

# MINING

REVIEW AFRICA



## BEWARE PIRATES CAN HAVE YOU UP IN SMOKE

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## MINING IN WEST AFRICA TOP PROJECTS IN-COUNTRY FOCUS NIGERIA MINING WEEK

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“ In the post COVID-19 world, West Africa may still be an attractive investment destination, ” Warren Beech, Partner: Head of Mining and Infrastructure, Eversheds Sutherland (SA)

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## DRILLING & BLASTING



# PYROSCAN 3

## FIRE DETECTOR FOR CONVEYORS

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**↑ FRONT COVER**

Allowing untrained professionals to service and maintain fire protection systems will not only dent a mining company's profit but it also puts its employees at great risk, warns Alien Systems & Technologies. **P4**

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**Managing Director – Africa**

David Ashdown  
 e: david.ashdown@clarionevents.com

**Group Director – Media**

Ross Hastie  
 e: ross.hastie@clarionevents.com

**Deputy Director – Media**

Bernice Bredenkamp  
 e: bernice.bredenkamp@clarionevents.com

**Editor-in-Chief**

Laura Cornish  
 e: laura.cornish@clarionevents.com

**Senior Editor**

Gerard Peter  
 e: gerard.peter@clarionevents.com

**Senior Deputy Editor**

Chantelle Kotze  
 e: chantelle.kotze@clarionevents.com

**Online Editor**

Richard Jansen van Vuuren  
 e: richard.jansen@clarionevents.com

**Brand & Advertising Specialists**

Rochelle Botha  
 e: Rochelle.Botha@clarionevents.com

Vuyisa Mfobo

e: Vuyisa.mfoba@clarionevents.com

**Production Manager**

Mandy Rust  
 e: Mandy.Rust@clarionevents.com

**Design & Layout**

Catherine van Dyk  
 e: clearimpressions@outlook.com

**Head Office**

2nd floor, North Wing, Great Westerford,  
 240 Main Road, Rondebosch, 7700  
 PO Box 321, Steenberg, 7947,  
 South Africa  
 t +27 21 700 3500  
 f +27 21 700 3501  
 info@clarionevents.com  
 www.clarionevents.com

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# The new normal

## We're bringing our lessons learnt into the future

To be perfectly honest, I didn't believe when I wrote the editor's comment for my last edition (April) from the confines of my lockdown home, that I would be hitting the repeat button for the May edition.

But here I am, an entire edition later, still sitting in my made-up office at home, contemplating what our new world will look like when lockdown is truly over. For South Africa, that won't be for a while still. On the eve of four weeks (of a five week scheduled lockdown), our president, Cyril Ramaphosa addressed the nation about the next steps to be taken to continue limiting the number of infections in the country.

The result: We will move out of lockdown in a slow and phased approach – moving from Level 5 to Level 4, after which we must steadily make our way to Level 1. As I sit here, I don't know exactly what changes will occur between levels or more importantly, how long each level will last. But, at least we have made the first step towards recovery as the South African economy has taken a particularly hard knock – still reeling from the fact that Moody's recently downgraded us to junk status.

On the plus side, open cast mining is back in business – 100%, while underground mining is allowed to ramp up to 50%, and must stay that way until

we move into Level 2. I hope that the downstream impact on our supply sector will be quick and painless as new business picks up.

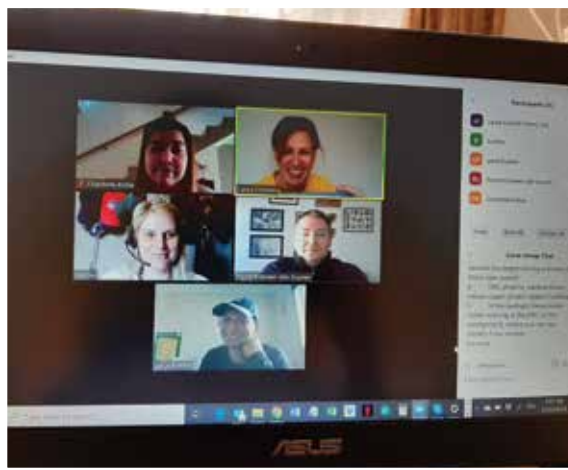
For myself personally, I'm looking forward to restarting my exercise regime; something I've missed most of all, that and sushi of course, although it will be a long time I'm sure before that craving is satisfied.

I want to take this opportunity however to congratulate our industry. You have been resilient, strong and taken the

necessary drastic steps to protect your businesses and employees. It's good to recognise that safety is always your top priority – across all spectrums of the business, and that extends to home life.

For those who have donated portions of their salaries or bonus structures to the country's Solidarity Relief Fund, we are proud to call you leaders of our sector.

No matter how the next few months/year pans out, *Mining Review Africa* remains here to support you and will do all we can to help rebuild your business and rebuild your name in this new world so that you can return to normal – albeit a new normal, but a normal nonetheless. My team walk away having learnt some vital new tools – how to operate successfully in a virtual world reality – which I believe can only benefit ourselves and our clients moving forward. **MRA**



↑ The MRA team connecting in a virtual reality

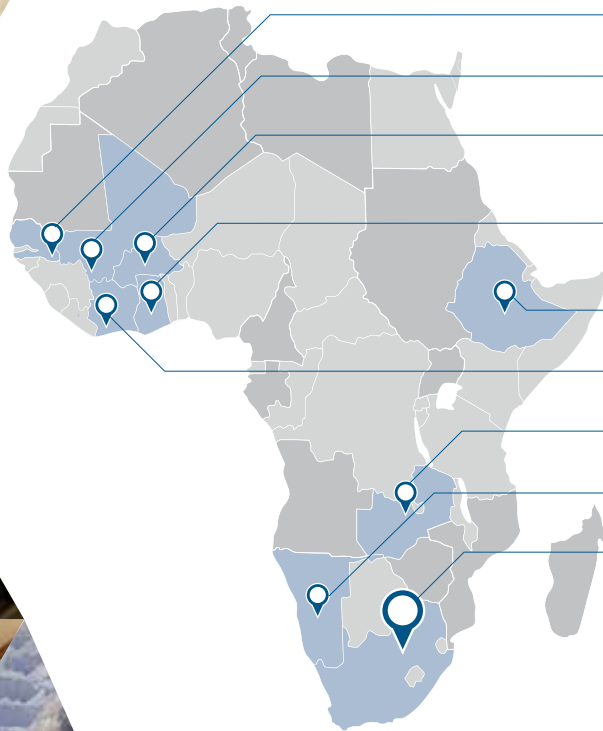




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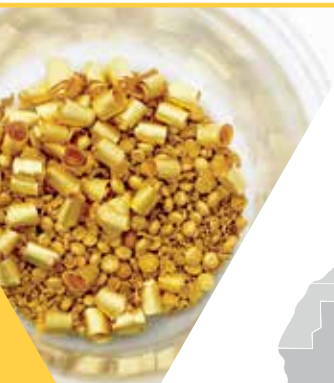
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Using uncertified service providers can put a mine at serious risk

# Pirates Can Have You Up in Smoke

## Unaccredited installers are a real danger

Allowing untrained professionals to service and maintain fire protection systems will not only dent a mining company's profit but it also puts its employees at great risk. This is the stern warning from **GRANT WILKINSON**, sales director of fire engineering company **Alien Systems & Technologies (AST)**. **GERARD PETER** reports.

With more than 20 years' experience in fire engineering, AST manufactures an end-to-end array of fire protection products and solutions that are designed to protect key risks against the threat of fire.

The company supplies an extensive range of fire protection systems to various mines locally and throughout the continent. AST has experienced teams of engineers available for installations on site, commissioning and inspection.

Wilkinson has now raised concerns about installers that are not accredited approaching mines to service and maintain AST products. "Over the last year or so, we have heard of maintainers purporting to be trained by AST servicing and maintaining our systems. There have been instances where the equipment has been damaged to the point that they don't function anymore. Mines need to be aware of this," he explains.

While the company consults with mining companies about their fire protection needs, Wilkinson says that AST does not always deal with the end-user. For example, a systems integrator will install equipment at a mine but after

a few months, he no longer deals with the mine. According to regulation, all fire protection equipment requires a service to be done every three months by a competent person and this ensures that the AST warranty and Pyroshield Lifetime of Free Policy is still valid. "Now, although our products are properly labelled, another company that markets itself as an installer and servicer and maintainer of fire protection equipment convinces mining companies that they are qualified to do it," states Wilkinson.

"But often they don't know how to do the routine checks or have the spare parts. As a result, they take shortcuts with the system, sometimes using pirate parts and ultimately damaging it and rendering it useless. In many instances, the client doesn't know that so they think they have a system that is in working order but this is not the case. It's a bit like taking your Rolls Royce to a backyard mechanic and expecting quality workmanship and genuine parts."

### Shortcuts can lead to calamity

Wilkinson adds that there have even been instances where products are

so damaged that the customer now has to purchase new equipment. He cites examples of this being the case with AST's Cirrus Pro range of aspirating fire detectors. These highly advanced detectors can detect invisible combustion particles (submicron carbon particles) that are formed even before smoke has formed. As such, Cirrus Pro is well suited to extreme mining conditions as it is impervious to false alarms caused by dust particles, humidity and temperature variations.

Another worrying development is the unauthorised refurbishment of AST equipment from old sites that is then 'passed off' to other mining operations. "For example, an installer will take our Pyroshield fire system from one site, refurbish it and sell it as a system to another mining company without any involvement from AST," explains Wilkinson. "It is not a genuine system anymore," says Wilkinson.

"This poses a major health and safety risk as Pyroshield is a 'tailored to suit' automatic engineered gaseous fire extinguishing system designed and engineered specifically for a particular room and is not like buying a can of beans off the shelf – it has cylinders that store gas under pressure and they also



fall under the pressure equipment regulations of 2009. Those systems have to come back to AST to go through the design process to ensure that the cylinder is safe, and that the gas flows at the correct mass flow rate through a pipe system – to comply with the relevant engineering standards such as SANS ISO 14520 and NFPA 2001. Also, if it is not checked by us, the system will fall outside of the Pyroshield independent third party approval certificates that we have from the international certification association, Bureau Veritas. Even some gas filling companies that do not have the correct tools, knowledge and parts try and refurbish our systems and we have seen pirate parts used and poor workmanship that can have serious consequences – even death should a failure occur. AST uses approved parts and trained persons. This provides the most cost effective support possible ensuring compliance with its full system, independent third party certificates for its Pyroshield Systems.

### Expert advice and experience available to clients

Wilkinson is confident that mining companies do take fire protection seriously. "On the whole, based on what I have seen, the intent is there by mining companies to ensure that fire protection systems are installed on their mines. However, at times mining companies are unsure about what system they need or how to maintain what they have and they get supplied with the incorrect information, leading to a buyer beware scenario," he adds. Fortunately, AST is on hand to offer expert advice in order to ensure the right system is installed.

"We have broad engineering knowledge from which we derive the exact specifications that each mine requires such as the type of fire detection system needed to avoid false alarms in that particular mining environment. For example, at iron ore and coal mines, the environments are very dusty, thus a smoke detector cannot always be installed since smoke and dust particles are very similar in size and the dust can create false alarms. A smoke detector would be more appropriate in a clean administration building. In addition, any mine that has our systems installed, such as Pyroshield, can contact AST directly on how to maintain and service this system using our Lifetime of Free Policy that ensures free hydrostatic pressure testing for the lifetime of a Pyroshield System," states Wilkinson.

Wilkinson also cautions mining companies to employ only properly qualified persons to design their fire protection systems. For example,



↑ The Cirrus Pro fire detector is well suited for extreme conditions and impervious to false alarms

when protecting a substation, it is imperative that the person designing the system is registered with ECSA at Pr Eng or Pr Tech Eng level in the category to undertake fire protection engineering as one of their competent skills.

It is also up to the company to ensure that all equipment installed meets the required standards. To add further peace of mind, AST sends out documentation in line with the relevant engineering standards with the product it supplies. This includes important information on how each product can be maintained and serviced and by who.

What's more, if a company is unsure about an installer's accreditation, it can contact AST directly. "All you need to do is give us the company details and we can check our database to see if that person's training is up to date. If not, we can get in touch with the integrator in order to get them up to date with their training," concludes Wilkinson. **MRA**

### GIVING YOU PEACE OF MIND

AST supplies some of the world's most advanced fire protection equipment. This includes a heat sensing cable that uses a cable digital interface monitoring module (DIMM). The cable can be fitted onto conveyor belts of up to 3 km. It can detect right to the nearest metre when a fire breaks out on a conveyor belt and stream this information onto the mines Modbus system.

Given the rapid pace of technology development, AST updates its products such as the heat sensing cable every one to two years. As such, accredited installers need to be updated on products on a regular basis. With this in mind, AST has a training school with dedicated trainers whose sole purpose is to bring installers on board and put them through a full training course. After completing both theory and practical aspects, they are then awarded a training certificate.

