chile plant has been designed and created to deal with large mining tyres, which is also scalable and can therefore be applied in just about any geography. Obvious targets would be large mining locations such as South Africa and Botswana, or any country where legislation will define the ethical disposal of waste tyres in an ethical and sustainable manner," said Martin.

In terms of the regional mining outlook, he said, "The outlook for the mining landscape in Southern Africa remains positive and bullish. Every Southern African country would have recorded increases in the volumes of commodities produced in recent years. Additional investment continues to flow into the region; however, it is evident that South Africa has not seen their equal proportion of investment into the region as country risk with poor services delivery remain a massive hurdle."

He further added that Kal Tire has a num-

ber of expansion plans, which will primarily to grow its presence in the surface mining segment of the market. Kal Tire has a strong global footprint and significant experience and competence in providing tyre management services to surface mining operations and Kal Tire in Southern Africa will be looking to leverage that competence to expand its Southern African footprint.

In concluding, Martin said, "As mentioned, a key focus for Kal Tire is offering ways to help our customers reach their ESG targets. Aside from our recycling solution that supports a circular economy, we also have our Maple Program that includes sustainable solutions such as retreading and repairs. At the foundation of this program is a carbon calculator that was built in-house and has been independently verified by an international leader in third-party environmental certification, SCS Global.

If a customer chooses to retread a tyre, as an example, vs buying a new one, not only are they extending the life of that tyre, but we are also able to provide them with actual and proven data in a certificate that can be used for environmental reporting. Kal Tire is not just a service partner, but also an active participant and contributor in our customers efforts to achieve their ESG targets."



Open The Doorway To Success & Gain The Edge with **ABARICOM**

Reliable internet solutions tailored for the mining industry

Our dedicated technicians are on call 24/7 to give you the best service & support to keep you connected & on top of your game.

Connect with us on **3916104** or **sales@abari.com.co.bw**

We offer:

- Data Connectivity.
- Network Integration.
- Data Center & Managed Services.
- IP Voice.
- Cloud Services.
- Digital Media Support.
- Home Connectivity.

Motheo Project Opencast Operation and Coal Processing Plant Officially Opens

The groundbreaking ceremony of Morupule Coal Mine's (MCM) Motheo Project last year, gave an assurance that the Project will be successfully completed this year. As Botswana continues to seek alternative engines for our economic growth, it is also very keen on exploring how best it can expand its revenue base to other minerals like coal which it has in abundant quantities. A quick observation of the current regional and global energy trends indicates that there is a noticeable steady demand for coal.

Botswana's untapped coal resources are sitting at an estimated 212 billion tonnes, which the country is now tapping into. On 28 September 2022, The President of Botswana, Mokgweetsi Eric Masisi officially opened the Motheo Project in Palapye. "The mine has demonstrated once again that they are aligned to the ambitious efforts made by Government to foster and accelerate socio-economic development in Botswana. While we are doing our best to unearth new avenues for our national economic prosperity, it is also worth mentioning that mining in Botswana, led by diamonds, remains one of the top and most important economic sectors that has for the longest time kept our economy growing and stable," said Masisi.

According to Masisi, a review of the coal market suggests that the customers requiring coal, mostly in the European and Asian countries, are prepared to pay a premium for higher grades supply of coal anywhere. "I am informed that currently, Europe and other parts of Asia need at least 50,000 to 100,000 tonnes of coal per month, which aggregates to between 10 and 15 million tonnes of coal per annum that is required to service those markets.

He further advised, "We must, therefore, seize this opportune time which has presented itself to us, to fully exploit this resource to feed the emerging and diverse markets, to grow our economy and create more job opportunities for Botswana, arising from the sure prospects of downstream supply chain operations and beneficiation initiatives, consistent with the Reset Agenda priority on value chain development.

The Morupule Coal Mine is the predominant source of energy feedstock for the production of energy locally by supplying the Botswana Power Corporation (BPC)

with coal to meet the country's electricity demands. And as you have heard of late, BPC is now producing surplus power which is being exported to neighbouring countries and surely the Motheo Project will go a long way in facilitating and consolidating the success of this most welcome development."

Motheo Project will increase the current Morupule Coal Mine production capacity from 2.8 million to 4.2 million tonnes of coal per annum. Morupule Coal Mine, through its newly developed corporate strategy, will be supplying various markets with a cumulative total of 7.6 million tonnes of coal per annum by the year 2027. This will grow the mine's annual revenue to P3 billion from P1 billion which is expected soon in 2023.

Although these are ambitious targets, Masisi noted that they can be delivered as expected, surely Botswana is on the right path to unlock its coal potential; to meet its local energy needs and still supply global markets to fuel the economic growth. However, the President acknowledged that he is aware that there are still challenges of insufficient logistics and infrastructure which must also be addressed as a matter of urgency to facilitate the activation and realisation of this ambitious throughput.

"It is for this reason that, as the Government, we are deliberately collaboratively engaging with our neighbouring countries with a view to forging partnerships that can help in the development of transport links to allow for the easy export of our coal using shorter and less costly routes. For example, as you might guess, we are looking at the Mmamabula/Lephalale Rail Link Project as a potential rail-link enabler to feed the growing coal demand in South Africa and beyond the region. In fact, the "looking at" refers to you tech-

nocrats in government who must put the design plans in place. The political decision-makers, being President Ramaphosa and myself, have made the decision that it is going to happen," said Masisi.

In terms of sustainability, government is aware of the sensitivities surrounding coal mining and the utilisation of natural resources, particularly from the point of view of environmental sustainability and the green future. Therefore the government is actively pursuing globally-adopted standards of de-carbonisation of fossil fuels like coal, through using clean coal technologies.

In April 2021, the Parliament adopted a Climate Change Policy in accordance with the COP-26 requirements to reduce carbon emissions. During the just energy transition period to a green economy, the Government will, in partnership with Independent Power Producers work steadily towards attaining investment capacity for the requisite energy mix that incorporates a significant proportion of cleaner energy sources, in the long-term.

Through the efficient and effective implementation of this policy, Botswana will ensure that the activities surrounding coal mining efforts will adhere to the international commitments for climate change. The commitment in this regard remains very strong as government seeks to promote responsible exploitation of natural resources for sustainable development while at the same time taking extraordinary measures to make best of the value of coal resources to enable economic diversification in Botswana, without prejudice.

As government's efforts continue in pursuing a more diversified economy and wider products and services cocktail, Masisi reiterated that he has no doubt that

the Motheo Project becomes the latest initiative that will open opportunities for new businesses to emerge; for new products to be developed; and hopes to see more and more jobs being created for the people.

On the jobs front, Motheo Project has created 3500 jobs during the construction of the basic or core infrastructure for the Opencast mining operations and the installation of equipment for the Coal Processing Plant. Of those jobs created during the peak of construction, 490 employees are still on the ground. As the project transitions into full operation, it is expected that it will create over 350 new and permanent jobs.

“I would like to commend Morupule Mine for having answered the Government’s clarion call for local economic empowerment and citizen economic inclusion. I have learnt that the Mine has since set up a Citizen Economic Inclusion Programme office to drive this effort. The Mine has set itself a target to create a shared citizen spend value of 50% and support for 3 000 jobs by the year 2027. Even more commendable is the fact that this office has moved at speed to forge partnerships

with different stakeholders such as local financial institutions like banks and other commercial entities. These financial institutions have already pledged a P3 billion access towards funding suppliers in the Morupule Coal Mine Supplier Development programme in the next five years. I am proud of this; this is new money, and new economy,” said Masisi.

Some other collaborative initiatives under consideration for downstream coal beneficiation opportunities include Botswana International University of Science and Technology (BIUST), looking into coal tar and coal to fertilizer by-products. In addition, Morupule Coal Mine and BIUST have signed a memorandum of Understanding (MOU) for the two parties to collaborate on areas of common interests, such as fostering innovation and mounting new tailor-made programmes in the industry. The construction of an MCM coal lab at BIUST is underway and these are the attributes of an active knowledge economy in the making.

Further to that, BIUST has done some studies on coal mining products such as fly ash coming from the power station operated by Botswana Power Corporation (BPC) is already being used as a critical

bonding ingredient in the making of the Kgalagadi Sand Brick, and an opportunity in the transport and haulage sector, alongside rail transport, as the additional coal will have to be delivered across the SADC region, mostly to South Africa, Zimbabwe, Namibia, and including Mozambique. The coal will be shipped abroad. Therefore, Botswana has committed to operating in the sea, land-locked as it is.

In concluding, Masisi said, “I recognise the Mine’s continued involvement with the community of Palapye and the surrounding villages. The social impact from its community engagement and corporate responsibility awareness is visible to the naked eye and we must applaud them for that. To mention but a few, Morupule Coal Mine recently renovated the Botswana Police Central offices to capacitate them to help fight social ills like crime in the village. They are also in the process of constructing a multi-complex sports facility for the promotion of sports and wellness. These are admirable initiatives and acts of Corporate Social Responsibilities (CSR) which will go a long way in building strong ties between the mine and the communities within which it operates.”

A long distance relationship that works.



Wear Resistant, High Performance - Global Quality Mining Pumps.

