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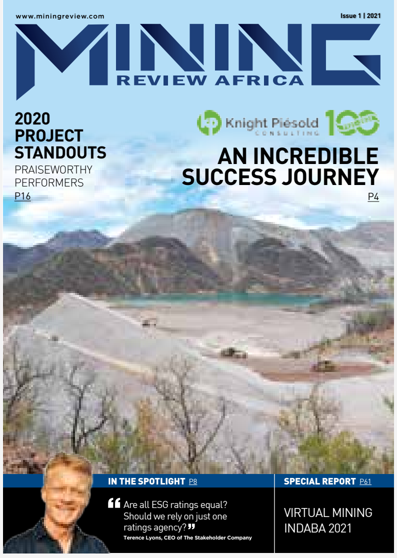

FRONT COVER

This year, Level 1 BBBEE, employee-owned Knight Piésold celebrates a milestone achievement few companies ever realise – 100 years in business. Its journey over the decades has resulted in the establishment of a truly global brand, with a very successful South African subsidiary.

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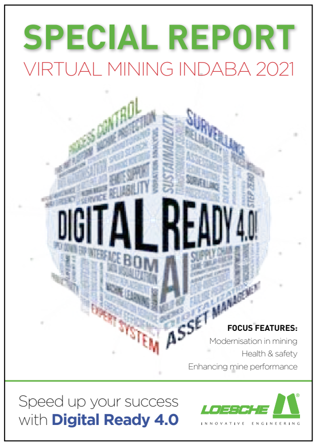

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2021

What we don't and DO know

2021 – what do you have in store for us? It's the burning question we all wish we had the answer to as COVID-19 and the variant new strains continue to drive uncertainty in our day-to-day lives and routines.

As I sit here contemplating our immediate future, and the future of our industry, I naturally have concerns. Lucapa Diamond Corporation announced on 13 January that the Lesotho government had imposed a 14-day lockdown which required that mining activities at its Mothae diamond operation be temporarily suspended. I didn't expect that so early on in the New Year.

Will more countries follow suit? Will more mines suffer the consequences? I really hope not.

In my honest opinion, I do believe that the industry has shown resilience (once again) and in 2020 quickly adapted to the new environment in which we found ourselves. But is it enough and how do we balance the importance of economic stability with the health of our workforces? The list of uncertain and unanswered questions just goes on.

There are a number of vaccines in the pipeline that promise to deliver the solution we so desperately seek. I wonder if mineworkers will make the early cut to receive this as they are essential workers. This of course will become a huge point of interest over the year and *Mining Review Africa* plans to cover the progress of this as it happens.

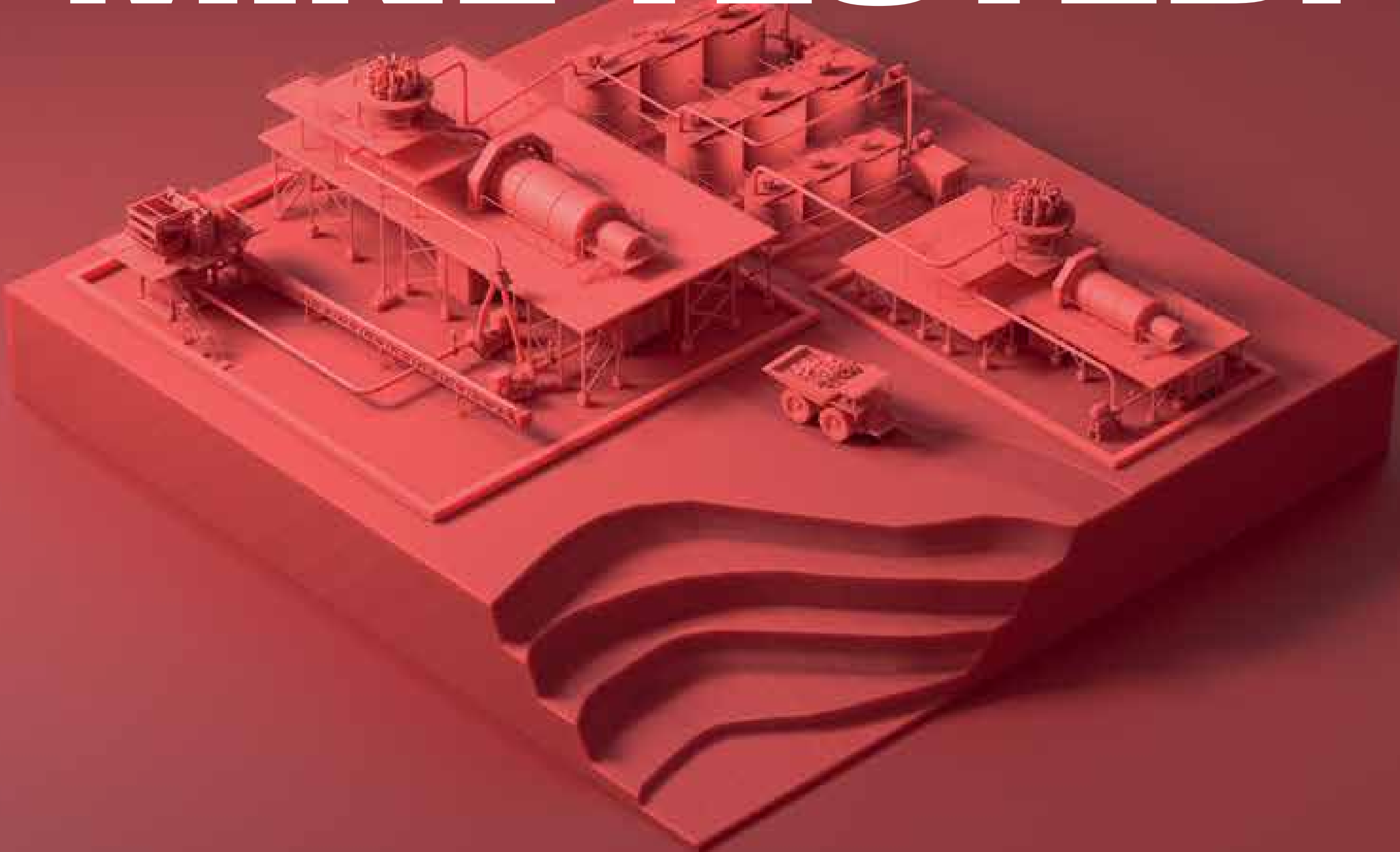

Laura Cornish

No matter what lies in store for us, one thing I am sure of is that we, as an industry, will work through this together and come out on the other side stronger for it. And our first edition of 2021 demonstrates this perfectly. We have provided you with an array of 2020 project leaders who have proven without doubt that despite the trying circumstances they found themselves in, pushing forward without fear and delivering on commitments promised would not be compromised.

These are stories of inspiration and courage and I suggest reading about them if you are looking for motivation or proof that COVID-19 does not have to put a damper on your objectives. These are the stories we intend to bring our readers every month and there are many out there.

Sadly, we won't be connecting in person at Mining Indaba to talk about this further, but there is a whole digital world out there that continues to teach us that we are not completely isolated. So let's explore these options fully and embrace the benefits associated with it – and keep those communication channels open. There is no better way to learn from each other than by connecting. *Mining Review Africa* is here to be the platform bridge that drives this, as we always have been and will continue to be moving forward.

Reach out: let's talk and let's work together to see the industry through this, fearlessly! MRA



Knight Piésold turns 100

An incredible success journey, continued

This year, Level 1 BBBEE, employee-owned **Knight Piésold** celebrates a milestone achievement few companies ever realise – 100 years in business. Its journey over the decades has resulted in the establishment of a truly global brand, with a very successful South African subsidiary. "Today, we proudly proclaim to be one of the oldest African owned engineering consultancy firms in Africa, with an internationally recognised pedigree of skill sets, committed to serving and uplifting the local markets in which we operate," **MD VISHAL HARIPERSAD** tells **LAURA CORNISH**.

It is Knight Piésold Southern Africa's (KPSA) approach to doing business that has largely resulted in the successes it has achieved, and will continue to achieve moving forward. "We are African at heart and we embrace the local cultures of any jurisdiction we operate in. This has resulted in the creation of one of the most progressive, fastest growing and diligent companies on the continent," Haripersad continues.

The company is largely recognised for its mine residue (tailings and heap leach deposition) design and execution capabilities within the mining sector, but its expertise stretches much further, with a well-established footprint and track record of delivering major infrastructure projects as well.

"As we move into the next stage of building another 100 years in the industries we serve, our intention is to deliver on a five-year growth strategy which will see us build our tailings reputation further, while showcasing and delivering our repertoire of infrastructure and geotechnical expertise skills to the African mining sector as well," Haripersad highlights.

In addition to road, railway, port and airport experience, Knight Piésold has delivered a wide range of water and power projects as well – two areas of great interest to the mining sector at present. Cost effective water and power security currently play a significant role in the financial viability of mining projects and this is an area which the company can contribute towards – particularly renewable power projects that offer the industry a greener footprint.

The company has more recently delivered a number of run-of-river hydropower schemes in Zambia and the Democratic Republic of Congo (DRC), regions it has a particularly strong focus on and presence in. "Barrick's Azambi

Installation of lining for a TSF in Tanzania hydropower plant for its Kibali gold mine is the perfect demonstration of what we can deliver in both water and power. The greater central African region would benefit enormously from similar projects."

Why the DRC? Why Zambia?

Knight Piésold's operating model within these two SADC countries demonstrates the extent of its commitment to being a responsible corporate citizen in the regions in which it operates.

"From a business perspective, these regions offer an abundance of work opportunities in the mining sectors specifically. Beyond this they offer our business the opportunity to build a lasting legacy in the countries, one which contributes consistently to the upliftment of communities that in the long term will help grow the country in their own capacity," Haripersad notes. "No project is undertaken by the company without contributing some of our profit margin to local upliftment and empowerment, over and above what is required of us. This identifies who we are."

For example, Knight Piésold was the only consultancy firm in the DRC to provide sanitation equipment to communities during the lockdown period.

"Our objective is to be the largest local consulting firm in the DRC, backed by KPSA and our global group. We want to help engineers train and develop so that in time they can play a meaningful part in building and developing infrastructure and facilities within the DRC and their own businesses. We also want to help more Congolese people to play more meaningful and complex roles both within the mining sector and within the Congolese economy. As one of the few consulting firms fully compliant with the DRC's sub-contracting legal requirements, we are fully capable of driving this," Haripersad highlights.

A renewed focus on TSF structures has delivered new business opportunities for Knight Piésold

"Our objective is to be the largest local consulting firm in the DRC, backed by Knight Piésold and our global group,"

VISHAL HARIPERSAD

A new tailings era

Knight Piésold remains true to its core tailings expertise which will over the next five years contribute towards the revitalisation of unregulated and non-safety conforming tailings storage facilities (TSFs), as governed by the new global industry standard on tailings management which was launched on 5 August 2020.

"This new standard has highlighted a great many areas where existing tailings facilities fall short in terms of safety and possible failures or environment compromising situations. We have already seen a significant uptake in work related to resolving this and we expect this to continue for at least the next five years, providing significant potential for growth," says Andrew Copeland, mining technical director for KPSA.

This work will more specifically include the addition of buttresses to some facilities to extend their lifespans in order that new facilities can be planned, while others will have to be fully retired. This entire process takes upwards of five years. In support of this work, Copeland says the company has also improved its tailings solution

A typical TSF


TSF structure showing underdrainage


Monitoring TSFs have become a critical focus area for mining companies

capabilities by adding software analysis – in terms of modelling, seepage analyses, etc. – to its service offering to improve and support its design work further.

Over and above this, Knight Piésold can also provide tailings facility monitoring and can conduct audits on existing facilities as well as legacy dams. "In South Africa, many of these dams are effectively owned by the government which for now is prioritising the highly toxic dams – especially those related to asbestos and coal mining associated with low pH acid mine drainage," Copeland reveals.

"Fortunately, we are still able to take a risk-based approach for very large tailings facilities – if it looks largely to be safe, with no record of elevated seepage and no history of sloughing, it can stay in operation with more rigorous monitoring and regular test work."

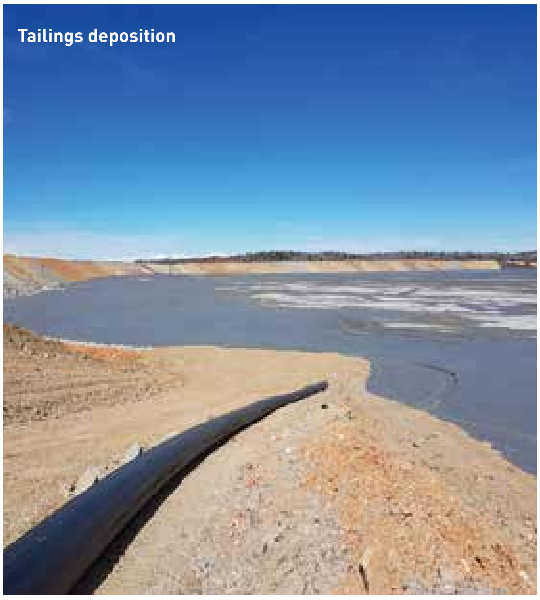
For international mining houses, KPSA is able to collaborate with its global sister companies – providing clients with global expertise that provides comfort in obtaining world class structures.

And while the standard is not legislated, Copeland encourages even smaller mining companies to comply. The expenditure to build a standard-compliant TSF may be a costlier exercise but stakeholders and even insurers are no longer willing to invest in or cover businesses that are not governed by environment, social and governance (ESG) standards – and tailings form a significant component of this. "Compliancy by the global tailings standards is simply no longer negotiable, for anyone."

The delivery of a tailings facility also requires supporting engineering disciplines in the fields of geological work and water management – all of which comprise a part of Knight Piésold's greater service offering. "Without these strong disciplines, the delivery of core tailings design and delivery is constrained," Copeland notes.

As Knight Piésold enters a new decade and work century, it has never been better equipped to meet the environmental needs and project support work to ensure a sustainable mining industry – one that is also supporting greater urbanisation across Africa, which in turn the company is also able to support. MRA

> "Compliancy by the global tailings standards is simply no longer negotiable, for anyone,"
>
> **ANDREW COPELAND**


Tailings deposition


The delivery of hydropower projects in Africa is a key strength for Knight Piésold

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ESG reporting

Are we getting it right?

As the world moves towards a green economy, mining companies' environment, social and governance (ESG) policies and activities are increasingly coming under scrutiny by investors. Funders are now demanding that mining activities are carried out in a more ethical, responsible and sustainable manner. However, there are challenges when it comes to ESG reporting as there is no universal standard that mining companies can subscribe to. As such, the questions that come to mind are: Is ESG being carried out in the right way and does it have the desired effect of attracting investors? **GERARD PETER** reports.

This was a key topic of discussion at a recent *Africa Mining Forum (AMF)* digital event session titled *Managing ESG compliance and investor expectations*. The session featured Rudolph de Bruin, funding partner of AMED Funds; Errol Smart MD and CEO of Orion Minerals; and Terence Lyons CEO of The Stakeholder Company (TSC). It was moderated by *Mining Review Africa's* editor-in-chief, Laura Cornish.

While ESG seems to be getting a lot of attention of late, to a large extent brought on by changing consumer habits, De Bruin stated that the concept is not entirely new. "ESG is about managing your risks. These issues are life-threatening today. If you don't comply with these key factors, then your company is at risk. So at the end of the day, it is a risk management exercise and it is essential."

Weighing in on the conversation, Smart added that ESG is about 'common sense' and about doing the right thing in a business. "If you don't do the right thing, your business will fail and ultimately it will affect the return on investment for investors. ESG is a fundamental part of making money because at the end of the day, we mine to make money and we need to do it in the correct way or we will not be allowed to continue doing it and we won't make money doing it either."

Ratings in the spotlight

While the mining sector grapples with the COVID-19 pandemic, the question is: How are mining companies going to ensure a return on investment while adhering to ESG factors during an unprecedented time?

According to Lyons, the short-term survival goal for mining companies is cash management. "However, this cannot come at the expense of neglecting ESG factors. In light of the pandemic, nothing should change as ESG is good business practice and so it should be business as usual," he stated.

The role of ratings agencies was also firmly in the spotlight during the session, with all three panellists calling for more standardised rating indices across the board. Lyons raised concerns about the authenticity of the rating indices. "The ratings field is completely immature. It is just a series of judgments made by rating agencies."

He cited the example of the various ratings given to electric vehicle manufacturer Tesla. "When it came to environment initiatives, the FTSE Russell ESG Index gave Tesla a 0 while the MSCI Index gave the company top marks. Meanwhile, another agency, Sustainalytics, gave the company an average score. So how does an investor decide which score to take into account?"

Weighing in on the point, Smart advised that there should be a single rating across the board for all mining activities. "What's more, the narrative these days is that investors are holding miners to account. However, when you look at ESG ratings, it comes across that miners are holding investors to account. There needs to be a dual accountability by both investors and miners to adhere to ESG factors," he noted.

Smart also concurred with De Bruin that ESG should be part of a company's overall risk management strategy. "We have to accept that mining has an impact on the environment – not just the ecological environment but also the social environment. But it is about managing the impact in the most positive manner so that there is a justifiable outcome."

Greater understanding needed

De Bruin reiterated that it is important to understand the primary purpose of why mining companies exist: To make money for their investors. However, at the same time, this needs to be done in a sustainable way. "What is very clear is that more work needs to be done, a better understanding needs to be created and there needs to be a strong focus on ESG so that it becomes a part of how mining companies are run," he added.

Smart further stated that downstream users also play an important role in promoting sustainability and good corporate governance. Mines, investors and end users all create the market that miners are trying to create. If we don't get it right, it won't be sustainable and ESG will be just another set of acronyms like CSR."

In closing, Lyons agreed that there is a strong need for a single standard but, at the same time, there can be no one size fits all approach. "Also, we can agree that ESG is not CSR – it is something far deeper and more profound and likely to be more sustainable than CSR.

"We agree that it is not very well defined yet and is not measured properly. Are all ESG ratings equal? Should we rely on just one ratings agency?

"These are all critical questions that will come out of the COVID-19 pandemic because we don't want to see mining companies focus more on their data and ESG management than solving the problems in the first place. So, the question remains: Is ESG the tail wagging the dog (which is the business) or is the dog wagging the tail?" he concluded. MRA

SCAN THE QR AND LISTEN TO A RECORDING OF THE ENTIRE SESSION

"Nothing should change as ESG is good business practice and so it should be business as usual,"

TERENCE LYONS

"If we don't get it right, it won't be sustainable and ESG will be just another set of acronyms like CSR,"

ERROL SMART

"There needs to be a strong focus on ESG so that it becomes a part of how mining companies are run,"

RUDOLPH DE BRUIN

Building back greener post-COVID-19

Investors and investment considerations in the mining industry

Image: 123rf.com

As the world recovers from the coronavirus pandemic, many countries have pledged to 'build back greener'. The green economy therefore has an important role to play in global post-COVID-19 recovery and is opening up new investment opportunities and attracting new investors to the mining industry – an economic sector that will be vital in supplying the raw materials needed to support the growth of the green economy, writes CHANTELLE KOTZE.

This was the topic of discussion at an *Africa Mining Forum* digital event session entitled *Raising lucrative capital for juniors in Africa*. The session was sponsored by diamond producer Catoca and featured Tony Harwood, president and CEO of Montero Mining and Exploration; Brian Menell, chairman and CEO of TechMet; Peter Major, director: mining at Mergence Corporate Solutions; and Tom Attenborough, head of international business development for primary market at the London Stock Exchange.

Africa could play a significant role as a supplier of battery raw materials to support the growth of the green economy, with many junior mining companies (and a few majors) developing battery metals projects across the continent.

Menell, whose focus at TechMet is to gain exposure to world-class projects across the technology metal supply chain, suggests that we can expect massive demand growth on the back of the global energy transition. "We are at the start of a battery metals supply/demand dislocation. If we are to meet even the most pessimistic predicted electric vehicle adoption figures, it will require billions of dollars of

The green economy has an important role to play in global post-COVID-19 recovery

investment over the next five years as well as significantly higher commodity prices to stimulate supply to meet global growth and demand."

Moreover, he says that investors will have to play their part in providing the capital needed to successfully grow the green economy (which will ultimately be an investment into the mining industry in one form or another). In so doing, investors could create a lot of value by engaging in this space because of the supply/demand dislocation and the value creation opportunities inherent in this.

Menell believes that the most exciting metals that will attract the most investment are the ones that will be considered as counter cyclical or at least super cycle driven, such as battery metals. Despite this, investment will continue to be needed in commodities that drive global growth and infrastructure, not only those needed to drive the green economy. Having said that, the big winners will be those commodities that drive the green economy.

Weighing in on this, Harwood agrees that there won't only be massive investment made into the commodities that will drive the green economy, but also those that will drive ongoing global growth more and infrastructure development. "With generally low commodity prices and a lack of investment appetite to drive exploration over the past 10 years, I believe that the post-COVID-19 growth surge will increase demand for raw materials across the board," he says. This, he believes, will in turn spur investment into the junior mining and exploration sector due to the lack of new discoveries and new mines needed to meet the demand.

The fundraising challenge

Despite the clear need for investment in the mining sector, there is however one major stumbling block – the ability for juniors to raise the capital necessary to bring these mining projects into production.

The past decade has been particularly challenging for the junior mining sector to secure funding – with a shift away from being able to raise capital on public markets to having to find alternative sources of capital such as equity, brokers and sovereign wealth funds.

Things are changing however, says Attenborough, noting that one of the side-effects of the COVID-19 pandemic has been to reinforce the value of using public markets to raise capital. While the narrative on public markets has been the difficulty for mining companies to raise capital, the COVID-19 pandemic has made it even more difficult though to raise long term capital through the mining cycles, by means of private equity for example, thus allowing public markets to re-establish themselves as viable sources of funding

Attenborough notes another trend that has emerged from the COVID-19 pandemic, and that is the desire by countries to build back greener and better than before. This trend may be helpful for sources of capital that may not have enjoyed the cyclical nature of the mining industry, who can now instead see the structural changes that will take place over the next couple of decades, which may provide a different investment story. This may lead to a diversification of capital sources in future, which bodes well for the mining sector, Attenborough believes.

Onerous regulations prevent investment, scaring away investors

Harwood says that the single biggest challenge for the junior mining sector, in Africa in particular, has been that countries and their governments have not provided the stability needed by mining companies to attract foreign investment and to deliver on the continent's mineral wealth. Onerous changes to mining laws and legislation have caused a tremendous problem and have led to some discoveries never reaching the point of development, he notes.

Major, a veteran mining engineer and respected mining sector analyst, says that governments in Africa have time and again implemented onerous laws or changed the rules and chased away investors. "South Africa is the poster child of onerous regulations chasing away good mining investment opportunities," says Major.

Menell says that African governments are at a strategically important crossroads and at a moment of very crucial choice. On the one hand, governments can choose to extract more value from the battery metals boom in the short term as it gathers more pace and in so doing significantly limit the extent to which they will be medium and long-term beneficiaries of the global supply/demand dislocation. On the other hand, governments can take a step back and evaluate the longer-term opportunities in which they could become substantial winners by creating a welcoming environment for investment in order to stimulate growth and production. MRA

SCAN THE QR CODE TO LISTEN TO THE FULL RECORDING OF THIS SESSION

INGWENYA
MINERAL PROCESSING

MANAGING ESKOM STOCKPILES MADE EASY WITH INGWENYA SLEWING STOCKPILE CONVEYOR

Stockpile management has never been easier than with Ingwenya Mineral Processing's slew conveyor which is fabricated at the company's in-house workshop and built for reliability and efficiency.

Ingwenya Mineral Processing's slew conveyor can rotate 220 degrees to build five conical stockpiles of 5500 tons each, in an arc. It's standard 900mm slew can stack a nominal of 600 tph of coal and can build one 5500 stockpiles in approximately nine hours.

It stacks **stockpile 1** and then moves to stack on **stockpile 2**, and then when that is complete, it moves to build **stockpile 3**, then **stockpile 4** and finally to **stockpile 5**.

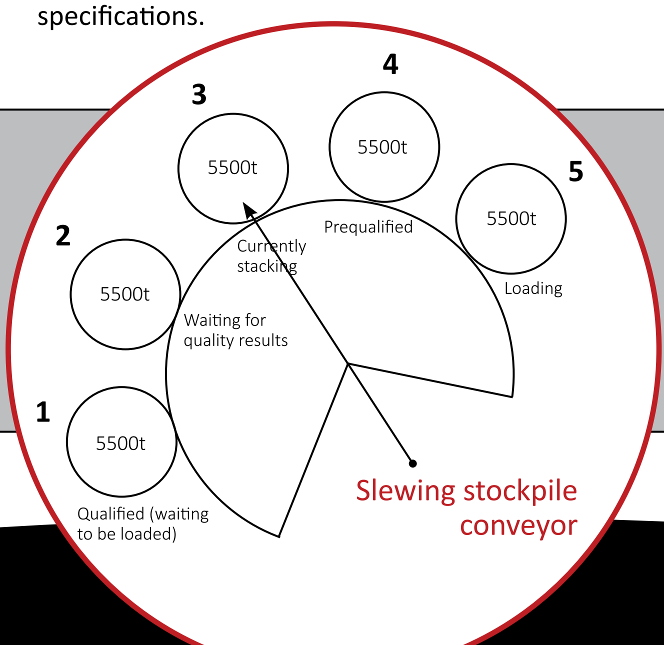
The residence time of the stockpile provides an adequate period for drying, which ensures that the moisture content is according to Eskom specifications.

The slew conveyor is designed with ease of operation and maintenance, and a low operating cost in mind. All safety specifications are in place. It is for these reasons that Ingwenya Mineral Processing's slew is popular with companies such as Universal Coal that has one slew at New Clydesdale Colliery and two at its North Block Colliery; and Palesa Mine where it installed two slewing conveyors.

The Ingwenya slew consists of a 52-metre slewing conveyor which is fabricated at the company's in-house engineering workshop, BOMAX situated in Hendrina.

The slew stockpile conveyor can be manufactured in 900,1050 and 1200mm conveyors depending on the size of the plant. The company's turnaround time for delivery of a slewing stockpile conveyor, associated civils and commissioning is three months.

Ingwenya's slew stockpile conveyor is reliable and efficient. It ensures proper blending which assures efficient quality management of Eskom stockpiles.



Stockpile 1: qualified stockpile: waiting to be loaded;
Stockpile 2: prequalified: waiting for final quality results;
Stockpile 3: currently stacking;
Stockpile 4: waiting to be loaded; and
Stockpile 5: loading.

Operations of Processing Facilities

Feasibility and Due Diligence Studies

INGWENYA MINERAL PROCESSING: 3-PRODUCT CYCLONE SPECIALISTS

Discarded rewash plants are a thing of the past: install a 3-product cyclone and cut on CAPEX and OPEX.

3PC cyclone is versatile, it has high sharpness and wide applicability, suitable for separation of easy-to-wash, middle-difficult-to-wash, difficult-to-wash, and extremely-difficult-to-wash coal.