According to Wilkinson, this has had considerable success and there has been an increase in the number of installers coming to AST for accreditation.

“Pirates take shortcuts with the system, ultimately damaging it and rendering it useless,”

**GRANT WILKINSON**



Need to check if your installer is AST certified? Call 011 949 1157 or email [sales@astafrica.com](mailto:sales@astafrica.com)

# April 2020

## Top 5 trending stories on [miningreview.com](http://miningreview.com)



### The impact of COVID-19 on the mining sector

Guest contributor and mining industry advisor, Shabir

Ahmed, highlights that the mining industry must reconfigure and prepare itself to operate under a new normal, one in which it can operate and sustain itself under the new constraints and challenges that such pandemics bring with them. Depending on how long the crisis lasts, the mining industry could see fast-tracked **autonomous mining technologies** being implemented.



### Proposals for the “new normal”

According to Dr Dirk Hermann, CEO of Solidarity, **the**

**coronavirus will be with South Africans for a long time still.** “We need to find a sustainable answer for healthy work environments. If people cannot work, it will place so much pressure on any lockdown it will implode. For a sustained fight against the virus, people must be



able to work in healthy environments. We must be fearless against the virus and fearless towards the economy in order to limit the long-term impact on both health and the economy.”



### More magic from Mothae

The high-value Mothae kimberlite mine in Lesotho continues to be a

gem for Lucapa and the government of Lesotho. Latest recoveries include a **top-quality 64 carat D-colour Type IIa gem.** The 64-carat diamond is the 12th +50 carat diamond recovered from Mothae since January 2019 and underlines Mothae’s status as a source of large and premium-value diamonds.



### A COVID-19 nine-point action plan

The South African mining industry has extensive and

existing systems in place to deal with communicable diseases. The Minerals Council South Africa has adopted a nine-point action plan that involves: 1) employee education and health promotion, 2) health worker readiness, 3) ensuring access to consumables and hardware, 4) proactive influenza vaccination, 5) understanding the potential impact on employees who may be immuno-compromised, 6) case definition and management, 7) employee isolation should the need

arise, 8) travel advice, and 9) reporting communication. The Council also says **the COVID-19 impact on the industry will be difficult to quantify** for several weeks.



### ArcelorMittal heading into a perfect storm

The hand of fate has not been kind to ArcelorMittal.

The early signs of a weakening in local demand for steel was apparent even before the first positive case of COVID-19 was reported in South Africa. The anticipated impact of COVID-19 on the economy has led ArcelorMittal South Africa to consider further **measures to ensure its sustainability.** **MRA**



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# COVID-19

## Can West Africa's mining & natural resources sector survive?

**By Warren Beech, Partner: Head of Mining and Infrastructure, Eversheds Sutherland (SA)**

The mining and natural resources sector in Ghana has regularly been in the spotlight for many reasons, including that it has been the beneficiary of extensive exploration and development of operating gold mines for approximately 20 years.

While Ghana, like most mining jurisdictions in Africa, has had its ups and downs, investment in exploration and mine development has been steady, with good returns. This has been mostly due to a combination of factors such as the relative accessibility of the gold reserves, better infrastructure in comparison to many West African countries, better access to semi-skilled and skilled workers, and a relatively stable policy and regulatory regime.

Ghana has also however faced significant challenges: socio-economic demands for participation in the benefits

that flow from the mining and natural resources sector; community activism; a large artisanal subsector with the consequences that flow from this largely unregulated subsector, such as smuggling; environmental impacts; and exploitation of vulnerable people.

### Making investment-smart decisions early on

The relatively accessible gold reserves, plus low-cost extraction, have also meant that neighbours such as

**DID YOU KNOW?**  
 In 2019, the Public Investment Corporation announced its interest in investing in West Africa, rather than South Africa, because of the potential return on investments

Mali and, more recently, Burkina Faso have also been benefiting from substantial investment.

Unlike the often naive references to the "Country of Africa", West Africa comprises 16 states (as identified by the United Nations) and

is appropriately referred to, in regional terms, as West Africa.

West Africa recognised the importance of regional solidarity as far back as 1975 (and possibly further back) when the Economic Community of West African States (ECOWAS) was established by treaty, amongst





member states. The vision of ECOWAS has been simple – to create regional opportunities for growth and development by removing barriers, and making it easy to do business in West Africa, so that the citizens of the member states can benefit. ECOWAS's vision 2020 has been focused on promoting economic cooperation and regional integration for the development of the West African economy, and has the stated goal of "...transforming ECOWAS from a body of states to a community of people".

It is not difficult to see why West Africa has been viewed by investors as an attractive destination.

South African investors, and the international investment community who had not been looking at West Africa for opportunities, certainly would have taken note of the comments by representatives of the Public Investment Corporation, in 2019, that the Public Investment Corporation had set its sights on investment in West Africa, rather than South Africa, because of the potential return on investments.

With its abundance of untapped mineral resources (although the vast majority of exploration and mine development has been focused on gold, West Africa also has substantial deposits of iron ore, diamonds, bauxite, phosphate, and uranium), the stability of ECOWAS, and common policy and legislative frameworks in the region which contribute to investor confidence, there should have been substantially more investment – particularly in countries other than Ghana, Mali and Burkina Faso. While there has been investment in Senegal and the Ivory Coast, expectations have been higher for more significant investment in West Africa.

### Why then the struggle?

The question, logically, therefore, is what is preventing more substantial investment? The primary reason seems to be significant: justifiable concerns regarding illegal mining operations, and regional security and stability.

Many West African states have faced the challenge of illegal mining which goes hand in hand with criminal organisations and structures, smuggling, child labour, and rule by fear.

The recent attacks on mining personnel in Burkina Faso, seemingly at the hands of organisations which have been branded by international bodies as terrorists, and expansion of incursions of these organisations into West African states, have caused alarm.

There is also the very real concern that illegal, artisanal, and large-scale mining would be the target for these incursions, because the gold reserves, which are relatively easily accessible, can fund the activities of these organisations.

### The impact of COVID-19

West Africa, like the rest of the world, is also facing the consequences of COVID-19.

COVID-19 has played havoc with international markets, which will also inevitably impact on West Africa, as demand decreases.

While countries like Ghana and Mali may be in a better position to implement the necessary measures to address the contraction and spread of COVID-19, other West African States may not be in the same position, and COVID-19, together with the regional security concerns, is likely to impact on West Africa's mining and natural resources sector, for some time to come.

This is extremely unfortunate, particularly in view of West Africa's history of trying to make investment in the region as easy as possible – for the benefits that can flow to citizens of the West African states, and the significant potential of the mining and natural resources sector to contribute meaningfully to growth and development in West Africa. Its relatively accessible gold reserves, low cost extraction, and ease of doing business, is unfortunately being overshadowed by COVID-19 and the regional security concerns.

In the post COVID-19 world, West Africa may still be an attractive investment destination because of the availability of large untapped mineral resources, and the relatively low cost of extraction, if it can address the primary concerns surrounding regional security. The usual challenges faced by mining jurisdictions such as infrastructure development and accessibility to semi-skilled and skilled workers, can be addressed, relatively easily, with the flow of investment. **MRA**



In the post COVID-19 world, West Africa may still be an attractive investment destination because of the availability of large untapped mineral resources,

**WARREN BEECH**



### About the author

Warren Beech has been practising for over 20 years, during which time he has developed a highly recognised and specialised practice in relation to the mining, natural resources, infrastructure and projects sectors.

He provides multi-disciplinary legal and related services, primarily to the mining, natural resources, infrastructure and project sectors. These include health, safety, and the environment, anti-bribery and corruption/human rights, fair employment practices, community and social aspects, black economic empowerment and transformation, interaction with government/regulatory bodies, corporate and commercial, criminal and employment, as well as training, auditing and compliance.

Recognised for his contribution to the mining and natural resources sector by several industry bodies, including association affiliated to the Minerals Council, he has participated in various industry-specific bodies on developments, including legislative amendments, at the request of the regulators.

Market risk, low interest rates and weak economic growth is driving gold demand in 2020



# Gold

Still a safe haven asset of choice during times of crisis

As a high-quality, liquid asset, gold performs especially well during times of systemic crisis, helping investors preserve capital. The unprecedented health crisis resulting from the COVID-19 pandemic has led to widespread travel restrictions, the complete shutdown of numerous sectors, and higher volatility in financial markets than was experienced during the 2008/2009 global financial crisis.

All these point towards a highly likely global recession. While the deceleration in economic growth is expected to impact gold consumer demand and result in gold price fluctuation, investor response to economic volatility will be supportive of gold investment demand as a safe haven in the longer term.

**CHANTELLE KOTZE** writes.





Image: 123rf.com

Despite the price volatility that gold experienced in March, it remains one of the best performing asset classes this year, with strong investment in gold through gold-backed exchange-traded funds (ETFs), says World Gold Council head of research Juan Carlos Artigas. In Q1, 2020, gold ETFs added 298 t, or net inflows of US\$23 billion, across all regions – the highest quarterly amount ever in absolute US dollar terms and the largest tonnage additions since 2016. Anecdotal evidence from the US Mint has also shown continued demand in physical gold bar and coin purchases. “These are clear signs that investors are adding gold to their portfolios to protect against and hedge vulnerability during these times,” says Artigas.

On the other hand, the deceleration in economic growth and gold price volatility is expected to impact on gold consumer demand, with early indications of softening consumer demand emerging from China. “Historically, however, investment flows in periods of uncertainty tend to offset weakness in consumer markets,” says Artigas.

## Uncertainty drives investment demand

The World Gold Council’s 2020 outlook, released in January 2020, predicted that market risk, low interest rates and weak economic growth would drive gold demand in 2020. While these fundamentals remain true, the magnitude of these have significantly increased, owing to the extent of the impact of COVID-19 and the extents of economic deceleration.

Several Central Banks around the world have lowered their rates to counter the fallout from the coronavirus pandemic on commercial banks, the economy and borrowers. This trend has in turn reduced the opportunity cost of holding gold, compared with that of stocks or bonds, and has driven investors that would not usually invest in gold to add gold to their investment portfolios as an additional hedge, says Artigas.

In terms of Central Bank gold purchases, data from the International Monetary Fund (IMF) in March, showed that Central Banks and supranational organisations, such as the IMF and the Bank of International Settlements, currently hold almost 34 000 t of gold as reserve assets (17% of total aboveground stocks), having been consistent net buyers of gold. These buyers have collectively added approximately 4 720 t of gold between the end of 2007 and the end of 2019.

While there has been a structural change in Central Bank demand over the past 10 to 15 years as developed market Central Banks have slowed down their net sales and emerging markets increased their net purchases, IMF data indicated an uptick in gold purchased from Central Banks in January and February 2020, following December’s five-month low.

The World Gold Council puts the primary reason for recent gold buying down to heightened economic and political risks, low negative interest rates and the rebalancing of allocations.

While Artigas says that some Central Banks may decelerate their level of purchases, others may use gold as a way to minimise some of the volatility in their own foreign reserves as a high-quality, liquid asset during this time of uncertainty.

## Volatility leads to asset sell-off

Like most asset classes, gold is being affected by the unprecedented economic and financial market conditions in play around the globe.

According to World Gold Council chief market strategist John Reade, gold was not the only asset to experience a sell-off, with massive liquidations across all assets, including equities and bonds.

Gold, however, was likely being used to raise cash to cover losses in other asset classes because it remains one of the best performing asset classes

“Despite the sell-off that took place at the beginning of March, the gold price has since recovered and settled down into a more stable range,”

JOHN READE





Image: 123rf.com

year-to-date despite recent fluctuations; and is a high-quality and highly liquid asset, trading over \$260 billion per day in March.

“This is entirely consistent with behaviour we have seen during periods of other major unexpected events, when volatility spikes to extreme levels, including the 2008/2009 global financial crisis, directly after the collapse of Lehman Brothers, when a very similar pattern of asset sales took place,” says Reade.

“Despite the sell-off that took place at the beginning of March, the gold price has since recovered and settled down into a more stable range. It does however remain very difficult to predict whether this gold asset sale will continue. I am hopeful that the gold purchases that have taken place might have deterred others from selling their gold for liquidity purposes going forward,” adds Reade.

### Future demand and supply fundamentals

While gold has remained relevant throughout the centuries, there has been an evolution in how investors interact with the metal and how they access it.

The significant improvements made to financial asset structures have facilitated new ways for investors to invest in gold, increasing demand in the metal, says Artigas. These trends are expected to continue in future as further developments are made to the ways in which investors can access gold.

While consumer demand for gold, particularly its use in jewellery, is influenced by generational shifts and differing perceptions between older and younger generations, there is a new consumer market gaining momentum in which gold is required. Artigas says that future demand for gold is expected to arise from its use in technological applications, such as electronics and green technologies.