KSB South Africa is based in Johannesburg with modern manufacturing and sales facilities. With nine additional sale branches

KSB South Africa, manufactures our globally recognised pump solutions locally to the most stringent international and local standards. Our innovative solutions provide for the most demanding and corrosive slurry applications with superior abrasion r

At KSB South Africa, we manufacture and service your slurry systems. We work with you one on one to find the best solution for and process pumping applications. Let us be your partner and work with you to help you meet your production goals. **One team with one goal.**



Now's the time to Explore Uncharted Paths and Discover New Solutions

By: Paul A. Bendall
PWC Global Mining Leader

Miners need to create value amid market volatility, increasing demand and the race to net zero. What it means to be a miner is changing. Though the world's Top 40 miners demonstrated stellar financial results in 2021, it's unclear how long this record run will continue. The global mining industry is experiencing unprecedented change—demand for 'critical minerals' continues to surge, operating environments are getting more challenging, and new players are emerging. So, the key question is: can the Top 40 transform themselves quickly enough to thrive and earn trust for the future?

Success will hinge on whether the Top 40 can take a leading role in the world's clean energy transition and continue to generate significant stakeholder value. To do that, miners must utilise their strong current financial position to meet challenges including development timelines, price volatility, geopolitical risks, stakeholder expectations, economies of scale and economic resource scarcity.

The rewards for those miners who emerge as leaders could be immense: the need for critical minerals is expected to grow over the next three decades, with some estimates suggesting that the annual demand from clean energy technologies will reach more than US\$400bn by 2050.

Here are four of this year's report's most important takeaways for the world's big miners.

Take a position on critical minerals

- Review your exposure to critical minerals and other materials necessary for the energy transition.
- Evaluate opportunities to own more of the supply chain or to partner directly with original equipment manufacturers (OEMs).
- Incorporate low-emissions technologies into operations.
- Evaluate development models around shared infrastructure solutions.

The shift to net zero will require more mining, not less. But resourcing the energy transition is not simply a matter of

mining more of the same materials in the same way. Instead, the world will need more critical minerals and raw materials to power the global economy of the future—and these resources will need to be mined sustainably. Net zero and the energy transition will drive demand for metals.

Take advantage of your financial strength

- Leverage strong balance sheets and abundant cash flow.
- Take advantage of expected strong short-term commodity prices to prepare for longer-term uncertainty.
- Reposition towards long-term growth while balancing shareholder distributions. Incumbent miners with strong balance sheets, available financing and abundant free cash flow are in the best possible shape to drive the direction of the industry for decades to come. But despite their size and financial advantages, the window to maximise growth opportunities and create value is closing; miners must make their move quickly.

Revisit deal strategy

- Think carefully about your M&A strategy in the context of the fundamental changes affecting mining, the market for mining products and your long-term strategic position.
- Consider the impact of high volatility in the short to medium term, increased geopolitical risks and competition from new players.

As deal activity heats up, the Top 40 are well placed to position themselves to take advantage of the rising demand for critical minerals. But with competition coming from multiple angles, they'll need to think

carefully about their next big moves. Deal value increased by 200%, Deal volume increased by 60%, Gold is the largest deal driver in the Top 40, but critical minerals deals are gathering steam.

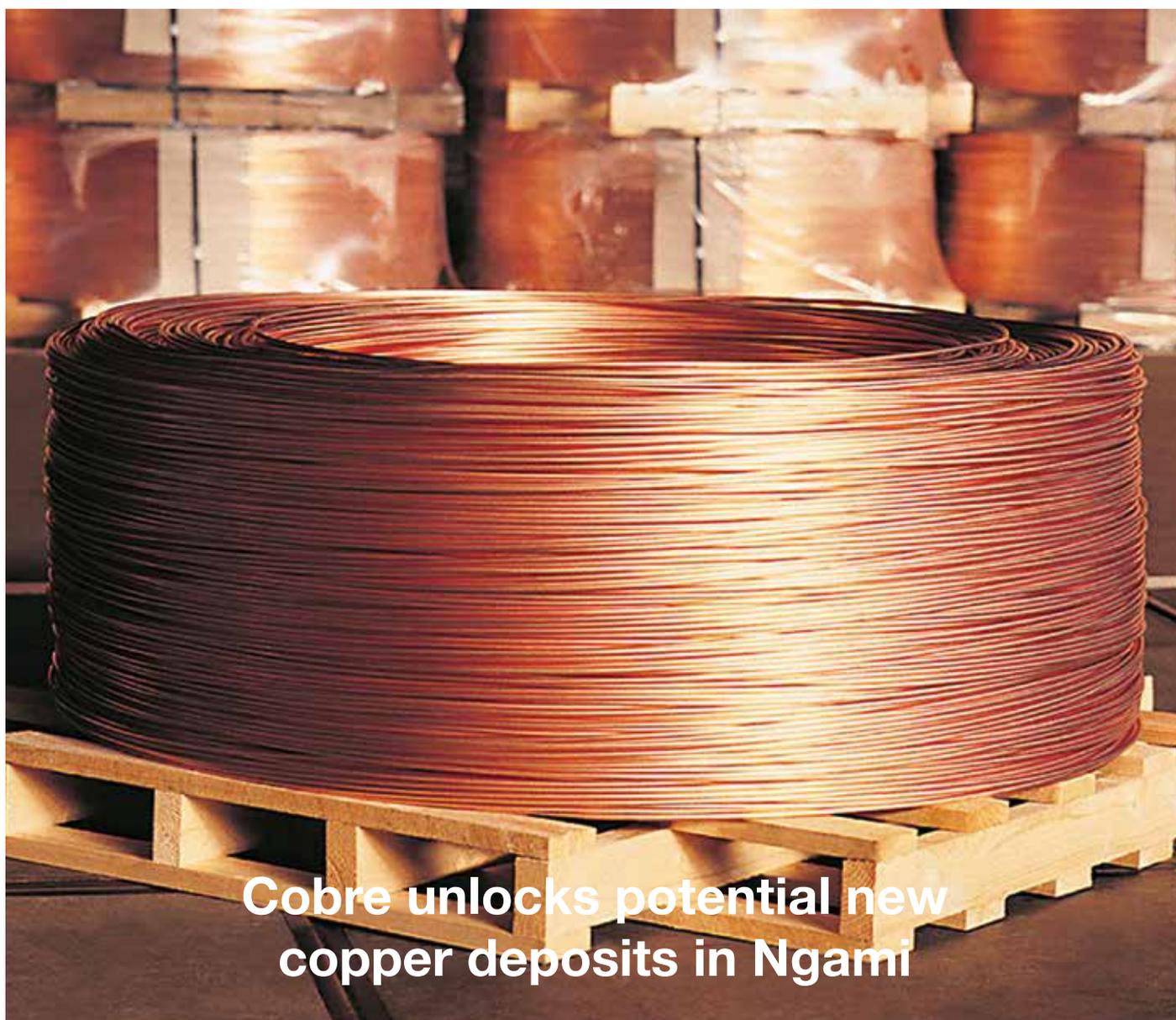
14% of mining and metals company CEOs have conducted scenario planning in response to Pillar 2. 137 member countries have agreed to the two Pillar solutions proposed by the OECD. 83% of mining and metals CEOs see meeting customer expectations as an influential factor that supports meeting their net-zero commitment.

Double down on ESG

- Establish strong social licences, and execute M&A responsibly.
- Act now to prepare for the potential impact of the OECD's Pillar 2 (global minimum tax).
- Explore green premiums and ESG opportunities for a reduced cost of capital. The mining industry is naturally competitive. But building trust in 'brand mining' cannot be done alone. Every miner is responsible for improving the trust that it builds with stakeholders and for strengthening mining's social licence to operate.

As leaders, the Top 40 play a crucial role. ESG is no longer optional or a point of differentiation; it is the minimum operating standard. Stakeholders are increasing the pressure, and strong social licences, responsible divestitures and tax transparency will be important for success. ESG should be considered at the heart of what a miner is; this will lead to sustained outcomes that drive value and growth while strengthening our environment and societies.





Cobre unlocks potential new copper deposits in Ngami

Australian miner Cobre says a new copper zone has been intersected at the company's Ngami Copper Project.

"Intersecting further copper mineralisation at a distinct new target (Nova), 10km away from current drilling at Comet, is a significant exploration milestone that validates the company's targeting strategy and methodology," said Martin Holland, Cobre Executive Chairman and Managing Director, commenting on the intersection of this new copper zone.

He said the identification of anomalous copper mineralisation at the Nova target represents an important indicator of the significant scale opportunity unfolding in this exciting new copper district.

He added that Cobre's current focus on exploration at NCP is based on the com-

pany's potential for expansion of its footprint in the highly prospective district, the company continues to unlock multiple distinct copper targets.

"We are currently undertaking a diamond drilling program to infill higher-grade portions of our Comet target, with a second drill rig secured to test the extent of mineralisation at the newly identified Nova Target before moving onto additional new targets in the vicinity.