The design and installation of the 3PC cyclone can be designed to feed either at the top or bottom depending on the orientation of the plant especially in retrofits, for ease of feeding and discharging.

A total yield of 85% can be achieved from a 3-product cyclone (3PC) which consists of a cylindrical cyclone and a secondary conical cyclone in one unit.

Coal and medium are pump-fed into the cylindrical cyclone where primary beneficiation takes place. The discard of the first vessel is immediately fed into the secondary cyclone for beneficiation to recover the middlings and final discard. This process eliminates the need for a discard rewash plant.

Advantages of a 3-product cyclone:

- Produces multiproduct: **A-GRADE** export at CV of 25-27 MJ/kg and Middlings at CV of 19-22 MJ/kg suitable for Eskom, in a single dense medium circuit;
- Low CAPEX (there is no need to build a second plant to beneficiate middling);
- Low OPEX (single dense media circuit, labour costs, and consumables are low);

- Treat various ROM sources;
- Suitable for modular plants;
- Operates at low densities; and
- Can be easily **retrofitted on existing DMS cyclone or drum plants**.

Retrofit

Ingwenya Mineral Processing installed a 3-product cyclone at Umlalazi Coal Preparation Plant in 2008 which is still operating efficiently.

So far, in addition to Umlalazi, Ingwenya has retrofitted three 3PC cyclones at New Clydesdale Colliery (NCC) and two at North Block Colliery (NBC).

- 1000/700; 850/600 and 800/570 at New Clydesdale Colliery; 1000/700 and 850/600 at NBC

The company can retrofit 3PC cyclone to replace either the drum or cyclone in the plant. The modifications are done while the plant is running, and it only takes 12 hours to switch from the normal cyclone to the 3PC cyclone over maintenance day. The switch is done overnight, which ensures minimal loss of production.

The efficiency of the 3PC cyclone can be optimised by adjusting the major parameters of the secondary cyclone such as vortex finder diameter, vortex finder length, and spigot diameter.

For more information, visit www.ingwenyamp.co.za

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2020

The best of Mining Review Africa

The key to ensuring future food security

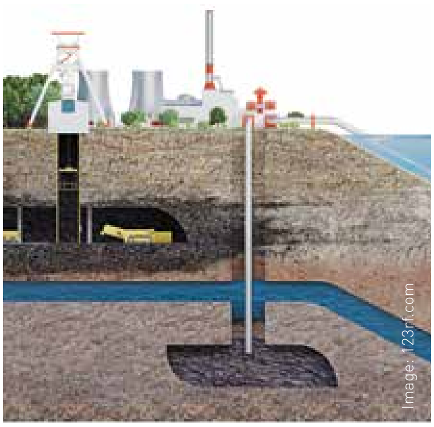
Danakali CEO Niels Wage speaks to *Mining Review Africa* Senior Deputy Editor Chantelle Kotze about how its Colluli potash project, that will soon enter the construction phase, will become a strategic future supplier of premium, high-value sulphate of potash.

Powering mines in Africa

Aggreko is delivering long-term solutions to give mines the most efficient operations and help them overcome geographical and infrastructural challenges.

Optimising shaft performance in mature mines

There is a renewed focus on refurbishing old assets and channelling capital to debottleneck and upgrade shaft and mine projects. Access this webinar recording hosted by UMS Group and *Mining Review Africa* that addressed the challenge of de-bottlenecking vertical shafts to maximise production.

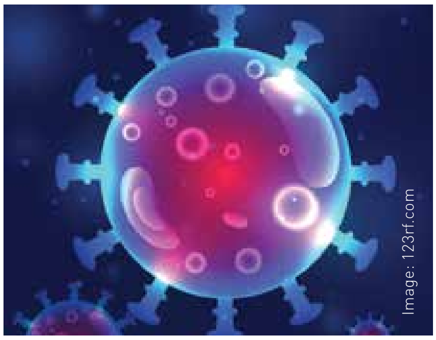


Webinar recording: A 5-year vision for AI in mining

Production uptime, employment, safety, and data management are key words linked to AI, but how can the industry achieve more immediate results when investing in technology to do so?

The new normal: Mining amid the COVID-19 pandemic

It will never be business as usual as South African mines slowly ramp up operations during the COVID-19 pandemic. How do companies ensure that their workers are safe yet still ensure a profitable operation?



Modernisation in Mining

In this episode of the Modernisation in Mining podcast series, *Mining Review Africa* Senior Deputy Editor Chantelle Kotze speaks to Gold Fields South Africa executive vice president Martin Preece,and vice president for people and organisational effectiveness Gerrit Lotz about the importance of equipping people for inevitable digital transformation brought about by the Fourth Industrial Revolution.

XR-rated VR from Accenture: Future-proofing the mining industry

Accenture Smart Operations System integrates best-of-breed technology with components of XR, including augmented reality, mixed reality, and virtual reality. It creates a unique user experience and 'ends distance' by providing an end-to-end overview of the business and all its units and mines that are widespread across remote locations, via an interactive 3D visualisation dashboard.

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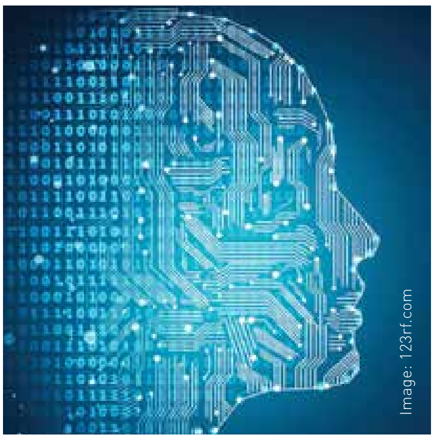
Technology key to the future of South Africa

Spiralling labour and energy costs are putting pressure



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on the financial performance of South African gold mines, but the solution could be found in adopting digital technologies. Most of these new technology solutions revolve around automation, facilitated by the convergence of multiple technologies, from artificial intelligence to robotics.

Uranium: A bull market is under way

The growing uranium supply deficit, currently being accelerated by COVID-19 pandemic related production cuts, has seen the price for uranium skyrocket – making it the world's best-performing major commodity right now.

Image: 123rf.com

Mining health safety – 7 common risks to protect yourself against

"Understanding and being aware of your environment is the first step to preventing illness or injury

Image: 123rf.com

in the workplace," reveals mining medicine researcher Megan Clark, who outlines seven common health risks to watch out for in the mining industry.

We have big plans: Join us on our journey!

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Venetia mine in South Africa showing the headgear

Venetia Underground Project

De Beers' darling delivers in 2020

De Beers Group's US$2 billion **Venetia Underground Project** (VUP): It has been a long time coming but the end of execution is in sight and production start-up fast approaches. In essence, the VUP is a 10-year project designed to transition the mine from open pit to underground and in so doing extend its lifespan by an incredible 23 years – a noteworthy investment designed to ensure Venetia remains one of the company's top performing diamond mines across the globe, VUP project director **ALLAN RODEL** tells **LAURA CORNISH**.

IN SHORT

The Venetia Underground Project is less than two years away from mining its first diamonds – the start of a +20-year lifespan in which it will mine and treat 132 Mt of material and recover roughly 100 million carats.

Situated in Limpopo, Venetia has been producing diamonds since Harry Oppenheimer officially declared the mine operational in 1992. Today it produces roughly 4 to 5 million carats from a ROM production of 5.5 Mtpa.

"Thanks to the VUP, we will maintain this production until 2045. And while this is a significant life extension project already, we believe there is potential to stretch this even further by gaining access below the planned mine levels of one of the two kimberlite pipes. Evaluation work to date indicates the possibility to add another five years to Venetia's lifespan should this be determined viable," says Rodel.

In essence, the VUP entails the design, procurement, fabrication, construction, logistics, etc. of an entirely new mining complex that includes an underground mine and all associated shaft and surface infrastructure.

Surface infrastructure to accommodate the new complex is a significant portion of the entire project and includes a surface terrace hosting a main consumer substation, winder houses and headgears, an office complex, change house, lamp room, proto room, concrete batch plant, surface ventilation fans, compressor house, shaft service workshop incorporating the rope store/skip workshop, fire and process water systems, process water settlers, domestic water tank, process water dam, firewater tanks, ore and waste conveyors and a buffer stockpile.

The underground infrastructure comprises two vertical shaft systems for personnel transport, ore transport, routing of services, lateral levels on 54, 94, 100 and 103 levels and shaft bottoms at 107 level for the service and production shafts respectively.

Once in operation, Venetia's two kimberlites (K01 and K02) will have fully transitioned from open pits to underground operations. The K02 pit's resource is already depleted and the K01 pit should conclude surface mining in late 2021/early 2022 – accommodating a smooth changeover to the underground mine. For now, both pipes will be mined using a sub-level cave method, although Rodel mentions that optimisation work is currently underway to consider the benefits of using the block cave mining method for K02.

The K01 mine – a sizeable ore body measuring 550 m x 120 m – will be responsible for the majority of production, generating an average of 3.5 million carats from about 4.5 Mtpa of material. The K02 ore body – measuring 200 m x 300 m – will fill the outstanding balance, producing roughly 1 million carats from 1.5 Mtpa of material.

↑ **VUP bank area**

> We will be conducting stakeholder engagements with our host communities and relevant authorities covering topics that will shape our transition journey,
>
> **ALLAN RODEL**

Both ore bodies will be accessed through two vertical shafts, blind sunk to a depth of 1 065 m. The service shaft has a finished internal diameter of 7 m and will provide all the services to the underground workings, while the production shaft, also with a finished internal diameter of 7 m, will be fitted with two rock winders, each having two 24 t payload skips. Both the service and production shafts will serve as downcast air intakes to the underground workings.

A decline and pit ramp will assist with early underground access for the construction of the K01 and K02 production infrastructure, concurrent to the vertical shafts. They will also serve as an additional air intake and logistics management facility, mitigating the immediate requirement of the loading stations on the service shaft to achieve the production ramp-up.

Tracking the project to date

As could be expected, COVID-19 and lockdown measures brought some challenges to the project's overall timelines and start-up. "The overall project is largely on track when compared to the 2020 plan, with overall progress at 40% against a plan of 41%. The current variance of 1% is primarily at the bottom of mine development, where resourcing challenges were experienced with the post-COVID-19 ramp-up schedule. The issues causing progress delays have been addressed and productivity is showing improvement. First production is on track for Q3, 2022," Rodel states.

The company is proud of the work it has achieved in light of the COVID-19 constraints. "We are on track according to our adjusted timeframes and the work that the mine has spearheaded within our host communities to best protect their health and wellness has seen significant achievements in their own right," Rodel continues.

There is a transition plan to ensure a smooth changeover from open pit mining to underground mining at Venetia

To date both shafts, being sunk and equipped by Murray & Roberts Cementation, have been completed, alongside +16.5 km worth of excavations. The VUP will construct a total of 54 km of excavations in the expansion project and will construct a further 180 km of excavations over the rest of the underground life of mine.

"The surface infrastructure is tracking extremely well. The change houses, control rooms, winder houses, ventilation system, and state-of-the-art training facility should be completed by Q1, 2021," Rodel notes.

A lot of focus was spent on determining how best to start extracting ore from the underground mine and this led to the De Beers Group introducing a revised ground handling system in place of the temporary rock hoisting system. "The updated ground handling system relies on a trucking fleet to haul production tonnes during start-up. The haul trucks will initially tram to surface via the pit ramp and later to the Top of Mine crusher that will crush the ore for hoisting with the production shaft. After the commissioning of the bottom of mine crushers the ore will be loaded into ore passes and transferred to the crusher using automated trucks," outlines Rodel.

This design has improved the project's sequence and schedule, enabling better access and optimising the development sequence, meaning the onset of production from K01 could be brought forward.

"Our operational optimisation also includes the introduction of the integrated owners team which is supported by a Tier 1 mining and development contractor to help establish world-class systems and processes for the stay-in-business (SIB) capital scope of works," Rodel states.

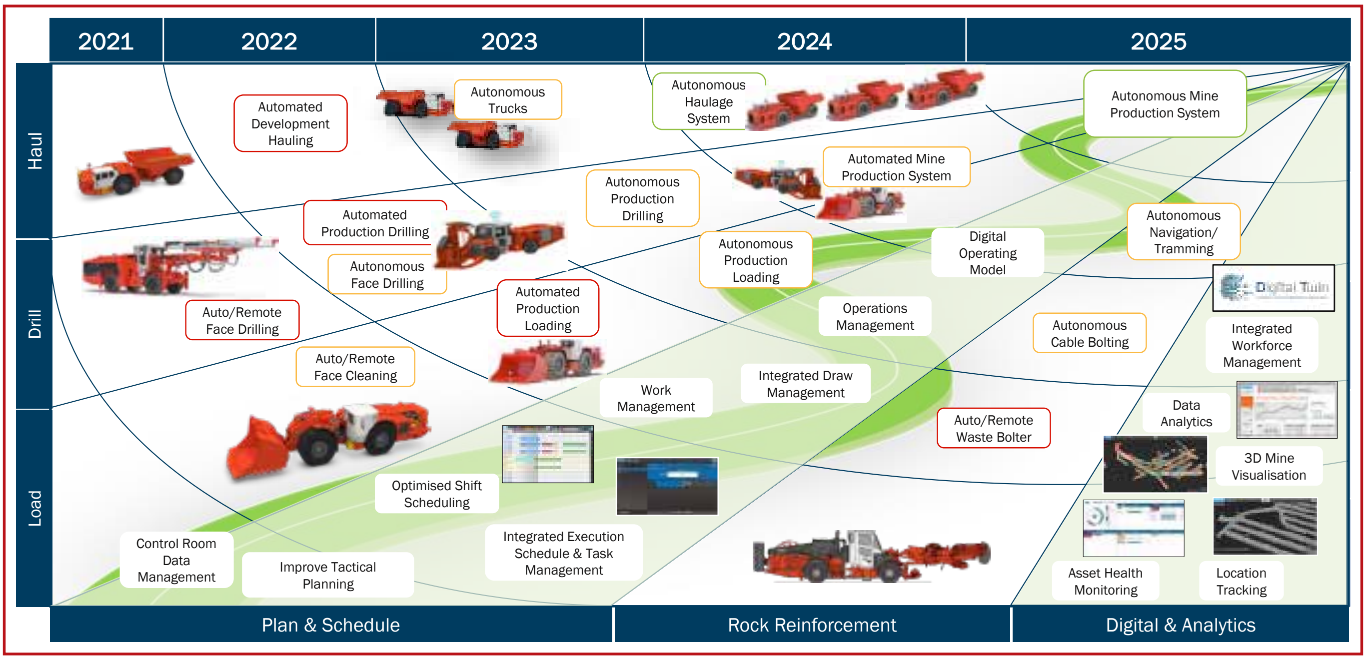
Key focus areas for mining start-up in 2022

There are three keys areas of focus for 2021, and these include development work to start production, the commencement of the SIB scope of works and the ongoing completion of surface infrastructure.

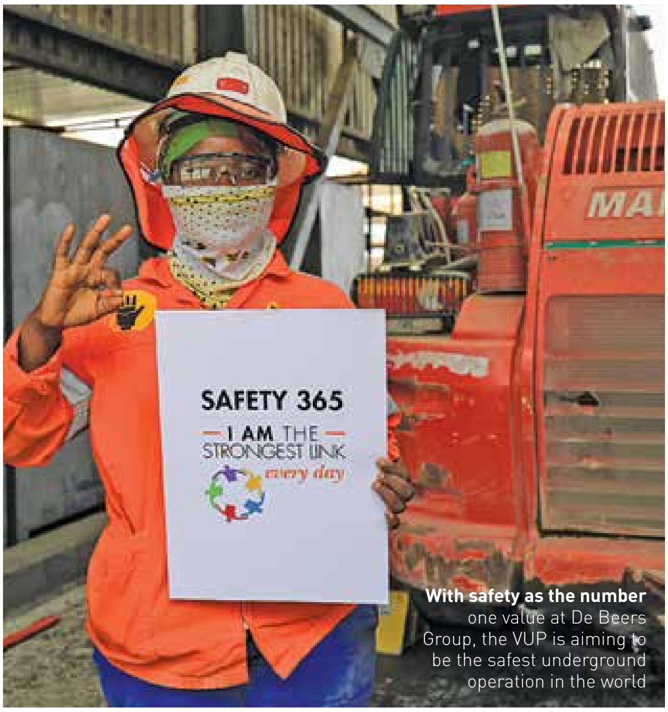
"Our K02 portal development will move forward in 2021 and we must start kimberlite development thereafter towards the end of 2021. The Top of Mine crusher must be completed and the establishment of an eastern decline from the portal to 54 level started," Rodel says.

From an infrastructure viewpoint, Q1, 2021 is scheduled to see completion of the control room, the change house complex and the training centre, followed by completion of the production shaft winder and bulk air cooler in Q2, 2021.

"The SIB programme will see the start of ramp-up in Q1, 2021 as the first



↑ **VUP's technology roadmap**



With safety as the number one value at De Beers Group, the VUP is aiming to be the safest underground operation in the world

pre-production primary fleet is commissioned. By year end we should be reaching steady state in terms of SIB development," Rodel explains.

Beyond the next 12 months, the transition plan will take significant leaps in its journey to a world-class underground operation:

Approximately 150 open pit employees are being transitioned to underground. The process of transferring them starts with medical fitness screening and heat tolerance testing. The successful employees will be cognitively assessed, before being released to an underground training facility. The tailored training programme enables them to meet minimum compliance obligations for working underground, in line with regulatory requirements. They will be further trained to acquire provisional licences prior to proceeding to practical training on trackless mobile machines (TMM). Those at supervisory level will be trained in line with Mining Qualification Authority (MQA) for the relevant qualifications.

"We will be conducting stakeholder engagements with our communities and relevant authorities covering topics that will shape our transition journey. The underground project has added 2 000 job opportunities annually since inception, and this will ramp down during the next four to five years as construction is completed. We are making our communities aware that the project will come to an end, and we are engaging them on initiatives that will generate economic activities away from the mine."

Other aspects of engagement include programmes to meet the housing needs of employees and skills development, including new recruits from the labour sending communities.

To manage the change, De Beers Group has introduced programmes aimed at assisting employees to cope and adapt. This includes a specialised change management programme that will involve change resilience workshops for employees.

New mine, new technology

Introducing a world-class mine within the industry requires the adoption and incorporation of the latest technology and De Beers Group has done just that.

"The VUP will have fully automated drilling, loading and hauling equipment – which we will introduce incrementally as the operation starts and ramps up. Our plan more specifically entails starting with the use of automated and autonomous equipment and thereafter introducing autonomous mining systems," Rodel mentions.

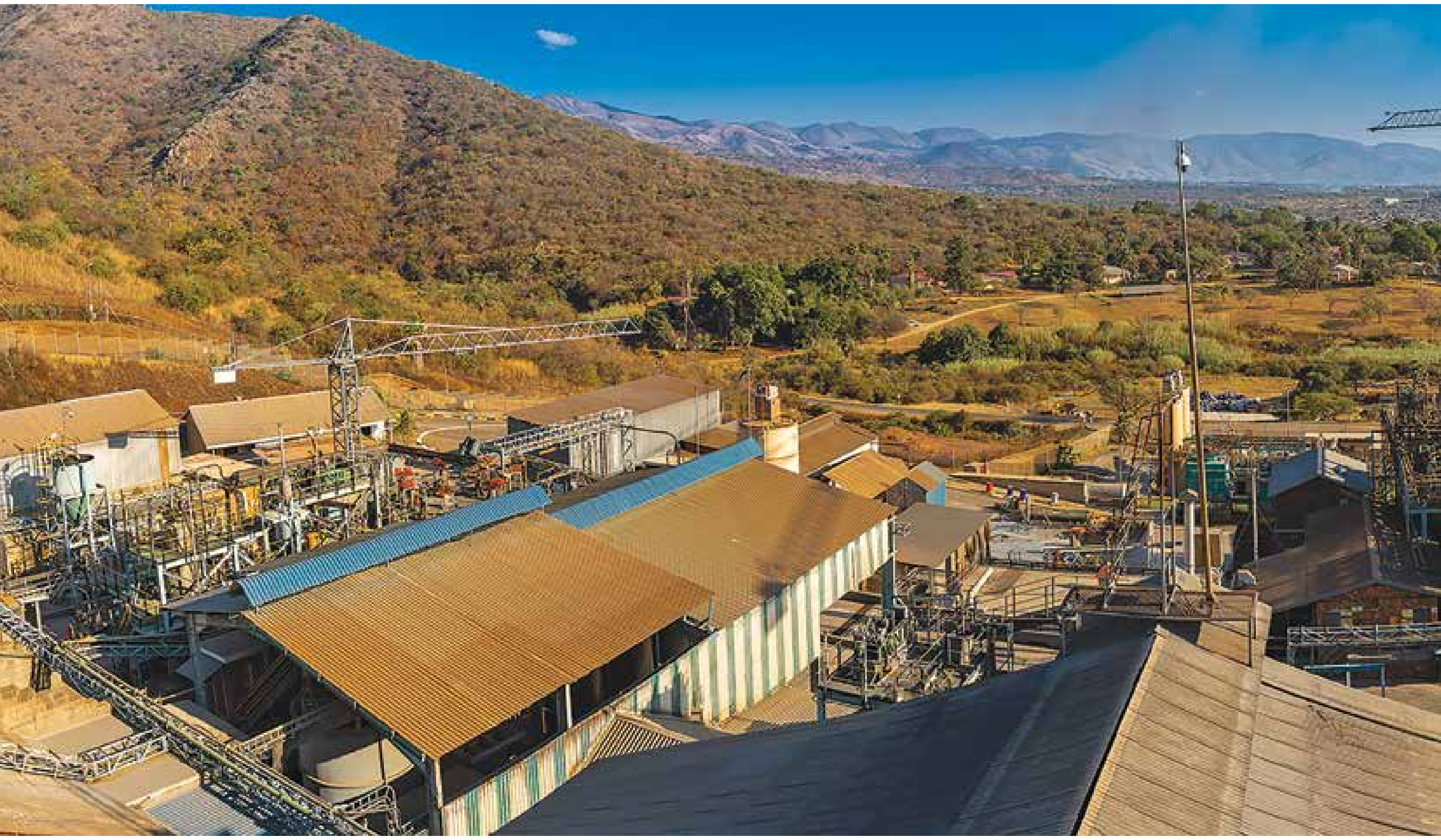
Naturally this is accompanied by a technology development and implementation roadmap encompassing asset health monitoring, data analytics, 3D mine visualisations, machine analytics, etc. "Not only will this deliver the best health and safety results for our workforce and reduce the need for physically demanding jobs but it will also increase the demand for higher technical skills."

De Beers Group, in consultation with its majority owner Anglo American, selected underground automation specialist Sandvik to supply all autonomous equipment for the VUP.

"This is a strong partnership with an experienced supplier in the field and this provides us with the comfort of knowing we will be able to target the highest possible productivity – the improvements of which can result in either higher output from the mine or producing the same output but with less equipment, resulting in capital savings," Rodel highlights.

The exposure to industrial information and telecommunication technologies, robotics and artificial intelligence, which is at the heart of automation, creates numerous employment opportunities of a technical nature. Thus automation brings about a shift from operational to technical skills and through this exposure, experienced individuals are much better positioned for employment in a technology-driven economy (Industry 4.0).

The skills required to drive an automated mine however are substantially different to those required to manually operate any machinery, and more so after an open pit environment. "To remove this barrier, De Beers Group has embarked on a journey to prepare its workforce for the transition – this will include on-site and off-site transition training teams as well as a full change management process as mentioned." Off-site training will be conducted at Murray & Robert Cementation's Bentley Park training facility in Carltonville. MRA



Egoli

The next frontier at Pan African Resources' historic Evander gold mine

IN SHORT
The Brownfield Egoli project will breathe new life into Pan African Resources' historic Evander gold mine complex in Mpumalanga, South Africa.

Many believe that South Africa's gold heyday is long over and that striking gold of any significance in the country's historic goldfields may be a fool's dream. Mid-tier gold producer **Pan African Resources (PAR)** is proof that the sun hasn't set on the sector, having recently discovered an exceptionally high-grade ore body at its Consort mine within the historic Barberton Greenstone Belt – the site of South Africa's first gold discovery, which later led to the 1880s gold rush, writes **CHANTELLE KOTZE**.

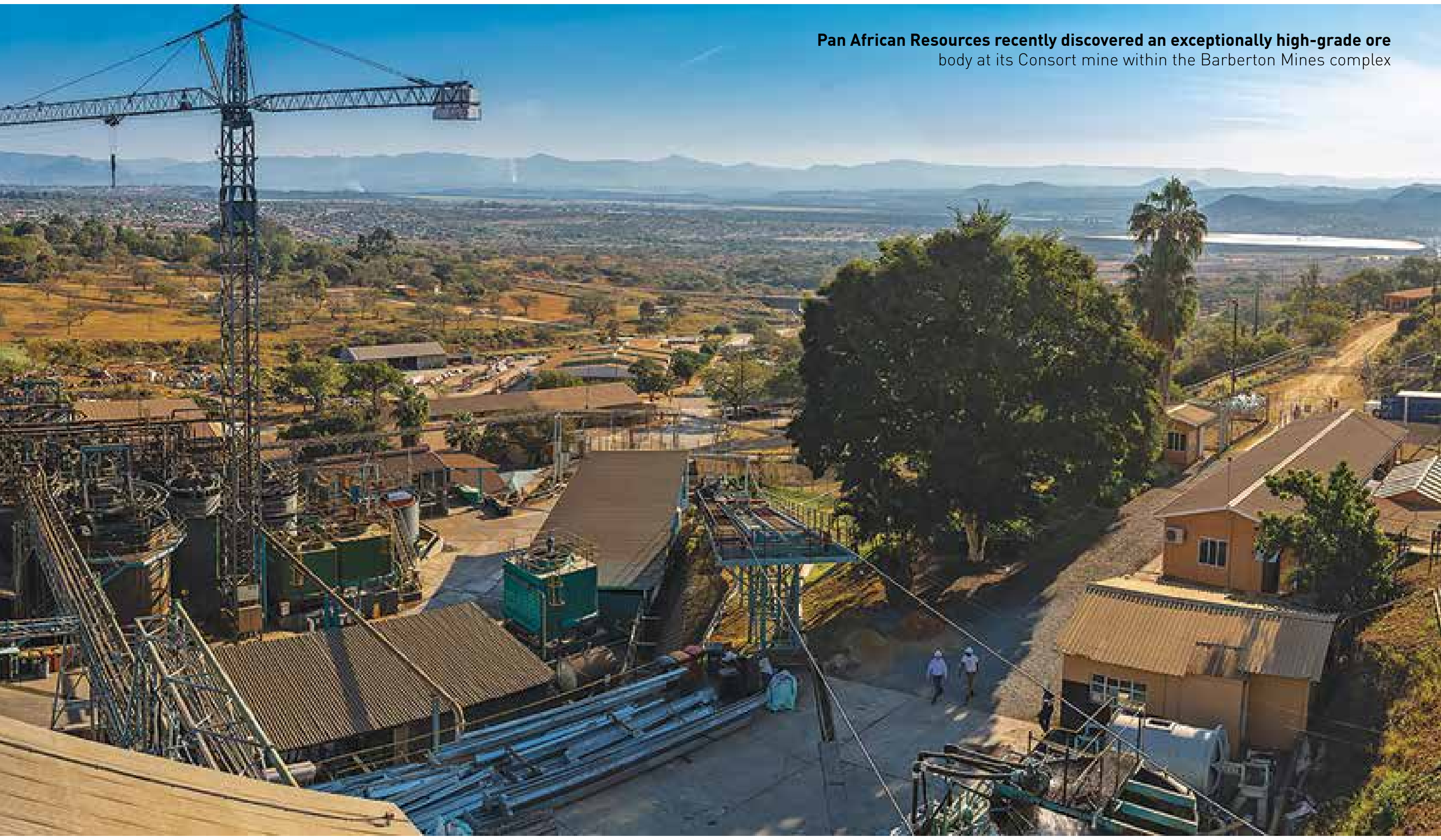
This is not the only historic gold mining area into which PAR is breathing new life: it is also doing so at its Evander mine.