On the supply side, gold mines have been able to steadily increase production over the past few decades. The trend in 2019 deviated from this with

← Central Banks have been consistent net buyers of gold

### DID YOU KNOW?

The World Gold Council has developed a tool, dubbed Gaurum, that helps investors intuitively understand how gold prices may react across various macroeconomic environments to facilitate strategic asset allocations



Despite the price volatility that gold experienced in March, it remains one of the best performing asset classes this year, with strong investment in gold through gold-backed exchange-traded funds,

JUAN CARLOS ARTIGAS



the first drop in gold production in almost a decade, albeit only a slight drop. This is a reflection of the fall of the gold price that took place in 2012/2013 and which resulted in many new projects being shelved while companies tried to survive at a lower gold price. This latest trend in lower gold production may be an early indicator that gold production may drop slightly or remain flat over the next few years and potentially longer, says Reade.

While there might not be enough new mine gold production to keep up with demand, Reade is confident that when the price of gold increases owing to demand outweighing supply, existing gold will come back to the market for recycling.

Despite a period of underperformance in gold from 2013 to mid-2019, which left investors questioning whether gold was a sensible investment asset, the past 12 months have proven its merit as a safe haven asset, says Reade.

While the World Gold Council argues that gold should always form part of an investment portfolio and not just for safe haven reasons, it is a clear asset investment, particularly during declining expectations for the global economy. Investors and Central Banks in particular continue to see value in gold during these times, because gold has been a source of returns, is a great diversifier of portfolios and because it enhances the risk adjusted returns of a portfolio. **MBA**

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2. Gold is a more effective diversifier than other commodities
3. Gold outperforms commodities in low inflation periods
4. Gold has lower volatility
5. Gold is a proven store of value
6. Gold is highly liquid



Image: 123rf.com



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# Lessons learned

## Creating self-sustainable community projects during the life of mine

By **Lisl Fair, principal consultant (social sciences), SRK Consulting**

Livelihood resilience in mining communities is vital to ensure their sustainability after mine closure; to this end, mines are learning valuable lessons to help local projects and businesses become more self-reliant.

Turning 'charity projects' into self-sustaining enterprises, for example, can help mining communities continue to thrive after mines close; success stories are rare to find, but increased focus among sustainability practitioners on co-creating resilient communities increasingly reflects valuable lessons on how to make this happen.

An important focus of good practice in mine closure today is on its social impact, and how a proactive process of social transitioning to closure can make communities more resilient and self-reliant. A key element of this is to move

away from community dependence on the revenues flowing directly from the mining operation.

Most mines contribute significantly to local social development projects in one way or another – either through regulatory requirements or through corporate social investment (CSI) initiatives. This is often done without upfront consultation with recipients, which results in the recipients being excluded from taking ownership throughout the entire development project life cycle. An example of this type of development strategy is when mines focus on developing infrastructure projects – like schools or water wells

for communities – instead of developing these projects with communities while having a clear community ownership and maintenance plan in place.

Environmental, social and governance (ESG) pressures on mines – through regulations or responsible investors – increasingly requires that mines demonstrate their local procurement spend in the public domain. To respond to this requirement, mines are gradually forming enterprise and supplier development departments to engage with and build capacity in the local supply chain.

While these developments are a step in the right direction, the need for





**Lesedi volunteers in the tree nursery** established to help make their early childhood centre self-sustainable

long-term economic diversification in the area makes it vital that the mine actively supports suppliers to find other customers in the region. This will avoid a long-term dependency and help strengthen networks and partnerships.

Traditional approaches to community support do little for social transitioning. When the mine closes, the impact is devastating for those many organisations and individuals who are dependent. Hence the importance of recent practical efforts by mines to take a new approach to community projects

– supporting them not just to survive but also to build a sustainable foundation for a future beyond the life of the mine.

### Sustaining early learning

An example of a project showing how this can be done is the Lesedi early childhood development (ECD) centre near Ivanhoe Mines' Platreef Project in South Africa's Limpopo province. Initially funded by Ivanhoe Mines in terms of the CSI mandate within the mine's legislated Social and Labour Plan (SLP), the centre has developed a path that supports its independence.

Started in 2011 as a volunteer organisation, Lesedi was supported by the mine in a five-year multi-pronged engagement from 2014 to 2019. The support included training courses starting in 2016 – on leadership, childcare and catering – that would foster self-sufficiency. Lesedi and the mine also collaborated on an enterprise approach to generating revenue, starting a tree nursery in 2017.

In 2018, the self-sustainability training continued with a process of asset mapping, business viability testing, and a micro-MBA small business course. The project was able to expand its nursery in 2019, and to apply for other funding from other social development funds.

### Leveraging supply chain

A similar approach was applied in the Democratic Republic of Congo, where Kamoia Copper SA – also one of Ivanhoe Mines' subsidiaries – in the Kolwezi district had a local brick-making cooperative in its supply chain. Working with the brick-makers to help diversify their market and broaden their customer

base, the mine provided a loan for more equipment. This allowed the cooperative to expand production and start earning revenue from other sources.

From our experience, mines can achieve a great deal in terms of social transitioning in their closure planning if they start early in the mine life cycle. To foster this process, an innovative 'Self-Sustainability Toolkit' has been developed to help project teams consider self-sustainability right from the beginning of the project cycle. This toolkit is applied within a framework covering the full project life-cycle, from the initial consultation phases for asset mapping and benchmarking through to project self-management and independence.

The instrument keeps evidence regarding self-sustainability interventions and guides the evaluation of existing projects against self-sustainability actions. It also poses questions such as these: Did the beneficiaries initiate or request the proposed project – at least in broad concept? Did the project team involve the beneficiaries in the project planning and design? Do the project beneficiaries understand that the ultimate aim is for the project to be financially self-sustainable? Did the beneficiaries receive training in basic project and business management?

The practical lessons in social transitioning toward mine closure that have been learnt in the mining sector to date have been valuable. They should be shared, adapted and emulated – where appropriate – as we continue to build good practice in this important field. **MRA**



↑ **Lisl Fair (second from right) with SRK's social transitioning during mine closure core team** Adel Malebana, Ashleigh Maritz and Jessica Edwards



↑ **The process of consulting with community members to map a range of community assets** – including natural, social, infrastructural, intellectual and economic – is vital to leveraging these assets as a basis for self-sustaining development initiatives

# Conflict-ravaged Burkina Faso faces its next threat

## The unprecedented Coronavirus outbreak

Since 2015, **Burkina Faso** has been faced with ongoing conflict and attacks that have displaced around 800 000 Burkinabe in the last year, and now the country is facing another major threat – COVID-19. The country's vulnerable citizens who were displaced during the conflict, are most at risk as the virus tightens its grip, with over 500 confirmed cases as at 15 April 2020, including four of the country's ministers, writes **CHANTELLE KOTZE**.

The country's mining industry has also been impacted – first by the ongoing conflict and now by the outbreak of COVID-19.

Despite the conflict, which has been concentrated in the north and the east of the country, the mining sector remained resilient until the succession of high-profile attacks, which occurred in late 2019. Most notable was the armed attack on a convoy of buses carrying mineworkers to SEMAFO's Boungou mine in the east of the country in November 2019 in which 37 people were killed and more than 60 people wounded.

These

attacks highlighted to mining firms the potential dangers and led to a sector-wide call for greater security provisions by the government in key mining regions, says Tristan Puri, consultant at Pan-African consulting firm Africa Practice.

Despite the call for increased security provision, the domestic and regional response to the violence remains weak. While France is seeking to foster closer collaboration among regional and international powers, these efforts are being undermined by a lack of international commitment. Most notably, the United States is threatening to withdraw from the region entirely, which would deprive regional powers of key equipment and intelligence gathering capabilities, says Puri.

While the conflict and lack of resolution has forced some mines to temporarily close their operations, there are some

producers that have been able to continue relatively unaffected. However, the outbreak of COVID-19 has the potential to change all this, says Puri.

Aside from the severe global impact of the pandemic on commodity prices and supply chains, as well as the broader economic impact within the country, the impact of the virus on the mining sector in Burkina Faso has thus far not been too dramatic, according to Puri. "While there have been several confirmed cases of Coronavirus in the western and south-western regions of the country, where many mining companies operate, only a handful of cases have been reported at mining operations. Roxgold and Endeavour Mining have both confirmed cases among their employees, while the country's Minister of Mines has also tested positive, but is expected to recover."

While the government has for the time being only introduced a night-time curfew, restricted all large gatherings and suspended international travel to deal with the pandemic, the expected uptick in cases in the coming months will likely see the government introduce more stringent distancing measures. These measures could hamper supply chains and slow mining production, with a further risk of potential lockdown in the regions where cases have been reported.





Also of concern in the country is whether the presidential election, scheduled for November, will go ahead as a result of the pandemic. Moreover, the country's weak health system, large numbers of vulnerable citizens and volatile security context, could lead to a catastrophic mortality rate and make it difficult to hold the election, says Puri.

Puri believes that Burkina Faso President Roch Marc Christian Kaboré, who took office in December 2015, is keen to see the election go ahead as it will shore up his legitimacy at home and abroad. Having secured only a marginal majority in 2015, an election victory in November will allow Kaboré renewed momentum to tackle the rising militant threat, and will facilitate further donor support for his economic development plan.

Assuming the 2020 election goes ahead, Puri says President Kaboré is in a relatively strong position, owing to the weakness of the opposition and the population's desire for political continuity in these uncertain times. This will likely see continuity in government policy – specifically regarding the mining sector, which is viewed as strategically vital by the government as it is a key contributor to GDP.

This has been reflected in the 2015 Mining Code, which was enacted by the interim government in July 2015, before Kaboré became president, and was upheld by his administration till now. This revised mining code introduced various investor-friendly measures. It reduced regulatory uncertainty in the sector, respected existing mining agreements to foster continuity and created a community development fund, which provides a favourable framework for investors.

While Puri says there are currently no high-level political discussions around changing the

regulatory landscape in the mining sector, parts of the mining code are yet to be fully implemented – mainly around social responsibility and compensation to local communities.

"This has caused some frustration in the mining sector, and also among local populations who are affected by mining operations. With the upcoming election, it is possible that President Kaboré will therefore seek to implement these social aspects of the code more comprehensively, in an effort to win over these communities," says Puri. **MRA**

## BURKINA FASO GETS CORONAVIRUS RELIEF FUNDING

The International Monetary Fund (IMF) in April approved a disbursement of US\$115.3 million for Burkina Faso's battle with COVID-19.

The financing provided under the Rapid Credit Facility will help finance the health, social protection and macroeconomic stabilisation measures, to meet the urgent balance of payment needs arising from the COVID-19 outbreak and catalyse additional donor support from the international community.

The economic impact of the COVID-19 pandemic in Burkina Faso is rapidly unfolding, with the short-term outlook worsening quickly – at a time when the country was already gripped by a heightened security crisis.

The authorities responded by putting in place measures to help contain the spreading of the virus, including by closing schools and universities, banning mass gatherings, and suspending international travel.

Though absolutely needed to contain the outbreak these measures, together with the global response, have significantly worsened the economic outlook in the near term, with real economic growth declining substantially, and both the fiscal and balance of payments deficits widening significantly.

As a result, Burkina Faso will receive relief from the Catastrophe Containment and Relief Trust on debt service falling due to the IMF in the next six months (about \$11.9 million). This relief could be extended for up to two years, subject to the availability of resources under the Catastrophe Containment and Relief Trust.

“

While there have been several confirmed cases of Coronavirus in the western and south-western regions of the country, where many mining companies operate, only a handful of cases have been reported at mining operations,

TRISTAN PURI



Editor-in-Chief **Laura Cornish** interviews Teranga Gold Corporation CEO Richard Young about the creation of the Massawa-Sabodala Complex in Senegal. Speaking of this ambition, Young highlights that “Massawa is a transformational deal for Teranga with tremendous synergies.”



**Did you know?**

Tietto Minerals’ project comprises three contiguous tenements over a total area of 1 114 km<sup>2</sup>, of which less than 10% has been explored.



Reporting on the acquisition of SEMAFO by Endeavour Mining, senior deputy editor **Chantelle Kotze** writes that this creates a leading gold producer in the region that can produce over one Mozpa. The transaction creates business streams in Burkina Faso, Côte d’Ivoire and Mali. The acquisition also creates a gold producer with six mines, a robust pipeline of development projects and a significantly enhanced exploration portfolio.



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**Did you know?**

While Burkina Faso and Côte d’Ivoire combined accounts for nearly 60% of the land mass of the Birimian Greenstone Belt, it only accounts for 27% of the current global gold production, because it is underexplored.