In addition to our ongoing drill programme at NCP, an extensive soil sampling programme on the neighbouring 2,000 km² Kitlanya West Project is nearing completion. This data will be used to prioritise additional new targets for our 2023 exploration campaign as we endeavour to unlock a potential new copper district in Botswana," said

With Ngami Copper Project Exploration, the drill programme at NCP has been designed to intersect sedimentary-hosted, structurally controlled, copper-silver (Cu-Ag) mineralisation associated with the redox contact between oxidised Ngwako Pan Formation red beds and overlying reduced marine sedimentary rocks of the D'Kar formation on the dipping limbs of anticline structures.

Mineralisation intersected at NCP appears to Proprietary Intertek-Genalysis partial digest method follow the general pattern observed in the prospective north-eastern KCB, where high-grade copper deposits are surrounded by anomalous copper halos which may extend over 2 to 5 km, separated by long-tracts of low-grade background mineralisation which is pervasive along the redox contact.

Debswana's Jwaneng Mine Leads in Safety and Health Implementation

The inaugural Letsholo Safety and Health summit was recently held by Debswana's Jwaneng mine at Albert Milton Multi-Purpose Hall in Jwaneng and it featured speaker sessions and a panel discussion.

The summit also had experts in the safety and health space from the mining industry and other reputable and leading institutions like Botswana Power Corporation (BPC), Botswana Chamber of Mines (BCM), Morupule Coal Mine (MCM), Civil Aviation Authority of Botswana (CAAB), to mention a few. Additionally, in attendance were various local authorities from Jwaneng Mine's Area of Influence.

At the summit, De Beers Group's Executive Head of Technical, Burger Greeff applauded Jwaneng Mine for assuming a

leading role in safety and health and he appealed for continued collaborations towards building a resilient and sustainable safety culture at the workplace and at home.

The summit that was held under the theme creating a safety culture through extreme ownership attracted multitudes of in-person and virtual attendees including the operation's employees, those of business partners, local authorities and subject matter specialists across Botswana.

Greeff said, "I hope that the summit will result in continued open partnerships, ownership, leadership direction and the co-creation of safety solutions in the dynamic environment in which we operate. It is important to note that attaining and

sustaining good safety performance requires personal commitment at all levels in the organisation.

Therefore, as ambassadors of safety, and with our results being testament to that: we need to own safety and make it a way of life here at work and at our homes. Promoting extreme ownership in the workplace is attainable through eliminating the concept of "Failure" and replacing the word with "learning moments."

Jwaneng Mine General Manager Koolatse Koolatse pointed out that the event provides participants with a forum to discuss latest trends in the management of the safety and health space in the workplace as well as at home. He added that the main intention of hosting the summit was to provide a platform to learn and grow from the collective experience of all present safety and health professionals and experts from the mining industry as well as other institutions.

In closing, he said, through the summit, Jwaneng Mine wants to acquire more insights and share experiences with the view to attain absolute zero harm by instilling and nurturing a resilient and sustainable culture of extreme safety and health ownership across at individual and collective level. He reminded all attendees of the importance of always Putting Safety First in order to ensure their safety and that of those around them.



SEVERE ILLNESS BENEFIT

This benefit is designed to provide a 100% cash payout to the member on 1st diagnosis of any of the pre-defined severe illnesses regardless of the actual medical expenses incurred..

The cash payout can be used among other things to:

- A. **Assist members with additional medical costs which might be above the allocated health plan limits.**
- B. **Pay for alternative care or rehabilitation therapies not covered by the health plan.**
- C. **Fund lifestyle changes that might be required following diagnosis and/or treatment of a severe illness.**

The following severe illnesses are covered under this benefit:

	Cancer		Kidney Failure (Chronic)		Coma		Loss of Hearing
	Coronary Artery Disease		Major Organ Transplant (Kidney, Lung, Liver, Heart, Pancreas)		Blindness		Major Burns
	Heart Failure		Stroke		Paraplegia		Valvular Heart Disease

* The Benefit has a termination age of 65years.

Culture, Protocols key to Blast Safety on Mines

A recent global safety report for mining indicates a gradual but steady improvement in mine safety, with a total recordable injury (TRI) frequency rate at a low 2,90 – down from 5,07 just a decade ago.

The Safety Performance Report by the International Council on Mining and Metals (ICMM) benchmarked the progress of its members during 2021. The ICMM noted that the industry has focused on “operational, cultural and leadership transformation” in reducing fatalities in recent years.

Blasting solutions specialist BME has concurred that a growing safety culture is a major factor behind positive safety trends in mining, as well as uncompromising compliance with strict safety protocols. According to Ramesh Dhoorgapersadh, General Manager for Safety, Health, Environment, Risk and Quality (SHERQ) at the JSE-listed Omnia Group company, safety must be ingrained into every activity, in line with recognised standards and procedures.

“The blasting philosophy of BME is expressed through our innovative products and leading initiation technologies. This also means aligning our policies with customer’s own safety protocols and broader regulatory requirements,” said Dhoorgapersadh.

This includes careful adherence to the regulated distances between communities and blasting sites. He highlighted that internationally accepted standards are stringently applied to ensure the safety of communities adjacent to mining areas. These protocols address any possible hazards from blasting such as ground vibration, airborne dust or flyrock.

Tinus Brits, BME’s Global Product Manager – AXXIS™, explained that electronic detonation systems play an important role in achieving safe blasting. They allow detonators to be accurately initiated within milliseconds of each other, staggering the energy release rather than having five or six holes detonating at the same time. Reducing the charge mass per delay thereby reduces the resulting vibration.

“We design our electronic detonators in such a way that key blast impacts are both measurable and predictable. With our integrated blast planning software, mines can simulate each blast before it is implemented – so that they can predict aspects like ground vibration to ensure it will be within the required parameters,” said Brits.

He emphasised that mines apply world-class standards in this regard, such as the United States Bureau of Mining (USBM) blast-induced ground vibration criteria. These include the requirement that any blasting in the vicinity of communities, structures houses, roads or other receptors requires a minimum safety radius. Where BME conducts blasts on behalf of customers, therefore, it applies a blasting radius of one kilometre away from any persons or communities, and 500 metres from any material that might be negatively affected.

In addition, Brits said, “For every blast, seismographs are then used to measure the resulting ground vibration and air blast.

This confirms that the blast did indeed achieve the simulated design parameters, to fall within the regulated limits.” These vibration reports can confirm that a mine’s blast was fully compliant with relevant standards or regulations, should there be a need for a mine inspector to investigate any blast-related incident.

While a range of safety protocols may be in place to comply with regulations, Dhoorgapersadh noted that human behaviour was still the cause of incidents that could be avoided. This required that mines and their suppliers continue to foster a culture of safety that brings behaviour into line with systems.

Dhoorgapersadh added, “BME’s Safety for Life brand, for instance, prioritises the safety of employees, communities and the environment. By ingraining a safety culture, we can apply and embed our safety learnings wherever we operate.”

As a result, BME can boast a recorded case rate (RCR) of just 0,15% - a world-class rating that places it among South Africa’s best safety performers, and a leader in its industry segment. BME has also been recognised at the Chemical and Allied Industries Association (CAIA) Awards for its safety, health and environment (SHE) performance.

SkyTEM is a leading airborne geophysical survey company offering the acquisition and advanced processing of the highest quality helicopter-borne transient electromagnetic data

LET'S EXPLORE

SKYTEM

- 01 Fast data delivery
- 02 Fast survey completion
- 03 High quality data

CONTACT US
 Christina Hutchinson
 Africa Region Sales Manager

✉ chu@skytem.com
 ☎ +27 (0) 11 011 9065

WWW.SKYTEM.COM

Giyani Metals Announces Results of Life Cycle Assessment Study for the K. Hill Battery Manganese Project

Giyani Metals Corp, developer of the K. Hill battery grade manganese project in Botswana, has announced the results of a life cycle assessment (LCA) prepared by Minviro Limited based on the feasibility study for K. Hill.

The goal of this LCA is to determine the significant project and process parameters contributing to the GWP from production of HPMSM at K.Hill. The LCA is a cradle-to-gate study, meaning the product GWP is assessed from the point of ore and waste rock extraction (cradle) to the end-gate (a set point at the end of processing, with HPMSM being ready for transport to customers), modelled in the two distinct stages of mining and processing using data developed as part of the FS.

The total GWP of 3.2 kg CO₂ eq. per kg HPMSM can be classified into scope 1, 2 and upstream scope 3 emissions. Scope 1 (direct) emissions, which reflect greenhouse gas (GHG) emissions associated with the combustion of fuels on-site and emissions from reagents used in processing, total 0.2 kg CO₂ eq. per kg HPMSM.

Whereas Scope 2 (indirect) emissions, which reflect GHG emissions from imported power, total 1.2 kg CO₂ eq. per kg HPMSM; and lastly Scope 3 (indirect)

upstream emissions, which reflect other GHG emissions such as the extraction and production of purchased materials and fuels, total 1.8 kg CO₂ eq. per kg HPMSM.

The LCA will support Giyani in understanding the GWP of the K.Hill Battery Manganese Project, its main drivers and inform decision-making on advancing project development. The main impact driver of the GWP is the consumption of electricity from the national grid in Botswana, corresponding to approximately 37% of total GWP. The plan, as laid out in the FS for K.Hill, includes a 4.5 MW photovoltaic solar plant and Giyani is currently assessing various options to further reduce the GWP for K.Hill and to develop a roadmap for decarbonization.