By conducting exploration and feasibility work at its existing assets, the company has built an exciting pipeline of organic growth opportunities – including in the Consort, Fairview and Royal Sheba mines at Barberton and the Egoli project at Evander.

Not only is the company reviving and redeveloping these historic assets, it is doing so with a completely future-focused business strategy, one that unlike its predecessors focuses on sustainability through also investing in local communities and minimising the impact on the environment – creating a positive gold mining legacy in South Africa.

At its Evander mine, PAR is currently underway with the 8 Shaft pillar mining project. As underground mining began to slow at the shaft, the company was faced with either shutting it down or finding an alternative way in which to maintain production and retain jobs.

Mining of the 8 Shaft pillar commenced in the 2020 financial year and achieved steady-state production during May 2020 (as opposed to March due to COVID-19 lockdown restrictions), following the completion of the shaft



Pan African Resources recently discovered an exceptionally high-grade ore body at its Consort mine within the Barberton Mines complex

tower construction between 14 and 16 Levels at this shaft. The project is expected to contribute an average of 30 000 oz/pa of gold production over the next three financial years at an expected all-in sustaining cost (AISC) of below US$1 000/oz and will act as a springboard into the Egoli project.

Egoli – worth its weight in gold

As part of its strategy to further reduce costs and increase margins at its underground mines, PAR will extend the life of the historic Evander mine and leverage off of the substantial existing shaft and plant infrastructure by investing into the development of the long-life Egoli project – which is situated within Evander's existing mining right, valid until 2038.

PAR completed an independent feasibility study for Egoli in 2020, which found the project to be viable with potentially compelling economic returns – surpassing the findings of previous technical and financial assessments.

The underground project has an expected initial life-of-mine of approximately nine years and is expected to contribute between 60 000 and 80 000 ozpa over its lifespan at an average head grade of 6.61 g/t, reaching steady-state annual production of 72 000 oz in the second year at an AISC of <-$800/oz. This is based on the current proven and probable mineral reserves and indicated mineral resources, but excludes the additional inferred mineral resources of 6.26 Mt at 9.68 g/t (1.95 Moz), which will be accessed once underground development is in place – potentially increasing the LOM to 14 years.

PAR CEO Cobus Loots believes that Egoli is likely to be South Africa's least complicated underground gold mine with low execution risk, noting that the Brownfield project only requires 600 m of underground waste development.

Existing infrastructure will be refurbished and utilised, including the twin vertical shaft system which extends 1.6 km below surface to 15 level, 7 Shaft hoisting infrastructure, and the Kinross processing plant (300 m away from 7 Shaft), while the mining method to be employed will be conventional breast mining with on-reef access development done with trackless mobile machinery.

Pan African Resources has a future-focused business strategy

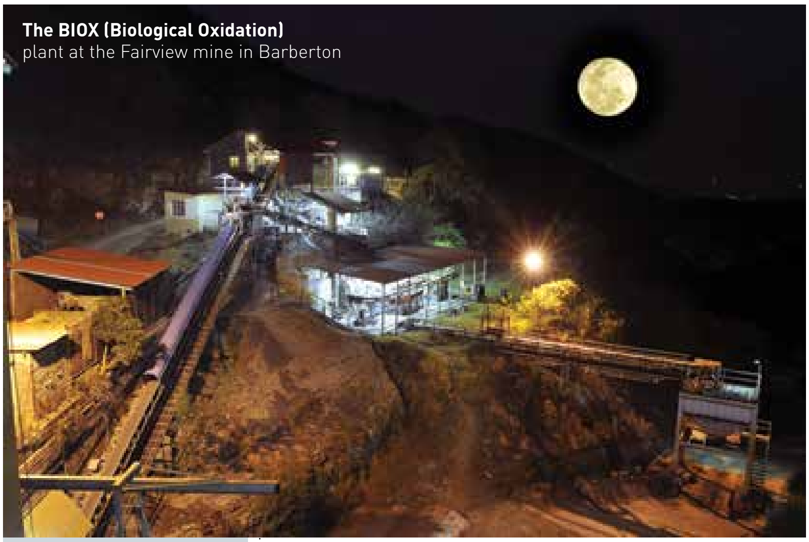
First gold is anticipated in the twentieth month of the project, commencing with ramp-up to steady-state production over the following 16 months, says Loots.

The Egoli project, which requires significantly lower capital investment when benchmarked against other development projects of similar scale, obtained credit approval from Rand Merchant Bank (RMB) for the first phase debt funding of the project's capital expenditure.

The funding structure will comprise two phases and will be repaid over a period of two years post commissioning from the Egoli project's cash flows. The first phase entails a debt tranche of R400 million (for which RMB has provided the full commitment) to dewater the 7 Shaft decline, equip the decline and shaft and conduct the initial mine development. The second debt tranche of R800 million will be utilised to fund the balance of the project's development over the remaining term of the three-year construction period.

According to Loots, what makes Egoli a relatively simple mining operation is that the infrastructure is significantly less complicated than at other South African gold mines. The mine effectively comprises one vertical shaft, a 2 km haulage to the start of the decline and a single decline to the ore body – located 2 km below surface.

The next phase of work in the development of Egoli is the completion of the detailed project scheduling and planning and the commencement of project development, once funding is finalised. Meanwhile, the broader focus at Evander will be to sustain steady-state production levels at the 8 Shaft pillar and commencing with exploration to delineate additional shallow organic growth opportunities within the existing Evander mining right. MRA



The BIOX (Biological Oxidation) plant at the Fairview mine in Barberton

Pan African Resources' flagship Elikhulu tailings retreatment plant at Evander

"Egoli is likely to be South Africa's least complicated underground gold mine,"

COBUS LOOTS

INCREASED FOCUS ON SUSTAINABILITY

The PAR board has approved the construction of a 10 MW solar photovoltaic plant at the company's flagship Elikhulu tailings retreatment plant at Evander. This will contribute to a more reliable power supply during daylight hours and is expected to materially reduce electricity costs at the operation after its 12-month construction period.

Moreover, the solar plant will also contribute to the sustainability of the operation, help reduce the carbon footprint and further reduce operating cost at Elikhulu – which is one of the lowest cost producers of gold in Southern Africa at an AISC of around <$700/oz.

Loots says that the solar plant could be expanded to cater for the power requirements at Egoli.

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Perseus Mining Comes of age

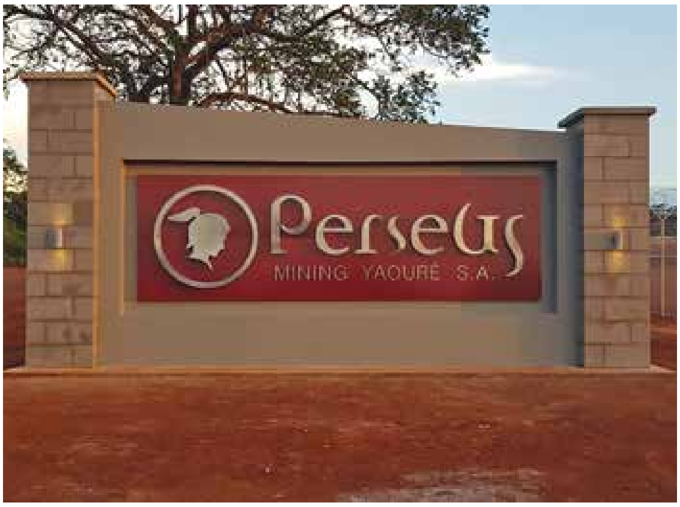
Yaouré hits its early-stage production mark

The end of December 2020 saw ASX-listed gold miner **Perseus Mining** again fulfil its commitment – to deliver its third operating mine, Côte d'Ivoire-based **Yaouré** before year-end according to its stretch target (the company achieved similar results at its **Sissingué** operation in January 2018). Having poured first gold on 17 December, five weeks ahead of schedule, the company is on track to meet its 500 000 ozpa production target by FY, 2022, MD and CEO **JEFF QUARTERMAINE** tells **LAURA CORNISH**.

IN SHORT
2020 represents a significant and company-changing year for Perseus Mining – with its third operation (Yaouré) now in production the company is on track to become a mid-tier gold miner.

Delivering a larger-scale gold mine in a year plagued with COVID-19 challenges makes the delivery of the company's 90% owned, US$265 million Yaouré mine ahead of schedule even more impressive and cements Perseus Mining's position in Côte d'Ivoire and indeed, West Africa. (Sissingué is also based in Côte d'Ivoire, as is a large portion of the company's exploration assets, having acquired Exore Resources in September 2020).

There can be little doubt now that the company will achieve its 500 000 ozpa gold production target, in turn establishing the company as a multi-



Plant construction was minimally interrupted due to COVID-19

jurisdictional, mid-tier, vertically integrated gold miner (by international standards), capable of exploring, building and operating gold mines in West Africa.

"Yaouré is clearly a very important piece of the Perseus puzzle – further diversifying our portfolio while generating substantial quantities of cash to feed back into the business and give back to our shareholders," Quartermaine starts.

"It adds significantly to our production portfolio. Over and above this the mine is likely to be a very long life asset. We've hardly scratched the surface of the mineral endowment on the property and will do a lot of work in this regard to extend Yaouré's lifespan beyond the current eight and a half years currently indicated in the feasibility study," he continues.

The delivery of Yaouré under trying conditions

While peak construction at Yaouré was minimally impacted due to COVID-19, fortunately the result of EPCM contractor Lycopodium securing all equipment items prior to any country lockdown (for the most part), Quartermaine notes the project was not without its challenges.

"Nonetheless, we improvised to minimise the impact. Commissioning start-up for example commenced in late October and was done using stand-by generators." Permanent power was switched on on-site on 21 November.

At the peak of construction, there were over 2 000 people on-site at one stage – many from local villages where health control procedures were difficult to manage. The company enforced a quarantine period in the capital city of Yamoussoukro. Regular health and temperature checks were conducted in addition to enforcement of social distancing and wearing masks. "We were vigilant with the protocols we deployed and to date have only encountered three positive COVID-19 tests. Expatriates unfortunately weren't able to travel home, some of them working between 14 and 16 weeks without leaving the site. Despite the stress, our team were determined to see the job through and did so with full commitment."

> "Yaouré is clearly a very important piece of the Perseus puzzle – further diversifying our portfolio while generating substantial quantities of cash,"
>
> **JEFF QUARTERMAINE**

Consequently, first ore was passed through the crusher on 12 November, and first ore delivered to the mills on 27 November. This saw the company recover just over 2 000 oz of gold during the first nine days of December.

Initially, lower grade oxide ore, mainly from decommissioned heap leach pads, will be processed in the Yaouré plant pending access to higher grade fresh ore from the CMA pit. "During the first five years of the mine's lifespan, our DFS forecasts annual gold production averaging around 215 000 oz at 2 g/t at a weighted average all-in-site-cost of (AISC) of approximately US$750/oz."

An updated 'Life of Mine Plan' for Yaouré, taking the actual commissioning date, current mining rates, operating costs and possible increases in mineral resources into account from nearby satellite pits, is scheduled for release in the March 2021 quarter.

YAOURÉ HISTORY

Perseus acquired Yaouré when it merged with Amara Mining in April 2016, following which the company completed an extensive programme of confirmatory drilling and test work and prepared a definitive feasibility study (DFS). After permitting and negotiating a Mining Convention with the Ivorian government, construction of the mine started in August 2019.


Waste mining is ahead of schedule

The process plant ramp-up is progressing well and the mine has successfully hit targeted throughput rates for short periods of time. Mining is going exceptionally well, Quartermaine points out. "We are well ahead of schedule (30%) in terms of moving material – a big task considering we need to remove waste material out of the CMA pit to expose fresh ore. This means there is a good chance of mining fresh ore a few months ahead of schedule – all further contributing to the success of the project and the returns we can make to our stakeholders."

Exploration work has taken equal priority on site – there are a number of pits on the surface and potential for underground off the side of the CMA pit and the intention is to gain access to these areas as quickly as possible.

As such, Perseus Mining conducted a three dimensional seismic survey over the Yaouré property in 2020 to delineate bigger ore body structures to help refine target areas for drilling. "The results observed to date have been eye-opening and our geophysicists are excited about how our ore body dips down and along strike. If the ore body carries the same mineralisation beyond the pit boundaries, we could have a sizeable underground mine," Quartermaine enthuses. In light of this, the company will commence with a sizeable drilling campaign in H2, 2021 once the satellite pits have been confirmed and scheduled.

"Being able to successfully develop the Yaouré gold mine, ahead of schedule and under budget during a year in which the COVID-19 pandemic has severely disrupted many businesses around the world, is a testament to the skill, resilience and dedication of our in-house development team, technical and commercial support staff, our contractors and consultants," Quartermaine highlights.

"We are now looking forward to achieving our next target of increasing our production to more than 500 000 oz of gold per year at a cash margin of not less than $400/oz in FY, 2022. We will also extend our capacity to consistently produce gold at these levels for many years to come by organically increasing our ore reserve inventory through successful near-mine exploration programmes across our three mines," he concludes. MRA

SOLID PLAY IN CÔTE D'IVOIRE

In June 2020 Perseus Mining announced its acquisition of 100% of Exore Resources – thereby acquiring approximately 2 000 km² of highly prospective land in northern Côte d'Ivoire, near Sissingué. Exore acquired an 80% joint venture in exploration permits that make up the Bagoe and Liberty projects, which cover 816 km², from Apollo in December 2018. Exore subsequently expanded this position to approximately 2 000 km² through additional earn-in and joint venture agreements with local Ivorian groups.

A JORC-compliant mineral resource at Bagoe (conducted by Exore) comprises indicated mineral resources of 0.75 Mt at 3.5 g/t for 90 000 oz of gold contained, and inferred mineral resources of 5.85 Mt at 2.3 g/t for 440 000 oz of gold contained.

Since completion of the transaction at the end of September, Perseus has mounted an exploration programme in order to update the resource and then proceed with a DFS at Bagoe with the intention of processing the ore at Sissingué and extending the operation's lifespan.

Firefinch acquired Morila and poured first gold in the space of a month

Firefinch's Morila

Soaring swiftly to greater heights

It has been a busy period for ASX-listed gold and lithium junior **Firefinch** (formerly known as Mali Lithium). In the space of a month, the company underwent a name change, acquired a producing gold mine and poured first gold. Executive chairman **DR ALISTAIR COWDEN** points out to **GERARD PETER** that this remarkable achievement of transitioning from an exploration company to a gold producer can be attributed to taking advantage of the lucrative opportunities the company has been afforded.

IN SHORT
The Morila mine, which has sat dormant for years, is forecast to produce approximately 26 350 oz of gold from November 2020 to the second quarter of 2021.

Firefinch has been active in Mali since 2011. The company first entered the country in pursuit of gold; and then, in recent years, it shifted its focus to lithium, concentrating on developing its Goulamina lithium project in southern Mali. However, by late 2019, it had become clear that the lithium market was in trouble. "We saw one major lithium mine in Mali move onto care and maintenance and several others cutting production. Downstream processing plants that were being built for large sums of money were also not being completed while others were shut down, further proving that the lithium market was in a downturn," explains Cowden.

Subsequently, the company's focus switched back to gold, in particular developing its Massigui gold project which partially surrounds the Morila gold mine, previously owned by Barrick and AngloGold Ashanti. Since it went into production in October 2000, Morila has produced 6.9 Moz of gold. The mine transitioned to a stockpile treatment operation in 2009 and began processing tailings in 2013.

Previous discoveries at Massigui supplied ore to the Morila plant and generated revenue for Firefinch via a royalty agreement.

The deal to acquire Morila came about following drilling work on a site that Firefinch was granted access to, thereafter making a discovery. "We then approached Barrick to put a similar royalty deal in place. However, the company was no longer interested in the asset considering the substantial volume of tailings that had built up over a ten-year period.

"Having received Barrick's blessing to conduct further due diligence, we were satisfied and put in the place the groundwork to raise the necessary cash to acquire the mine. We raised A$74 million which allowed us to pay Barrick and AngloGold Ashanti. We then also held back some working capital to start implementing a production strategy for Morila," Cowden explains. As a result, Firefinch now owns 80% of the mine, while the remaining 20% is owned by the Malian government.

Morila's inferred mineral resource is 1.3 Moz and Cowden believes that there is strong potential to increase this resource. The mine is currently producing 50 000 ozpa of recovered gold from tailings; however Firefinch plans to grow production from re-commencing open pit mining at satellite pits and the main Morila pit itself as well. Production from tailings is expected to go up to May 2021.

In November last year, the company announced its first gold pour only a few weeks after it had acquired the mine. At the time of writing, Morila was producing gold above forecast in its first month of operation. Tailings retreatment, mining and processing is operating as planned, the company is achieving grade in line with forecasts, and tonnage is above forecast. Production for the first month of operation amounted to 4 130 oz of gold at an approximate All-In-Sustaining Cost of US$1 000 – $1 100/oz.

The mine is forecast to produce approximately 26 350 oz of gold from November 2020 to the second quarter of 2021 and there is excellent potential for near-term growth in production and mine life.

Morila vital for Malian economy

Firefinch's acquisition of Morila bodes well for Mali's economy. Prior to its acquisition, the mine was scheduled for closure this year. "Over

20 years, Morila has put around $3 billion into the Malian economy through taxes, royalties and wages," Cowden adds. Also, the company has re-employed all of the mine's employees. Meanwhile, the surrounding communities have expressed gratitude that the mine will remain open and Cowden states that Firefinch will continue to support communities through CSI initiatives and job creation just as the previous mine owners have done.

Given the fact that Firefinch's Massigui project surrounds Morila, Cowan believes that the two projects will almost certainly end up becoming one larger complex. Regarding Goulamina, Cowan states that the project remains a key part of Firefinch's plans. "The lithium market is difficult but Goulamina is a world-class asset and has a life-of-mine of around 23 to 24 years. So, we will take our time and find a way to develop it, possibly through a partnership. There's no panic to do a deal and we will continue working on it to make sure that it gets better and better."

Firefinch's acquisition of Morila comes at a time when the gold price is at peak levels. Cowden believes that this has also been a key factor for a renewed focus on the mine. "When the gold price was around $500/oz, I would agree with Barrick and AngloGold Ashanti and not put a penny into developing the mine. It just hasn't had any attention for quite a long time because it has been in closure mode and no one was going to spend a lot of money on something they believed was going to shut down. So, this gold price is just fantastic and gold producers around the world are doing really well and hopefully we can get Morila to that stage too," he concludes. MRA

↑ **Morila is currently** producing 50 000 ozpa of recovered gold from tailings

→ **Cowden with the** team on site

↙ **Primary crusher** in action

"Over 20 years, Morila has put around $3 billion into the Malian economy through taxes, royalties and wages,"

DR ALISTAIR COWDEN

WHAT'S IN A NAME?

In early November 2020, Mali Lithium adopted a new brand and identity, Firefinch. The firefinch is the national bird of Mali. Cowden said the change heralds a new chapter and supports the company's strategic transformation initiated when the company agreed to acquire the Morila gold mine in August 2020.

Gold Fields' South Deep mine

Solid steady-state strategy delivers top-notch turnaround

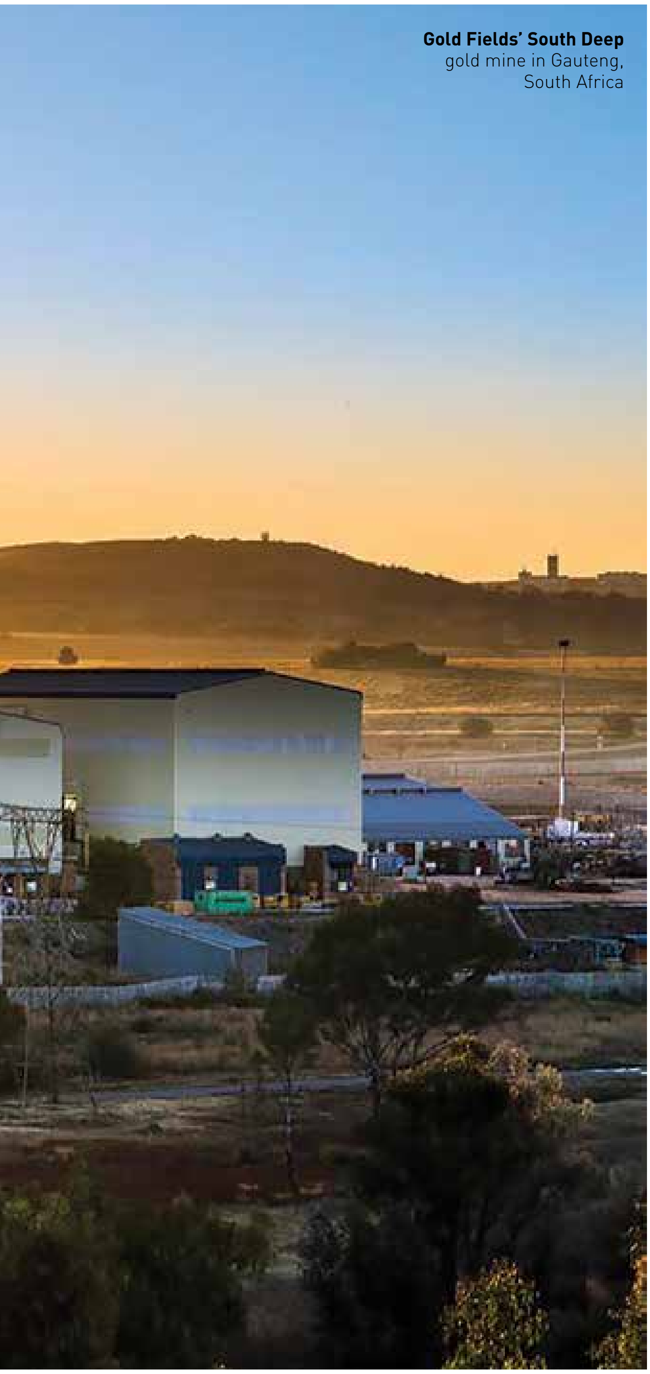
Dual-listed gold miner **Gold Fields** is confident that it is on track to meet its life-of-mine steady-state production target at its **South Deep** gold mine in Westonaria. While the South African asset was affected by the COVID-19 pandemic, it has maintained traction with its production ramp-up and expects to meet its 2020 production guidance of 225 000 oz, executive vice president for South Africa **MARTIN PREECE** tells **CHANTELLE KOTZE**.

IN SHORT

The South Deep gold mine, which has a mineral reserve of 38 Moz and a current life-of-mine of 75 years, is on track to reach a sustainable, steady-state production profile.

South Deep – an asset that has underperformed for years – is showing substantive progress both operationally and financially, having increased its gold production by 63% to 64 900 oz in the September 2020 quarter from 39 800 oz in the COVID-19 affected June quarter. Announcing the company's half year results for 2020, CEO Nick Holland said South Deep is now generating meaningful cash flow at current gold prices.

Since undertaking a massive restructuring process at South Deep in



Gold Fields' South Deep gold mine in Gauteng, South Africa

Gold Fields applies mechanised mining methods at its deep level South Deep mine

The company is considering the use of remote loaders underground that will be operated from surface at South Deep

2018, in which Gold Fields recalibrated the mine's cost base and reduced its workforce and mobile equipment fleet, the mine began to demonstrate remarkable improvements in productivity and production and generated positive cash flow during 2019.

Notwithstanding the impact of the COVID-19 pandemic on the operation, Preece says South Deep is largely on track with where the operation should be from an efficiency, productivity and financial point of view. Although the mine experienced a disrupted second quarter due to lockdown restrictions, the operation bounced back in the third quarter, and the company is

"South Deep is largely on track with where the operation should be from an efficiency, productivity and financial point of view,"

MARTIN PREECE

pleased with the progress it has made since the restructure to set the operation up for long-term and sustainable growth.

Moving forward, emphasis is on ensuring substantive progress in the short to medium term on the mine's four core strategic focus areas; namely organisational capacity, internal business processes, stakeholders and financial performance.

Sustaining traction in these areas remains integral to facilitating delivery on the production ramp-up and is pivotal to maintaining the mine's profitability and reaching a sustainable steady-state production profile over the mine's remaining 75-year life, says Preece.

Creating margin in the business

One of the key objectives of the restructuring process at South Deep was to move the focus from producing ounces to producing profitable ounces, says Gold Fields vice president for people and organisational effectiveness Gerrit Lotz.

In order to do so, Lotz explains that Gold Fields adopted a four-phased turnaround approach at South Deep. The first phase was

to understand what was working and what was not working from a social, commercial and technical perspective, which translated into a clear turnaround strategy. The second phase was to recalibrate the mine by focusing on its priorities; and rightsizing the operational footprint, equipment, cost structures and labour accordingly. The third and current phase is focused on stabilising and optimising the mining and operational value chain, ensuring that people, process, systems and technology all work in tandem. This lays the foundation to move into the fourth phase, dubbed the 'mine of the future', in which Gold Fields will optimise the operation against benchmarks with the aim of becoming a best-in-class mine.

Following the labour restructuring and rationalisation of the mobile underground production fleet, South Deep now has a workforce of 4 000 people, comprising employees and contractors. Despite the reduction in the workforce and equipment, productivity – which is measured in ounces per fully costed employee – has increased dramatically, while the cost per ton of gold produced is also decreasing.

The reduction in the underground production fleet has decluttered the underground workings, which has placed the asset in a much better position for Gold Fields to better operate, maintain and manage, believes Preece. This has dramatically extended the time between failures on all equipment including the load and haul, and

↑ **Gold Fields has** recalibrated South Deep's cost base and reduced its workforce and mobile equipment fleet

> One of the key objectives of the restructuring process at South Deep was to move the focus from producing ounces to producing profitable ounces,
>
> **GERRIT LOTZ**

drilling fleets from between two and five hours to between 10 and 15 hours.

Creating an enabling environment and improving the capability and capacity of its people

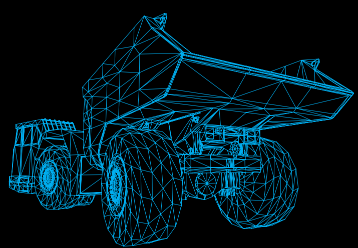
According to Preece, if South Deep is to meet any of its operational targets, it needs to create an enabling environment and improve the engagement, capacity and capability of its people, which it is doing through its frontline productivity improvement programme called Siyaphambili.