“In the post COVID-19 world, West Africa may still be an attractive investment destination because of the availability of large untapped mineral resources, and the relative low cost of extraction, if it can address the primary concerns surrounding regional security,”

**Warren Beech**



Guest contributor **Warren Beech** from Eversheds Sutherland explains why West Africa is an attractive investment destination. Global investors who have previously ignored the region will certainly be giving it their full attention. This new curiosity stems from several factors but most notably the fact that the Public Investment Corporation has set its sights on investment in West Africa, rather than South Africa, due to the potential of greater returns on investment.

Senior editor **Gerard Peter** interviews executive director of Tietto Minerals, Mark Strizek, regarding the company's fast tracking its **Abujar gold project** in Côte d'Ivoire. Earlier this year Tietto won the *Investment Battlefield* at the *Investing in African Mining Indaba* for its plan to reignite the project and has since attracted more interest in investment.



# USIVE AFRICA TENT



**Did you know?**  
Teranga Gold Corporation is focused on lifting its annual gold production to 500 000 ozpa

# FRONT & CENTRE NEWS

## FROM THE REGION

### GUINEA

#### SRG Mining awards EPCM contract for Lola graphite project

TSXV-listed graphite junior SRG Mining has selected DRA Global for its engineering, procurement and construction management (EPCM) services for its Lola project in Guinea.

Over the past three years, DRA has assisted SRG with the evaluation of the project, having been involved with the project from preliminary economic assessment to the most recent feasibility study.

“Our tender process cemented our belief that DRA is the best partner for SRG to successfully complete the design and construct our Lola graphite project,” says Ugo Landry-Tolszczuk, president and COO of SRG.

Highlights of the Lola feasibility study:

- Average annual production of 54 600 t of graphite flakes over a 29-year mine life;
- Proven and probable reserves of 42 Mt @ 4.17% Cg;
- Capital costs of US\$123 million including a power plant of \$5.8 million, concentrate transport equipment of \$3.6 million, and contingency of \$12 million;
- Added flexibility of the plant to process soft saprolite and fresh rock, provides optionality and the ability to expand the production profile;
- Average operational costs of \$470/t and \$38/t of transport. For the first 16 years of production, the average operational costs are \$447/t;
- Pre-tax NPV (8%) of \$277 million and internal rate of return of 28%;
- Post-tax NPV (8%) of \$159 million and IRR of 21%;
- Average grade of graphite flakes over 95%;
- A low strip ratio of 0.69.



↑ Minister of Mines visits SRG lab in Lola

### CÔTE D'IVOIRE



#### Kodal Minerals' gold exploration permits renewed for Dabakala and Korhogo projects

**Kodal Minerals** has received confirmation that its exploration licences for the Dabakala and Korhogo concessions have each been renewed for a further three-year term, expiring in April 2023. (The company's other Côte d'Ivoire concessions will expire after one to two years and upon grant will be for an initial three-year term with potential for renewal.)

Kodal Minerals' Côte d'Ivoire exploration concessions further include Boundiali (under application), and the Tiebissou, Nielle and M'Bahaikro (under application) projects, which are owned in a joint venture with Resolute Mining.

The Dabakala project is located in central Côte d'Ivoire where previous work completed by Kodal Minerals has defined a new extensive surface geochemical anomaly which extends for over 10 km of strike and up to 800 m in width.

The Korhogo project is located in north central Cote d'Ivoire and several phases of geochemical sampling have defined surface gold anomalous zones extending for over 2 km in strike and up to 600 m in width.

“

We are delighted to have been awarded a further three-year term on two of our wholly-owned concessions in Côte d'Ivoire which secures the company's exploration interests in these gold projects,”

**BERNARD AYLWARD, KODAL MINERALS CEO**



## BURKINA FASO

### Orezone receives environmental approval for Phase II expansion at Bomboré

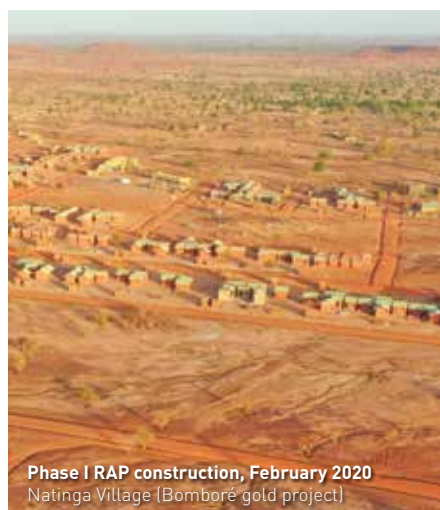
TSXV-listed **Orezone Gold Corporation** has been granted environmental and social impact assessment (ESIA) approval for the Phase II Expansion at its Bomboré gold project.

The approval, received from the Burkina Faso Ministry of Environment and Sustainable Development, marks a significant milestone in the permitting process and solidifies the staged development timeline of the Bomboré project.

The Bomboré project was the subject of an updated feasibility study in 2019 (2019 FS) that incorporated a staged higher-grade expansion (Phase II Expansion) to the oxide-only mine plan in the 2018 feasibility study (2018 FS).

The Phase II Expansion incorporates select zones of higher-grade fresh rock and lower transition reserves. With this mine expansion, the 2019 FS highlighted a 60% increase in mineral reserves to 1.8 Moz of gold along with significantly improved project economics as compared to the 2018 FS.

"With the approval of the ESIA, the company has now filed an application to include the planned expansion, which will be the final step in the permitting process. A decision regarding the expansion from the Burkina Faso government is expected in Q3 of 2020," says Patrick Downey, president and CEO.



Phase I RAP construction, February 2020  
Natinga Village (Bomboré gold project)

## CÔTE D'IVOIRE



### Roxgold delivers robust PEA for the Séguéla gold project

TSX-listed **Roxgold** announced the results of a preliminary economic assessment (PEA) for its high-grade Séguéla gold project. The PEA provides a base case assessment of developing the Antenna, Ancien, Agouti and Boulder deposits as open pit mines feeding a central gold processing facility.

#### Key Highlights

##### Production

- LOM gold production of 841 000 oz with average annual gold production of 103 000 oz
- Average annual gold production of 143 000 oz over the first three years of production, with an estimated production peak of 154 000 oz in year three

##### Costs

- Average cash costs of US\$605/oz over the LOM, including a cash cost of \$475/oz over the first three years of production
- AISC of \$749/oz over the LOM, including an AISC of \$600/oz over the first three years of production

##### Development Capital

- Estimated pre-production capital cost of \$142 million (including a \$20 million contingency)
- Conventional processing plant with a processing rate of 1.25 Mtpa with scalability incorporated into plant design for potential expansion

John Dorward, president and CEO comments: "We acquired Séguéla in April 2019 for \$20 million, and through the hard work of our exploration and project team have been able to generate exceptional prospective project economics with an after-tax NPV attributable to Roxgold of \$268 million and an IRR of 66% at a gold price of \$1 450/oz.

"Importantly, this assessment is just a snapshot of the potential value of Séguéla. Our exploration programme has returned material intersections from five of the first seven targets identified, with an additional 21 targets on the property yet to be tested."

# Endeavour Mining and SEMAFO join forces

## Creating West Africa's largest gold producer

Having worked side by side as industry partners on a range of issues in West Africa for the past several years, TSX-listed miners **Endeavour Mining** and **SEMAFO** have begun the process of joining forces to create West Africa's largest gold producer, with six mining operations and an attractive growth pipeline to boot, writes **CHANTELLE KOTZE**.

### IN SHORT

The merger between Endeavour Mining and SEMAFO, once concluded, will enhance the strategic positioning, strengthen the asset portfolio and enhance the capital market profile of the combined companies.

The two West African-focused gold producers entered into a definitive agreement in March 2020, which will see Endeavour acquire all of the issued and outstanding securities of SEMAFO.

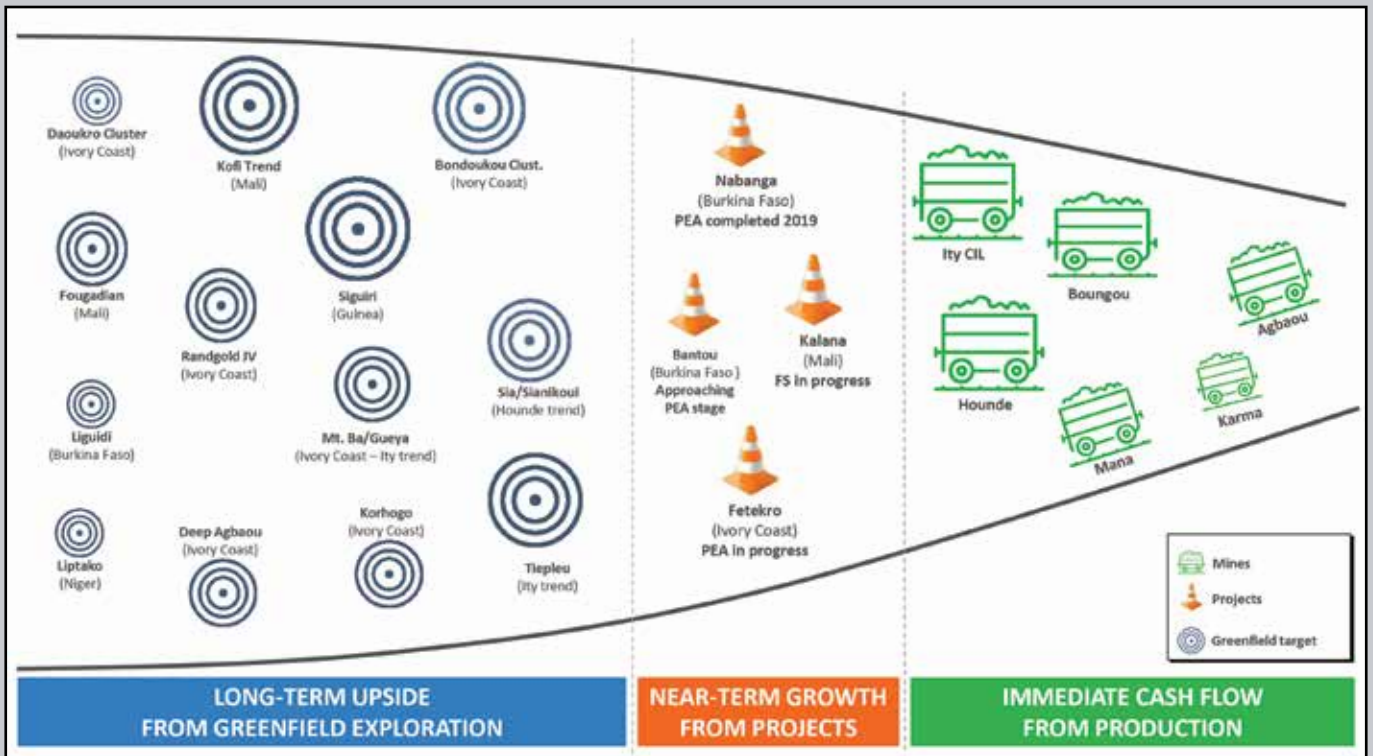
If approved by the two parties' shareholders – earmarked for finalisation in Q2, 2020 – the combined company will have more than 1 Mozpa

in gold production. This would make it one of the top 15 gold producers globally and the largest in West Africa with six mines, supported by a robust pipeline of development projects and a significantly enhanced exploration portfolio focused on the highly-prospective Birimian Greenstone Belt. Endeavour Mining President and CEO Sébastien De Montessus expanded on this during a webcast.

In early 2019, Endeavour and SEMAFO engaged in a mutual dialogue in order to evaluate the merits of a business combination. The dialogue included extensive mutual due diligence as well as discussion of potential terms of a transaction, with a final proposal in May 2019. At that time, it was not possible to agree on terms that appropriately shared the risks and rewards of a combination.

Construction of the Boungou mine in Burkina Faso, which poured first gold in September 2018





↑ The combined asset portfolio consists of six mines, four projects and several exploration targets

In early 2020, discussions between Endeavour and SEMAFO recommenced. Endeavour’s management team completed on-site due diligence at SEMAFO’s operations in Burkina Faso during February 2020, including a comprehensive

assessment of security, operations and exploration. Both companies also re-opened data rooms for mutual confirmatory due diligence, including visits and, following collaborative discussions, confirmed their shared strategic vision and desire to complete

a combination, subject to negotiation of agreeable terms. Despite the current market volatility, negotiations proceeded and culminated in signing of the definitive agreement, with teams currently engaged in discussing the merits of the combination.







↑ Endeavour Mining's CEO and COO holding Houndé's first gold bars, which were poured in October 2017

The C\$1 billion offer consists of 0.1422 Endeavour shares for each one SEMAFO common share, and represents a premium of 27.2% based on the 20-day volume weighted average price of both companies for the period ended 20 March 2020, with existing Endeavour and SEMAFO shareholders owning approximately 70% and 30%, respectively, of the combined company.