Robin Birchall, CEO of the Company, commented, “The results of the LCA confirm the potential of the K.Hill Battery Manganese Project to be a low-carbon producer of a critical battery raw material. One of Giyani’s key strengths will be our

ability to produce HPMSM directly from our high-grade manganese oxide ore without the need for calcining or electro-refining, both potentially significant emitters of greenhouse gases.

In addition to calculating our global warming potential, the LCA will also act as a guide to help develop a roadmap to decarbonize our operation, which is part of our long-term strategic objective. Further information on K. Hill and its development plan will be available in the FS, which is expected to be published in the coming weeks.”



How can you minimise dust in agricultural environments?

Sappi manufactures Lignex, which is an environmentally friendly dust suppressant and surface stabiliser for unsealed (gravel) roads produced from renewable woodfibre. Lignex is derived from lignin, a major component of wood, one of the most abundant natural organic polymers.

Applying Lignex to the road surface will help mitigate the negative impact of dust on orchards and packhouses, and improve efficacy of pest and disease control spray programmes due to improved penetration of active ingredients. Using Lignex as a dust suppressant also provides health, safety and maintenance benefits.

For more information, email Lignin@sappi.com



sappi | **Lignex**



Specialised Exhibitions shelve Electra Mining Botswana

Organisers of Electra Mining Botswana, Specialised Exhibitions have canceled the edition of the biannual exhibition slated for next year.

According to the company, the decision comes after a strategic review of the mining and industrial show and the broader vision that Specialised Exhibitions has for the expansion of Electra Mining Africa.

“We recognise and value the tremendous levels of support that Electra Mining Botswana has received from local stakeholders over the years.

The show has provided a platform where buyers and suppliers of products can meet and where business partnerships can be developed,” said Gary Corin, Managing Director at Specialised Exhibitions.

Corin said the global pandemic and subsequent two year exhibition hiatus gave the company time to review the portfolio of exhibitions and make strategic decisions around future consolidation and expansion.

“This may sound contradictory, but growth is stimulated through consolidation,” said Corin, adding that the company has made the decision to bring Electra Mining Botswana into the fold of Electra Mining Africa with exciting plans for 2024.

“Electra Mining Africa is recognised as Southern Africa’s biggest mining, electrical, automation, manufacturing, power and transport trade exhibition and has consistently been ranked as one of the top three mining and related industries shows in the world.”

He said the company will be engaging with stakeholders to discuss the inclusion of a Botswana Pavilion at Electra Mining Africa in 2024 where local Botswana exhibitors will have the opportunity to showcase their products and services to a greatly expanded audience profile.

Electra Mining Africa attracts thousands of visitors from South Africa and neighbouring African countries with a large contingent also attending from other countries across the globe.

“We will also engage with our Botswana visitors to encourage them to visit Electra Mining Africa 2024 as they too will have the opportunity to see a far greater range of products, services and technologies on a much larger scale.

“The massive machinery and equipment on view at Electra Mining Africa and the many live demonstrations are not possible to replicate at the local show.”

Corin further said an inward buying mission from Botswana in 2024 is also a possibility to explore in the upcoming months.

Kavango Resources to secure £3million for exploration

London Stock Exchange listed Kavango Resources has announced plans to raise £3million on the bourse for exploration on its three projects - Kalahari Suture Zone Project, Kalahari Copper Belt Project and Ditau Camp Project.

The Kalahari Copper Belt (KCB) land package is one of the company's flagship projects and sits near large projects being developed by companies like Cupric Canyon, MOD Resources, and Sandfire.

Kavango Resources intends to raise £3 million before expenses by issuing 166,666,660 new ordinary shares in the capital of the Company through new ordinary shares at a price per share of 1.8 pence.

“Supported by many existing shareholders and new investors, we are now empowered to drive forward a dramatic exploration programme across our portfolio. Our current key focus is on our Kalahari Copper Belt interests, where the drilling programme is underway,” said Ben Turney, Chief Executive Officer of Kavango Resources.

Turney said the company is now fully funded for our ambitious plans through 2023 and are in an excellent position to achieve its goal of becoming a leading minerals exploration firm in Botswana.

As part of the fundraising, 158,555,555 new ordinary shares have been conditionally placed by First Equity Limited (First Equity), on behalf of the company with institutional and other investors, including high net worth and retail investors.

The placing includes one strategic cor-

nerstone investor, who subscribed for over half of the placing amount.

In addition to the placing, the company has also conditionally completed a direct subscription for the issue of 8,111,105 new ordinary shares.

Okavango is optimistic that the placing and subscription are to raise funds to meet exploration costs across the Company's portfolio of projects in Botswana, and general working capital as set out below.



TARGETING WORLD CLASS BASE AND PRECIOUS METAL DEPOSITS IN BOTSWANA



WMI Seminar – Innovating for the Future of Mining

As the University of the Witwatersrand (Wits) celebrates 100 years since its doors opened in 1922, the Wits Mining Institute (WMI) recently hosted its inaugural annual Seminar, which highlighted the value of innovative research in developing mining technology for the future of the industry.

Speaking at a WMI Seminar held at the Wits Club during the last week of September, WMI director Professor Glen Nwaila noted that although the mining industry in South Africa had some turbulent times during its 100 years, the WMI continued to innovate while holding at its core the sustainable provision of minerals to support the future wellbeing of the industry. “The WMI looks to specifically create the environment to foster the characteristics for research, innovation and development, alongside excellent relationships with our stakeholders”, said Nwaila.

Under the theme of ‘Turning research curiosity into 21st Century minerals industry performance, relationships and technology’, Nwaila noted that it could not have developed advanced technologies for the 21st Century model of mining - which included SmartMine Internet of Things (IoT), wearable technologies and sensors, safe blast imitation and optimisation and point-cloud surveys, without ongoing, multidisciplinary partnerships.

He further highlighted that through this research, innovation and development, and ongoing public-private partnerships, Wits

was not only able to progress cross- and trans-disciplinary research and solutions for the mining industry but was also able to address new and emerging challenges. This included stumbling blocks under the umbrella of environmental, social, and governance (ESG), the circular economy, mine waste, sustainable process engineering, orebody modelling and geo-technical engineering. Another challenge faced by the industry as mines continue to develop, is the question of capacity development.

“The WMI cannot stagnate, as the mining industry continues to be in flux. The research will continue to develop alongside industry, which is developing at a rapid pace.” He added that not being hindered by conventions, data and capabilities of any discipline have been some of the key factors in its success. Nwaila noted, “Here at the WMI, we have a curiosity, a technical capability and determination to thrive. Understanding market realities and the management of high-risk and exploratory data-driven projects has also put us at the forefront.”

Industry perspective

Delivering his keynote speech on the first day of the event, diversified miner Sibanye-Stillwater CEO Neal Froneman highlighted that the Sibanye-Stillwater DigiMine laboratory at Wits was a prime example of one of Sibanye’s strategies to create a better mining world. “Fundamental and applied research within

the DigiMine laboratory provides us with strategic intelligence on relevant digital advances to institutionalise innovation,” said Froneman.

Sibanye-Stillwater, which is sharpening its focus on the battery metals space, is further pursuing its 3D strategy to address forces of change within the industry. Dubbed ‘grey elephants’ - a highly probable, high impact, yet neglected catalyst – Froneman pointed out that the company was working towards finding innovative solutions to counter these challenges.

This included an ageing workforce, more pandemics, an angry planet, inequality, multipolarity, angry people and intelligent advances.

“Our 3D strategy is designed to harness opportunities, manage a complex environment, and facilitate continued growth. We intentionally find new ways to do things better,” he said.

Illustrating some of the work carried out at the DigiMine laboratory, aimed at making mining safer and more sustainable through the use of digital technologies, Katekani Maswanganyi, a shift supervisor at Sibanye-Stillwater’s platinum division, highlighted how, through digital technology and innovation, mines are no longer working hard but smart, tackling challenges such as mining at depth, mining lower-grade reserves, labour disputes and unauthorised access to mining facilities.

Having achieved her MSc in Mining Engineering through the DigiMine laboratory at Wits, Maswanganyi further highlighted how the digitisation of the mining industry has also advanced the role of women in mining. "Mining will always remain a labour-intensive working environment, with 43% of female recruits not being physically fit for the nature of the work," she said.

"With modernisation in the mining industry, which offers various levels of automation, we will be working alongside machines, with hazardous work being done remotely and physical strength no longer being a mandatory requirement," she noted. This she highlighted, would not be possible without ongoing research and facilities such as the Sibanye-Stillwater DigiMine laboratory.

South African Mining Extraction Research, Development & Innovation (SAMERDI)

The WMI Seminar also served as the launch platform of two new research centres established through the SAMERDI strategy.

Hosted by the WMI, the two SAMERDI Research Centres (SRCs) will focus their fundamental research on the themes of Real-Time Information Management Systems (RTIMS) and Successful Application of Technology Centred Around People (SATCAP), respectively. These are two of the thematic areas pursued by the Mandela Mining Precinct (MMP) in Johannesburg, which is administered by the Council for Scientific and Industrial Research (CSIR). The initiative is also funded by the Minerals Council of South Africa (MinCoSA) and the Department of Science and Industry (DSI).