The programme is structured around five phases of intervention; namely shaping the culture, building capability, managing the work, improving the work and sustaining the improvement.

"At South Deep, our people's capability and capacity is developed and is measured against four main anchors," notes Preece. Depending on how they perform against these anchors, the coaching and upskilling of employees is undertaken, with the aim of driving personal operational improvement year on year, he explains.

"In so doing, and without first seeing the business results, we can accurately predict what an individual's performance results are going to be based on the degree of compliance to these anchors," he adds.

Having made tremendous strides in recent years to turn the underperforming South Deep asset around, Holland and Preece are confident in South Deep's future contribution to the larger Gold Fields portfolio. MRA



Relocating Kenmare Resources' plant B

Big on commitments, and even bigger on delivery

The latter half of 2020 saw LSE/ISE-listed mineral sands miner **Kenmare Resources** successfully achieve what most might consider an incredibly challenging task – relocating its Mozambique-based **Moma** operation's **Wet Concentrator Plant B** (WCP B), in its entirety, from its original home in Namalope to its new home in Pilivili – in just less than two months, MD **MICHAEL CARVILL** tells **LAURA CORNISH**.

IN SHORT
Relocating a large-scale mining plant without any disassembly was a huge undertaking for Kenmare Resources – one which it accomplished with great success.

WCP B in starter pond at Pilivili 2

Kenmare's WCP A first began mining the Namalope ore zone in 2007, with WCP B commencing mining at Namalope a few years later in 2013. WCP B completed its mine path at Namalope in August 2020, although WCP A and WCP C will continue to mine this ore zone for several more years.

The conclusion of a definitive feasibility study in June 2019 confirmed the technical and economic feasibility of relocating WCP B to a new mining area, Pilivili – at a capital cost of US$106 million – which not only ensures the longer-term sustainability of the greater mine, but also guarantees greater volumes and higher grade material, Carvill notes.

In combination with two other growth projects in 2018 and 2019, the relocation project targets a 35% increase in ilmenite production (plus by-products) at Moma from 2019 production levels to 1.2 Mtpa on a sustainable basis from 2021 – and the move of WCP B to Pilivili is the final step in achieving this goal. The increased production is also expected to significantly lower cash operating costs to between $125 and $135/t (in 2020 real terms). Consequently, from 2021, the group expects to be positioned in the first quartile of the industry revenue to cost (or margin) curve, supporting stronger free cash flow generation and providing for increased shareholder returns.

While all ore zones within the Moma portfolio were considered for the relocation of WCP B, Pilivili was selected due to the favourable combination of higher grades, strong co-product credits and free flowing sand with low slimes, enabling ease of mining and processing, Carvill points out. Additionally, Pilivili is located 23 km from Namalope and the existing mineral separation plant (MSP), allowing for ease of heavy mineral concentrate transportation by a newly constructed 16 km pipeline.

The Pilivili ore zone has the highest grades within Moma's portfolio, with mineral reserves of

Aerial shot of the WCP B at mouth of river crossing (with float off pond behind)

"We are achieving the higher grades we are targeting and are happy with the plant's performance since its re-start,"

MICHAEL CARVILL

180 Mt averaging 4.4% total heavy minerals. The life of mine average grade mined by WCP B at Pilivili is expected to be 4.6% THM and in the first four years of production the average grade mined is expected to be 5.3% THM.

Relocation a success – in spite of COVID-19 challenges

"We reviewed many alternative approaches to relocating our plant – including the disassembly/reassembly of the plant, building a new plant or alternate transportation options for the assembled plant by road and/or sea. Moving the full plant by road not only offered the lowest risk profile, but reduced our production offline time significantly, from months or years to weeks," Carvill highlights.

Moving WCP B, which consists of a 1 700 t floating dredge and 7 100t plant, measuring 80 m long, 24 m high and 60 m wide, was no easy feat – and the planning, design and logistics required to transport it some 23 km to Pilivili was undeniably impressive.

As a start, Kenmare Resources had to invest in the construction of a purpose-built road for the

WCP B about to undertake river crossing

WCP B and dredge in starter pond 3

transportation of WCP B and its dredge. This was a nine-month process. The 23 km road is a massive 66 m wide – sufficient to transport the plant without compromising its structure in any way. (For more information on the detailed process required to relocate the plant, please see the October 2020 edition of *Mining Review Africa*).

The relocation project kicked off on 28 August 2020 and was concluded in full on 25 October – an impressive feat to undertake while managing the challenges associated with COVID-19 such as social distancing and obtaining visas for highly skilled contractors to travel into and out of the country with lockdown measures still in place.

"In spite of this, we concluded the relocation with only minor delays – leaving the team with a great sense of achievement and success when the WCP B reached its final destination," Carvil highlights.

Crossing a river was one of the major undertakings necessary to move the plant and required the establishment of an adjacent pond to bring the plant down to the same elevation.

"The original plan was to build a road across this semi wetland marsh area. But the material beneath the road was semi fluid. Having decided that this wouldn't be the safest approach, we elected to float the plant across by creating a canal. The material that needed to be moved in order to do this was however also very soft – and so we had to bring in our own material to make a base for our excavator to sit on and mine that material and then the soft material underneath it. With the construction of a berm we were then able to break our end point starter pond into the canal and float the plant across," Carvill outlines, adding: "The success of the project is clearly and largely the result of the effort delivered by the team to resolve challenges quickly and efficiently." The team encountered various other trials along the way. Fabrication delays due to COVID-19 was a major frustration and was experienced across many regions including South Africa, Spain, Denmark, Italy and Bahrain.

"Teichmann, our civil contractor, for example, brought their team to site at an early stage in the project and every member of that team, including their MD Ken Gibbs volunteered to stay on site until completion. This level of commitment was outstanding and contributed to the success of the project."

Another component of the project – which could have caused delays – was the delivery of an overland positive displacement pumping system which will convey the material from Pilivili back to the mineral separation plant in Namalope. Delivery of the pipes has unfortunately been delayed. But even


WCP B in starter pond at Pilivili 1

this has posed no major problem. Until the system is commissioned – estimated now to be in the first quarter of 2021 – Kenmare is trucking the material along its custom-built road to ensure production targets remain on track.

The supply of electricity to Pilivili was also delayed because the overhead transmission line pylons were also not permitted to travel from the locked down South Africa. While that has subsequently been resolved, Kenmare moved its diesel electric power station from Namalope to operate the plant as an interim measure. The power station has since been transferred back to Namalope.

What next?

Ramp-up of the WCP B is now a priority, and Carvill is comfortable with how this progress is tracking. "We are achieving the higher grades we are targeting and are happy with the plant's performance since its re-start," he highlights.

From this point moving forward, Kenmare needs to demonstrate that the plant can operate at a higher level than it has ever worked before – consistently.

1.2 Mtpa

The volumes of ilmenite Kenmare will produce from the WCP B plant in Pilivili

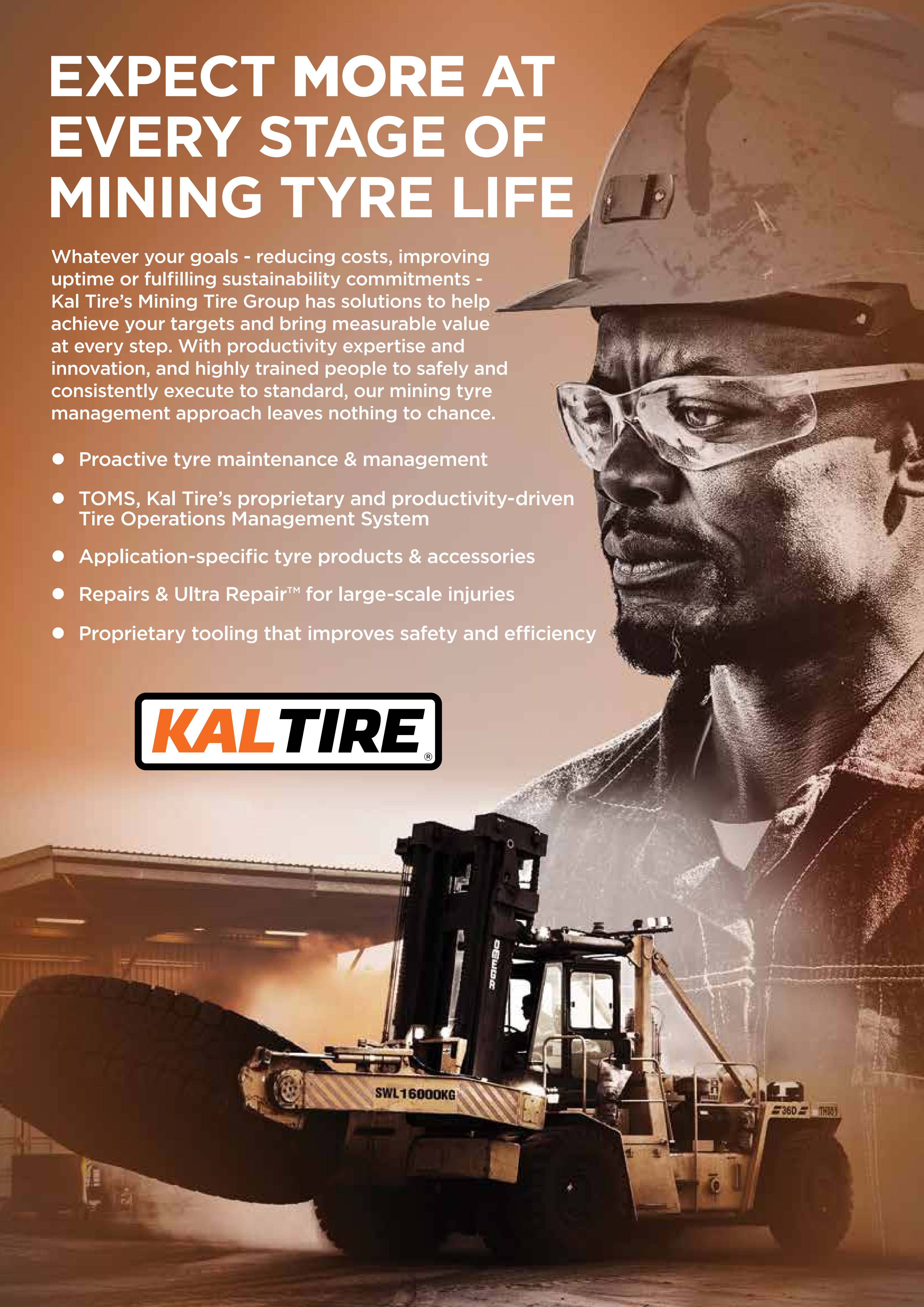
And so the first six months will be focused on delivering that level of throughput and operational efficiency.

Beyond this, the MD notes that there are many more areas of mineralisation at Moma that will be considered for the larger operation. There is also intention to relocate the WCP A to another area within the tenement of Mozambique known as Nataka in 2025.

"We want to continue returning dividends to our shareholders so they are able to benefit from the projects we have implemented and the faith they have given us to deliver on our commitments. We are engaging with our board to determine what is best in this regard as well as for the future," Carvill concludes. MRA

COMMUNITY IMPACT

One of the major components associated with the WCP B relocation was the interaction with various communities located along the road path – a process that Kenmare took with extreme care. A compensation process was undertaken to work closely with the communities, which are much larger in the Pilivili region than in Namalope. The priority around this saw negotiations and discussions commence four years prior to the start of the project and as such have been managed successfully.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Ivanhoe Mines' Platreef

Plan to fast-track production

TSX-listed **Ivanhoe Mines'** South African subsidiary, **Ivanplats**, is weighing up the merits of fast-tracking production at its **Platreef** PGM project in South Africa. It is simultaneously also considering an alternate, expanded production scenario, after an integrated development plan released in December confirmed the potential to do so. Compiled by **CHANTELLE KOTZE**.

IN SHORT
The updated feasibility study and preliminary economic assessment both underpin future expansions at Platreef, leveraging the asset's immense resource base containing palladium, platinum, rhodium, gold nickel and copper.

The Platreef Integrated Development Plan consists of an updated feasibility study (FS) and a preliminary economic assessment (PEA) and marks an "important step in our vision of building and operating the world's next great precious metals mine, together with our local community and Japanese partners", says Ivanhoe Mines co-chairperson Robert Friedland.

According to Ivanhoe Mines president and CFO Marna Cloete, the Platreef project will be the world's

The Platreef project will be the world's lowest cash cost primary producer of platinum group metals

lowest cash cost primary producer of platinum group metals with cash costs of US$442/oz of 3PGE plus gold produced, net of by-products and including sustaining capital.

The updated FS builds on the results of the FS announced in July 2017 and is based on an unchanged mineral reserve of 125 Mt at 4.4 g/t of 3PGEs plus gold, project designs for mining, and plant and infrastructure as in the 2017 FS – except with an increased production rate from 4 Mtpa to 4.4 Mtpa – comprising two modules of 2.2 Mtpa each.

The updated FS includes an updated production schedule based on the current project status, costs and economic assumptions, while the schedule for the FS is predicated by the sinking of the project's second, larger shaft (Shaft 2). Early-works surface construction for Shaft 2 began in 2017.

While Shaft 2 is being sunk, Ivanplats will undertake underground development from Shaft 1, which will allow the mine to ramp up to its envisioned 4.4 Mtpa relatively quickly. It is envisioned that Shaft 2 will be equipped for hoisting in 2025, allowing for first concentrate production in the latter half of the year. The initial capital cost for the Platreef 2020 FS is estimated at US$1.4 billion.

The Platreef IDP20 also includes the Platreef PEA, which is an alternate, phased development plan that fast-tracks Platreef into production for significantly lower initial capital.

The plan uses the project's first shaft (Shaft 1) for initial hoisting and mine development, with 825 000 tpa of total rock hoisting capacity, of which 125 000 t is allocated for development rock. The alternate plan envisions building an initial concentrator with a capacity of 770 000 tpa, and could produce first concentrate in mid-2024.

US$2 159/oz

The current basket price at Platreef

The sinking of Shaft 1, completed three months ahead of schedule in June 2020, has created the opportunity to access early, high-grade tons in this scenario. While the 700 000 tpa initial mine is being operated using Shaft 1, there would be opportunities to refine the timing of subsequent phases of expanded production, which is driven by the sinking of Shaft 2.

Sinking of shaft 2 would recommence in 2025 and coincide with the construction of two 2.2 Mtpa concentrator modules, which would be

The recently-completed sinking of Shaft 1 has created the opportunity to access early, high-grade tons

DID YOU KNOW?
Mineralisation at the Platreef project is open to expansion to the south and west, beyond the area of the current mineral resources, currently containing 42 Moz of 3PGEs plus gold in indicated resources with an additional 52.8 Moz in inferred resources

commissioned by 2029 and 2030. Moreover, the initial concentrator would be ramped up to its full capacity of 770 000 tpa, increasing the steady-state production to 5.2 Mtpa, with annual production of more than 600 000 oz of palladium, platinum, rhodium and gold, plus over 40 Mlb of nickel and copper, by using Shaft 2 as the primary production shaft.

Important to note is that the initial capital cost for a 700 000 tpa concentrator as envisioned in the PEA is estimated to cost $390 million – substantially lower than the updated FS, which requires the development of Shaft 2 for first production.

Detailed engineering has commenced on the mine design, 770 000 tpa concentrator and associated infrastructure for the phased development plan, which will be incorporated into an updated feasibility study, expected to be released in 2021.

The Shaft 1 changeover will take place simultaneously in preparation for permanent hoisting by early 2022. Following the completion of the changeover, off-shaft development would take place in early 2022 with the initial aim of establishing a ventilation raise from the bottom of the shaft, allowing for the development of underground infrastructure from 2023.

The budget for 2021 is $59 million, which includes US$10 million for commencement of the construction of the headframe to the collar of Shaft 2.

> "While the PEA considers the deferral of Shaft 2 sinking to 2025, shaft sinking can be started at any point in time, pending funding,"
>
> **MARNA CLOETE**

Ivanplats completed the sinking of Shaft 1 three months ahead of schedule in June 2020

Ivanplats strives to ensure that every employee returns home safely to their loved ones at the end of each shift

According to Cloete, the phased development plan would allow Ivanplats to build a smaller project for a much lower initial capital cost, allowing the company to start generating revenue while doing a proof of concept, while also maintaining optionality, as the critical path for the larger 5.2 Mtpa project is predicated on the development of Shaft 2.

"While the PEA considers the deferral of Shaft 2 sinking to 2025, shaft sinking can be started at any point in time, pending funding, which could see the shaft be in production in as early as 2025," she notes.

"Advanced financing discussions are underway with a number of parties, for up to $400 million in funding from a combination of project finance, mezzanine debt and streaming, for the phased development plan outlined in the PEA, with the aim of concluding this in the first half of 2021. This will then underpin the funding for the larger development scenario as outlined in the FS," adds Cloete.

Dr. Patricia Makhesha, executive vice president for sustainability and special projects at Ivanhoe Mines, says that Platreef is an extremely diverse project by its nature. The project comprises a host of international investors, relies on a broad range of stakeholders and employs a diverse range of people from the surrounding host communities; all of whom are working side by side to realise the development of one of the world's most significant future mining projects.

WHAT THEY ALSO SAID…

"We believe world-scale projects like Platreef will be integral as South Africa plans its economic future around the green-energy transition and materials that will fuel a growing, global clean-technology supply chain," Dr. Patricia Makhesha, executive vice president for sustainability and special projects at Ivanhoe Mines.

The Platreef resource base contains palladium, platinum, rhodium, gold, nickel and copper

The start of something much bigger

According to Friedland, the Platreef Integrated Development Plan reflects the first phase of development for the Platreef mine. It is designed to establish an operating platform to support potential future expansions to 12 Mtpa and beyond, as demonstrated in previous studies, which would position Platreef among the largest platinum-group metals producing mines in the world, producing in excess of 1.1 Moz of palladium, platinum, rhodium and gold each year.

"The feasibility study demonstrates once again the incredible efficiency that can be achieved at Platreef when Shaft 2, one of the largest shafts in Africa, is completed. It confirms, without a shadow of a doubt, that not only is Platreef one of the largest, richest precious metals deposits on the planet, but it also will be one of the lowest-cost operations and feature exceptional returns on capital," Friedland adds.

"Now that Shaft 1 is complete, the phased development plan shows that there is an exciting alternate path to develop this great deposit, with much lower upfront capital requirements, to establish a strategic production foothold on the emerging Northern Limb of South Africa's prolific Bushveld Complex. In turn, this can be leveraged to unlock Platreef's tier one, long-life mineral potential, Fiedland adds.

Platreef's mining, processing and deposition at a glance

Mining zones in the current Platreef mine plan occur at depths ranging from approximately 700 m – 1 200 m below surface. Once expanded mine production is achieved, primary access to the mine will be by way of a 1 104 m-deep, production shaft (Shaft 2). Secondary access to the mine will be via the 996 m-deep, ventilation shaft (Shaft 1). During mine production, both shafts also will serve as ventilation intakes. Three additional ventilation exhaust raises (ventilation raise 1, 2, and 3) are planned to achieve steady-state production

Mining will be performed using highly-productive mechanised methods, including long-hole stoping and drift-and-fill. The production plans in both the PEA's initial five-year drift-and-fill mining operation off of Shaft 1 and the larger FS expansion are focused on maximising higher-grade areas. This was achieved through optimisation based on stope locations, stope grades, mining method, and zone productivities. The orebody was targeted to recover approximately 125 Mt at the highest net smelter return.

The ore will be hauled from the stopes to a series of internal ore passes and fed

19 meters

The average orebody thickness at Platreef throughout the mine life to the bottom of Shaft 2, where it will be crushed and hoisted to surface.

A two-phase development approach was used for the flow-sheet design comprising a common three-stage crushing circuit, feeding crushed material to milling-flotation modules. Flotation is followed by a common concentrate thickening, concentrate filtration, tailings disposal and tailings-handling facility. The phased approach allows for increased processing flexibility and introduces process redundancy whilst allowing for phasing of capital and mine ramp-up.

To further evaluate optimisation opportunities and confirm additional detail design parameters, a mini pilot plant test work programme is proposed and will be undertaken as part of the project implementation phase.

Ivanplats has decided to change the tailings storage facility (TFS) deposition methodology from a hybrid paddock deposition methodology (as per the 2017 FS) to a dry-stack methodology – a sustainable and water-efficient method wherein tailings are placed and compacted in a mound that is concurrently rehabilitated with soil and vegetation during the operating life of the facility.

With an operating life of 32 years, approximately 55.4 Mt will be stored within the dry stack TSF, with the remainder (approximately 60%) of the tailings to be used as backfill in the underground mine. The stacked facility will comprise a starter dam constructed primarily of rock fill, engineered tailings, nominally compacted tailings, and random fill. Tailings will be delivered to the dewatering plant situated at the stacking facility using the same pumping systems from the processing plant. Dried tailings will be delivered to the stacking facility, using load and haul transportation with trucks from the dewatering plant.

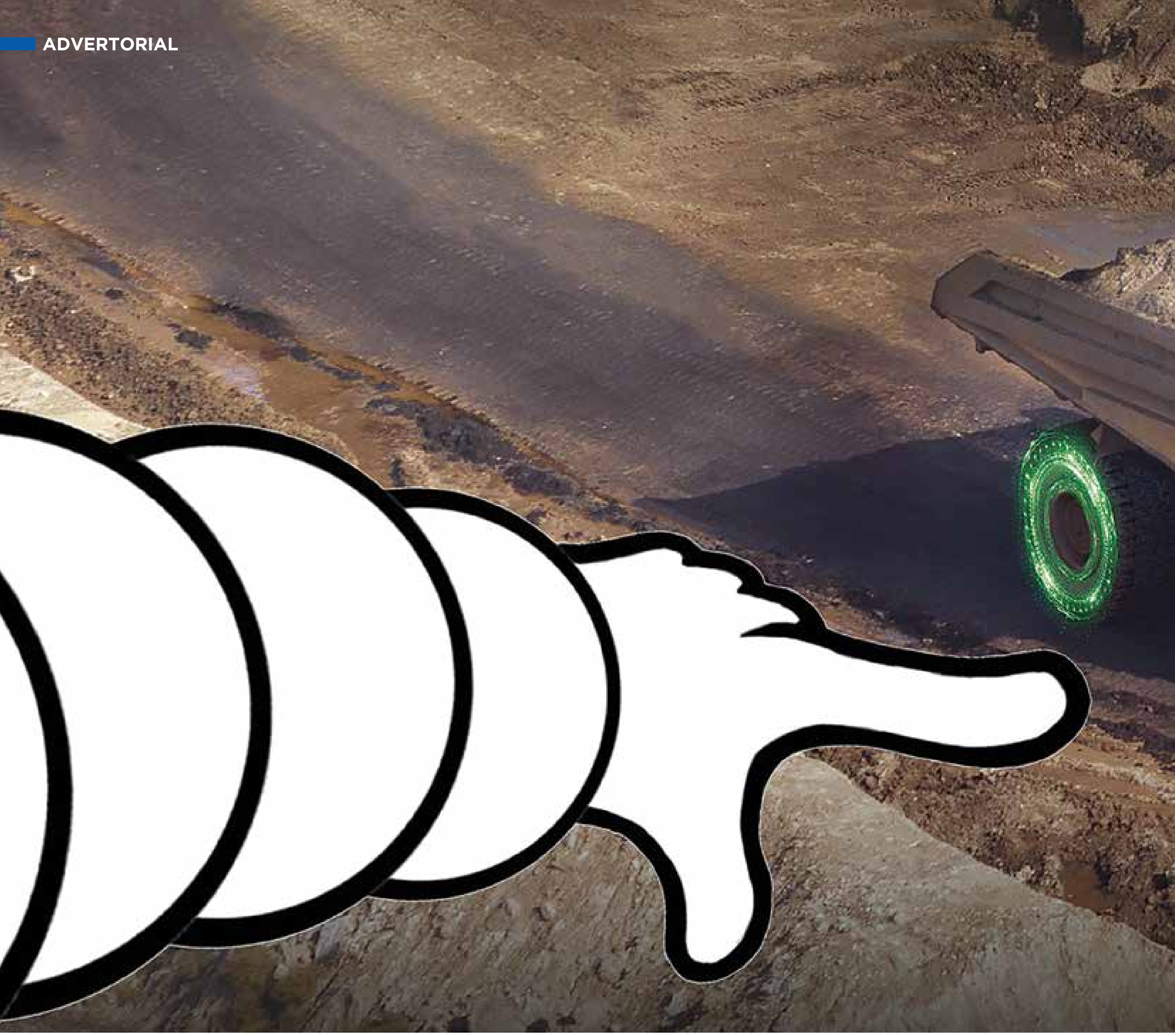
According to Cloete, as a result of the new tailings deposition plan, amendments to the water use licence, waste licence and environmental impact assessment will be required. Design work on the TSF is currently underway in order to apply for the relevant amendments to the existing authorisations, she adds. MRA

PLATREEF METALS BASKET OF FUTURE STRATEGIC IMPORTANCE

Platreef has an immense resource base containing palladium, platinum, rhodium, gold nickel and copper.

Stricter air-quality rules are increasing demand for the PGMs used in vehicle pollution-control devices, while PGMs also have a very bright future in clean energy, including hydrogen fuel cells. Meanwhile, nickel and copper are vital metals for global decarbonisation initiatives

Palladium and rhodium have been two of the best performing metals in recent years, currently trading at approximately $2 400/oz and $16 100/oz, respectively, while nickel and copper make up a significant amount of the overall basket, contributing about 25% towards the overall revenue at Platreef.



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Behind the curve

Step-change needed to expedite exploration in South Africa

Investment in exploration is crucial to ensure the sustainability of the South African mining industry through the discovery of new projects, but the country has been unable to attract a large enough share of the global exploration budget needed to reignite its junior mining and exploration sector, writes **CHANTELLE KOTZE**.

While the Department of Mineral Resources and Energy (DMRE) acknowledges the need to rebuild the mining sector, given that the economy remains dependent on the sector for foreign earnings, the lack of tools and incentives to boost the junior mining and exploration sector is in stark contrast to this goal.

As a crucial first step in the project cycle, exploration is expected to become a key focus for South Africa as the DMRE looks to release a six-point exploration strategy aimed at creating an enabling environment in which to expedite exploration to take place within the country.

Speaking at the *Junior Indaba*, DMRE Minister Gwede Mantashe said that he recognises the critical attributes that support junior mining exploration activities, namely, regulatory certainty, transparency in licensing system, and the investment into competitive geological data.

In this regard, the government has allocated over R268 million towards the establishment of a geoscience research library and for geological mapping. Plans are underway to improve the quality of geoscience information available for investors through the Council for Geoscience and the DMRE is also well underway with the finalisation of the exploration implementation plan, together with the Minerals Council South Africa and the Council for Geoscience.