Endeavour's cornerstone investor, La Mancha, has committed to invest US\$100 million through a private placement into the combined company in order to maintain a 25% stake in the company – a reduction from its current approximately 31% interest in Endeavour. This will provide for a larger free float and greater liquidity in the stock of the combined entity.

De Montessus will be the CEO of the new company while Benoit Desormeaux, President and CEO of SEMAFO, will become President and will oversee

operational performance. Upon closing of the transaction, SEMAFO's CFO Martin Milette will be appointed Executive VP and CFO of the combined entity, while the remaining board of directors will be comprised of ten directors, seven of whom will be nominated by Endeavour and three of whom will be nominated by SEMAFO.

### Regional consolidation

"This combination offers a rare opportunity to bring together two leading West African mine operators with a shared strategic vision, complementary assets, and management teams with a proven track record," says De Montessus.

The transaction represents a compelling value equation for both sets of shareholders with the potential for

### FAST FACT

While Burkina Faso and Côte d'Ivoire combined accounts for nearly 60% of the land mass of the Birimian Greenstone Belt, it only accounts for 27% of the current global gold production, because it is underexplored

a meaningful re-rating, while providing increased asset diversification, enhancing the ability to manage risks within the business, he added.

The combined company, which brings together experienced management teams with complementary skills,

as well as synergies at a corporate, asset and country level in a number of areas, also provides a much stronger base in dealing with governments and key stakeholders, says De Montessus.

He adds that on a country level, there are significant opportunities to combine the expertise of the operational and financial teams through efforts in procurement, logistics and supply chain management, and knowledge to create a centralised technical



services hub with enhanced security across all operations – as well as opportunities to enhance the workforce across operations.

The merged company would consist of four cornerstone mines, each producing over 200 000 ozpa of gold; namely Endeavour's Ity and Houndé mines in Côte d'Ivoire and Burkina Faso respectively, and the Boungou and Mana mines from SEMAFO, both in Burkina Faso. Endeavour's Karma and Agbaou mines in Burkina Faso and Côte d'Ivoire, respectively, are top of the list of operating mines.

The Birimian Greenstone Belt in West Africa – which extends through Ghana, Côte d'Ivoire, Guinea, Mali and Burkina Faso – is one of the most prospective gold mining belts globally, and with the asset combination, the merged company will have one of the strongest positions in the region.

The merged company will also allow for the consolidation of assets within the 200 km Houndé Greenstone Belt,

**Exploration at the**  
Kalana project in Mali



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## WHAT THEY ALSO SAID

“In today’s changing world, gold producers require scale, tangible growth prospects and a business model that demonstrates sustainable cash flow. Despite being undertaken during the unprecedented global Coronavirus pandemic, both companies believe that now is the right time to carry out this transaction as the combined company will be very well positioned in the gold sector,”

### SÉBASTIEN DE MONTESSUS



economic assessment (PEA) in 2019;

- SEMAFO’s Bantou in Burkina Faso, which is approaching PEA stage;
- Endeavour’s Kalana in Mali, which is currently underway with an updated feasibility study; and
- Endeavour’s Fetekro in Côte d’Ivoire, which is underway with a PEA.

The company also has a portfolio comprising several longer-term Greenfield exploration targets in Burkina Faso, Côte d’Ivoire, Mali, Guinea and Niger, where exploration is expected to be ramped up in future.

The key priorities at its four cornerstone mines include restarting mining operations at Boungou by Q4, 2020 with an enhanced security and operations plan. This includes working with the government and Burkina Faso partners in order to ensure that its people, partners and assets are safe when mining restarts. Operations were suspended in November 2019 owing to the deteriorating security situation in Burkina Faso.

Meanwhile at Mana, the company will focus on extending the current mine life through an ambitious near-mine exploration programme.

The focus at Ity and Houndé will be to continue the exploration programmes, bringing high-grade Le Plaque deposit at the Ity mine into production and bringing the high-grade Kari Pump into production in 2020, while also bringing Kari West/Kari Centre discoveries into reserves at Houndé. **MRA**

in Burkina Faso, which is host to two mines and a development project, and strong future development potential. The Houndé Belt, where the company expects to produce 400 000 ozpa of gold, holds significant exploration potential with over 20 Moz already discovered on belt.

When combined with the Ity Belt in Côte d’Ivoire, where the company holds extensive exploration permits covering the most prospective areas of the belt, the company believes that it holds one of the most extensive and prospective land positions in West Africa.

“With both companies having recently completed build-out phases and mine ramp-ups, both companies are at the right juncture to combine operations and emerge stronger together as the combined business is well positioned for a sustained period of strong cash flows,” says De Montessus, adding

that the company’s enhanced capital markets profile should provide added trading liquidity, free float and size, characteristics that investors are seeking in today’s market environment.

Moreover, there is a strong alignment in upcoming strategic focus with both companies looking to de-risk the project builds and ramp-ups, optimise their portfolios and use exploration as a tool to extend mine lives and source new projects, in preparation for the next growth phase.

### Unlocking the project pipeline

In addition to the six operating mines, the new company will have four development projects, which could provide near-term growth opportunities for the company:

- SEMAFO’s Nabanga in Burkina Faso, which completed a preliminary



The open pit Ity gold mine in Côte d’Ivoire





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# Teranga Gold Corporation

## Poised for great growth across West Africa

TSX-listed gold miner **Teranga Gold Corporation** (Teranga) is a shining example of how to build a strong and solid portfolio of producing and exploration assets in the West African region. Having successfully brought its Burkina Faso-based Wahgnion mine online in H2, 2019 and then completing the acquisition of Senegal-based project Massawa in March 2020, the company remains committed to keeping its growth plans on track with a COVID-19 management plan effectively in place, CEO **RICHARD YOUNG** tells **LAURA CORNISH**.

### IN SHORT

Teranga is an example to follow for those small cap companies looking to develop a pipeline of projects in Africa.

“It is undoubtedly a real challenge for small cap companies to grow in a cash-strapped environment. Developing assets without blowing your balance sheet is no easy feat, but Teranga has done so thanks to our focus on capital allocation and ability to retain highly skilled and experienced people who contribute significantly to the success of our business,” Young starts.

This more recently required the company to implement a management plan to best withstand the COVID-19 pandemic while continuing to produce gold, which stands the company in good stead considering that the gold price is at a seven year high (as of April 2020).

“Both of our gold mines are in operation and we are doing all we can to ensure the virus does not impact our operations,” the CEO continues.

Sabodala's remaining lifespan has increased from 12 years to more than 20 years with the addition of high-grade ore from Massawa



## Pandemic aside, Teranga poised for growth

Teranga is ultimately focused on raising its gold production to reside within the 500 000 ozpa gold mark. This is well within reach when combining the annualised production from what is now known as the Sabodala-Massawa complex and its Wahgnion mine

While the Wahgnion mine added upwards of 130 000 ozpa of gold (over the first five years) to Teranga's production profile, it is the recent US\$380 million Massawa acquisition that will breathe new life into the Sabodala operation, which after 11 years of production has produced over 2 Moz of gold and retains the title of Senegal's largest gold producer.

Teranga entered into a definitive agreement with a wholly-owned subsidiary of Barrick Gold Corporation and its joint venture partner, Compagnie Sénégalaise de Transports Transatlantiques Afrique de l'Ouest SA (CSTTAO), in December 2019 to acquire a 90% interest in the undeveloped Massawa project. The government of Senegal will retain the remaining 10% interest.

At nearly 4 g/t, Massawa is one of the highest-grade undeveloped open-pit gold reserves in Africa. It is located within trucking distance of Sabodala (~25 km), creating the opportunity for significant capital and operating synergies. The proximity of the projects and the combination of Sabodala's +4 Mtpa mill and Massawa's high-grade ore are expected to scale Sabodala into a top-tier asset.

"Massawa is a transformational deal for Teranga with tremendous synergies. We anticipate that production from the Sabodala-Massawa complex, together with production



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The majority of employees working at Sabodala were sourced from within Senegal



from Wahgnion, will increase our targeted consolidated annual gold production and reposition Teranga as the next multi-asset, low-cost, mid-tier gold producer in West Africa, one of the world's premier gold mining regions."

Processing the Massawa ore using the Sabodala plant delivers a significant reduction in start-up costs: in the range of \$5 – 10 million to bring the first of four open pits into production (expected in Q3 this year), and another \$20 – 30 million to complete retrofits and upgrades to the Sabodala plant to increase its

current processing capacity, Young outlines. The Massawa feasibility study completed by Barrick projected building all phase 1 and phase 2 infrastructure for approximately \$333 million.

In essence, Sabodala's remaining lifespan has increased from 12 years to more than 20 years with the addition of high-grade ore from Massawa. "With much higher grade ore being processed through the Sabodala mill commencing in the third quarter of

this year, our cost per ounce metrics will decline, ultimately leading to an increase in our margins," Young expands.

Consequent to the above, Teranga intends to mine and process Massawa's high-grade reserves on a priority basis and it is anticipated that by 2021, more than half of the ore processed through the Sabodala plant could potentially be sourced from the Massawa deposits.

Working with Barrick, the company has invested significant resources in due diligence to gain a better understanding of the technical details of the Massawa ore bodies to support the development of an optimised, integrated mine plan for four of the two properties. This includes detailed resource modelling for the mineralogical characterisation; the chronology of metallurgical test work to determine BIOX as the process of choice for the refractory ore in a retrofitted Sabodala plant; and a revised life of mine plan that optimises annual operating and capital costs, as well as the timing of the Sabodala and Massawa ore bodies for processing.

This detailed due diligence work will form a basis for the pre-feasibility study that the company plans to complete for the integrated Sabodala-Massawa complex within six months of the acquisition close in March 2020.

In advance of an integrated definitive feasibility study, the company will embark on a drill programme to expand the resource base of the Massawa project. The definitive feasibility study, which is expected to be completed in 2021, will assess the optimal size of the retrofit and the timing of implementation for processing of the refractory components of the Massawa ore.

"BIOX is a well-recognised technology for processing refractory ore and with input from both consultants and members of our team with extensive BIOX operating experience,

we are confident we will process these portions of our ore body without difficulty," Young notes.

**2 700**

The number of employees currently working for Teranga





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**www.baraconsulting.co.za**

**UNITED KINGDOM OFFICE**

**Andrew Bamber: +44 744 486 4046 / bamber@baraconsulting.co.uk**  
**Pat Willis: +44 781 018 2169 / patw@baraconsulting.co.uk**  
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SABODALA	<ul style="list-style-type: none"> <li>Expect to produce 215,000 ounces of gold<sup>(12)</sup> before addition of ore from Massawa's Sofia deposit</li> <li>Close the Massawa acquisition, expected Q1 2020</li> <li>Prepare for mining at Massawa's high-grade Sofia deposit</li> <li>Release combined pre-feasibility study within six months of the transaction close</li> <li>Commence exploring for additional refractory and oxide deposits</li> </ul>
WAHGNION	<ul style="list-style-type: none"> <li>Expect to produce 130,000-140,000 ounces of gold<sup>(13)</sup> in first full year of production</li> <li>Relaunch resource drilling program on mine license</li> </ul>
GOLDEN HILL	<ul style="list-style-type: none"> <li>\$10M exploration program to expand the resource base</li> <li>Complete engineering, environmental, and social work to support the preliminary economic assessment required for a mine license application Q3 2020</li> </ul>
CÔTE D'IVOIRE	<ul style="list-style-type: none"> <li>Increase the exploration budget to \$6M-\$8M for the Afema and Miminvest exploration properties.</li> </ul>

Turning to Wahgnion, Young notes the success that has been realised at this operation since its start-up, which was achieved ahead of schedule and under budget. "Wahgnion is operating well, with throughput above nameplate capacity. Already we are looking at the potential of increasing production above its 130 – 140 000 ozpa capacity." The company will implement a reserve development programme in an effort to extend the mine's lifespan up to about 15 years in total.



### The longer-term future

Massawa hosts historical mineral reserves of 2.6 Moz from 20.9 Mt at 3.94 g/t gold and Sabodala's mineral reserves sit at 2.4 Moz from 55.7 Mt at 1.35 g/t gold. "The potential that resides within both properties is significant," Young highlights.

As such, the company is embarking on a significant drill programme at both properties and believes there is considerable upside in terms of depth and along strike through additional targets that the former Randgold Resources had identified. The Sabodala property also offers organic growth opportunity, including the potential to move underground.

But the potential for further significant growth lies well within Teranga's reach. The company is looking to its next project – Golden Hill – to be the project that could lift its gold production well above 500 000 ozpa.