Speaking at the conference, MinCoSA Senior Executive: Modernisation and Safety, Sietse Van Der Woude noted that the launch of these Centres re-emphasised the importance of public-private partnerships to further innovation and research. "To ensure that our mining industry is and remains globally competitive, we need to ensure that our young people are developed in the right capability and capacity to ensure that they can come up with innovative solutions, which mining companies can implement. Some of these may be core-level innovations, and other ones may be transformational at their outset. We will continue to support initiatives that will enhance the capability and capacity of South African mining to be globally competitive," explained Van Der Woude.

During his address, Johan le Roux, director of MMP and CSIR, noted the MMP's strategic objectives and said, "Initiatives like we have here today are significant in re-establishing the mining research capacity that was lost over the last few decades."

Skills Development

Referring to the 'grey elephants' raised by Froneman, Prof Gill Drennan, Head of the School of Geosciences at Wits, believed the answer was in skills development. "Wits is aligning its teachings to develop with the changing world, allowing for multiple skillsets. Therefore, we are reviewing, revitalising and refreshing our curricula to allow for ongoing continuous assessment to increase learning during classroom time and enhance student motivation, combining theory and training embedded in a real-life work environment in interconnected educational ecosystems and encouraging self-directed training and nano-degrees – a certified online education programme that helps students develop specialised skills for lifelong learning," said Drennan.

During the three-day seminar, other cutting-edge research on topics critical to mining in the 21st Century was also discussed by industry partners, including Soteria Advanced Technologies, DetNet and TLS Leica Geosystems, OIM Consulting, Ramjack Technology Systems and Schauenburg Systems.

Realising advances in technology

Speaking at the event, Wits Alumni and DetNet Senior Mining Engineer/Product Support Technician Ntombifuthi Mathebula pointed out that over thousands of years, the fundamental purpose of mining has remained the same: removing metals and minerals from the ground and separating those that are desirable from waste. "Globally, over the past two decades, increased scrutiny of environmental and social issues has led major mining companies to adopt sustainability. At the same time, new technology trends and economic developments are shaping the future of mining. Greater productivity, improved safety and sustainability are realised from these advances in technology."



Securing Power Supply on the DRC's Inga-Kolwezi HVDC link



Hitachi Energy, a global technology leader advancing sustainable energy for all, has signed a long-term service agreement with Société Nationale d'Electricité (SNEL), the national electricity company of the Democratic Republic of Congo, to secure power supply in the country's most important power transmission asset: the Inga-Kolwezi high voltage direct current (HVDC) link.

The link supplies up to 1 000 megawatts of emission-free electricity from the Inga Falls hydropower plant in the far west of the country to the Kolwezi mining region in the south. It is 1 700 kilometres long, the longest HVDC link in Africa. The link also enables the DRC to export surplus power to member countries of the Southern African Power Pool.

The recently signed agreement continues the close collaboration between SNEL and Hitachi Energy that has run over the past 40 years to ensure the link operates at maximum availability and reliability through its long operating life. Hitachi Energy supplied the two converter

stations at each end of the link in 1982 and has subsequently upgraded them and doubled transmission capacity.

As part of the agreement, Hitachi Energy will assess the service needs of the converter stations, develop a preventive maintenance programme, and supervise its implementation over the next five years. The agreement includes training, knowledge sharing and expertise enhancement for SNEL service personnel.

"We are delighted to be continuing our long collaboration with SNEL to protect the nation's investment in its most important power transmission link. This long-term service agreement demonstrates how we work closely with the customer to secure availability and reliability over the lifetime of the asset," said Andreas Berthou, HVDC and HVDC Service Global Product Group Manager at Hitachi Energy.

SNEL Chief Executive Officer Jean-Bosco Kayombo Kayan, said, "Hitachi Energy has been a close and valued partner of SNEL for almost 50 years, when we first collaborated on the design of what was

then a ground-breaking HVDC link with the world's longest transmission line. From that time, we have worked closely together to increase the capacity and maximise the reliability of this critical national infrastructure."

Hitachi Energy's HVDC solution combines world-leading expertise in HVDC converter valves, the MACH™ (Modular Advanced Control for HVDC) digital control platform, converter power transformers and high voltage switchgear, as well as system studies, design and engineering, supply, installation supervision and commissioning.

HVDC Light® is a voltage source converter technology developed by Hitachi Energy. It is the preferred technology for many grid applications, including interconnecting countries, integrating renewables and 'power-from-shore' connections to offshore production facilities. HVDC Light's defining features include compact converter stations and exceptionally low electrical losses.

New Kobold process monitoring, control flowmeter hits market

Kobold's latest KDS flowmeter, now on offer at Instrotech, performs process monitoring and control tasks reliably.

According to the manufacturer, the instrument uses a magnetic tracking system, the float position is transmitted to a corresponding pointer and optionally to an analogue output. And the fluid flows from bottom to top through the meter tube of the flowmeter. The float is lifted until an annular gap between the measuring cone and the float is produced which corresponds to the flow and the forces acting on the float are in equilibrium.

The height of the float resulting from the flow rate is transmitted by the permanent magnet in the float through the magnetic

tracking system in a rotation to the pointer axis of the analogue indicator unit.

In addition, the variable-area flowmeter comprises a stainless steel device with an integrated conical stainless steel measuring tube and a vertically movable float. The KDS-K/C model has a built-in valve for setting the flow rate.

The robust Kobold KDS flowmeter with its low wear rate is widely used in the chemical industry as well as in medical and laboratory engineering. It is used for measuring mass and volume flow rates, or for dosing applications, and is available with additional electrical equipment for process monitoring and control.

The KDS meter is also suitable for flow measurement of liquid or gaseous prod-

ucts in pipes. It shows the current flow rate in volume or mass per unit in time.

Characteristics include:

- Measuring range for water: 0.1 – 1 l/h...20 – 200l/h
- Measuring range for air: 3 - 30 NI/h... 600 – 6000 NI/h
- Accuracy: +3.0% of full scale
- Pressure max: 420 bar; Temp max: 130 °C
- Material: stainless steel
- Optional: Analogue output contacts; Flow controller; High-Pressure application
- Horizontal and vertical connections and wall mounting variations are available



Sibanye-Stillwater interested in buying Zambia's Mopani Copper Mines

Expansion-minded Sibanye-Stillwater is interested in Zambia's Mopani Copper Mines (MCM), the mine and smelter complex looking for new investors after Glencore sold the asset to the state firm ZCCM-IH in January last year.

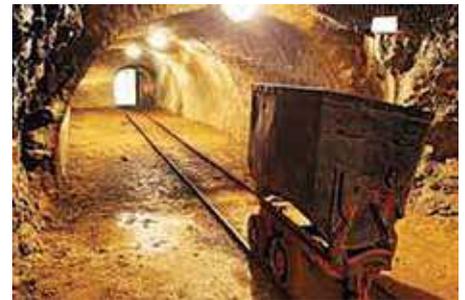
The Chief Executive Neal Froneman, who has urged gold miners to consolidate, recently stated that the company had expressed its interest around a year ago. While it remains interested, he thinks the market is just not conducive at this stage to doing value-accretive transactions. "It's not a buyer's market, which is why we've been quiet. There's still too much froth," added Froneman.

The precious metal company has been expanding into the battery metals in the

past two years, including acquiring half of Ioneer Ltd's (ASX: INR) lithium-boron project in Nevada in September 2021. Sibanye also attempted to buy the Santa Rita nickel and Serrote copper mines in Brazil, but walked away from the \$1 billion deal due to what it called "technical issues" it was not aware of when presenting the offer.

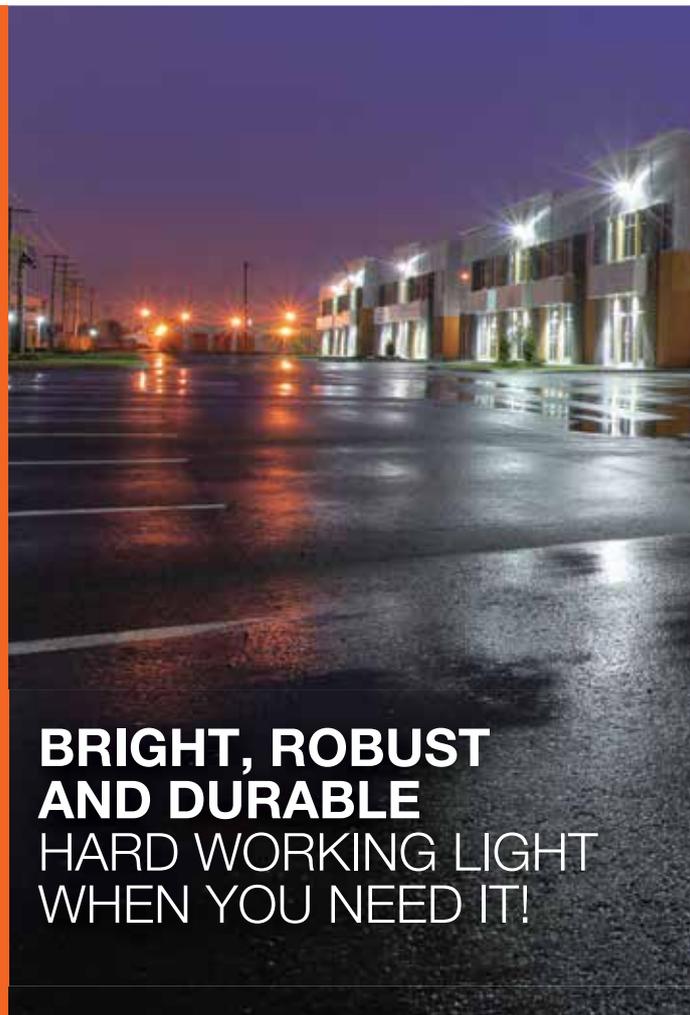
ZCCM-IH hired investment bank Rothschild & Co in June to help find a new investor to upgrade and expand Mopani, which is more than 90 years old. The operation has the potential to produce 225,000 tonnes of copper a year, nearly three times its expected 2022 production, but it needs investment of at least \$300 million to fund a complex underground expansion.