Through its plan to resuscitate Greenfield exploration in South Africa through the geological mapping programme, Mantashe has a set a target for South Africa to move from capturing 1% of global exploration spend to between 3% and 5% within the next five years. "We believe this will boost investor confidence due to availability of more reliable geoscience data," Mantashe said.

Industry remains bullish on South Africa's exploration potential

In a panel discussion, aimed at dissecting the current climate for junior mining and exploration in South Africa – also held as part of the *Junior Indaba* – PwC's Africa energy, utilities and resources leader Andries Rossouw said that massive untapped exploration opportunities still exist in South Africa.

Gwede Mantashe

Roger Baxter

Mosa Mabuza

Exploration drilling at Orion Minerals' Prieska project in South Africa's Northern Cape Province

According to Rossouw, every R1 billion in additional spend injected into exploration activities by mining companies potentially contributes about R1.2 billion to the country's GDP through direct, indirect and induced impacts; 3 200 new direct and indirect jobs; and R0.3 billion added to total government revenue through direct and indirect tax collections.

Should South Africa manage to capture the full 5% of the global exploration budget as envisioned by Mantashe, then the country would have R8.8 billion of exploration expenditure, a R10.2 billion contribution to the GDP, create 27 700 jobs and generate R7.2 billion in tax revenue.

This sentiment was shared by Errol Smart, CEO of Orion Minerals and also the chair of the Junior and Emerging Miners Leadership Forum of the Minerals Council South Africa. Smart believes that "the impact of investing in exploration is short and is significant" and has a massive potential impact on the country's GDP and job creation.

Smart is pleased that the DMRE has reached a point where exploration licensing and permitting as well as the country's geological mapping database is being formalised. He believes that this will assist the Minerals Council in its endeavour to incentivise exploration, while enabling the exploration sector to attract foreign direct investment through its mineral wealth.

Also part of the panel, Council for Geoscience CEO Mosa Mabuza says that South Africa is in a unique position to resuscitate exploration activity and turn the country into an 'exploration site' for the benefit of junior and emerging miners in particular. The six-point exploration strategy is aimed at doing just that, he says.

Meanwhile, boutique tax consulting firm Tax Lexicon founder Muhammad Saloojee noted that there are no real incentives or tax breaks for investors, junior miners or prospectors under the current tax regime, but noted that this challenge would be addressed through the six-point plan.

The lack of incentives has further been exacerbated by a lack of funding or capital available for the junior mining sector, says Lili Nupen, director of legal firm Nupen Staude de Vries.

Nupen notes that the challenges have mainly arisen from concerns around the regulatory environment, in that while South Africa has a world-class regulatory system, the challenge lies in that the regime is a one-size-fits-all system and is not fit for both junior and major mining companies. Nupen suggests a more relaxed or flexible regulation for juniors which may assist in attracting investment into the sector. She also calls for public-listed market development and market participation by a diversity of investors.

Minerals Council South Africa CEO Roger Baxter shares the view of Mantashe that with the right interventions, South Africa could grow exploration to 3% of global expenditure within five years; and mining could contribute upwards of 10% to South Africa's GDP, and in so doing, grow GDP overall and help lead the economic recovery post-COVID-19. MRA

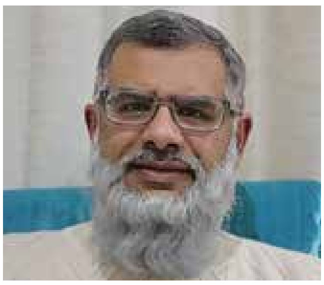
WHICH COMMODITIES ARE BEST SUITED TO JUNIORS?

PGMs has overtaken coal for the first time in 10 years as the biggest revenue generator in South Africa in 2020, followed by gold and iron ore, says PwC's Africa energy, utilities and resources leader Andries Rossouw.

Globally, gold attracts more than half of exploration expenditure, which, according to Rossouw, indicates gold exploration potential in South Africa, despite being a mature industry. There is also scope to grow the already active junior coal mining sector in South Africa, with potential to create a junior mining sector in the iron ore and manganese sectors in the Northern Cape.

Significant exploration potential has been created in base metals and rare earths, as critical technology and battery metals in the manufacture of electronics and technologies is needed to ensure a low-carbon future.

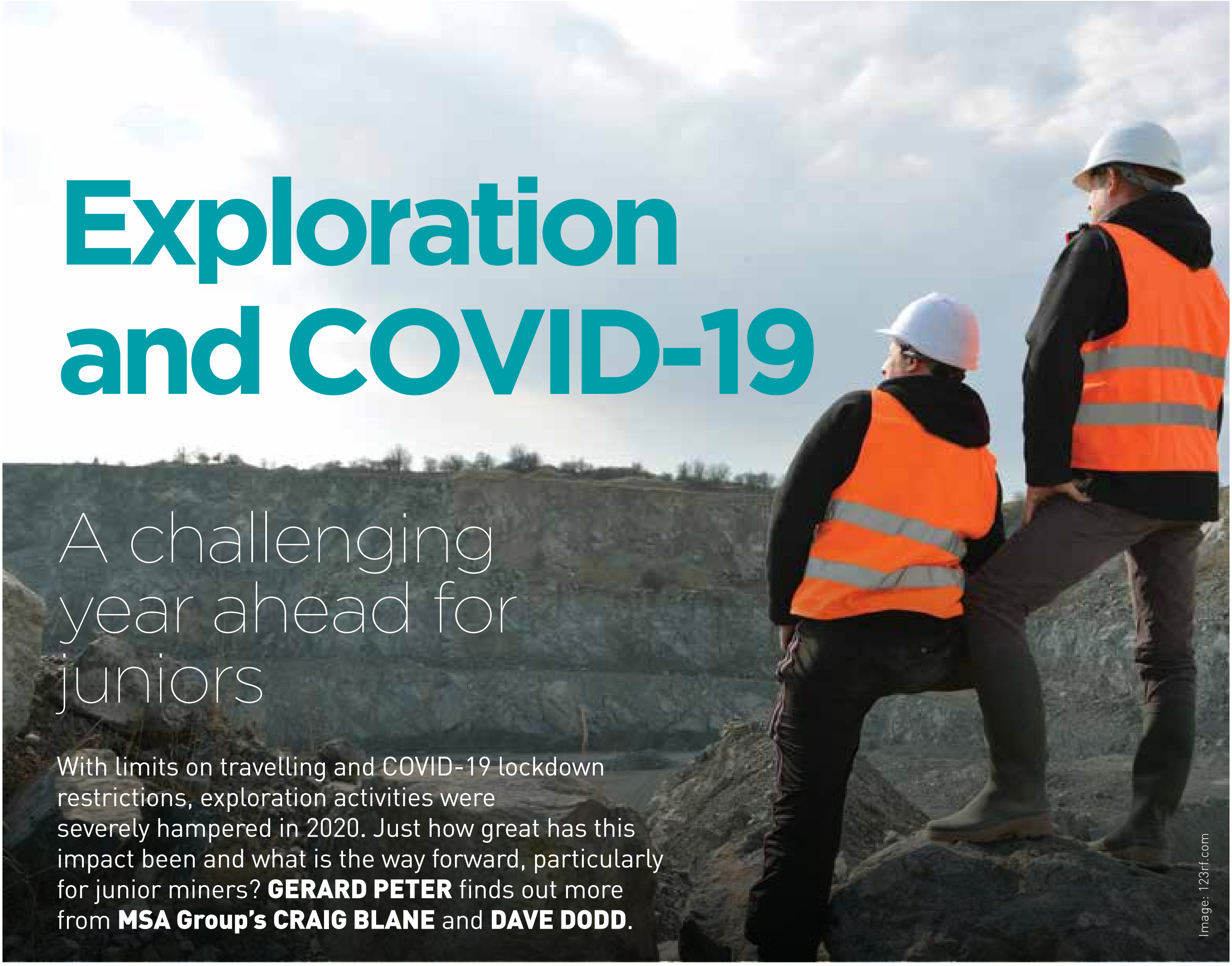
Lili Nupen



Muhammad Salooje

Andries Rossouw

Errol Smart



Exploration and COVID-19

A challenging year ahead for juniors

With limits on travelling and COVID-19 lockdown restrictions, exploration activities were severely hampered in 2020. Just how great has this impact been and what is the way forward, particularly for junior miners? **GERARD PETER** finds out more from **MSA Group's CRAIG BLANE** and **DAVE DODD**.

Image: 123rf.com

According to Blane, exploration services manager at The MSA Group, COVID-19 has had a significant impact on their clients' exploration activities, in no small part due to travel restrictions around the continent.

Not only has there been an enforced barrier to cross-border travel, but Dodd, geology HOD at The MSA Group, states that the threat of COVID-19 is also putting the brakes on exploration projects because of logistical challenges. For example, when a team is mobilised and travel together and one team member contracts the coronavirus, the entire team has to self-isolate, thereby delaying operations.

What's more, even though most borders have opened up, some companies remain reluctant to resume exploration. "For example, even if we can travel to project sites, if there are large numbers of COVID cases in the domicile of the exploration company they are sometimes still reticent for us to start work on their projects" states Dodd

While this has all negatively impacted MSA's ability to mobilise geologists to the field, many of MSA's clients have still made every effort to use the time to progress their projects in other ways. Blane notes that there has been an increased demand for other service offerings that do not necessarily require a physical presence on site, including commodity studies, exploration data management, laboratory services, mineral resource estimates and environmental consulting.

In addition to travel restrictions, Dodd avers that another key factor hindering exploration at present is due to to uncertainty around the medium to long term impact of Covid 19 on global economic growth and commodity demand. "When you look at the various commodity prices, we saw a dramatic crash around March and April 2020, particularly for base metals. And while they have recovered remarkably well, especially in the latter part of last year, we've seen that there's been a little bit of a hesitancy in committing large amounts of money to exploration programmes," he states. "The concern is that we could end up with a surplus of certain commodities if economies don't pick up to the extent that we are hoping for," he explains.

> "We are seeing a lot of enquiries, particularly in the gold space and I think that this will continue."
>
> **CRAIG BLANE**

Focus on rebuilding

Dodd adds that over 40% of the African exploration industry has suffered as a result of COVID-19 with a large portion of these companies being junior miners. He puts this down to two reasons – the inability to raise money and the inability to operate. "We are doing some work on behalf of junior companies where we can and provide oversight on their operations; however, many junior companies are battling with liquidity to keep operations going."

"And even now that we are seeing an increase in many of the metal prices, a lot of these companies have had to use much of their cash reserve and have also retrenched staff. So there is going to be a recovery period where companies try and regroup.

On a positive note, Blane states exploration is heading into a growth phase. "We have seen many companies aggressively deal with the constraints and restrictions around COVID-19. From our stance as consultants, we are thus seeing many enquiries coming through, particularly in the gold space, and I expect that this will continue." Dodd explains that already the company has got a few projects in Nigeria lined up and now that travel restrictions have been lifted, they can focus on finishing these projects.

> "There has been hesitancy in committing large amounts of money to exploration programmes,"
>
> **DAVE DODD**

When it comes to the battery metals sector, Blane has noted a decline in activity in this space in line with most other commodities and as countries try to restart their economies. There has been a decrease in pursuing lithium exploration projects but, on the other hand, The MSA Group is seeing an increasing number of enquiries into other battery and green energy metals including nickel and REEs.

As the industry comes to terms with mining in the new normal, the key question is whether the pandemic is going to have a lasting impact on the junior mining sector in particular. According to Blane, COVID-19 has thus far has been a relatively short cycle, compared to some of the super cycles previously experienced. "However, in spite of the remarkable progress in developing vaccines, the impacts of Covid-19 are far from over. We are seeing the second wave in Europe and other parts of the world, resulting in very high numbers of active cases and that will continue to negatively impact the main markets driving commodity demand. So I do think we are going to have a challenging year in 2021," he concludes. MRA


Drilling on Thorny River

Diamond exploration

Turn back the clock

The COVID-19 pandemic has had a devastating impact on the diamond industry, with demand for these precious stones reduced as a result of a global economic downturn. This, in turn, has cast doubt on diamond exploration programmes. **Botswana Diamonds** MD **JAMES CAMPBELL** believes however that there is no better time to undertake exploration than now. **GERARD PETER** reports.

As a veteran of 35 years in diamond exploration and project development, Campbell has experienced both the highs and lows of the sector. According to him, while the sector is going through a rough patch, this is not new. "The diamond market reflects world economic situations, so this is hardly surprising. However, if you are an explorer, you need to take a long-term view, meaning now is a really good time to do deals and get your work done," he states.

To illustrate his point, Campbell points to the global financial crisis of 2009. At the time, he was MD of African Diamonds and a similar market sentiment prevailed as it currently does. "There was a lot of talk that no one was investing in diamonds. However, we executed a financially attractive deal with Lucara Diamond in Botswana who bought us out and then went on to develop the diamond-rich Karowe mine. This was a really good deal for our shareholders who made a 25 times return on their investment."

In a more recent example, in November 2020, Botswana Diamonds acquired Sekaka Diamonds for US$300 000 plus a 5% royalty. On the contrary, according to Campbell, four years ago, it would have cost the company about $8 million to acquire 30% of the company.

World markets aside, there has been talk that there is very little exploration upside for diamonds because most of the large discoveries have already been made. However, Campbell explains that there is still plenty of potential for diamond exploration. This is predominately down to new technology and a higher level of precision.

> "Will we find another Orapa or Jwaneng in Botswana? It's unlikely but will we find another Karowe? The answer is yes,"
>
> **JAMES CAMPBELL**

Turning back the exploration clock

Meanwhile, the advancement of technology has also reopened up opportunities for diamond exploration. Campbell explains that diamond exploration traditionally comprises two aspects. The first is heavy mineral sampling, which looks for kimberlitic indicators that are ubiquitous to kimberlites. This is used in combination with geophysics such as electromagnetics, magnetics, gravity, radar or a combination thereof.

Now, in a breakthrough for the sector, Botswana Diamonds has added a third component to its exploration process. The company has teamed up with UK-based Subterrane to conduct a detailed structural geology analysis. Campbell illustrates the use of this three-pronged technological approach by referring to activities at the company's Thorny River and Marsfontein project areas.

"When kimberlites push through the crust, they naturally find their way through to the surface or close to the surface using zones of weakness which is a fracture or a fault. All of the blows (small kimberlite pipes such as the highly lucrative Marsfontein mine) in the area are on an intersection of a fracture and a dolerite dyke. This essentially means that the pipe has emerged near surface using the fracture to find a pathway to surface. So by using heavy mineral sampling, doing the geophysics and the structural geology, we have now embarked on a phased drilling programme."

When it comes to the argument that most of diamond discoveries have already been found, Campbell has a contrarian view, particularly when it comes to Botswana. "To a large degree, I believe that the larger deposits may have been found. Will we find another Orapa or Jwaneng in Botswana? It's unlikely but will we find another Karowe? The answer is yes."

However, in order to discover new diamond mines, the industry requires a different technological approach which may also be more costly. For example, Campbell explains that most of the kimberlites found in Botswana are Group One kimberlites that contain ilmenite, which makes them magnetic. As such, a company can use to magnetics to discover kimberlites.

On the other hand, there are also Group Two kimberlites that do not contain ilmenite and are therefore not magnetic (or only weakly so). "As such, you then have to consider the more expensive techniques such as gravity or electromagnetics, in combination with sampling, to find these kimberlites," explains Campbell.

Geophysics on Thorny River

Campbell is highly optimistic that by using the right technology new discoveries will be made, even in areas that have been explored before. "There's an old saying that every time there is a breakthrough in exploration technology, the exploration clock actually starts again.

"So you've got to go back to those old areas, whether they were discovered 100 years ago or whether they were discovered 20 years ago, and apply your mind through the lens of new technology and new thinking. It may result in something or it may not. But if you don't try, no one will discover anything in the world ever again," he concludes. MRA

West Africa has the potential to become a significant supplier of critical battery metals in future

Image: 123rf.com

Battery metals boom

West Africa poised for minerals diversification beyond gold

While gold is undoubtedly the most sought after commodity in West Africa, the region may soon be able to diversify its mineral resources base as junior miners flock to explore the region's potential for battery metals – a key input in the manufacture of the batteries needed to store energy for the burgeoning electric vehicle sector, writes **CHANTELLE KOTZE**.

The *Africa Mining Forum* digital event session, titled *Beyond Gold: West Africa's potential to feed the emerging battery metals market,* looked beyond the vast gold resources within the region, and placed the spotlight on the vast battery metals that are hosted within West Africa.

The panel comprised George Heppel, senior analyst for cobalt, lithium and nickel at CRU Group; Bernard Aylward, CEO of mineral exploration and development company Kodal Minerals; George Arhin, partner and West market mining leader of PwC Ghana; and Alfonso Tejerina of Global Business Reports, who was the moderator for the session.

According to Heppel, analysts were rather pessimistic about battery metals and electric vehicles during the early stages of COVID-19 due to economic turmoil, possible austerity plans that would remove subsidy policies and concerns that vehicle manufacturers would delay their electric vehicle plans in order to preserve their balance sheets, compounded by a decrease in automotive sales and consumer demand.

Despite these fears, none of these fears materialised, Heppel noted. In fact, many major economies around the world used the opportunity presented by COVID-19 to push forward 'green recovery' plans, especially in the electric vehicle sector, with several European countries introducing new subsidy policies. As a result, Europe is now on track to overtake China as the largest electric vehicle market globally in 2021.

"With Europe's plans and policies in place, and China also remaining steadfast in its EV adoption plans, electric vehicle sales are expected to increase from 2.5 million in 2019 to 10 million by 2025," says Heppel.

Owing to the continued strong demand for electric vehicles, both Heppel and Arhin believe that Africa has potential to become a significant supplier of these critical battery metals in future. While the Democratic

Republic of Congo (DRC) is expected to remain the dominant global cobalt supplier, Heppel says that there are several potential lithium sources in Africa currently under development in countries such as Mali, Zimbabwe, the DRC and Namibia. While none of this lithium supply has yet been committed to CRU Group's future lithium forecasts until they get closer to reaching production, he believes that the continent could become a substantial supplier by mid-2020 as the projects enter production.

One such lithium supplier on the road to lithium production is Kodal Minerals, which is developing the Bougouni lithium project in Mali. Aylward says that the company has spent the past two years de-risking the project and is currently in the process of finalising its mining rights application.

In addition to Africa's potential to become a significant cobalt and lithium supplier, Arhin says that West Africa in particular has a number of other battery metals that could be unlocked, which would in turn help the region diversify from its mineral roots in gold and bauxite.

The opportunity presented by COVID-19 was used to push forward 'green recovery' plans, especially in the electric vehicle sector

Image: 123rf.com

Battery metals is a key area that is growing and continues to grow in West Africa, says Arhin, noting that there is an abundance of nickel, graphite and manganese throughout West Africa. According to Arhin, 80% of the world's manganese is in Africa. In 2019, Ghana and Côte d'Ivoire accounted for 10% of global manganese supply and are expected to remain significant suppliers as additional resources are unlocked.

In terms of graphite, Guinea and Liberia are well placed to unlock their graphite resources as demand for this key battery raw material increases; while Côte d'Ivoire is home to nickel – with nickel accounting for 2% of the country's GDP – with plans to increase this contribution to 10% as the country aims to further unlock its nickel resources.

Arhin says that this potential can only be realised and harnessed if countries within West Africa commit to establishing a good exploration database to attract investment into its mineral resource sector, a stable tax regime and sufficient security measures – a key concern in the West African region at present. Should these measures be put in place, given the opportunities in West Africa, Arhin believes that the region will play a key part in furnishing the world with the key minerals required for battery production. MRA

SCAN THE QR CODE TO LISTEN TO THE FULL RECORDING OF THIS SESSION

SPECIAL REPORT

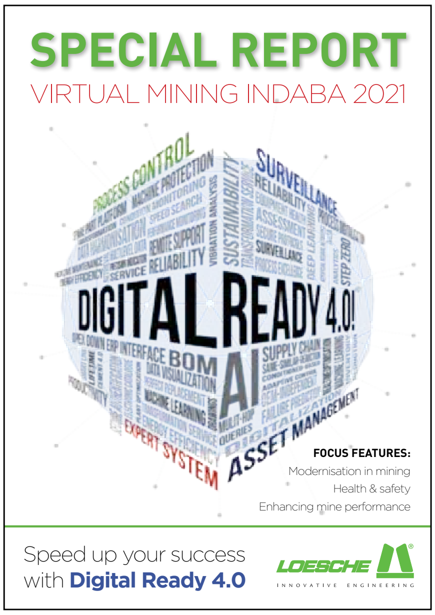
VIRTUAL MINING INDABA 2021

FOCUS FEATURES:

Modernisation in mining

Health & safety

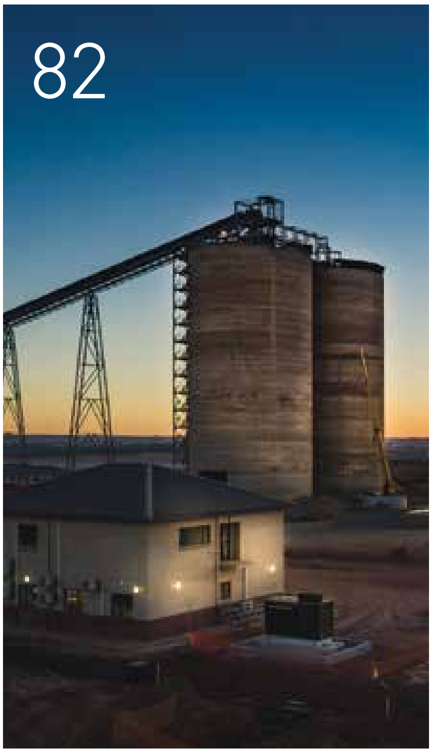
Enhancing mine performance



SPECIAL REPORT COVER

Although the actual manufacturing processes in many heavy industries are already extensively digitised, there is still a high demand for supporting processes until Industry 4.0 strategies are fully implemented. Under the leadership of LOESCHE, four companies have formed a 'Digital Center of Competence'.

P62



MINING INDUSTRY OVERVIEW

MODERNISATION IN MINING

SPECIAL REPORT: HEALTH AND SAFETY

ENHANCING MINE PERFORMANCE

Speed up your success

with Digital ready 4.0!

Although the actual manufacturing processes in many heavy industries are already extensively digitised, there is still a high demand for supporting processes until Industry 4.0 strategies are fully implemented. The RWTH University in Aachen, Germany already came to this conclusion in January 2019 in a study commissioned by the "Initiative for Sustainability in the German Cement Industry".

This finding coincides with experiences gained by LOESCHE, kingsblue, aixprocess and DALOG. Under the leadership of LOESCHE, these four companies have formed a 'Digital Center of Competence' and provide with their solution package 'Digital ready 4.0!' closely interlinked platforms and software for the analysis and use of data across all process steps – for all heavy industries including minerals processing, cement, steel and energy.

Industry 4.0 follows digitisation

Digitisation is not the same as Industry 4.0. 2020 will see almost all the data obtained from machines through a wide range of installed sensor systems, the collection of this data and its networking; for example via process control system (PCS) technology. One can therefore speak of a very high degree of digitisation through *computerisation* and *connectivity*. However, this means that only the first two stages in a six-stage maturity model have been reached to Industry 4.0. The further intensive and intelligent use of this database is the prerequisite for achieving higher levels of maturity. Only these offer the greatest benefit in the continuous improvement of the value chain.

Data is always available in several systems and with their *visualisation* the third maturity step is reached. Provided that the data situation always remains resilient and credible.

Step four refers to the *transparency* achieved when additional, software-supported solutions make it possible to identify correlations. Then, with the knowledge of how process states will change, the fifth maturity level - *forecasting capability* - is reached. The final sixth stage in this maturity model is called *adaptability*. Predictive software that acts autonomously, derives measures independently and even applies them - comparable to an autopilot in aviation.

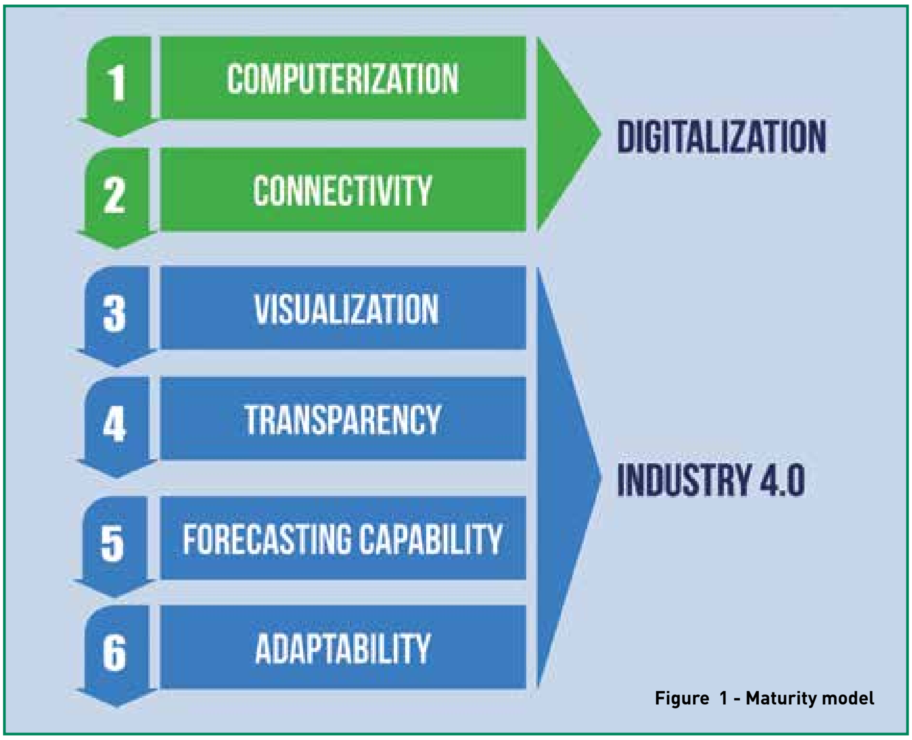


Figure 1 - Maturity model

Figure 2 - Four categories

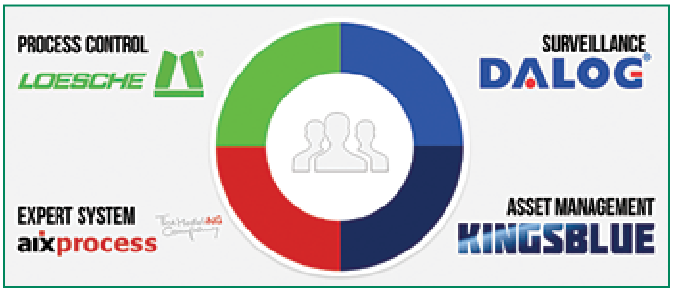


Figure 3 - Digital Center of Competence

Four categories

In which areas or categories do digital solutions pay in? What does it take to reach the fifth or even sixth level of maturity on the road to Industry 4.0? Four categories can be identified across industries. They are potentials in energy saving; efficiency and productivity; reliability and durability; and optimised supply chains for the preferred maintenance and service strategies.

Of course, when exploiting these potentials, the maintenance of a consistently high quality of the actual product is an absolute prerequisite.