Teranga acquired Golden Hill as an early-stage exploration project in 2016 as part of the company's acquisition of Gryphon Minerals. Formerly part of a joint venture, Golden Hill is now 100% wholly owned by Teranga. It is located within the central part of the highly mineralised Houndé Greenstone Belt, and is surrounded by an area known for gold discoveries, including the Siou, Houndé (contiguous with Golden Hill) and high-grade Yaramoko deposits.

Exploration is advancing rapidly. In just three years, Golden Hill has produced a series of excellent grade, near surface and deeper drill results at a variety of prospects. Currently there are over a dozen prospects and deposits, the majority of which are located within 10 km from a central point on the property.

"Further to this we have also put together a very attractive portfolio of properties in Côte d'Ivoire – with a number of good results. This will be the company's next West African country focus and the next leg of our growth strategy, which in the longer term will take us close to the 1 Moz mark," Young concludes. **MRA**

↑ Teranga's 2020 goals and milestones

Teranga is evaluating the potential of increasing Wahgnion's production above its 130 – 140 000 ozpa capacity

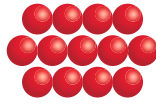


Massawa is a transformational deal for Teranga with tremendous synergies,

**RICHARD YOUNG**







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Abujar spans 1 114 km<sup>2</sup>, of which less than 10% has been explored

# Tietto Minerals' Abujar

## Still progressing amidst uncertain times

Strong leadership, a carefully laid out plan and forward thinking have ensured that ASX-listed **Tietto Minerals** is still able to fast-track the development of its **Abujar gold project** in Côte d'Ivoire despite the impact of COVID-19 in that country. **GERARD PETER** finds out more from executive director **MARK STRIZEK**.

Tietto Minerals was founded in 2010 by Caigen Wang who has more than 25 years' experience in mineral exploration in Africa, Australia, China and Canada. Funded by high net-worth individuals in the early days, Wang focused on exploration in Liberia followed by pursuing interests in Côte d'Ivoire. The company listed in 2018. Among

its leadership team is Strizek who has more than 20 years' experience in gold exploration, resource development and operations of open pit and underground projects in African and Australia. The company also has a local partner, who is also a shareholder, and has been vital to Tietto Minerals' success in Côte d'Ivoire.

Since listing, the company has been keenly focused on developing

a multi-million ounce resource at Abujar, which is located approximately 30 km from the major regional city of Daloa in central western Côte D'Ivoire.

The project comprises three contiguous tenements over a total area of 1 114 km<sup>2</sup>, of which less than 10% has been explored. "When we started drilling in 2018, we were at 700 000 oz. As of the end of 2019, the current resource stands at 45.5Mt at 1.5 g/t gold for 2.15 Moz of contained gold," adds Strizek. The next mineral resource estimate update is planned for Q3, 2020.

### IN SHORT

Thanks to the early adoption of extensive hygiene and self-isolation policies along with the stockpiling of supplies, Tietto Minerals is able to continue progressing Abujar during the COVID-19 pandemic.

### Early preparation ensures continuity

Tietto Minerals's steady progression of Abujar received recognition at this year's *Investing in African Mining Indaba* when it won the *Investment Battlefield* competition, a platform for junior mining



companies with a market cap of \$50 million to pitch their projects to high-profile investors. "There has been a fair amount of interest after winning. It is a validation of the work that we were doing," states Strizek.

The win is testament to the potential of Abujar and Tietto Mineral's effort to keep the momentum going – a recipe that Strizek says makes good economic sense for investors. "It's a simple value proposition. We said that we were going to generate a resource of more than 2 Moz and we have delivered on that. We have been able to identify some very high grades from surface and this is very attractive from a mining proposition as we are looking for an early payback.

"Another thing we have done is create our own drilling company that allows us to drill further and at a low cost. This is important when you are trying to grow resources. We can currently drill about a third more than any of our competitors and that allows us to grow quickly," he states.

Despite the COVID-19 pandemic, work at Abujar still continues



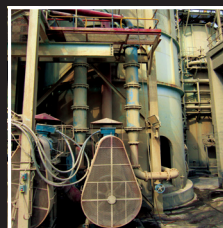
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Currently, Tietto Minerals is operating four company-owned rigs to undertake a 50 000 m drilling programme targeting rapid resource growth, with a fifth rig due to be added in the near future.

Now, while many exploration efforts have been hampered because of COVID-19, Strizek is confident that Abujar will meet its deliverables in 2020. This is mainly due to the fact the company had already started putting in contingency measures as early as February. This includes the early adoption of extensive hygiene and self-isolation policies to protect its workforce and mitigate any potential impact from COVID-19 in Côte d'Ivoire. In addition, Tietto Minerals also began stockpiling supplies, fuel and drilling consumables in the event of a countrywide lockdown.

"We took early steps and we are able to keep drilling," states Strizek. "We put a lockdown on the site and are pretty well stocked up. The only thing that is leaving the site is core to be analysed and the only thing that might slow down is our environmental study work where you need to bring specialist consultants into the country.

"At this stage, I am pretty confident that we can manage what we need to do. In terms of engineering studies, we already have samples in Australia. Our schedule is still on track. We are looking to do a pre-feasibility study by the end of this year."

### Abujar the main focus

Tietto Minerals is also in good financial standing to progress the project this year. Last year, the company was able to raise US\$17 million and now has around \$17 million in cashflow reserves. "At



↑ The team on site at Abujar

this point, we don't need to go back to market as we are sitting quite comfortably and that allows us to complete our work and get to a funding point to build an open pit mine," adds Strizek.

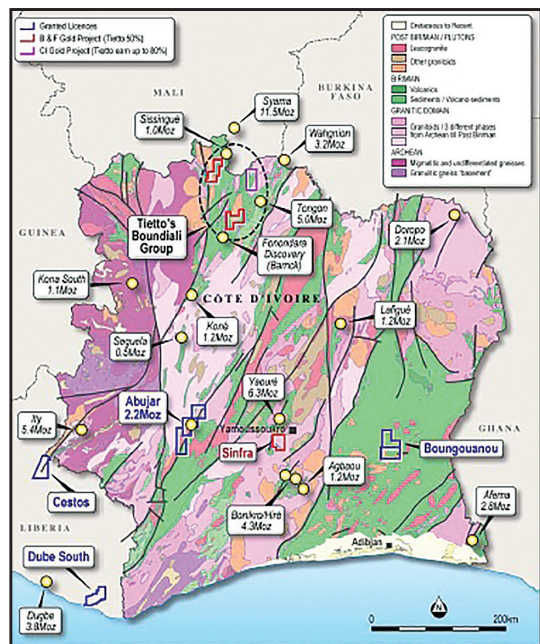
While Tietto Mineral's priority is to get Abujar up and running, the company is also considering its other gold exploration interest in West Africa, but on a much smaller scale. The company has interests in Liberia as well as two other projects in Côte d'Ivoire that are in early exploration stages.

"One of these is close to Endeavour Mining's Ity gold mine and we also have some good ground in Boundiali in the north of the country, so we have plenty of depth in the company going forward. But there is a lot to do around Abujar; we are only just getting started there," explains Strizek.

As investors once again start to look at safe haven assets such as gold, this bodes well for gold miners. By ensuring that progress continues at Abujar amidst uncertainty, Tietto Minerals is in a good position to create one of largest gold mines in Côte d'Ivoire and capitalise on its vast resources once international gold markets stabilise. **MRA**

We have been able to identify some very high grades from the surface and this is very attractive from a mining proposition as we are looking for an early payback,

**MARK STRIZEK**



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Aerial shot of the Macy pit looking north

Images: PWN

# Nigeria Mining Week

## Investment a key focus at expanded event

Matching the right investors with the right project will be top of mind at the new Finance and Investment Day during the upcoming **Nigeria Mining Week** taking place in Abuja on 26-28 October.

“As a booming market in its infancy, the upward trajectory of the Nigerian mining sector is a strong incentive for investors to profit from the golden opportunity of newcomers,” says event manager Sabrina Tab.

“The Finance and Investment Day will provide a full day of dedicated conference sessions featuring industry experts along with financiers, allowing investors to tap into this strategic territory through project showcases and case studies, while miners looking for

funding will be able to learn more about strategies and models best suited to their financial needs,” she explains.

This year marks the fifth edition of an event that has garnered increasing interest over the years. The expansion of the event and the expectation of welcoming in excess of last year’s 1 159 attendees from 17 countries, have prompted organiser *Clarion Events Africa* to move to a larger venue – the International Conference Centre (ICC) – to accommodate the expected 60+ exhibitors as well as several country pavilions.

The event is organised in partnership with the Miners Association of Nigeria (MAN), PwC Nigeria and the Ministry of Mines and Steel Development. Nigeria’s Minister of Mines and Steel Development, Arch. Olamilekan Adegbite, has stated that the ministry wishes to increase its support for *Nigeria Mining Week*. He recently told *Mining Review Africa*: “It is my wish to upgrade *Nigeria Mining Week* to an international event like the *Investing in African Mining Indaba*, PDAC of Canada and *Mines and Money*. This is what we are working on.”



## Advancing its mining portfolio

A longstanding supporter of the event and returning gold sponsor for 2020 is the engineering specialist PW Nigeria Ltd (PWN). Chris McQuillan, mining director at PWN, says: "Since 1974, we have worked continuously in Nigeria on major civil engineering projects. During this time we moved 55 million m<sup>3</sup> in bulk earthworks projects, constructed 2 000 km of roads and constructed some of Nigeria's premier bridges. In 2015, we started a diversification process which would integrate mining into our core competencies."

The majority shareholding in PWN was recently acquired by the BUA group. "The BUA group is one of the largest groups on the Nigerian Stock Exchange and is a perfect fit for PWN, with its strong capital base, quarrying possibilities and its commitment to improve infrastructure in Nigeria. With their help and support PWN will be able to advance its mining portfolio," adds McQuillan.

PWN's current projects in the country include securing a consortium of Irish-Canadian mining investors on three gold targets in Niger state. The investment will be used for further exploration of these targets in the form of geo-chemistry, aero magnetics, reverse circulation drilling, diamond drilling and fire assays.

The company also owns the Lafarge Ewekoro quarry project which oversees the removal of 500,000 bank cubic metres (BCM) of overburden to expose limestone, the drill and blast, load and haul and ROM refeed of 3.5 m tonnes of limestone annually.

## Reigniting the sector

McQuillan further adds that the COVID-19 pandemic has compelled PWN to close many of its operations due to the obvious health and safety



↑ Safe trenching operations at the Mint prospect

“

It is difficult not to get excited by the opportunities that exist in Nigeria's mining sector which remains largely untapped

CHRIS MCQUILLAN



issues and to help the government's efforts to contain the spread of the virus. "These closures have been done in a strategic manner to best allow our clients to implement their own policies and closure processes. We hope to be able to return and recommence these projects at the earliest opportunity and are in constant liaison with our clients.

"It is difficult not to get excited by the opportunities that exist in Nigeria's mining sector which remains largely untapped. We recently spent some time in the British geological survey, going through mining records for the region which dated back to the early 1900s. A lot of enthusiasm existed during this period, and we want to reignite this enthusiasm and bring the sector back to life."

PWN is equally excited to return to *Nigeria Mining Week*. "The show continues to grow and attract the right attendees. The more good news the Nigerian mining sector puts out the better; this is the right forum to do that," concludes McQuillan. **MRA**

## READY TO EXPLORE THIS EXCITING MARKET?

Join the next Nigeria Mining Week in Abuja from 26-28 October 2020. For more information visit [www.nigeriaminingweek.com](http://www.nigeriaminingweek.com).

**WATCH: IS THE NIGERIAN MINING INDUSTRY READY FOR INVESTMENT?**



Last year's event attracted high-ranking government officials and key industry stakeholders

# REFLUX Classifier

## Modular concept a proven success

Gaining market penetration for new technologies and solutions can be a challenge in a largely conservative mining industry. Nonetheless, this can always be overcome if that solution delivers on the benefits it promises. Most recently, this has been demonstrated with **FLSmidth's** REFLUX Classifier (RC) modular plant, first launched in 2017, and successfully installed and commissioned for one of South Africa's largest PGM producers, director of technical support and engineering **TERENCE OSBORN** tells **LAURA CORNISH**.

The second half of 2019/ beginning of 2020 saw mining and cement processing technology specialist FLSmidth install and commission its second REFLUX Classifier modular plant solution since introducing the concept to market some three years back. Although this is three years into its launch, Osborn believes this new application represents a pivotal moment in gaining market penetration.

"The operating success we have achieved to date, which started during the commissioning phase, is largely as a result of the commitment we have shown in showcasing this plant's capabilities to treat waste material and of equal importance, the learnings we were able

to apply following the installation of our first modular plant," Osborn starts.