Copper production in Zambia, Africa's second largest producer of the metal, dropped to 800,696 tonnes last year from 837,996 tonnes in 2020, official figures show. Analysts expect shortages of the orange metal, as well of cobalt, nickel and other industrial materials needed for the shift to a low carbon world, partly due to underinvestment in the mining sector and accelerating demand.



 **LEDVANCE**

LEDVANCE.COM



**BRIGHT, ROBUST
AND DURABLE**
HARD WORKING LIGHT
WHEN YOU NEED IT!

**PERFORMANCE
AT IT'S BEST!**

Our LED Performance Floodlights are impressive for their simple installation, high energy efficiency and high quality of light – at a very good price/performance ratio and with a guarantee of up to 5 years.



**PERFOR-
MANCE
CLASS**

RioZim Acquires Namibia's Sperrgebiet Diamond Mine

Zimbabwean mining Group, RioZim Ltd. has bought Sperrgebiet Diamond Mine in Namibia as it seeks to expand in Africa. Sperrgebiet holds two onshore and two offshore mining licenses, within Lüderitz's protected diamond zones.

According to RioZim Group's Company Secretary Tawanda Andrew Chiurayi, the Group has been trying to broaden its footprint in the mining industry in Africa and this acquisition is part of the strategy. It also wants to diversify its assets and geographies.

However, Chiurayi declined to disclose the amount RioZim paid for the mine. An undisclosed source revealed an estimated acquisition cost of about \$58 million.



"We are also planning further investments in base and precious metals in Zimbabwe, after spending more than \$150 million at our gold mine and a new plant at the Murowa diamond mine. Output at Murowa tripled in September following the investment," revealed Chiurayi.

and a nickel refinery, said rules that oblige miners in Zimbabwe to switch 40% of their income into local currency are proving a drag on its operations. "Forex shortages and power shortages are seriously hampering progress, but our belief in the long term is undeterred," said Chiurayi.

RioZim, which also has interests in coal



Condition Monitoring is at the heart of machine reliability

WearCheck, Africa's leading condition monitoring company, is dedicated to saving money for you, our customers. We analyse data from condition monitoring and fluid analysis to schedule maintenance and avoid unexpected machine failure.

Accurately predicting maintenance = saving you time and money.

Branches

Botswana	+267 311 6829
Ghana	+233 20 896 8484
Mozambique	+258 843 173 781
Namibia	+264 81 129 6078
Uganda	+256 78 529 6994
Zambia	+260 212 210 161
Zimbabwe	+263 24 244 6369



South Africa (Head Office)

+ 27 31 700 5460 support@wearcheck.co.za www.wearcheck.co.za

Testing and Analysis | Lubricant-Enabled Reliability | Asset Reliability Care

AUTONOMOUS ROAD INSPECTION DEVICE

ADDED VALUE QUANTIFICATION

Dust-A-Side has been specializing in mine haul road dust suppression for more than 40 years. The benefit of these solutions and systems are well understood but historically it has been difficult to quantify and verify the real benefits to the client. To address this measurement need, Dust-A-Side has developed SmartRoad Inspection System for its clients.

SmartRoad provides condition inspections, monitoring and maintenance management information for mining haul road networks; improving safety, productivity, and energy, and reducing cost.

It provides condition inspections, monitoring and maintenance management information for mining haul road networks; improving safety, productivity, and energy, and reducing cost.

The system is underpinned by autonomous and semi-autonomous road and plant inspections (visual and vibration) for identification and verification of road defect and dust performance. This is done using digital processes, machine learning, and artificial intelligence-enabled systems together with performance analytics and dashboards; to monitor, record, score, and report on road conditions.



The SmartRoad system has three types of data acquisition systems for inspection of road condition and dustiness – depending on the area of application. These are based on: **semi-automated inspection of road conditions** (manual inspection), **autonomous inspection of roads and associated conditions**, and **static inspection** of dustiness levels at fixed locations at production haul roads, mine load and dump areas, etc.

SMARTSNAP: SEMI-AUTOMATED VERSION

This is a manual inspection and auditing process done by an expert; aided by automated visual information capture. These inspections and audits are automatically uploaded into the SmartRoad Performance Dashboard.

AUTONOMOUS ROAD INSPECTION DEVICE (ARID)

This device is fitted to a vehicle. Once set up, it autonomously does the auditing function using an artificial intelligence-enabled inspection instrument that processes and uploads inspection data to an inspection and scoring dashboard. These results are then transferred into the SmartRoad Performance Dashboard.

BENEFITS OF USING THE DUST-A-SIDE ARID DEVICE

- Road inspections are autonomously and automatically done based on a predefined inspection schedule and inspection zones
- No human interface is required for visual inspection activity when the device is moving across the road network



S-ARID: STATIC VERSION OF ARID

S-ARID is a specific system for identifying dustiness levels at locations requiring visual evidence of dust levels and dust suppression performance. It is placed alongside the haul road or mining area – typically where vehicles travel or at material transfer locations (crushers). It uses camera technologies with computational vision algorithms to score dust levels and signal dust level limits. It has proven correlation between analytical dust measures and human perception of dust (for example, visual limits due to dust).

PERFORMANCE REPORTING

The performance of roads is monitored using the Roughness Defect Score (RDS - visual) and Road Quality Score (based on vibration- based road roughness). Performance Reporting is generated using Business Intelligence platforms and analytical services, resulting in dynamic reporting and insights.

The adoption of SmartRoad across 15 open-pit mining operations in South Africa has proven value. A summary of these values, as percentages, is shown below.

Value Element	Opportunity
Productivity Improvement	1% to 2%
Fuel (Energy) Saving	3% to 6%
Tyre Saving	10% to 18%
Water Saving	30% to 95%
Tax Incentive- Section 12I	R0.95 per kWh saved
Energy Reduction	Matched with fuel saving
CO ₂ Reduction	Matched with fuel saving

There are further associated benefits in safety improvement, effective management and control of hauling speeds, and reduction in heavy mining and plant equipment and maintenance costs.

Based on inspection and audit information, ECS develops credible haul road condition baselines, which are used for the continuous businesses improvement projects and business case support. The use of SmartRoad opens up opportunities for cost saving and value generation.

CONTACT US

Dust-A-Side Botswana (Pty) Ltd
Plot 139 Finance Park, Kgale View, Gaborone.
Tel: +267 3114236 | +267 72908575

Europe's coal price rises due to South African strike

The price of importing coal to Europe's largest ports rose the most since May as a strike in South Africa curtails shipments of the fuel during the middle of an energy crisis.



The action by Transnet SOC Ltd. employees is "lasting longer than anticipated and has started to take a serious toll on exports. Re-

cently, coal flows out of South Africa were 600,000 tons, the lowest in more than a year," said Alex Claude, Chief Executive Officer of DBX Commodities in London.

South Africa's troubles dovetail with those of European power producers, who are trying to stock up on coal ahead of winter to make up for dwindling supplies of natural gas from Russia. Traders are relying increasingly on South Africa because European Union sanctions ban purchases from Russia, long the continent's largest source.

"Month-ahead European coal futures rose as much as 11%. They're now trading at

about \$290 per ton, rebounding from an almost seven-month low on 10 October 2022. The jump also may be driven by traders covering shorts or profit-taking after a long decline," said Claude.

The Transnet strike also is hobbling iron ore exports as staff refuse to work unless the company raises their pay. Negotiations are set to continue. "Coal exports to Europe from a consortium that owns the Richards Bay Coal Terminal in South Africa increased to 4.1 million tons in the first half of 2022, compared with 500,000 tons a year earlier," concluded Deon Smith, Chief Financial Officer of Thungela Resources Limited.

WE SELL CABLE

sales@continentalcables.co.za

PRETORIA
012 111 9719
086 166 9000

ALBERTON
011 617 1500

DURBAN
031 304 1417

www.continentalcables.co.za



Ctrack launches Crystal, a game-changer in Online Business Fleet Data reporting



Ctrack has 35 years experience in vehicle tracking and fleet management, and during that time, they have developed a variety of innovative solutions for efficient fleet and asset management services.

Ctrack has completely redesigned and consolidated their offering into a new product, with a big focus on how data is managed and presented. Utilising proven hardware Ctrack Crystal allows for the management of movable assets, no matter how big or small, in a new and innovative way.