Digital Center of Competence

The four companies mentioned above have developed independently functioning but well-coordinated and complementary products that can be used in a variety of industries including mining.

PROCESS CONTROL powered by LOESCHE

LOESCHE, as international market leader in grinding technology, provides its broadly diversified process engineering knowledge. The **Plant View** process control system, developed by Loesche in Germany, is characterised by high user-friendliness and ergonomics, structured displays and its lean licensing model. It prepares the essential key figures and statistics of the manufacturing process and makes them available in the sense of an MIS. **Plant View** forms an excellent basis for connecting further components of the 'Digital ready 4.0!' package (DR4!).

SURVEILLANCE powered by DALOG

With the **CMS** (combined machine surveillance) diagnostic and condition monitoring system from DALOG, the level of *visibility* described above is achieved by visualising load and operating conditions. Highly developed evaluation electronics process the continuously recorded data streams of the sensors installed on the monitored machines. The CMS is a multisensorial online condition monitoring solution for machine health assessment. It combines load and vibration measurements with process parameters to detect failures of the drive at an early stage and reveal root causes of critical overloads. This builds the foundation for a cross-functional cooperation between maintenance, production and process

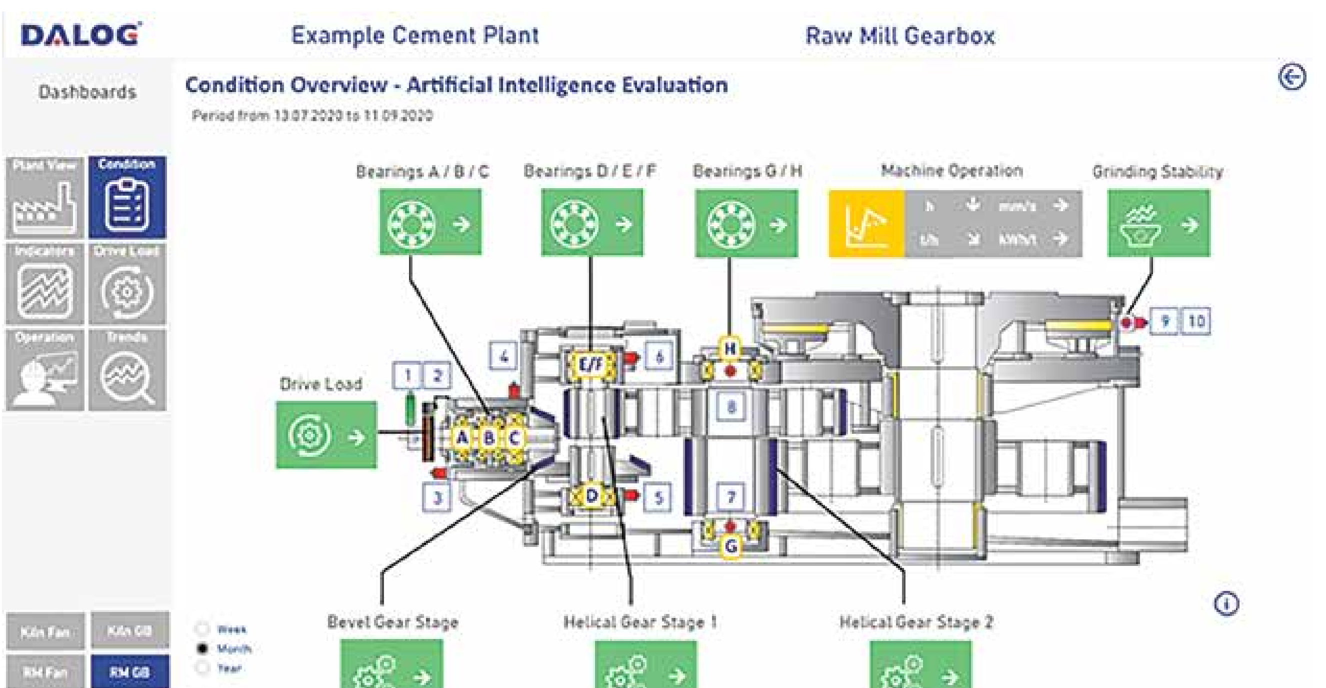
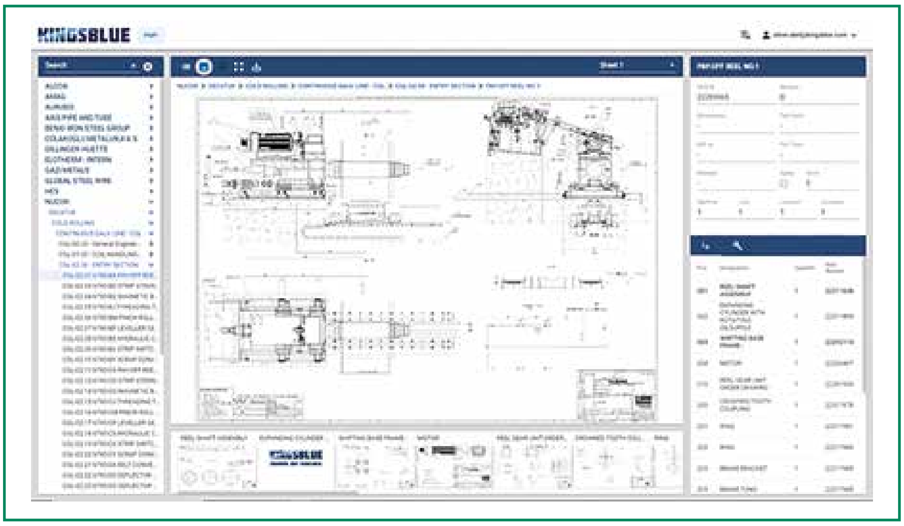


Figure 4 - Bevel helical gearbox - BusyBee panel view



↑ **Figure 5 - PMP by kingsblue (GUI)**

teams that work together to increase machine availability.

The platform software called 'BusyBee' is reduced to the essentials, but visualises the 'condition' of, for example, important drive components in great detail if required. The CMS communicates with the modules of kingsblue and aixprocess via the **Plant View** PCS.

ASSET MANAGEMENT powered by kingsblue PMP

If the *reliability* and *lifetime* of a monitored roller bearing in a gearbox, e.g. an ore mill, is endangered by recurring overload conditions, kingsblue's asset management tool 'Plant Management Platform' (PMP) provides the information necessary for a perfect replacement long before damage occurs. PMP combines in its clearly arranged user interface essential functions for part identification and data visualization.

In a browser window, which is divided into several parts, the plant or machine structure, a large drawing or list area, preview pictures and detailed information such as stock quantities, OEM numbers and lead times or own ERP-based information and meta-data are displayed simultaneously.

Drawings can be zoomed in or out very quickly without any visible loss of quality. The loading times of even extensive drawings and thumbnails are outstandingly short, even with limited Internet speed. The user interface with its modern layout is designed according to the guidelines of material design and makes all kinds of drawings, bills of materials and other manuals and documents accessible within a few clicks – universal and OEM independent.

EXPERT SYSTEM powered by aixprocess

At the same time, the expert system of aixprocess Plant Pilot provides the operator in the control center with alternative setting parameters in order to minimize or completely avoid overload.

Plant Pilot is a software and data acquisition system installed to visualise different process variables in an easy to use, fully interactive graphical user interface. Pre-defined and easily accessible statistical analyses (PCA, scatter plots, histograms) provide a deep insight into plant performance and indicate long-term drifts, instabilities and other disturbances, complemented by early warning management. Project-specific continuous calculation of KPIs, such as specific energy consumption or production costs, adds a significant amount of information. Also included are AI functions for the short-term prediction of all PVs and KPIs as well as advanced early warning functions.

Additional soft sensors for configurable product quality parameters add up until the fifth and sixth maturity level is reached.

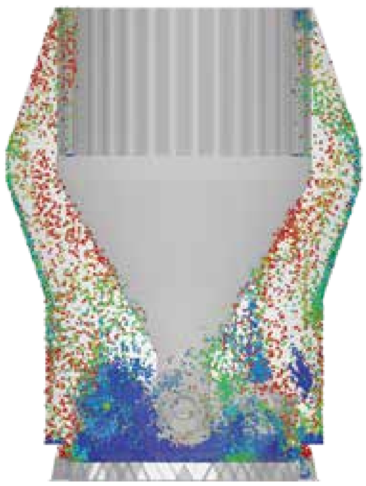
Digital ready 4.0!

The package solution 'Digital ready 4.0!' is focusing on assets' failure prediction, real-time production optimisation with machine learning, enhanced management of plants' equipment, sensors and operational data. The tools are platform solutions accessible by browser via Internet.

The 'Digital ready 4.0!' package solution contributes to unearthing identified potentials in various industries and can serve mining facilities worldwide on their way to reach individual excellence levels.

Learn how to speed up your success by contacting Ralph Viebrock, CDO of the LOESCHE Group in Düsseldorf, Germany via LinkedIn or email: ralph.viebrock@loesche.de MRA

↑ **Figure 6 - Central Control Room – Cement plant in Soma, Turkey**



↑ **Figure 7 - Particle flow in a vertical roller mill** (simulation)

Image: 123rf.com

Market watch

Precious Metals

In 2020 gold led the way as investors turned to this safe haven asset amid turbulent international markets brought on by the COVID-19 pandemic. Will the trend continue in 2021 or will silver outshine gold? And what does the year hold in store for other precious metals?

By Philip Newman, director, Metals Focus

Gold's stellar run expected to continue

Gold achieved a remarkable rally in 2020, with the price up 20% year-to-date (December 2020). That said, after notching fresh all-time highs in August, the metal has struggled to regain the US$2 000/oz level as sentiment in global financial markets has been lifted by vaccine-driven optimism and the US election uncertainty resolved.

Looking ahead, the backdrop of rising COVID-19 cases and challenges related to vaccine production and distribution in the short-term will continue to weigh on the global economic recovery. Equities, therefore, will remain vulnerable to sharp corrections, especially given the pace and extent of the recent price rally. In that context, notwithstanding the recent sharp pull-back in the gold price, I would maintain a positive view towards gold and my projection still sees gold regain the $2 000/oz threshold in early 2021 before challenging $2 300/oz later in the year.

This is premised on the assumption that the global economy will require further monetary easing/fiscal stimulus for economic momentum to revive materially. This, coupled with the persistence of negative real yields will limit the cost of carrying precious metals. That aside, ballooning US debt and rising inflows into emerging markets will also continue to put pressure on the US dollar and provide a supportive environment for gold.

All these factors, together with ongoing geopolitical risks, should continue to underpin gold investment. With positive vaccine developments now largely priced in by financial markets, the downside in the gold price should be limited going forward.

Will silver outperform gold?

After underperforming gold in early 2020 when the gold:silver ratio touched a record high of 127, silver has witnessed a notable recovery with the metal up more than 30% year-to-date (December 2020). More recently silver, in keeping with gold, came under sustained pressure following the Pfizer-BioNTech vaccine news. After a brief rally to $26 in early November, the metal lost almost 16% by end of the month to trade just below $22, a level last seen in September.

Importantly, in contrast to previous sell-offs when silver tends to underperform gold, the gold:silver ratio moved sideways within a 75-79 range over much of November, underlining silver's resilient performance relative to gold. To some extent, this reflected growing investor confidence in industrial metals, thanks to a V-shape rebound in Chinese GDP and the country's massive stimulus plans for new infrastructure investment. Silver's use in the photovoltaic (PV) sector has also played an important role, especially in light of a growing call for a green economic recovery among major economies.

Looking ahead, the macroeconomic outlook will remain supportive for precious metals investment, which will benefit silver. The metal's outperformance during the summer rallies should also boost its appeal with professional investors looking for enhanced returns. As a result, one can expect to see further investment inflows into the white metal this year.

Economic recovery to drive platinum prices

Having underperformed the precious metals complex for much of 2020, platinum broke ranks from gold and silver in November, steadily rising by

$123 intra-month. By early December the spread to gold had fallen by over $220 to $780 as news about the vaccine punished gold while platinum benefited from the emergence of supply constraints in South Africa.

Looking ahead, as operational problems in South Africa are largely addressed and demand recovery lags pre-pandemic levels, the market is expected to return to a marginal surplus in 2021 which will act as a headwind as the platinum price rallies. That said, the strong recovery expected in automotive demand should lend some price support as we progress through 2021. This year, we also expect jewellery offtake to recover, but absolute volumes will still be lower compared with 2019s pre-COVID-19 levels.

Automotive demand to underpin palladium

Although palladium has been the best performing precious metal over the last couple of years, the gains in 2020 have been overshadowed by gold and silver as the pandemic hit automotive demand significantly. That said, it is forecasted that the annual average palladium price will achieve a new high for the fourth year in a row.

Looking ahead, optimism about a COVID-19 vaccine means that automotive production is forecast to achieve double-digit gains in 2021. And although 2021 production will still fall short of 2019 levels, palladium automotive demand is expected to recover notably, driven by tightening emissions legislation, specifically in China. As a result, palladium is expected to continue its gains next year, with the potential to reach a high of $3 000/oz during 2021.

A key risk to the forecast is that the Biden administration could support powertrain electrification in the US. While this may not impact demand in the near-term, it could influence sentiment and dampen palladium price expectations. MRA

Demand for electric vehicles will drive the palladium market

Image: 123rf.com

ABOUT THE AUTHOR

Philip Newman is a founding partner of Metals Focus and has over 25 years of experience. He holds a BSc (Hons) Economics from the University of Surrey.

The outlook is stable for iron ore and base metals

Image: 123rf.com

Market watch

Iron ore and base metals

The coronavirus pandemic and lockdown measures across most major economies in 2020 triggered an economic recession of similar size to the 2009 financial crisis, with most commodity prices falling sharply in March 2020 as industrial activity halted. However, according to a **Fitch Ratings** report, the outlook for base metals and iron ore prices is stable for 2021.

According to the report, China has fuelled the recovery with a sizeable government stimulus. As such, commodity markets have since rebounded strongly, even though a full economic recovery will take much longer outside of China.

Iron ore market remains tight

Iron ore prices have rallied in 2020, reaching a high of US$129/t in early September 2020. Demand has been supported by steady steel production in China throughout the pandemic, while iron ore supply was disrupted earlier in 2020 due to seasonal weather patterns and some pandemic-related curtailments. While Fitch expects the benchmark price to fall below $100/t going into 2021, the iron ore market will remain tight in 2021 and possibly 2022.

Copper an economic bellwether

In 2021, copper traded as low as $4 600/t at the height of pandemic-related uncertainty and rebounded to more than $6 500/t at signs of the economic recovery. Based on fundamentals, the price can fluctuate between $5 000 and $7 000/t, depending on the macroeconomic outlook, market sentiment and supply situation. Considering low stock levels of around two weeks, Fitch's price assumption of $6 000/t for 2021 has little downside risk.

Stimulus drives nickel demand

China is the most important consumer of primary nickel globally with a consistent market share of around 55%. Fitch expects global nickel demand to rebound in 2021 as end-markets outside of China add to the momentum.

The rating agency forecasts ex-China consumption growth of 10% and Chinese growth of 7% in 2021. This will be matched by supply and the market should mostly balance.

Zinc remains steady

A shortage of concentrate developed as zinc smelters continued to operate throughout the crisis, while mine supply declined by about 3.5% due to pandemic-related restrictions. Zinc prices recovered sharply due to the shortage in Q2, 2020 (after a massive fall in March, similar to that of other base metals), whereas treatment charges for smelters dropped. Fitch expects the concentrate market to remain tight during most of 2021 as mine output recovers. Prices should begin to weaken in 2022 as new capacity comes online and concentrate follows the refined market into surplus. MRA

South Africa's mining sector in 2021

Top legal issues unpacked

2020 Was a year of many firsts with countless lessons learnt across the board. For the mining sector – key issues for 2021 will be on adopting lessons from the successful response to the pandemic to other aspects of risk management within businesses; continuing to build a culture of sustainability; and managing the risks of environmental pollution.

Adapting the lessons learnt from Covid-19

According to law firm Webber Wentzel's Kate Collier and Lizle Louw, the mining industry's response to Covid-19 in helping employees to cope has largely been lauded.

Organisations that coped best were those which already had a culture of resilience and adaptability and communicated with their employees, making them feel valued. The most effective responses were those led by the most senior executives in a company, and mining companies showed how fully engaged executives were able to bring employees back to work, safely and as soon as permitted and practicable.

In future, the lines between work and home will continue to be blurred and the Labour Court has indicated that occupational health cannot necessarily be separated from public health issues.

- The understanding of a workplace has to be reimagined; and
- employers should adapt their health and safety policies and systems for different workplaces which now are likely to include private homes.
- Working from home requires a new approach to managing employee performance, productivity, and defining which categories of employees can work from home.
- In mining, there is often a clear distinction between those who can perform their duties from home and those who cannot, but in other sectors there could be a risk of unfair discrimination.
- Work from home policies must take all the above into account.

Building a corporate culture of sustainability

To standardise the Environmental, Social and Governance (ESG) narrative, companies can start by incorporating ESG into their core business model and decision-making. This will assist to set qualitative disclosures and quantitative metrics (KPIs) and report on them transparently, according to Webber Wentzel's Jonathan Veeran and Paula-Ann Novotny.

South Africa's mining industry is moving in the direction of developing mining-specific standards on ESG to guide monitoring and disclosures, beyond the current independent reporting requirements under current legal frameworks (e.g. Mining Charter, procurement spend, environmental permitting compliance and Social and Labour Plans).

Operationalising ESG as a culture: Companies need to move away from seeing ESG as a reporting and data gathering exercise, to extracting value from it. ESG standards need to inform all business decisions and be understood and believed in by all management, supervisors, employees and business units/ functions.

Environmental pollution has far-reaching consequences

According to Webber Wentzel's Garyn Rapson and Merlita Kennedy, the number of class actions stemming from environmental pollution events is rising internationally, and especially in Africa and South Africa.

These events need not be current. South African law also covers historic pollution or pollution on land that a company owns or controls.

Even if the company was not the perpetrator, it has a duty to address it:

- Under Section 28 of the National Environmental Management Act
- Under Section 19 of the National Water Act.

Addressing this pollution is very complex and requires technical expertise. However, there is a risk that remedial measures could incur liability in the event of a subsequent class action.

We advise a company to:

- appoint these experts under legal privilege;
- ensure all draft reports are written under legal privilege; submit reports to government only in final form.
- There should be a separate technical team for potential future litigation because the team involved in the clean-up will be conflicted.

It is necessary to have a co-ordinated action plan, with technical and communications teams working together. There must be very strict document management procedures (including notes and boardroom minutes) and timeline management. Ignoring these steps could result in administrative directives/ compliance notices or even criminal liability, up to board level. MRA

Integrated operations management

Key to unlocking hidden value in mining

According to the **World Economic Forum**, digitalisation in the mining, minerals, and metals (MMM) industries has the potential to deliver over US$425 billion in shareholder, customer and environmental value by 2025. Much of this value will come in the form of operational effectiveness, increased productivity, faster decision-making, and enhanced safety. However, this value will not be achieved without some changes to the way the MMM organisations operate, and this won't happen overnight.

"These industries need to consider an Integrated Operations Management (IOM) approach to gain holistic insight into their operations from design to maintenance," says Craig Hudson, business development manager for mining metals and minerals for the Anglophone region.

"What does this mean in practice? Well, it means bringing all the data into a central location, using advanced analytics, and business information platforms to gain a real-time view of the complete value chain," adds Hudson.

Improved reporting capabilities

"The nature of many South African organisations is that often they have too many paper and spreadsheet records, in separate departments, using out-of-date solutions with no real ability to dynamically share the data they produce. Such a silo mode of operation leads to inefficiencies that propagate mistakes and that prevent streamlining of processes," Hudson explains. "Further, it prevents accurate reporting, which is so vital in the MMM industry that requires thorough safety and environmental reporting."

Image: 123rf.com

In order to help support global sustainability goals and to validate their social licence to operate, MMM companies must find easier ways to document and report their efforts to save energy and reduce carbon emissions. "Integrated operations management systems can help in this regard, by capturing and analysing energy data across the various stages of the value chain. This in turn ensures that sustainability reporting becomes significantly more precise."

A more collaborative environment

Value chain optimisation is another important aspect when taking an IOM approach. "Better visibility across the entire supply and value chain enables companies to optimise their entire operation and identify areas where bottlenecks occur," says Hudson. IOM establishes a consolidated environment that brings together plant and business information across multiple sites and commodity groups.

Hudson elaborates: "Siloes are eliminated by bringing all stakeholders onto one platform – including mine executives, process metallurgists, production planning and scheduling personnel, procurement teams, mine operators, engineering and maintenance personnel, and more. This collaborative environment reduces instances of conflict and miscommunication by ensuring there is just one version of the truth. All of the controls are reachable from one place, so that situations can be properly dealt with as necessary."

Maintenance decisions made easy

"Within the MMM industry, 40% of opex is generated through maintenance activities. In fact, asset maintenance costs will far exceed capital costs over the life of the asset. In some mining operations, more than 30% the total site workforce is exclusively dedicated to maintenance," says Hudson. IOM considers asset performance by integrating risk and asset criticality into an overall asset performance management strategy.

"Real-time Asset Performance Management (APM) software can generate optimised maintenance and spare parts strategies, by first looking at the company's business strategy and objectives, and then prioritising actions down to an individual asset level to maximise production availability. APM with real-time data moves us from reactive or preventive maintenance, to informed predictive maintenance," concludes Hudson. MRA

Image: 123rf.com

Digital transformation

Long-term approach required

There can be little doubt that the disruption caused by the COVID-19 pandemic has been an accelerant for the adoption of technology in mining. However, while the benefits are clear to see, TIM WALWYN, head of Siemens Minerals Solutions South Africa, advises that companies need to take a long-term approach when implementing new technologies. GERARD PETER reports.

Walwyn starts by saying that the last few months of 2020 really forced companies to take steps towards implementing digital solutions that they may have been thinking about for a while. "COVID-19 has forced companies into a situation where they have had to adapt. Some of the technologies companies may have been wary about in the past have in a short space of time, and with a little more consideration, shown that they really do add value to their operations."

According to Walwyn, there is no looking back for the mining industry as it permanently adjusts to operating in the 'new normal'. However, at the same time it will require a different approach when it comes to adopting technology. "Many of the technological changes that organisations have made over the past few months have been purely in response to an unprecedented emergency situation. I think companies are going to have to look at technology solutions that will enable them to work just as efficiently as they did previously by relying heavily on having expert personnel present on site. So, this is an opportunity for the mining industry to realise some significant synergies and cost savings, not only for the present but for the long term as well," he explains.

One example of technology being adopted in a beneficial way is remote working. According to Walwyn, this was very prevalent in the early stages of lockdown as companies could not mobilise teams to get to site, particularly in remote areas. As such, the sector saw a much wider adoption of remote service capabilities and remote connectivity into their technical systems on mine sites. Remote working has proven to be effective and could be a part of how mines operate in the future, particularly when it comes to automation.

In a further effort to deal with the lack of personnel on site, technologies that enable virtual operations have been brought to the fore. This was particularly important when expert skills were required for service and maintenance tasks. "For example, in the early stages of lockdown, if you had to mobilise a maintenance team from a different country to deal with a breakdown, it would have been extremely difficult to get them quickly to site because in many countries they would have been subjected to a two-week quarantine.

"As such, those companies that invested in preventive predictive maintenance technologies prior to the lockdown were at a real advantage because they were able to plan and mobilise their resources in time to manage problems before they occurred," explains Walwyn.

No silver bullet

While there are a number of advanced solutions that make use of technology such as artificial intelligence (AI) and virtual reality (VR), Walwyn cautions that companies should not get caught up in the 'buzzwords' of the day. "Because of the hype around such technologies, everybody thinks they should be doing something with AI or virtual reality, for example. This sort of enthusiasm is rightly placed but can 'jump the gun' on really analysing what the right tool is for a particular application.

"For example, we have been using machine learning and AI in the field of predictive maintenance. However, this is not a silver bullet and it's not the right solution to every problem experienced on a mine. Also, it must be remembered that sometimes a mine may have its own unique challenges so there is no one size that fits all solution."

Another common challenge that mines face is the amount of effort that has to go into collecting data and then processing, categorising and formatting it in a way that can actually be used to gain insight. "These big data approaches don't always work and a lot of companies think they can simply plug a box into their machines and analyse things for a couple of days and figure out exactly what's wrong and in so doing solve a problem. But that's just not going to work. They need to focus on having the right technical solution for the right problem, rather than chasing that buzzword."

Furthermore, Walwyn points out that a lot of companies have been approaching technology solutions in a fairly unstructured way, investing in 'small islands of technology' that are only a solution to current problems.

"Companies need to take a step back and look at the bigger picture and determine what the end goal is and implement a step-by-step solution in a structured way towards that end goal," he concludes. MRA

> "Many of the technological changes that organisations have made over the past few months have been purely in response to an unprecedented emergency situation,"
>
> **TIM WALWYN**

SCAN THE QR TO LISTEN TO TIM WALWYN SPEAK ON MODERNISATION IN MINING

The foundation of digital transformation in mining

As the mining sector moves towards a more digitised and automated future, connectivity is becoming increasingly important. However, as Nokia's head of energy sales **GARY CONWAY** explains to **GERARD PETER**, it is important to have the right infrastructure and right connectivity solution from day one.

Conway points out that some connectivity technologies are not designed for mission critical work on mines. Rather, they were initially designed mainly for office connectivity. He states that one of the key challenges when it comes to connectivity is that many mines are working with technology that wasn't specifically designed for any sort of digital transformation.

He explains that because mines are often found in remote areas, they are hard to cover from a connectivity point. "Also, there are probably multiple disparate networks that are operating on a mine. So, companies are facing a number of challenges when they start looking at technology to start transforming their operations within the mining site itself," he states.

On a positive note, Conway explains that over the past few years, mining companies have been making more informed decisions about digital transformation. "Mining is an industry where there's a lot of learning that takes place. For example, when we sit with a customer who requires an LTE network, we first determine if it is the right solution for them and if they have the right infrastructure for this type of network. At the very start of the discussion, the most important thing is that the foundation network has to be right from day one."

Conway states that LTE 4G is the ideal solution for a mine site. He points out that this technology has been proven to be successful in harsh conditions and has a great ecosystem of devices. This means that companies have a lot of choice when it comes to devices and end user control points. In addition, LTE 4G offers high bandwidth and covers 85% of digitalisation use cases for mining operators. It is for this reason the large majority of Nokia's mining clients use this technology.

Practice makes perfect

Mining is a key component of Nokia's growth strategy. The company's solutions are based upon the Future X architecture developed by the world renowned research organisation Bell Labs – part of Nokia – and have been optimised for the mine of the future. These solutions enhance and streamline operations by taking advantage of automation, robotics, digitally enhanced equipment, sensor data, predictive analytics and machine learning.

The key technology that's powering Nokia's network offerings for the mining industry is industrial-grade private wireless. Private wireless builds the foundation for a converged mining automation network in order to create safer, more efficient and productive mines. It comprises one single network for voice, video, data and Internet of Things (IoT) applications.