The RC modular plant – capable of processing 100 tph of waste material or 350 m<sup>3</sup>/hr of slurry material – was determined by FLSmidth to be the ideal solution to helping and educating industry on how an RC works and consequently on the processing benefits it has to offer. To ensure its effective delivery, FLSmidth can deliver the RC modular plant through the BOOT model. Doing so ensures the plant operates optimally and is properly maintained.

The plant itself is ideally suited to processing PGM UG2 material to extract chrome which, in most cases, would be left untreated as a waste product. It will also work in extracting coal, iron ore and mineral sand fines.

"On the back of our first RC modular plant installation and operation (which we did for three years as part of a BOOT contract also secured to treat PGM UG2 material to extract chrome), we were able to gain considerable learnings in how to enhance the performance of our plant," Osborn states.

FLSmidth was awarded its second contract to supply a modular RC plant late in 2018 and started cold commissioning work towards the end of 2019. With a one-year period between contract and start-up (the same was achieved on the first plant), the time benefits associated with the plant are obvious.

There were some ramp-up teething problems, which is not unusual in any mining application, and saw the company move into full hot

**RC modular plant with**  
chrome product stockpile  
in foreground





commissioning towards the middle of January this year. "Almost immediately, we started achieving product grade," Osborn states.

### Lessons learnt

One of the primary learnings Osborn refers to saw FLSmidth incorporate and provide the necessary auxiliary infrastructure to support the RC plant – which specifically included a thickener that delivered to the plant sufficient process water necessary to run the plant, together with process water tanks, pumps, etc., all tying into existing infrastructure on site.

"We also implemented fine screening on the plant, using an aperture size of 350 microns. This was necessitated following an assay-by-size analysis to determine the different size fractions of the silica waste material and the chrome. Incorporating a fine screening element into the plant eliminated this challenge which we had experienced on our first plant – due to the coarser PGM UG2 material received – and which affected production rates," Osborn reveals.

"Our client is also benefiting from the new B-BBEE technology partnership we have established for our RC technology," Osborn highlights.

In February last year, the company launched its cooperation agreement with black-owned fabrication and minerals processing operations company Linhleko Projects. The agreement entails a 50:50 profit-sharing arrangement, in which Linhleko uses FLSmidth's RC technology to enhance chrome recovery for the project. Under the terms of the agreement, Linhleko, which has guaranteed access to the RC technology, will build, own, operate and eventually transfer the RC modular plant to the client. "FLSmidth will continue to provide technical

“On the back of the continuous learning about the technology, FLSmidth is expecting the momentum it has been driving around its RC modular plant technology to elevate quickly,”

TERENCE OSBORN



↓ **Reflux classifier**  
modular plant on a chrome operation

↓ **Aerial view of RC**  
modular chrome recovery plant

expertise to the project as well as fulfilling our financier partnership role," Osborn notes.

Based on the success achieved to date, which has seen the plant deliver product grade of up to 42% chrome (just below the theoretical maximum product grade that can be achieved of 44% chrome), Osborn says the company and the plant has continued to ramp up to full production (although it has not been operational during South Africa's COVID-19 lockdown period).

"We are managing our water balance well and the plant has proven to be stable and easy to operate. We are removing further chrome material after the spiral circuit which has the same objective. Subsequently, we have already started discussions on how we can optimise the plant further and we'll start by conducting another assay-by-size analysis which might see us reduce the aperture size on the screen further."

Having implemented a digitisation capability to the plant, Osborn is confident this technology will open up further opportunities to enhance the plant's performance.

"On the back of the continuous learning about the technology, FLSmidth is expecting the momentum it has been driving around its RC modular plant technology to elevate quickly," Osborn says.

"As a result of our first installation, we were able to generate sufficient data about the plant and technology in order to improve our plant's performance moving forward, which we have done," Osborn concludes. **MRA**



A custom-engineered 15/18 MVA, 120 kV/11 kV mobile substation, manufactured by Zest WEG, on site at a mining operation in the DRC



# Alleviate project risks and constraints

Zest WEG provides African mines with flexibility

The African mining sector presents a unique set of challenges for mining companies looking to explore for or develop an orebody. Owing to the remoteness of some of these sites, they are often isolated from grid power connection. Electrical equipment group **Zest WEG** understands that stable energy supply is a critical requirement for the success of any mining venture and manufactures customised mobile generators and substations, as well as modular pre-manufactured substations and electric house (E-house) solutions capable of fulfilling this energy need while also helping to overcome the logistical constraints that many African mining projects face. **CHANTELLE KOTZE** writes.

Not only do these modular and mobile solutions offer an alternative to traditional fixed-type solutions, says Zest WEG Integrated Solutions executive Alastair Gerrard, they also provide clients with the added benefit of flexibility.

Built in accordance with client needs or site-specific requirements, Zest WEG provides power generation solutions, electrical infrastructure solutions, and mobile solutions (generators and substations) – all able to meet the specific needs of customers that are still





“Modular, pre-manufactured containerised substations and E-houses are the more attractive solution, compared to traditional brick and mortar solutions, specifically for clients in Africa who want to limit risks and establish solutions on site as quickly as possible.”

**BEVAN RICHARDS**



company with the necessary power to begin construction and mining activities.

“This allowed the mining company the time and flexibility to establish a more permanent substation solution on site without any interruption to its power supply. In addition to this, the company could then make further use of the mobile substation when it began developing additional orebodies in close proximity to one another, moving the substation to each orebody to power the necessary construction and mining activities,” explains Gerrard.

Moreover, Zest WEG worked with a gold mining company in South Africa where it developed a mobile diesel-powered generator set solution to enable the mining company to have readily available emergency power supply at several of its mineshafts. The gold mining company reconsidered its initial plan to establish permanent, fixed, diesel power stations at each of the shafts, and instead chose to use mobile diesel generators because of the relatively close proximity of these shafts to one another.

“Instead of equipping each shaft with a permanent power plant, we produced four 2.5 MW, 6.6 kV trailer-mounted diesel generators, following road ordinance guidelines, that they could deploy to the various shafts, as and when needed. The generator units could be used either as single generators, or in different combinations, depending on the load



in the process of exploration, site establishment or orebody development.

“It is during this stage of a mine’s development that a mobile solution – which fulfils the energy need for the duration of time that it takes to initially access a permanent grid power connection – makes the most sense,” says Gerrard.

Zest WEG undertook a project for a mining company in the DRC, which had access to some grid power supply to start mining activities but were still planning for additional power to undertake and sustain future development at the mine.

Using a Zest WEG manufactured mobile substation, the company was able to access the energy from the grid and provide the mining

➤ **A 2.5 MW, 6.6 kV mobile emergency diesel powered generator set, designed and manufactured by Zest WEG to promote flexibility and ease of deployment to various mine shafts**

➔ **Pre-manufactured E-house after factory acceptance testing at Zest WEG’s manufacturing facility**



requirement at the respective shaft. They were all designed for ease of synchronisation with one another and were all connected to infrastructure at the respective shafts, allowing for plug and play within minutes upon arrival at each shaft.

Gerrard says that this solution allowed for a much more cost effective (capex and opex), flexible solution for the gold miner.

Having supplied mobile solutions for over 10 years, Gerrard maintains that these solutions continue to provide a good opportunity for Zest WEG in the African mining market, where the mitigation of risks associated with on-site work is crucial.

“The development of large projects necessitate having several contractors interacting on site simultaneously, but this often causes project delays,” says Gerrard.

“Our mobile generators and substations alleviate some of these risks as they allow for a lot more manufacture and testing to be done in the factory as opposed to on site – mitigating on-site risk, limiting the amount of contractor involvement, reducing the costs associated with standing time on site and allowing for plug and play upon delivery,” he explains.

### Modular, pre-manufactured containerised substations and E-houses provide speedy solution

Zest WEG has seen a growing trend in the deployment of modular, pre-manufactured containerised substation and E-house solutions, owing to their indirect cost savings and ease of on-site establishment, says Zest WEG executive Bevan Richards.

This is a more attractive solution, compared to traditional brick and mortar solutions, specifically for clients in Africa who want to limit risks and establish solutions on site as quickly as possible.

There is, none the less, a similar growing trend within local South African operations for similar reasons.

The deployment of these pre-manufactured and fully-tested electrical substations and E-houses reduce the amount of site-based labour and civil work required, with only very

↑ **Pre-manufactured**  
E-house in transit to a cross border mining operation

“Our mobile generators and substations mitigate some of the risks associated with doing work on site as they allow for a lot more manufacture and testing to be done in the factory,”

**ALASTAIR GERRARD**



basic foundations required to support these structures, Richards explains.

The pre-manufactured container substation solutions are housed in standard 6 m or 12 m shipping containers, with no limit to the configuration of these; whereas the company’s pre-manufactured E-house solutions – the more custom engineered of the two solutions – are custom designed, engineered and manufactured accordingly in any ‘transport splittable’ configuration and to any size.

Unlike the majority of companies that participate in the containerised and modular E-house sector, which are mechanical companies outsourcing to electrical original-equipment manufacturers (OEMs), Zest WEG is in a unique position in that it is one of very few OEMs that have both the electrical skills base and the mechanical manufacturing capability.

“As an electrical engineering company, Zest WEG does not need to rely on a third party electrical manufacturing company to produce the electrical components or integrate any of the electrical components into the substation or E-house.

“Because clients are able to place a single order with us, which we singlehandedly coordinate and deliver from start to finish, it results in shorter lead times for customers,” Richards explains.

When delivered to site, the pre-manufactured, preassembled and interconnected structure (which has already undergone a factory acceptance test by the client) is offloaded, placed into position (reconnected – in the case of the more complex E-houses) and secured to the civil interface on site. Richards says that installation and connection on site will vary from a maximum of 10 days for a very complex pre-manufactured E-House to as little as one day for a simpler pre-manufactured substation. This is a significant reduction in both time and risk compared with brick and mortar building construction on site.

While challenging enough to establish construction operations on site in countries like South Africa, crossing the border into Africa compounds these challenges as well as the associated cost of constructing a brick and mortar substation in remote regions, says Richards.

Zest WEG has delivered in excess of 23 pre-manufactured E-house solutions to the market, in various applications. This includes a pumping application at an underground gold mining operation in Ghana, and a conveyor application at an underground coal mine in South Africa; as well as a combination of an E-house and pre-manufactured containerised solution for a catalytic converter manufacturer in South Africa. **MRA**





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# Dry type transformers

## The preferred choice for African mining conditions

For a long time brick and mortar substations that made use of oil transformers were the de facto standard at African mines. Now, as companies intensify their efforts to exploit mineral potential in more remote areas on the continent, miners are turning to mobile power solutions that make use of dry type transformers in substations. **DAVID CLAASSEN**, MD of **Trafo Power Solutions** (Trafo), explains to **GERARD PETER** why dry type transformers are cost-effective and more importantly, safer to use in mining operations.

**F**ounded in 2017, Trafo is a leading supplier of transformers to mining operations throughout the African region, including Zambia, the Democratic Republic of Congo (DRC), Mozambique, Sierra Leone and Ghana. The company's clientele varies from Greenfields projects to upgrades at existing operations across a variety of commodities including gold, coal, tin and base metals. Collectively, the Trafo Power Solutions' team has nearly 20 years' experience of supplying turnkey power solutions to the mining industry.

Trafo's main focus is on the supply of dry type transformers and associated power equipment such as low and medium voltage switchgear. According to Claassen, there is a host of different applications for these transformers – anything from standard-type designs for indoor use to complex substations at underground mines.

In simple terms, oil-based transformers make use of oil in order to keep the parts of the transformer, such

as windings and the core, insulated. However, oil is a major fire risk, particularly in harsh operating conditions. On the other hand, dry type transformers only use air to cool the transformers.

Dry transformers are also well suited for harsh conditions such as underground coal mining operations. "Firstly, there is a high demand for dry type transformers in coal mining because there is a high risk of fire in this type of operation," explains Claassen.

"Dry transformers are rated for Class F1 fire protection. Generally, speaking if you look at the benefits over oil transformers, they are mainly around safety from a fire hazard perspective – this could be a fire caused by a transformer

short circuit or a fire reaching the transformer. In both types of scenarios, our transformers are flame retardant, whereas oil transformers are a fire risk," he adds.

**DID YOU KNOW?**  
Trafo Power Solutions has an engineering database of over 1 million designs and solutions, ranging from the smallest of control transformers to the largest dry-type transformers available today

### A new trend emerging

For many years, dry transformers cost significantly more than their traditional oil counterparts. However, this has now changed with the cost for either transformer being on similar lines. Furthermore, when it comes to operational costs, dry transformers are more cost-effective. "In terms of maintenance, oil transformers are very maintenance intensive," Claassen states. "You need to take oil samples that need to be tested at an accredited lab. This can be a logistical nightmare if a mine is in a remote area. You also need to check for leaks, measure oil temperature, monitor gas levels and check to ensure that there is no high pressure build-up in the oil tank, all of which take up a lot time.