“In this day and age, the usefulness of data is determined by how easy it is to make decisions based on that data. Ctrack Crystal takes the guesswork out of fleet and asset management by offering cutting edge tools and functionality in an easy to use format,” says Hein Jordt, Chief Executive Officer of Ctrack Africa.

Cloud-based

By integrating with hardware installed in vehicles, data is now transmitted to the cloud and hosted within the Microsoft Azure environment, a much faster and more secure solution.

An advantage is that there is no software located on devices such as computers or tablets as the platform runs from the device browser, this means added security and seamless transition between a variety of devices using the same user credentials.

Real-time web interface

For fleet managers and business owners, this means tracking and tracing solution in real-time, with live updates every 15 seconds. It is no longer necessary to wait for data to refresh.

Interactive functionality

Ctrack Crystal is user customisable and features improved functionality such as a live map with traffic views, the ability to send a message to the driver and the setting up of user-defined locations amongst a myriad of other options, from one location, all designed to save time and costs. Analytics generated by Ctrack Crystal offers a graphical representation of large data sets, giving insight into your business through prediction models and trends analysis.

Fleet managers are often inundated with data and Ctrack Crystal aims to simpli-

fy operations. With the rollout of Ctrack Crystal, users will be able to choose from a variety of functionality packages and add functionality as their particular needs change, including innovative features like voice commands and live in-cab camera views.

As with many of the functions of Ctrack Crystal the in cab camera system can be paired with Artificial Intelligence software. As an example, this clever software sifts through the data gathered by in-cab cameras and only reports on the transgressions defined by the fleet manager, instead of on every transgression.

New management reports and dashboards

As part of the improved user experience, users will need to make fewer inputs in order to reach the desired outcome. Best of all, the entire solution is fully customisable by the user and according to their own preferences.

The snapshot dashboard offers a high-level overview and highlights the most important areas where attention is needed at that time resulting in quick and decisive decision-making.



This is done by focussing on critical parameters such as what needs to be done today, what assets worked and which did not, presented with graphics, detailing jobs scheduled, jobs remaining, jobs completed, unscheduled jobs, fleet alerts, and geofence visits, amongst others.

Better driver management will result in less risky driving behaviour but better driver engagement and performance, including safer more fuel-efficient drivers.

The optimal management of a fleet of vehicles or moveable assets has a direct bearing on factors such as collision, insurance and fleet costs as well as total cost of ownership which in turn results in better utilisation of vehicles and increased profitability.

Similarly, a fleet health summary gives an easy to understand status on assets and allows fleet managers and business owners to keep a handle on maintenance, servicing and regulatory issues.

The executive dashboard allows decisions to be made more rapidly by highlighting trends based on 72-hour data, selected from any date on the platform, as opposed to the 24-hour view that was given previously. This display allows users to keep an eye on their fleet with readouts of the most pertinent data presented in a manner that makes it easy to understand and utilise in making relevant decisions.

This functionality ensures a 24-hour, 365 days a year view of assets prescribed by the user from anywhere on the planet.

New driver app

A new native mobile app, released alongside Ctrack Crystal, now combines the functionality of Ctrack Mobi, Driver Mobi, Drive and OTR (On-The-Road) into one app that is easy to use yet offers more extensive functionality. The use of this app gives fleet managers true control of their operation from any location. The new Ctrack Crystal app will be available for both Android and iOS devices.

Features include, but are not limited to, two-way messaging, business/private use selection, user-configurable settings, driver behaviour scorecard, pre-trip inspection with photos, jobs (To Do / Completed) with navigation, trip information, an integrated camera solution. This app allows drivers to manage themselves from their smartphone and see their own scores and driver behaviour on journeys.

In the interests of safety certain functionality can only be accessed while the vehicle is stationary. Voice-activated com-

mands similar to Apple Siri add an extra layer of safety for use while on the move.

Conclusion

“Ctrack Crystal is an all-new data processing platform that places operational performance, vehicle utilisation and key result figures based on precise clear data, in the palm of your hand, on the platform you choose, or on the device you prefer,” concluded Jordt. Ctrack Crystal allows the convenient tracking and tracing of multiple assets, and the generation of clear and precise data, all on one easy to use platform. Ctrack Crystal will be implemented in a phased rollout, culminating during quarter four of 2022. Phase one will see the migration of customers using the light product followed by those that rely on the Assist product offering. Customers who sign up for the new Crystal platform will enjoy a seamless transition from their existing solution.

Please download the Ctrack Crystal video here: [Ctrack Crystal](#)

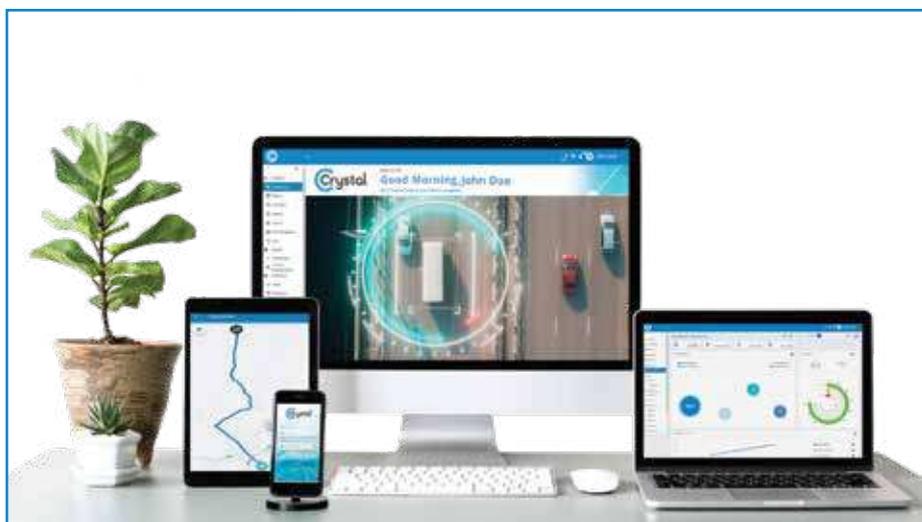
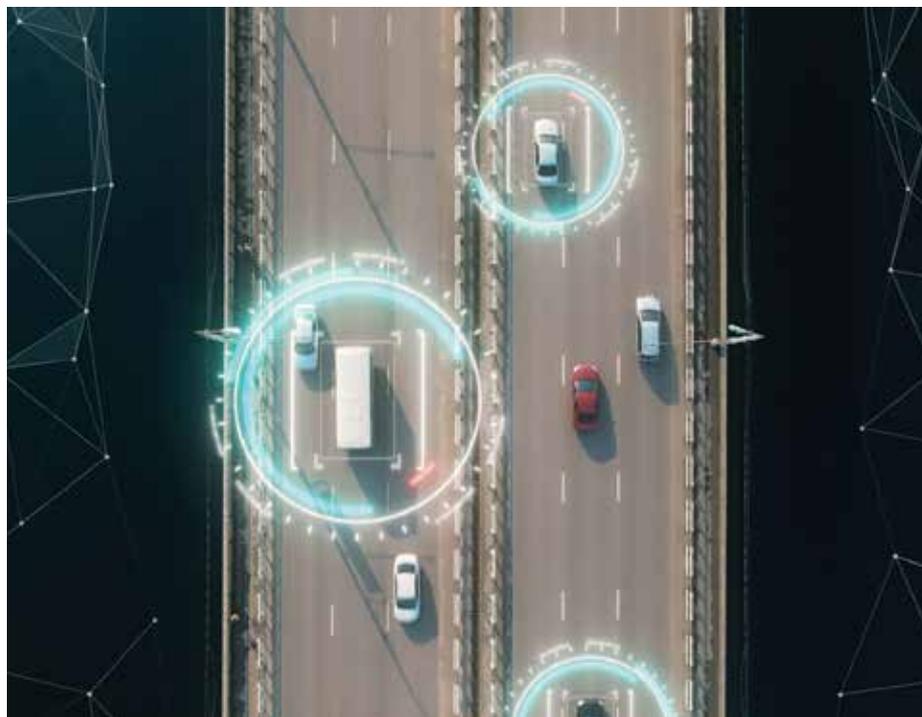
or paste the link below into your browser:

<https://www.dropbox.com/s/g2pi4d1n-8v4i1w3/CtrackCrystalFINAL.mp4?dl=0>

Issued by Wilken Communication Management - Tel: 012-4604448
On behalf of Ctrack South Africa
Contact: +27(0)860 333 444
sales@ctrack.co.za

Contact: Flip Wilken
Wilken Communication Management
012 4604448 / flip@icon.co.za

Ctrack
Raymond Schulz / Chief Executive
Marketing & Sales
012 450 2222 / Raymond.Schulz@ctrack.com





Mozambique's Graphite to be used for U.S

Africa and Mozambique are part of a growing confrontation between the US and China. Mozambique was one of five African countries invited to the United States convened Minerals Security Partnership (MSP) which US Secretary of State Antony Blinken opened on 22 September 2022 in New York on the margins of the United Nations General Assembly High-Level Week.

The MSP is part of the US attempt to control critical minerals for the clean energy transition, many of which are now mainly produced in China. Blinken cited the graphite mine in Balama, Mozambique.