It is suitable for automated and remote operations with real-time operations monitoring via video and features low-latency control that allows for a quick response to critical events. Advanced data and video analytics enables asset lifecycle management and preventive maintenance of vehicles and machinery, while allowing for autonomous drilling and hauling systems for 24/7 operations.

Furthermore, by using video analytics, it can remove remote workers from hazardous situations, while providing push-to-talk (PTT) and push-to-video (PTV) capabilities for mission-critical communications. It can also enforce virtual exclusion zones and regulate unauthorised access to unsafe areas with geo-fencing applications.

Already, private wireless has been warmly received by OEMS. In January 2019, Komatsu announced the mining industry's first Autonomous Haulage System (AHS) running on Nokia's private wireless technology. In the meantime, more than half of Komatsu's operational fleet is running on Nokia networks. Predictable communication lets AHS trucks consistently drive at optimum speed, while also providing more accurate component life prediction, reduced tyre wear and higher fuel efficiency. This, in turn, increases mine safety, productivity and efficiency through collision awareness, hang time reduction and autonomous haulage.

In addition, Nokia also works with other mining solution vendors to improve its network offerings. A case in point: the company is the only vendor in the world to have a full LTE and 5G infrastructure at Sandvik's test mine in Finland. "Also, we have worked with a number of drill manufacturers and have completed type approval testing with four of the top five global miners in the world," adds Conway.

In closing, Conway states that the key to digital transformation is collaboration between a network provider and the mining company. "Companies like Nokia provide the connectivity backbone that mining companies are going to need to go on their transformation journey – not only for the company's day one requirements but also for future use cases." **MRA**

> "The most important thing is that the foundation network has to be right from day one,"
>
> **GARY CONWAY**

The ability to make a contextually-based judgement from more than a sufficiency of information is a key skill

Effective risk management

Making the information work for you

By Simon Barry, lead consultant: risk and standards, The Advisory Group, and Hedley Tomlyn, director of programmes at Minerva Advisory Group.

Our previous article began to explore the links between information and data for effective decision-making. It did this in the context of a sound risk-based approach to mining operations with regard to their outputs and consequences. The main thrust of the argument was that data is but a small part of the information necessary to enable sound judgement and decision-making.

Data, artificial intelligence (AI), machine learning and robotics have become the new 'must haves' for many businesses and consultancies, all enabled by the new phenomenon of the Internet of Things (IOT). Mining companies are being targeted by consultancies offering smart mines, digital mines, AI enabled mines and so on, all operating at or on 'The Edge'. What is missing from so much of this is that the decision support tools can often become ends in themselves, and do not actually enable people to make the right decision within a safe timeframe. A look at recent tailings and pit collapses, as well as Anglo

American's self-inflicted hit in Australia, will tell the same tale – all the data and information in the world is of little use if it is not part of effective risk mitigation, and integrated into an effective management decision system.

In the previous article we covered the business of the collection of information. How the critical first step is to define what you need to know in order to enable the achievements that you desire. That first step is important in that it demands some clarity of purpose and thought before an effective list of critical information requirements can be determined. Throughout, the overall goal must be kept firmly in mind in order to avoid those tangential distractions which can be a real danger, especially when the collection process may involve many attractive pieces of hardware and software.

The risk-based approach to this, whether following the standard of ISO 9001 or the guidance of ISO 31000, leads you to a simple process that should be based upon the organisation's risk register. This is a very effective tool that can sometimes be hijacked or curated by people who see it as a silo type industry, or as an end in itself. This is to miss the point totally; it must be a dynamic and live document that drives a dynamic process and mindset. The identification and analysis of risks will enable the mitigation measures to be determined, and from that process the critical information requirements can be identified. Managing risks through actionable insights will protect the environment, lives and property.

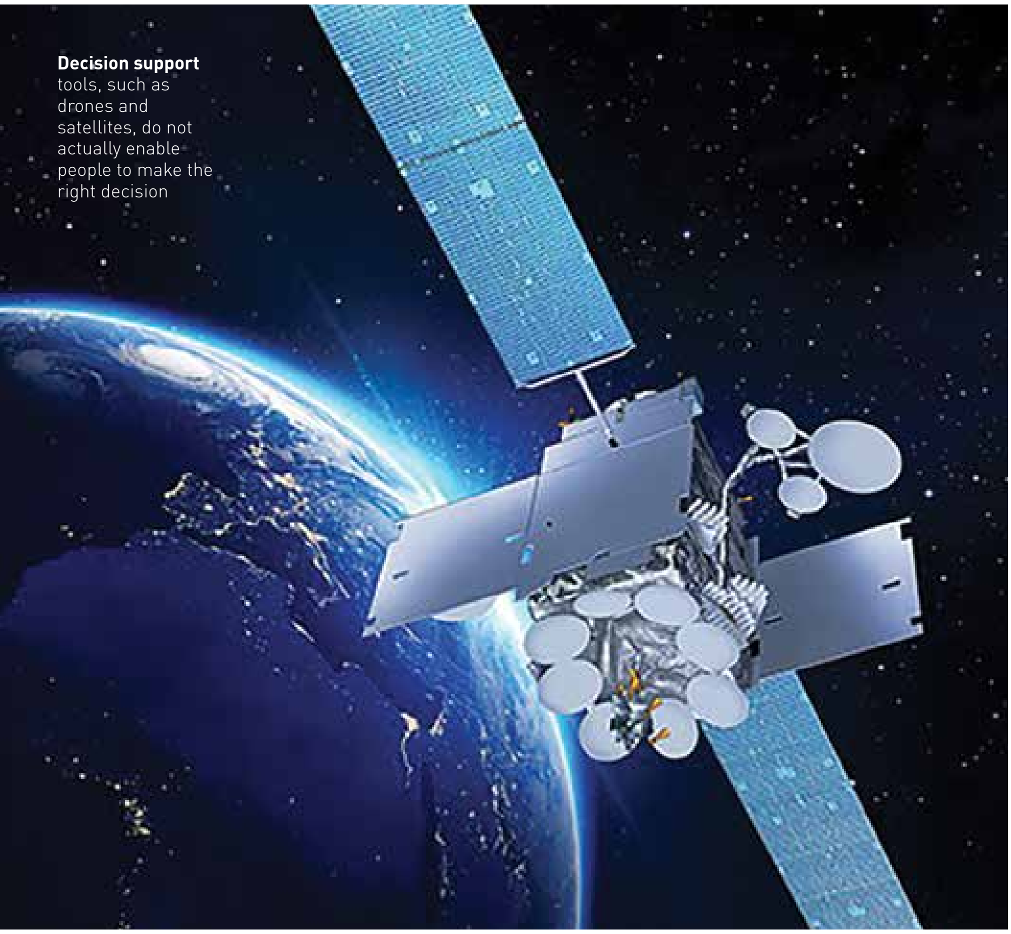
Now you have the question, the next big question is how to find the answer.

Sensors that collect data are important, but often only judgement can place data into the proper context to be of real use in reaching the correct decision point

This requires the question to be broken down into parts, each of which provide indicators that can be registered sometimes by a sensor, but also by a human: the "What?". What indicates that a dam or a slope may become unstable? How is that monitored and measured? What is the effect that I am trying to achieve? Do I just want to know when it is going to 'go'? – or do I want warning so that I can do something about it? This process in itself drives a more disciplined approach to risk.

The next stage after determining the "What?" is the "How?" as in "How do I get this information in an accurate and timely fashion?" The sources are often a combination of technical, sound professional knowledge and good old-fashioned judgement, with the courage to make a decision. Sensors are important, but often only judgement can place data into the proper context to be of real use in reaching the right decision point.

The array of sources can be mind boggling at times with all the technology now available. There is always a danger of being seduced by the technology and so missing the key element, which



Decision support tools, such as drones and satellites, do not actually enable people to make the right decision

is identifying the sensor to answer the question that you have asked. Drones are a great example of this. The peddlers of the drones tout them as 'the answer' when really they are only a platform. The drone is only as good as the reliability and effectiveness of the sensor that it carries. For some, the weight of that sensor has a real effect on the performance of the drone, sometimes to the extent that it may not be able to carry what is needed for the time and distance required. Again, the key questions remain "What do I want to know?" and "What can tell me that?". However, in some cases the drone may be a much more effective, and cost effective, observation platform than a satellite. It is easier to adapt the optics on a drone than those on a satellite.

Connecting the dots

Multiple sources bring a plethora of information from a variety of directions and in a variety of forms. The next stage is the fusion of all this information, discarding the chaff to enable a clear picture to emerge. This becomes an issue of judgement and management. It is not something that has yet been effectively automated. The ability to make a contextually-based judgement from more than a sufficiency of information is a key skill, and one that can only be made effective by training and experience. Uppermost in the mind must always be "What do they want to know and why?". The latter enables an informed decision in the case of the situation changing either on the ground or in terms of policy or governance.

Much has been said about context, but it is critically important. Only context can determine which data is currently important and so should be acted upon. As context changes the data's place in it will change also. This enables an up-to-date iterative process that should then maintain relevance throughout the management of operations and their associated risk, through constant review. Context is something that has to be learned by experience. This means that merely expecting a third party, or an algorithm, to develop interpreted data into a decision-supporting piece of information is itself going to be a risky business.

The bottom line is that the overused word 'context' is key. The context of the requirements for information and the context within which it is placed. Then the crunch comes when with all the information available someone has to make the right call and in the right timeframe. This also needs to be supported by sound procedures that actually enable the effect to be achieved, which in the risk business usually involves saving lives, money and/or reputation. The bottom line is much more than data!

So, by all means make that investment the CTO is pressing for, but do not ignore the requirement to ensure that you can make the right decision in the right place and at the right time. That too is most worthy of investment. MRA

ABOUT THE AUTHORS

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Barry holds a MSc in Risk Management from the University of Leicester and is a specialist member of the UK Institute of Risk Management and an ISO 9001 lead auditor. With extensive experience in aviation, logistics and management development he is a firm proponent of the team-based integrated approach to problem solving, addressing the hard questions early.

Hedley Tomlyn
Tomlyn is a former submariner, military intelligence officer and diplomat with wide-ranging experience working with multi-national and boutique consultancies. He is the Director of Programmes at Minerva Advisory Group.

Leading technology solutions

A new generation of mechanisation

Fermel is a 54-year-old original equipment manufacturer, specialising in the development of intellectual property which is converted into mechanised solutions for underground mining operations.

Although the company's roots are proudly South African, Fermel benchmarks itself against a global context where its core business is entrenched in the development of sustainable and relevant technology.

The journey of NEWGEN technology started more than a decade ago through the development of programme architecture to create intelligent machines via CANBUS communication.

Based on its engineering and mining industry experience, Fermel believes that the migration from mechanical machines to onboard controllers is an integral part of the future of trackless mining equipment, hence all its software is developed in-house and includes specific machine functionalities in the initial design mandate.

Developed to provide a singular and seamless backbone, Machine Intelligence (MI) offers reliable and tested technology to assist users in improving safety and productivity, integrating asset management capability as well as adherence to promulgations by the mining regulatory. Due to the inclusion of sophisticated protocols, supplied directly from Fermel, the OEM eliminates inflationary costs associated with third party interventions and ensures compliance and accountability from a single engineering source.

Automation and BEVs

Currently, Fermel has begun with preliminary machine automation and is adopting this technology on equipment at user operations: Semi-autonomous steering for example to avoid collision with side walls and keep a vehicle on a predetermined route without driver intervention; or autonomous driving of trackless equipment in given areas where accuracy of movement is important.

Machine intelligence incorporates the equipment's capability to allow equipment to perform tasks with accuracy and repetitively without direct human operation, to optimise productivity and quality of execution without error or variation. Typical examples include autonomous docking of cassettes in the instance of our cassette handler, or autonomous spraying of shotcrete to ensure optimal and continuous application with the least amount of rebound in the most effective time.

When it comes to fleet electrification, Fermel's approach is purpose-driven with the progressive rollout of its product offering to electric vehicle (EV) drive.

Fermel's E-Drive system was created in 2010 with further development in the IP for a unique battery management system which is typically required for mining vehicles as well as the capability to package and industrialise solutions with single and multiple motor drives to match the vehicle control to its onboard energy source.

From the inception of a single electric motor drive system (for smaller applications), the conversion of existing ICE vehicles to electric drive as well as a multi-wheel motor-electric drive system for larger end applications, the supply of Fermel's EV range is not limited to South Africa's boundaries but is extended to clients in Latin America and India. MRA

At Belfast, Exxaro will mine the last substantial coal deposits remaining in the 100-year-old Mpumalanga coalfields

Exxaro's Belfast coal mine

A mega, modern mine of the future

Belfast mine business unit manager **LONDOLANI RAMPFUMEDZI**, appointed to his role in May 2020, is a proponent of using technology to improve the way things are done. This attitude mirrors diversified mining company **Exxaro**'s approach to adding value and providing opportunities for growth through the use of technology – something that the company has successfully achieved at its Belfast coal mine in Mpumalanga, writes **CHANTELLE KOTZE**.

Exxaro's decision to embark on a modernisation journey began in 2012. This aligns with its 2026 strategy aimed at remaining relevant in the changing world in which it operates. It was this "mine of the future" concept that drove the development of the company's digitalisation strategy.

According to Rampfumedzi, the "mine of the future" concept became a reality after various studies were concluded and the R3.3 billion Belfast Implementation Project was approved for construction. Construction began in November 2017, the operations team was on-boarded and the digital and connected mine produced first coal six months ahead of schedule in September 2019, with nameplate capacity achieved in October 2019.

At Belfast, Exxaro will mine the last substantial coal deposits remaining in the 100-year-old Mpumalanga coalfields. With a 17-year life-of-mine, Belfast will produce about 2.2 Mtpa of A-grade, export quality coal grading at 6 000 kcal/kg and 500 000 tpa of secondary quality grading at 21.5 MJ/kg.

"Belfast opened our eyes to what is possible and the boundaries that we can push as we continue to deliver value from the business," says Rampfumedzi, noting that the mine has made massive strides in the areas of real-time decision-making and productivity improvement through remote monitoring and tracking of all devices and performance data.

"For us it is not only about introducing technology for the sake of digital transformation, but rather for the value we can unlock from the process," he notes.

A truly digital mine

Belfast was the first of its kind in South Africa to have a "digital twin" – a complete digital replica of the mine that will enable the relevant people to connect to and manage it from anywhere in the world.

The digital twin was also used in the development of the entire mine and its scope, in order to proactively train, monitor, analyse, and simulate physical asset performance and pre-empt failure and disruption to the operation.

According to Rampfumedzi, while most of the benefit of having a digital twin has been realised in the processing plant environment, the information is not limited to this environment alone because the very same information can be used to inform other dependent value streams within the mining value chain.

Having since ensured that the digital infrastructure at Belfast is in place and that all the required equipment, assets and end points are deployed, Exxaro now has the ability to visualise all of the aspects of the Belfast mine value chain. This diagnostic capability has enabled Exxaro to de-bottleneck and optimise the Belfast value chain in near real-time. The benefit of this has been better co-ordination between mining and processing as well as increased production throughput, says Rampfumedzi.

Moreover, Exxaro has been able to better manage and execute maintenance. Through identity access management and privileged access management platforms the engineering teams have instant access to all information relating to their work when in the field, including remote assistance.

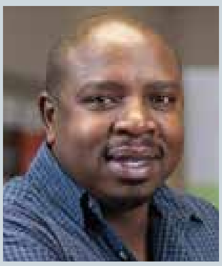
The use of virtual reality training on the plant processes and its components has also significantly improved the competency of the company's skilled workers. The virtual reality training has also led to improved training turnaround periods, says Rampfumedzi.

The Belfast management team is now focused on the enterprise-wide integration of the Belfast

↑ **Exxaro has adopted** virtual reality training on the plant processes and its components at Belfast

↙ **Belfast was the first** mine of its kind in South Africa to have a "digital twin"

> For us [at Exxaro] it is not only about introducing technology for the sake of digital transformation, but rather for the value we can unlock from the process,
>
> **LONDOLANI RAMPFUMEDZI**



business unit. This is being done to digitalise all aspects within the mining value chain and link them throughout the wider Exxaro organisation. The objective is to provide visibility of the mine's operational and business performance to the right stakeholders, at the right time, through in-time integrated reporting and analysis to facilitate better and faster operational, tactical, and strategic decision making.

Rampfumedzi warns that despite the clear benefits of digital technologies, the adoption of these technologies and the change management required for the success of the digital transformation is a challenge that should not be overlooked.

Digital transformation journeys can often be misconceived as being digital deployment projects: in fact they form a transformation programme that impacts all areas of a business such as governance, culture, policies, processes, skills and capabilities. As a result, all of these areas require significant effort, leadership and investment for them to be a success, Rampfumedzi emphasises.

Taking its digital strategy forward

Having laid the foundation for digital transformation through the Belfast Implementation Project, Exxaro has implemented a group-wide business strategy for adoption and execution by the respective business units within Exxaro, with the digitalisation programme as a core enabler.

The digitalisation programme varies from operation to operation and is geared at addressing the unique bottlenecks faced at each respective operation in order to achieve the desired business outcome. To do this, each operation currently has a sound data management and analysis process in place to proactively and efficiently manage business performance. MRA

South Africa is a global leader in safety regulations as they relate to proximity detection and collision avoidance

Level 9 PDS compliancy

Five-year preparation time draws to a close

The South African mining industry's health and safety regulations should take a giant leap forward in 2021 as Level 9 proximity detection system (PDS) compliancy comes into effect. But is the industry sufficiently prepared for this? **ANTON LOURENS**, CEO of safety equipment OEM **Booyco Electronics**, shares his views on compliancy progress made to date, and provides action steps for those mines who may have fallen behind the safety regulation curve, writes **LAURA CORNISH**.

Mining safety has been on the government's agenda for the last few years, and is being pushed by the introduction of new legislation to ensure mining companies conform to some of the world's most globally recognised safety standards. This includes the implementation and verification of Level 9 PDS safety standards.

The Level 9 standard is a significant improvement on lower PDS levels. Where Level 7 includes systems that warn pedestrians of their proximity to trackless mobile machines (TMMs) and Level 8 requires those systems to deliver an advisory instruction to TMM operators, Level 9 requires electronic PDS systems to effect engineering control of the TMM and automatically bring it to a stop when a dangerous situation is detected, explains Lourens. "This elevates what is traditionally called a PDS into what is really a collision avoidance – or collision management – system."

The deadline to deliver such a system – December 2020 – has been a long time coming and mining houses were first introduced to this pending legislation more than five years ago – "giving them ample time to prepare, both for the capital outlay and the installation work required on site," Lourens continues.

As such, 2020 became a pivotal year for the South African mining industry in terms of PDS implementation. "Unfortunately, no one could have foreseen the impact that COVID-19, and the subsequent lockdown measures, would have on the country and the mining industry, whose attention became focused on the health of its workforce and the contingency plans put in place to counter the effects of lost production. As such, the necessity for PDSs in many cases fell from the priority agenda."

And while the December 2020 deadline has come and gone, Lourens believes the legislation will come into effect in 2021. "The industry has had a significant period of time to prepare and I believe our mining minister Gwede Mantashe will not delay this for much longer. For those not fully compliant, I believe his expectation will be to see that work in this regard has at least begun."

Booyco Electronics was the first to begin official Level 9 testing at Gerotek in South Africa, and also has a well-established and significant PDS installation footprint in the country, meaning the company should be considered a specialist in the field and mines should take cognisance of the team's expert advice.

"More than 50% of South Africa's mining industry are not compliant with

Attention to detail during assembly ensures a quality end product at Booyco

upwards of Level 6 PDS systems. Those that are comprise mostly the larger, more well-established mining houses," Lourens notes. "Interestingly, and probably not surprisingly, we have quoted on the implementation of more PDSs in the last month or two of 2020 than we did over the entire year – clearly indicative that the industry is bringing PDS back onto the agenda as legislation could come into play very shortly."

If your mine is not compliant

A lack of compliancy is often the result of uninformed opinions. "The industry understands the various levels of PDS and what they entail and the majority of them do have Levels 1 to 6 in place as they require little infrastructure and more systems reporting. Nonetheless, companies look for short cuts such as applying PDS technology to high-risk vehicles only. Technology laggers also continue to believe that relevant and suitable PDS technology is not far enough advanced, or in some cases does not even exist."

This simply is not true. Not only does Booyco Electronics have Level 9 PDS systems installed and operating successfully in South Africa, it also engages with the internationally recognised organisation, The Earth Moving Equipment Safety Round Table (EMESRT). This is a global initiative involving major mining companies which engages with key mining industry OEMs to advance the design of the equipment to improve safe operability and maintainability beyond standards for the earthmoving sector.

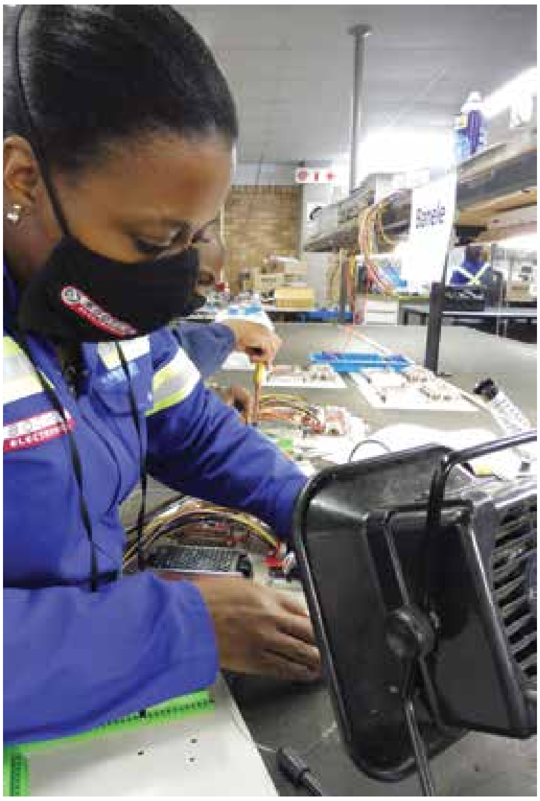
Within EMESRT, a task team has been created to develop a new ISO standard (ISO 21815) – designed to have all PDS suppliers and OEMs operating with a single interface. This standard has been submitted to the ISO committee and is now under final review for adoption. "Our contribution and involvement in this area is testimony to the global standards to which we adhere as a business locally," Lourens emphasises.

Having verified that few hurdles exist as regards the implementation of a Level 9 PDS system, Lourens notes the importance of advancing to this stage in phases. "I would recommend taking the necessary steps to first become compliant at Level 7 and Level 8 before trying to proceed directly to Level 9. Through these two levels a lot can be established to help shape a Level 9 system that works for each operation – by understanding safety compromising hot spots and trigger points. Through these stages, machine operators can also receive the necessary training in preparation to advance," Louren advises.

For operations that have older, legacy equipment that may not be equipped to handle a PDS Level 9 system, Booyco Electronics has adopted a new vehicle interface also driven by Controller Area Network (CAN bus) that is designed to help overcome this challenge. MRA

"More than 50% of South Africa's mining industry are not compliant with upwards of Level 6 PDS systems,"

ANTON LOURENS



Significant progress towards understanding what is needed to transform today's fleet of mining vehicles into tomorrow's new generation of cleaner, safer vehicles

Sustainable ambitions

Progress made in developing cleaner, safer mining vehicles

Image: 123rf.com

The Innovation for Cleaner, Safer Vehicles (ICSV) initiative – a supply chain collaboration comprising the **International Council on Mining and Metals** (ICMM), its 27 member companies and several world-class OEMs and technology providers – has made significant progress towards understanding what is needed to transform today's fleet of mining vehicles into tomorrow's new generation of cleaner, safer vehicles. **CHANTELLE KOTZE** speaks to ICMM director **SARAH BELL** to find out more.

The ICSV programme was launched in October 2018, in recognition of the ICMM's stance on climate change, as well as its aim to reduce vehicle collision related incidents and to limit harmful exposure through a reduction in diesel particulates. The ambitions of the initiative are to introduce greenhouse gas emission-free surface mining vehicles by 2040, minimise the operational impact of diesel exhaust by 2025 and make vehicle collision avoidance technology available to mining companies by 2025.

Moreover, the growing need for and importance of mined raw materials – from supporting the promotion of sustainable economic growth and the building of resilient and inclusive communities to enabling the innovations needed to address the urgency of climate change –means that these metals and minerals must be produced responsibly, says Bell.

Two years on from announcing these ambitions, eight new OEMs have joined the initiative, taking the number of participating OEMs to 19 – showcasing that the ICSV initiative has achieved the critical step of sending strong signals to OEMs and third-party technology providers on their requirements and on what is needed to accelerate development and adoption of technology across the industry.

In 2020, the ICMM developed tools to support the industry, OEMs and third party technology providers to meet the initiative's ambitions. These tools include a Knowledge Hub that facilitates knowledge-sharing of industry innovations; and provides technical and practical resources including case studies, standards, regulations and a technology and solutions database.

Additionally, a set of 'maturity frameworks' that help to map, motivate and measure progress against the ambitions were published, with the intention to stimulate conversations within companies that drive thinking, decision-making and action.

Bell explains that an important part of the ICSV initiative is forming the aggregated assessment of ICMM members' progress towards each of the three ambitions. The ICMM members, which represent approximately 30% of the global metals market with over 650 assets, have undertaken self-assessments to establish a clearer view of progress made towards each of the ambitions at a site level.

The exercise indicated that the ICMM member companies are generally at the early stages of maturity on their journey towards meeting the initiatives' ambitions.

It also informed how companies can increase their 'readiness to adopt' existing or new technologies such as through initiating 'change

DOING MORE TOGETHER

The ICMM's Innovation for Cleaner Safer Vehicles programme has partnered with several world-class OEMs and technology providers, including:

- Caterpillar
- Cummins
- Epiroc
- Future Digital Communication
- Hexagon Mining
- Hitachi
- Komatsu
- Liebherr
- MTU
- MacLean Engineering
- Nerospec
- PBE Group
- Sandvik
- Behault
- 3MTech
- Miller Technologies
- Newtrax
- Torsa
- Wabtec

conversation' at all levels within the business to seek alignment on the path ahead. To support adoption readiness within member companies, the initiative's working groups also developed a set of implementation pathways to illustrate the optionality that industry has to achieve the ambitions by identifying currently available solutions and development challenges to meet or surpass the ambition statements.

Lastly, the exercise signalled to OEM participants in the initiative that the journey towards the ambitions is not that different across region, commodity and type of operation. With ICMM members generally at early stages, there is a critical mass to create an industry shift.

With industry feedback at hand, the ICMM member companies will, in 2021, focus on building their readiness to adopt technologies by integrating the ICSV initiative's goals into their corporate planning processes, allocating internal resources and effectively leveraging external resources such as synergies with other industry initiatives and collaboration between member companies. "They are also in the process of understanding where they currently rank against the ambitions, committing to a desired 'future state' and establishing a unique rate of change, as well as identifying areas for further collaboration," notes Bell.

The ICSV programme is being guided and governed by a CEO Advisory Group comprising leaders from both the ICMM member companies and the OEMS.

Nick Holland, chief executive of Gold Fields and chair of the CEO Advisory Group, says that there is a critical need to advance work on cleaner, safer vehicles in mining, which will have important health and safety benefits and contribute towards the pressing need of decarbonising the mining industry.