The US Department of Energy (DoE) in an 18 April 2022 statement said, "Graphite from Balama mine will soon be sent for further processing to a plant in Louisiana, where it will create more jobs and where it will provide graphite used for batteries by American electric vehicle companies. The United States is 100% reliant on imported graphite as China produces nearly all the high-purity graphite needed to make lithium-ion batteries."

The DoE is providing \$107 Mn loan to the Australian owners of Balama, Syrah Resources, to build a processing factory in Vidalia, Louisiana, to produce graphite-based anodes for lithium-ion batteries. The DoE said the plant would create 98 good-paying, highly skilled operations jobs within the clean energy sector.

Yet again, Mozambique gets nothing but a hole in the ground, while the manufacturing is in the US. For a critical mineral such as graphite, which the US wants from a non-Chinese source, Mozambique could have demanded that the processing be in Cabo Delgado. But it did not.

But on the same day Blinken spoke, workers at the Balama graphite mine were on strike, as were 100 workers at the nearby Ancuabe graphite mine, demanding wage increases. (Carta de Moçambique 29 Sept) Work at both mines was halted. Miners claim they are being paid less than the mining minimum wage of \$162 per month.

At Balama, local workers first went on strike on 7 September, calling for wage

parity with employees brought in from elsewhere, and for benefits such as health insurance. Zitamar noted that the management of the graphite mine, is largely made up of Mozambicans from outside the region, who were evacuated at the start of September for fear that protests could turn ugly.

And there are warnings that as more people are displaced by the new graphite mines, this could fuel the insurgency, as happened with people evicted from the ruby mines and gas project.

China is cutting back on lending to Africa, which means that 'developing countries in Africa are losing a champion that for years allowed them to borrow at cheaper rates than they could find in capital markets'. (Bloomberg 7 October 2022) China has been particularly important because it lends for long term infrastructure projects such as the Maputo ring road, that could not be funded elsewhere, and funding was without the conditions imposed by the IMF and World Bank.



Accurate down to the smallest grain. Radar for reliable levels in bulk solids applications

From simple to challenging: With radar technology that is highly robust, flexible and economical all at the same time, VEGA is putting things on track to ensure more reliable and efficient production processes involving bulk solids.

Due to our decades of experience we understand the requirements of the industry quite well. That's why VEGAPULS level sensors are able to deliver exact measured values even when conditions get extreme because of dust, noise or buildup. And why they are also ideal for simple applications where efficiency, and economy in particular, are required.

Duroxite® chromium carbide overlay (CCO) products safeguard equipment against wear in severe abrasive environments.

The harder the abrasive material, the more Duroxite® is the solution. Duroxite® overlay products are made by welding a carbide-rich steel alloy on top of a steel plate. This compound material has very high resistance to wear, for example in sliding wear environments where small and hard materials are processed such as rocks or coal with high quartz content.

Wear protection the Duroxite® way

Duroxite® overlay products can add weeks, months, even years of trouble free operations to your most extreme wear situations. The outstanding performance of Duroxite® is the result of hard facing a metal by welding different types of chromium or complex carbides on top of the base material. By carefully composing the hard facing material, each Duroxite® product is optimized for different wear situations and abrasive materials.

Duroxite® 100 made to order

Duroxite® 100 overlay plate is available to SSAB's customers in Sub-Saharan Africa as full-size or cut-to-order plates.

Guaranteed wear performance

Duroxite® has guarantees which are unique for

the overlay market. Duroxite® plates are delivered with a carbide layer thickness guaranteed within $\pm 10\%$. This is consistent throughout the plate and from plate to plate. The high wear resistance is more than skin deep. The wear properties are guaranteed throughout the plate down to 75% of the carbide layer thickness as opposed to just the surface of the layer. The remaining 25% is the transition layer necessary to maintain good bonding to the base plate.

Applications where Duroxite® improves service life and reduces maintenance

Duroxite® products are used in all types of wear-challenged industries, ensuring high productivity and uptime. These are some examples of common applications:

- Chutes and hoppers, liners for truck beds, dozer blades, shovel buckets, dragline buckets and excavators in quarrying and mining operations
- Guide vanes, hoppers, discharge cones for clinker storage bins, chutes and outlet ducts for clinker grinding mills in cement production
- Fan blades and housings and coke vibrating screen plates in the steel industry
- Coal handling chutes, coal feeder liners, crusher screen plates, classifier cones, journal

liners and silo bunkers in power plants.

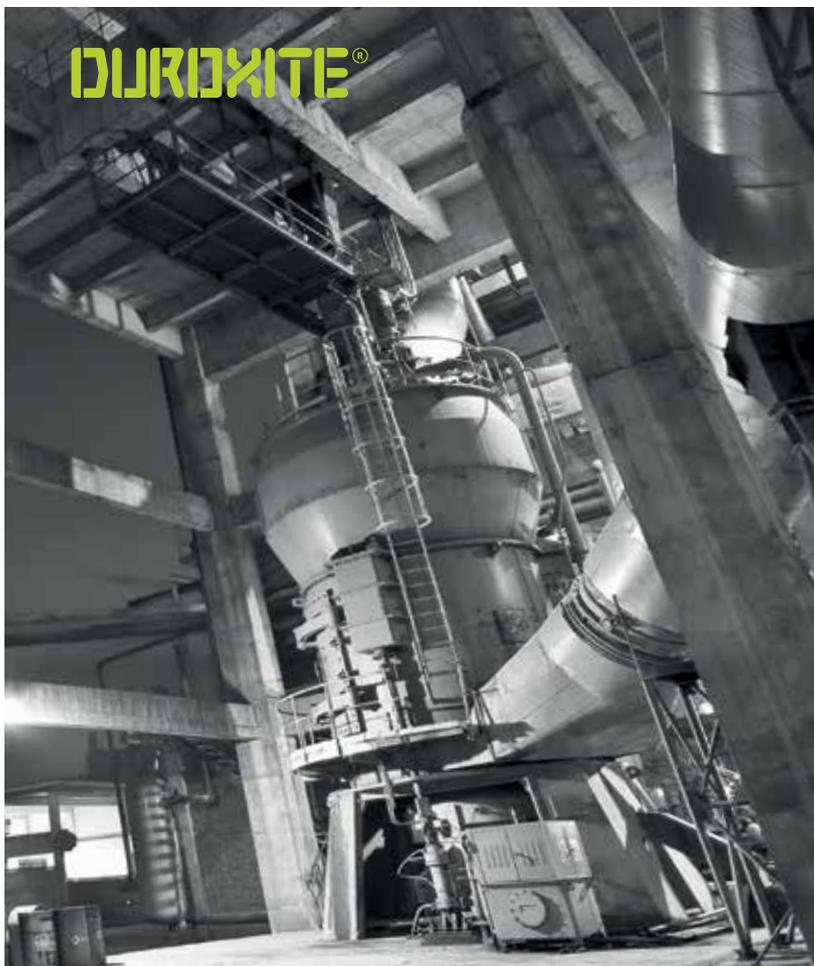
The way of welding overlay products

The hard facing layer is welded on a steel base plate. The base plate in Duroxite® overlays is either mild steel or Hardox® wear plate for additional strength and durability. Duroxite® 101 and Duroxite® 201 both have Hardox® as base plate.

The staggered cracking pattern

When the welds cool, a pattern of fine cracks perpendicular to the welding direction is created. These cracks are intended and don't affect the plates wear resistance. They allow the plate to be roll formed into a curved shape, usually with the hard facing layer on the inside, although it can also be on the outside. Overlay plates should not be bent parallel to the welding strands. Chromium or complex carbides can also be deposited with specially formulated welding wires and stick electrodes. This is commonly used for repair and maintenance, or for producing wear parts such as recycling hammers and teeth for excavator buckets.

Contact SSAB South Africa on: info.za@ssab.com



DOWNLOAD
DUROXITE® DATASHEETS
ARE AVAILABLE BY
SCANNING THE QR CODE,
OR VISIT
www.duroxite.com

THE LATEST IN OVERLAY TECHNOLOGY

FIGHTS WEAR, GUARANTEED

Duroxite® overlay products can add weeks, months, even years of trouble-free operations to your most extreme wear situations. Duroxite® is particularly well suited to fighting sliding wear from exceptionally hard particles such as minerals containing quartz.

FOR MORE INFORMATION
info.za@ssab.com





You know why.



Contact us:





TRUST IS WHAT MAKES OUR NAME OUR PROMISE.

Major industries in South Africa and globally trust Invincible Valves to continually innovate and invest in valve solutions for their industries.

With in-house rubber lining services for valves, pipes, fittings and vessels, we are able to offer complete service, maintenance and reconditioning services with exceptional service, pricing and quality standards.

The bond we have with our customers, coupled with world-class facilities means that the Invincible Valves team is able to continually provide customers with our enhanced services that leads to their profitability.

+27 11 822 1777
enquiries@invalve.co.za
invalve.co.za

LEVEL 1
BBBEE

GENERAL INDUSTRY | MINING | PETRO-CHEMICAL | POWER GENERATION | WATER | SEWERAGE



If its not INVAL®, it's not Invincible