"It is recognised that there are measures we can implement now, but other, more impactful, interventions are reliant on technology pathways that are still evolving. This will undoubtedly take time, but the industry's collaboration with OEMs, through the ICMM, is critical as we look for these long-term, sustainable and integrated solutions," he notes.

BHP chief executive Mike Henry notes the importance of safer, cleaner mining equipment for both people and the world but understands the importance of doing this as a collective. "The ICSV initiative is a great example of the collaborative industry-level effort that can help bring about the scale and pace of change that is needed," he says.

This is iterated by ICMM CEO Tom Butler, who further notes the need to accelerate the level of innovation investment required to scale up commercial solutions.

According to Caterpillar group president Denise Johnson, the company is committed to helping customers operate safely and sustainably. "The progress to date within the ICSV programme has helped to form a shared understanding of where the industry is on its journey and demonstrates that by working together we can more quickly accelerate the pace of change."

As the mining industry rebuilds following the COVID-19 pandemic, there will be continued demand for minerals to support a greener and more sustainable future. "Because the mining industry plays a critical role in meeting this demand, the industry will need to find the right balance between producing these vital materials, protecting jobs and protecting the safety and wellbeing of workers and communities, says Bell, noting that the ICMM and its member companies will continue to strive to do this. MRA

> An important part of the ICSV initiative is forming the aggregated assessment of ICMM members' progress towards each of the three ambitions,
>
> **SARAH BELL**

ICMM SUPPORTS BUSINESS THROUGHOUT THE ENTIRE MINING VALUE CHAIN

The ICMM is committed to ethical business practices that support sustainable development.

Developed with extensive input from a variety of stakeholders, ICMM's Mining Principles respond to evolving societal expectations of industry by strengthening ICMM's member requirements on a myriad of issues – such as resettlement, mine closure pollution and waste – while also supporting progress towards the global targets of the UN Sustainable Development Goals and the Paris Agreement on climate change.

De Beers Group

Inspiring brilliance through safety

Health and safety is not just the responsibility of a select few but rather the responsibility of every person in the business. This is the ethos of the **De Beers Group** as it continues to improve its health and safety programme to move Beyond Zero Harm, even in the midst of the COVID-19 pandemic. **GERARD PETER** finds out more from De Beers' **DR URISHANIE GOVENDER**, head of safety, sustainable development and risk, and **GARY VAN ECK**, principal: safety leadership.

Employees embrace De Beers Group's number one value to 'Put Safety First'

De Beers' purpose statement is to make life brilliant, not only for its people in the workplace but also at home and within communities, Govender starts. "When it comes to safety, all the work that is done takes into consideration how we can be change agents on our home fronts as well as our communities. Instead of providing direction and instructing people to follow, De Beers believes that everyone is a safety leader and we all should pioneer together towards a brilliant future state."

She adds that De Beers is very transparent when it comes to reporting safety performance within the group. Lagging indicators, which are incidents where injuries and fatalities have occurred, are shared. Impressively, De Beers has reported no loss of life at its operations since September 2018.

However, Govender says that does not mean that the company's goal has been accomplished. "We are very humble about this. Unless we have a level of chronic unease where people fully appreciate that risk is dynamic and it could happen to you at any point, we are not where we need to be."

Analytics to drive safety

Another impressive statistic is an increase in high potential hazard (HPH) reporting statistics. HPH refers to a hazard or an incident that somebody had observed and there was a control in place that prevented a fatality or a serious injury. They provide advanced warning of potential problems so that preventive actions can be taken. Last year, there were 32 HPH incidents reported while this year there has been a staggering 403 as at the end of October 2020.

"In 2018, we identified about 44 high risk areas where there have been injuries or fatalities. Every HPH that is reported is allocated to one of the high risk areas and then on a monthly basis, we total the number of reports and can see the risk focus and how it changes or needs to change," explains Van Eck.

By reporting on such statistics, Van Eck says that the company is using the power of analytics to improve safety performance and get the company to move beyond zero harm. "If the leading focus is on driving down to zero harm, then people are reluctant to report injuries because there might be financial implications such as losing out on their bonuses, etc.

"We would rather have a higher number of HPHs reported so that there is a true indication as to what is happening in the field. The type of change that we want to bring is the ability for our people to report hazards and incidents without being penalised for it."

Meanwhile, there can be no denying the fact that the COVID-19 pandemic has had an impact on the company's safety performance, with the company reporting a decline in its safety performance during and immediately post the lockdown period. Van Eck states that this is due to the fact that people are more focused on taking precautions around COVID-19 and that having that concern takes away the presence of mind to be conscious about other health and safety factors.

Govender concurs, adding that the start-up of production after lockdown meant that there had to be COVID-19 inductions that were taking place at a fast pace. These inductions came with further complications such as temperature and coronavirus testing, both additional risks that the company had to address.

Of sound mind and body

De Beers' commitment to ensuring that its people affected by COVID-19 receive the necessary assistance goes far beyond its mines and business operations. As Govender explains: "Our health staff intervene to understand how our people are being treated. This is particularly true in cases where there are comorbidities. We do this so that our people can return to work, healthier, sooner."

Furthermore, the company has implemented its Wecare programme, in partnership with Anglo American. This is a global initiative that protects its people's well-being amid the pandemic. The programme is focused on four areas.

The first is physical health where there is an emphasis on educating and promoting behavioural change to support personal health and hygiene as well as providing health screening and testing; and PPE and medical equipment and facilities.

Secondly, the programme is focused on living with dignity. "We fully appreciate that when people come to work, they bring with them everything such as their issues from home and experiences in the community. We talk about issues such as gender-based violence or other traumas and we encourage people to reach out," adds Govender. In addition, the company works with its people and communities to combat gender-based and domestic violence by working with health authorities to identify abuse cases and provide referrals to support facilities.

Another component of the Wecare programme is community response. This is done through initiatives such as donating food parcels, medical supplies and equipment and promoting procurement of goods through communities. For example, De Beers procures masks from the communities in which it operates. The company has also worked with government to secure PCR equipment so that there is a quick turnaround of PCR test results.

The fourth part of the programme places a strong emphasis on mental health, which has been increasingly important as a result of the pandemic. Govender admits that not much time was spent on mental health in the past but the company acknowledges that when workers are present, they need to be in a state of emotional stability.

> "Do not walk away when there is an incident, no matter what level of employment you are,"
>
> **DR URISHANIE GOVENDER**

THE 4C APPROACH

Another key takeaway from the CEO Safety Summit was the adoption of the 4C Group Safety Framework. The first C is working on the Competencies of all its people.

Next is the Connectedness of people and systems. "This is ensuring that people have access to data and analytics, and that there is a seamless connection between our people and contractors; and that there is no difference in the way operations are carried out throughout the world," explains Van Eck.

The third C is to Cultivate value in all its people. By growing its people, it can grow the company and create value across the company. The final aspect is to promote a Culture of leadership in all its people when it comes to safety. "At De Beers we believe that no diamond is worth a life. So if it is not safe, then stop working," concludes Van Eck.

↑ **De Beers Group** embeds a culture of safety leadership by promoting 'I am the strongest link' every day

It is with this in mind that it is providing support programmes to assist with mental health management. "For example, we use the Engage app that workers can use to check in on a daily basis. This gives them a chance to pause and reflect on their health and they are given the clearance to come to work.

"In addition, on a group level, we have the Headspace app that promotes meditation and reflective moments during the course of the day. We are also looking at employing mental first aiders where people can reach out to individuals to talk to them. We also have regular coffee sessions where we book off time in our diaries and do nothing but talk about how a person is feeling," she states.

Going Beyond Zero Harm

Moving beyond the pandemic, at the most recent CEO Safety Summit, De Beers adopted a Group Safety Framework that puts the company on a path to go Beyond Zero Harm. First held in 2017, the event is held bi-annually and includes CEOs from all regions. However, the most recent summit – held in October last year – was more successful because by holding it virtually, it had a wider reach. "Previously, it was just CEOS and the first line managers within the various business units; this time we were able to reach out to all leaders in the business," states Govender.

Van Eck explains that the new framework enables progressing up the levels of cultural maturity in the company and comprises five key levels.

The first is Basic where you accept that incidents and accidents happen and people will get hurt. The next is the Responsive level which looks at preventing a similar accident. "At that point, it is only once companies start to adopt safety as one of its core values that there can be a safety values breakthrough where you will decide on cardinal rules and where all our people start to talk about safety," Van Eck states.

The next level is Participative level and Van Eck explains that this is when there are systems and processes in place to prevent accidents before they happen. This takes the form of formal risk assessments and compliance audits. However, Van Eck points out that the involvement here is only by safety representatives and is not by all its people.

"As you build trust at all levels, you move into the Citizenship phase. This improves the systems and talks about safety being owned by the line functions – so people work safely because they want to and they start looking at how they can continuously improve systems."

The final phase is Inherent. As Van Eck points out, this is going beyond the near zero plateau so that safety becomes part of the company's business ethos and a way of life. "This means that people don't leave safety at the mine but take it home with them. The Inherent level is the ultimate level of maturity where workers are extremely risk competent and risk aware."

Meanwhile, Govender states that when it comes to safety, all its people need to be involved. "We talk about 'I am our strongest link' every day. We tell our people on the ground that while we fully appreciate that humans are fallible, we fully support the notion that people are our strongest link; they are the glue to our teams, to our communities, to themselves.

"We talk about safety behaviours that empower people to speak up, to stick to the rules, to get involved. Do not walk away when there is an incident, no matter what level of employment you are," she concludes. MRA

> "This means that that our people don't leave safety at the mine but take it home with them,"

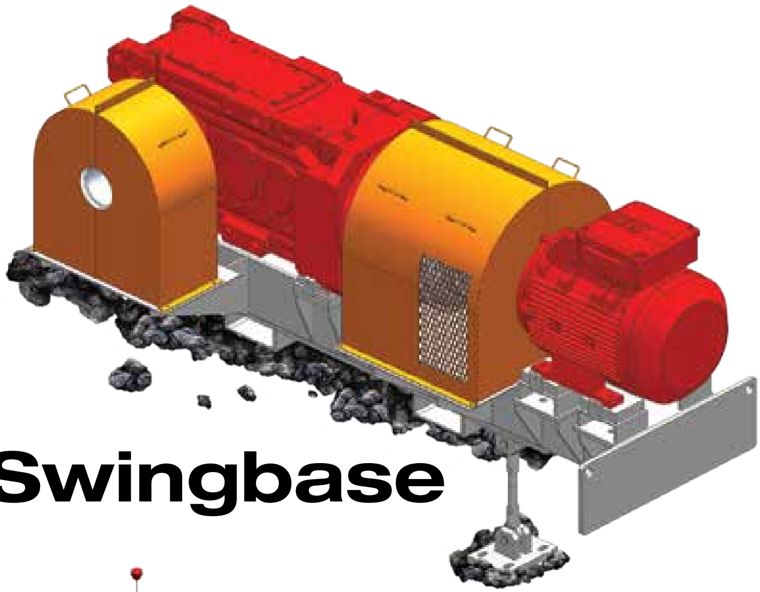
GARY VAN ECK

RECOGNISING SAFETY CHAMPIONS

This year De Beers initiated the Albert Milton Safety Leadership Award, named after the former CEO of its Debswana operations, a man who was known for putting safety first in all endeavours.

The company received 110 nominations globally, with the winner being an operations manager and his team from the De Beers Marine Namibia Business Unit.

Going forward, Dr Govender and Van Eck add that they recognise that the new diamond world requires pioneering a safe diamond mine of the future. Some of the guiding principles that De Beers will address are to ensure that zero people are exposed at the workplace through embracing safety technology, transparent and tangible community benefits and mine designs that are supported by a new operating model where safety is inherent in the new way of work.



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Contractor Onboarding

More than just compliance

Contractor Onboarding at a site is not always top of mind for a mining company. However, with the onset of the COVID-19 pandemic, there has been increasing awareness about who has access to a mine site. **KBC Health & Safety** is helping companies ensure contractors do more than just comply with the necessary regulations when it comes to health and safety in the 'new normal'. **GERARD PETER** finds out more from company MD **GRAHAM EMMETT**.

KBC started 21 years ago as a small health and safety compliance company in Richards Bay. Emmett explains that back then there were six major industries in Richards Bay and each of them had their own onboarding processes to meet occupational health and safety regulations.

As a result, contractors were doing at least eight inductions per year to get on site, and twice as many medicals, because every company had its own medical requirements. "A contractor would spend a month in Richards Bay just trying to get onto site. So, the model we created was really to centralise that and set a single standard across all industries," explains Emmett.

By having a centralised system, both the companies and the contractors would be compliant, thereby saving an inordinate number of days. KBC introduced the model to the mining industry, initially for the platinum and coal mines. Today, it trains around 100 000 people a year in the industry.

While onboarding courses cover the Mine Health and Safety Act and those regulations are stipulated by a mining company, the aim is to ensure that workers are motivated to take the lessons that they learned in the classroom onto a mine site to work safely, ensuring that they can return home safely where they can share and apply many of those same safety concepts.

Taking to tech

From a training perspective, KBC has enjoyed considerable success in the coal mining industry. One of the company's main clients is Anglo American Coal which has seven coal mines in the eMalahleni area. The company runs a centralised onboarding programme that has saved the coal miner a substantial amount of time and money.

As stated earlier, COVID-19 has forced mining companies to rethink their health and safety procedures and not just ensure that it is a tick box compliance exercise. "Covid-19 has made mines realise just how vulnerable they are. They need to know who is accessing mine sites and the pandemic has put their health screening processes under enormous strain. Furthermore, it has meant that we are not just putting people on site through training but also investing in their health," states Emmett.

To that end, KBC has been working with clients to curb the coronavirus on their sites. A case in point: The company has set up a mobile screening clinic at a coal mine in eMalahleni where contractors are screened prior to training and eventual onboarding.

Going forward, Emmett believes that technology will play an even greater role when it comes to Contractor Onboarding. That said, he states that practical training is still needed. "For example, we

> "Covid-19 has made mines realise just how vulnerable they are."
> **GRAHAM EMMETT**

Image: 123rf.com

want to have people in a classroom so that they are being guided through a hazard identification process. Also, we run a behaviour change programme called RISKI DISKI, which is linked to soccer. The learning through soccer and taking the safety principles onto the soccer field has just been enormous. There's an Aha! moment that you just don't get if you had to try and do the same thing through e-learning," he concludes. MRA

Mining after COVID-19

Adaptation needed to ensure safety

South African mining companies will have to adapt their operating models to ensure safety and sustainability as they work to recover from the impact of COVID-19. This is according to a report by the **Boston Consulting Group (BCG)**.

Image: 123rf.com

Mining sites in South Africa have been among the hardest hit by country lockdowns, suffering significant production losses. "Our current scenario modelling estimates that 15% to 25% of South Africa's 2020 output and resultant ramp-up of production was lost due to lockdown," says Tycho Mőncks, MD and partner at BCG.

According to Mőncks, government and mining companies' continued priority needs to be workforce protection to avoid any further spread of COVID-19. Numerous digital and other solutions could help, especially for contact tracing. And while some mining companies have taken decisive steps, full coverage is not yet in place. Companies should also not let their guard down, and plan for how they can help to deploy vaccines for their workforce and communities once those are available.

As part of a structural reform package, BCG has identified eight priority actions to improve mining competitiveness in South Africa. These are:

1. Regulatory reform

South Africa should continue to rethink its regulatory framework to enforce regulation in a more permanent, stable and predictable manner.

2. Industry modernisation

Through technology, mechanisation and digitisation, mines can improve operational performance, cost efficiency, safety and productivity – extending the life of the mine, increasing production and creating new and improved job opportunities.

3. Reliable energy supply

Complementing generation, either through self-generation or independent third-party generation, is the key to mitigating the risk of unreliable energy supply. Government should further ease the regulatory burden and process barriers to self-generation.

4. Infrastructure development

Bottlenecks in South African rail and port infrastructure inhibit the export of certain minerals. A detailed feasibility study needs to be commissioned to address the immediate bottlenecks, which includes increasing the Saldanha railway capacity to 87 Mt and allowing private concessioning of the Lephalale–Maputo railway line, targeting 15 Mt of additional capacity.

5. Intensified community development

All new projects should be conceived with inputs from government, industry, and communities, building long-term development plans on what communities should look like in future.

6. Exploration strategy

Mining companies should develop a comprehensive exploration growth strategy, remap high potential geographical areas, improve the quality of the geomapping platform, and encourage risk capital through a flow-through share scheme similar to the Canadian model.

7. Government–industry task force

A joint government–industry task force should be created to oversee and fast track all processes required to improve mining competitiveness in South Africa. This task force should be made up of all relevant decision-makers to ensure effective, joint and hence true value accretive and quick decision-making.

8. Investment promotion

Government and key industry stakeholders should develop a consistent narrative on mining in South Africa as an attractive investment destination. Crucially, this narrative should be underpinned with actual reforms to address some of the real concerns many investors have. MRA

2021
Vibramech delivers new innovation

The realities of 2020 are yet to manifest in full for the minerals processing industry, due to the relatively long lead times on projects. In consequence, an anticipated downturn in activity has presented an opportunity for Vibramech to offer its clients an online vibrating equipment monitoring application.

Vibramech will be launching its **Vibrasure** online and remote monitoring system during the first quarter of 2021. Vibrasure will enable all aspects of Vibramech vibrating equipment to be monitored 24/7, providing added insurance for machine performance.

Together with its clients, Vibramech can, as required, receive real-time notifications on vibration patterns and bearing temperatures via email, mobile phone messaging or PLC. This will eliminate the occurrence of unplanned downtime due to normally unnoticed detrimental operational issues. This will add to the renowned and reliable Vibramech equipment, with clients sleeping sound knowing that Vibramech is maintaining a constant watch on machine performance, resulting in improved machine longevity.

Vibramech supplies its equipment to mining and minerals processing industries throughout Africa, Eurasia, Australasia, North and South America. Its equipment is operating in processing plants, ocean vessels and mining operations worldwide. The company has extensive experience in gold, diamond, coal, iron ore, manganese, platinum, chrome, nickel, uranium, copper, mineral sands and aggregate operations.

The company is southern Africa's largest manufacturer of vibrating minerals processing equipment. "We engineer solutions for each client's unique minerals processing requirements. We are proud to be the preferred supplier of vibrating equipment to project houses and mines in southern Africa, and we have earned the reputation of being an OEM that designs and manufactures robust and durable screening equipment," says MD David Massey.

The company fully understands the harsh operating conditions which vibrating screens, grizzlies and feeders are subjected to in the mining industry. As such, the company is cognisant that its designs need to cater for both abrasive and corrosive environments. "Our equipment needs to withstand the high wear associated with the screening of abrasive ores. We also have a range of speciality liner materials, paint specifications and wear prevention compounds which are used to combat the effects of corrosion in the marine and refinery applications. Vibramech even offers the option to install a screen in stainless steel," explains Massey.

As sound dynamic behaviour is essential to ensure vibrating equipment reliability, all equipment is built to perform within strict dynamic parameters. All internal mating surfaces are machined in order to maintain stringent dimensional tolerances. In addition, the company's quality assurance programme makes provision for a full 3D vibration analysis to be conducted on all equipment prior to release. This is used as a benchmark for the life of the equipment.

Vibrator motor and geared exciter repairs form part of Vibramech's service offering, with repairs conducted to OEM specifications. URAS vibrator motors and geared exciters are part of Vibramech's key product offering, which, along with other OEM vibrator motors and geared exciters, are repaired at Vibramech's 25 000 m² facilities. Vibramech has distributed URAS vibrator motors as part of its vibrating equipment product offering since 1981 and is the exclusive URAS vibrator motor distributor for Africa and the Middle East. MRA

Please visit Vibramech's website at *www.vibramechglobal.com* for an overview of how Vibramech could assist with your current and future minerals processing requirements.

Image: 123rf.com

New year's revolution

Own the impact of 2021

There is no denying that the past several years have been extremely challenging for the mining industry. The decline in commodity prices, increased union pressures and rise in international competition have all contributed to this difficult period and 2020 has made it only more challenging.

By Stuart Woolmington, CEO: WinWin International

That said, 2021 provides an opportunity for us as industry leaders to own our impact on the mining industry and the millions of staff, contractors, families and communities who make this industry possible. This year is an opportunity to not fear the future but to understand and own it.

This immense change is taking place largely due to digitisation and it is a change that will have a positive impact on mine workers and their careers. The opportunity to own the impact lies in three key strategies.

Embrace the change

The Fourth Industrial Revolution is no longer a buzzword but a reality. The COVID-19 pandemic has rapidly increased the need for digitisation and it is crucial to embrace this change to remain competitive. This change can be daunting but organisations who have a clear company-wide strategy – coupled with a user-adoption and training plan – will come out on top. This training should help employees understand why change is taking place and empower employees to take advantage of the new technologies.

Create a personalised people development strategy

Our mines will always need great talent to operate. Therefore, it's crucial that we embrace the digital age and create a personalised journey for employees from recruitment, onboarding and induction through to career development and growth. By connecting your workforce to their colleagues, managers and work environments through digital tools, you have a holistic view of employee health, happiness and progression. All these data points will allow you to identify opportunities to improve as well as proactively engage workers to ensure that you develop and retain your top talent.

Use technology to create safer working environments

Health and safety is and will remain a crucial indicator of successful mining operations. By connecting your workforce with their colleagues, managers and equipment through digital tools you're able to create safer working environments. Using digital technologies such as the Internet of Things and cloud applications, you can now deliver personalised health and safety content to workers on the job and allow them to quickly report incidents. These same digital tools can be extended into surrounding communities to make health and safety a priority beyond the mine.

Although many of us were happy to bid farewell to 2020, we must not forget the lessons it has taught us about rapid change. In 2021, we must own the change that is occurring and work closely with staff, contractors and communities to ensure they are prepared for this exciting future. MRA

ABOUT THE AUTHOR

Stuart Woolmington has over 30 years' experience in learning and development and strategic communications.

DRC Mining Week

Returning in safety and in numbers

"There is no doubt that the DRC's mining sector will have a solid year in 2021 and the mining community is ready and looking forward to gathering in Lubumbashi from 15 to 17 June for the annual ***DRC Mining Week*** expo and conference."

↑ This year sees a return to a live event with 400 delegates expected to attend

↑ Look out for a series of digital events in the run-up to the live event

This is according to Emmanuelle Nicholls, group director: mining and natural resources at Clarion Events Africa, who have been the organisers of *DRC Mining Week* for the last 16 years.

She states: "DRC's mining sector did well to cope with and address many of the challenges that the COVID-19 pandemic presented, and as always, the extractives community proved resilient and innovative. Moving forward, with the prices of key commodities such as copper, cobalt and gold, doing well, the outlook is good and we will have a lot to talk about in the run-up to and during the event."

Promoting responsible mining

The DRC hosts 70% of the world's cobalt, primarily used in lithium-ion batteries and in the manufacture of magnetic, wear-resistant and high-strength alloys.

"During 2020 it became abundantly clear that mining groups and off-takers alike are starting to take the global movement towards responsible mining seriously by proactively reaching out to the local communities to improve conditions and support social development," adds Nicholls.

Once such example is the support by the Eurasian Resources Group (ERG) for the *Children out of Mining-Northern Kolwezi* programme, an initiative carried out by international development organisation Pact, in the Kolwezi region in the south of the DRC where ERG's Metalkol RTR project is located.

In addition, German car manufacturer VW recently joined the *Cobalt Alliance for the DRC* initiative as part of its efforts to improve artisanal cobalt mining conditions in this central African mining hub.

Safety and security important themes

The event programme will offer various activities for the delegates, with an important focus on responsible mining, while also taking anti-COVID-19 measures onsite very seriously to make the experience a safe, yet valuable one.

"We have missed being onsite," says Nicholls, "and many of our clients and partners have echoed that sentiment, although everyone had to adapt." The event was postponed twice last year due to the uncertainty surrounding the pandemic.

"However, the disruption caused by COVID-19 accelerated the change that was bound to happen with the emergence of the digital world," notes Nicholls. "It is now part of most people's lives and is part of our future. Given the number of people that participated in our digital event in June 2020 and in our webinars during the course of the year, the mind shift was a positive one, the uptake was excellent and people have embraced the shift. Moreover, we have been able to reach a new audience that would not necessarily travel to the DRC but is excited about the investment and trade opportunity the mining sector offers."

"My only regret," says Nicholls, "is that unfortunately the digital activities do not always allow miners and other stakeholders in remote places to connect onto the platforms. It was impressive how everyone embraced going digital, despite the technical and connectivity problems at times, but one has to be realistic about reaching everyone, and *DRC Mining Week* has always offered something for everyone in the mining value chain. This is why our live event will be back this year so no one is left out and everyone involved in mining in the DRC can touch base with all industry players.

"While the conference will welcome 400 delegates over two and a half days to engage on topics such as policy and regulation, trade and collaboration, power and infrastructure, industrialisation, safety and security, artisanal mining, women in mining, beneficiation and technologies, our numerous functions will take place in a controlled environment, and a golf day has been organised in partnership with ComexAfrica. Additionally, 2021 will see the first of its kind speed dating between mining companies and exhibitors."

Furthermore, in the run-up to the next live event, the organisers are also developing another series of free but exclusive digital engagements, in French and in English, that will take place throughout the course of the year.

> DRC's mining sector did well to cope with and address many of the challenges that the COVID-19 pandemic presented,
>
> **EMMANUELLE NICHOLLS**

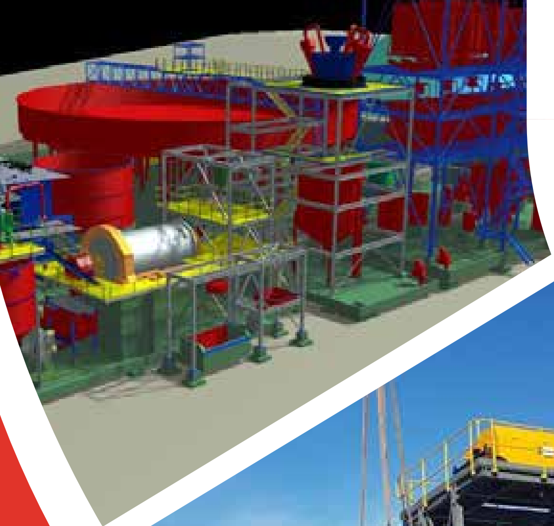
Bringing the industry together

Banking giant Standard Bank has been a longstanding business partner in the mining sector of the DRC and is the returning diamond plus sponsor of *DRC Mining Week 2021*.

Amedeo Anniciello, CEO of the bank in the DRC, states, "DRC Mining week is a valuable conference for Standard Bank. As the diamond plus sponsor of the event, our main goal is to foster a platform that brings together the industry, investors and government leaders from across the globe.

"Through this sponsorship, we are reinforcing our commitment to support DRC's growth and we are confident that the mining industry will continue to play an important role in the development of our economy," he concludes. **MRA**

SCAN THE QR CODE FOR MORE INFORMATION ABOUT *DRC MINING WEEK 2021*



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