A modular substation for a mobile mining application





“When it comes to dry transformers, you only have to monitor the temperature. Also, because dry transformers have few parts, they only need to be serviced once every six months. All you need to do is check that all the physical termination connections are tightened to the correct torque and remove any dust build-up around the core and the windings. All of this takes a maximum of two hours to complete.”

**Offering further peace of mind**

As stated earlier, the trend of building solid foundation substations in Africa is slowly dissipating. This is largely due to the fact that it is costly to get building materials to remote locations as well as have manpower on site to build these structures. “Nowadays, a lot of substations are being built in modular structures such as sea containers. In fact, at Trafo we can assemble an entire substation in South Africa and ship it to its location where there is very little cabling needed to install it once it reaches there,” adds Claassen.

To ensure that its offering meets the unique requirements of each of its clients, Trafo invests heavily in application engineering upfront. In fact, the company hardly ever supplies the same transformer

→ Internal view of a modular substation including a 2 000 kVA cast resin transformer



At Trafo we can assemble an entire substation in South Africa and ship it to its location,

**DAVID CLAASSEN**

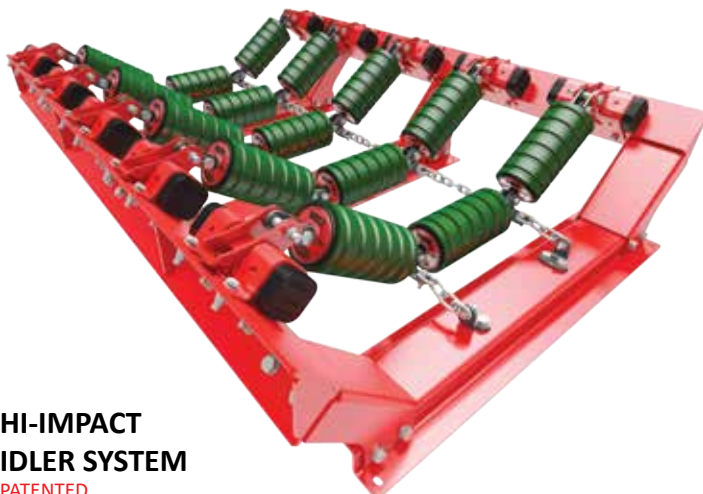


to different operations as each operation has its own environmental requirements and voltage supply requirements in different regions of Africa.

While dry transformers are relatively hassle free when it comes to service and maintenance, Trafo also offers its customers aftersales support from its head office in South Africa for additional peace of mind.

“We like to plan for any eventually. Our focus upfront minimises the risk but we also offer service agreements for maintenance. In addition to telephonic technical support, we offer on-the-ground service within three days of being notified in the sub-Saharan region,” he concludes. **MRA**

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# Mobile pump rental

## Cost-pressed mines see benefits

Tough economic conditions for the mining sector – aggravated by the COVID-19 lockdown – have seen a growth in the rental of mobile pumping and dewatering solutions.

“The industry has seen capital expenditure being cut drastically, making renting a popular option for this versatile equipment,” says Integrated Pump Rental’s Sykes product specialist Henru Strydom. “The mobile configuration offers considerable value by allowing mines to move vital equipment to wherever they need it at the time.”

This can help avoid the expense of multiple stationary units, as well as the infrastructure that must accompany fixed pumps. The rule applies to both dewatering and water transfer functions in mining operations, says Strydom, noting that even high capacity pumps can be rendered mobile – as demonstrated by the wide range of

sizes that comprise Integrated Pump Rental’s fleet.

“In our range of top-end quality Sykes pumps, our extra-high head XH150 pump with a 150 mm discharge connection can dewater an open pit down to 250 m deep,” he says. “At about 6 t in weight with a full tank of fuel, this unit can run at full pumping load for 24 to 28 hours continuously between refills.”

These larger pumping units can be transported to site on an 8 t drop-side truck, along with a wheeled base. At their destination, they are simply craned off the truck and assembled. Moving the trailer around the mine site is usually done with heavy equipment like a grader or loader. This mobility also has the advantage of being moveable in the case of an emergency; this may include incessant heavy rain, where there is risk of flooding.

The high head (HH) range of Sykes pumps comes in options up to 300 mm discharge connection, and can pump over a height of 70 to 150 m. The HH130, for instance, is permanently on a site trailer, and can be transported to site as is. Medium head pumps – the MH models in the range – can, in turn, manage heads of between 50 to 90 m. On the smaller end of the company’s Sykes range are the CP (contractors’ package) models which can easily be pulled by a bakkie – and are popular for moving water between mine dams, for example.

“Among the advantages of the Sykes CP units is that they weigh only about 1.5 t on a road trailer, and are compliant with road regulations,” Strydom says. “This makes for easy mobility on-road and off-road. Wherever a 4x4 vehicle can go, our mobile pumps will go.”

**IPR customers value the manoeuvrability** of their on-site mobile pumps, which allow the flexibility to change location and application







↑ The Sykes CP units weigh about 1.5 t on a road trailer, which allows easy mobility on-road and off-road



↑ In line with efforts to promote local sourcing for the mining sector, Integrated Pump Rental locally manufactures its pump sets

The robust, auto-priming range has features that protect against hazards like overheating or low oil levels, optimising uptime and ensuring low maintenance requirements. He emphasises that these pumps do not need constant monitoring, due to their reliability and safety features. Internal components on the Sykes pumps – including the impeller, wear plates and shaft – are supplied in stainless steel as standard, suiting them well for highly acidic applications.

In line with efforts to promote local sourcing for the mining sector, Integrated Pump Rental locally

manufactures its pump sets. One of its locally built Sykes XH150 units has been operating successfully in a dewatering application at a Lesotho diamond mine, under demanding conditions that include very cold winters.

“We find that most of our customers value the manoeuvrability of their on-site mobile pumps, which gives them the flexibility to change location and application,” he says. “The mobility also usually means quicker deployment of the equipment, which could be important in avoiding costly downtime.”

While some customers prefer the ownership option, there has definitely been an increase in rental demand over the past year or so, says Strydom. Apart from the capital outlay that renting saves, there are a number of other benefits.

“Renting gives us the responsibility for maintenance, leaving the mine to deploy its resources elsewhere,” he says. “We service the units every 250

hours and are in regular contact with the customer, should they need anything. Our technicians are also on-hand, servicing the main mining areas.”

So attractive is this option that one mining customer in the North West province has been renting for almost 18 months already – despite the option to purchase. There is also a noticeable trend towards certain customers requesting service level agreements. Where a mine has numerous pumps on site, Strydom says, Integrated Pump Rental has been requested to maintain the equipment on a regular and ongoing basis.

“In many cases, mines find it cost effective to outsource maintenance,” he says. “It is also sometimes a challenge to find and retain the skills to professionally maintain this specialised equipment to the highest standard, to ensure that performance and reliability are not compromised.” **MRA**



The mobile configuration offers considerable value by allowing mines to move vital equipment to wherever they need it at the time



# Compact and mobile plants

Companies around the world are looking at optimisation options for their mill and processes, be it cement or ores. The race to exploit the opportunities is what matters; however it would make better commercial sense to have the option of opting out of a given market and relocating to a newly identified, more profitable one with very little capital cost.

Since 1906, Loesche has consistently introduced new grinding technologies to meet its customers' needs. Building on this tradition, the company has designed compact milling plants that are able to mill a range of products such as cement (CCG), coal (CGP) and ores (OGP).

And that is not all – the Loesche Compact Plants provide the answer for both start-up and existing operations, where there is a demand for operations to become bigger. To make it even more versatile, you can specify additional equipment that will expand the compact plants to stand-alone systems that can handle the complete grinding of products and loadout or recovery processes. The "thinking" behind the compact plants is the short delivery time, with minimised

installation and commissioning. The bottom line is that you can enter the market quickly with profitable production and recoveries.

## Compact cement grinding plants (CCG)

The CCG is a small-scale grinding plant designed to produce different types of cement. At the heart of Loesche's well-proven, state-of-the-art plants are

the mills. The LM 15.2 CS, LM 24.2 CS and the LM30.3CS give the potential owner a range of products and tonnages including packing as well as bulk out loading.

## Ore grinding plants (OGP)

This plant can be used in two applications. The first is a proof of concept scenario where the plant is located at the site to process ore and recover the minerals in a continuous laboratory type environment. The second is a larger scale OGP which has been developed to process small scale deposits where large type operations were not financially viable. Due to the plant being built in containers, the plant is easily installed and easily relocated when done. These plants also come with various recovery circuits to suit the ore type.







### Coal grinding plants (CGP)

Loesche's containerised coal milling plant is specifically designed to supply thermal processes with pulverised fuel. The plant, developed by Loesche, is housed within containers and this enables it to be utilised at any location. This mobile plant can process all types of coal under almost all environmental and physical conditions. This plant also complies with all EU and ISO standards and safety regulations for pulverised fuels.

Coupled with this plant, Loesche can also supply decentralised processing plants such as:

- Asphalt mixing plants. This would be a CGP mobile plant with a burner to either dry or heat asphalt products.
- Process steam plants. This would be a CGP mobile plant with a steam generator.
- Process heat plants. This would be a CGP mobile plant with a hot gas generator to generate process heat for drying.
- Decentralised power plants. This would be a CGP mobile plant with a steam generator and steam turbine for the production of electricity.

Due to some of the remote locations where these plants can be used,

Loesche has also made the control systems for the mills versatile and user-friendly. The PLC system offers a user interface allowing all critical controls and signals to be displayed on one screen, which ensures ease of use for critical decision making and plant control.

Loesche is dedicated to ensuring customer satisfaction with modern innovative designs, delivering the best possible capital and operational expenditure to allow the owner to be competitive in their market. Coupled with the plants are Loesche's

professional and effective maintenance options and onsite support. **MRA**

#### CONTACT:

Jonathan Smith  
Sales Manager  
jsmith@loeschesa.co.za  
[www.loesche.com](http://www.loesche.com)







The Sandvik DD422iE is considered the pioneer of battery operated drill rigs for face drilling in high profile mines

# Revolutionary drilling technology

## Hitting South African shores

Optimising production efficiency has become a primary objective for the mining industry. The solution lies in the utilisation of modern technology and equipment that has been designed to overcome the challenges experienced in typical mining methodologies. **Sandvik Mining & Rock Technology**, a company committed to technology advancement, is bringing new-era drilling technology to the African continent to drive significant production improvements, while contributing towards improved safety and working conditions, underground drills business line manager **SALTIEL PULE** tells **LAURA CORNISH**.





technique offers various benefits such as speed and accuracy by comparison with conventional mining methods but is nonetheless still a long and complex process.

Raise blasting is not considered by most an effective drilling technique during production, generally because its lack of mobility, set up times and the requirement to drill relatively short lengths cannot be justified in terms of time and cost.

Mechanised raise drilling should however be considered a viable drilling application for raise boring in massive mine applications. Slot raises refer to relief holes within a stope, intended to provide void space (or burn-cuts) for blasting, thus allowing ‘expansion’ of the blasted rock and improving fragmentation. The benefits of larger diameter slots are well documented – but only if these slot holes can be produced simply and cost effectively, especially as these holes are relatively shorter in length and larger in diameter when compared to typical raise boring projects.

“Sandvik has spent the last year focusing intensively on producing a raise boring machine capable of eliminating the challenges associated with raise boring. And the Sandvik Rhino 100 machine delivers on every front,” Pule notes.

“The Rhino 100 reduces the time to drill a typical 660 – 1 060 mm slot hole, of 20 m in length, from roughly five days to just one,” he continues.

The electro-hydraulic, fully mechanised, self-contained and independent mobile drill is used in galleries with dimensions of at least 4.5 m x 4.5 m. The equipment is able to perform ascending or descending drilling. “The machine does not require a concrete pad, additional rock works

or any special utilities or provisions other than the ones already established on the equipment. It also requires only a single operator – even the drill rods are manoeuvred using a robotic arm. It is for these reasons that we are able to establish the machine in place so quickly, drill effectively and then dismantle and relocate the machine rapidly as well,” Pule outlines.

The Rhino 100 raise borer includes a comfortable, safe, quiet and ergonomic operating cabin. To further assist the operator, the most advanced controls are installed: The Rhino SMART operating system is a dedicated raise boring management software offering various features for operator, manager, maintenance personnel, and mine planner to improve production efficiency, optimise maintenance schedules, and maximise uptime. Additionally, an almost unlimited number of cameras can be added to remotely follow the operation, if needed.

Hydraulic jacks and stingers are used to establish the drilling position with actual drilling starting immediately afterwards. The first piece of drill string (complete with pilot bit) is already attached to the gearbox. This design integrates dust suppression and a muck chute not only to create a dust free drill site, but also to take the cuttings away from the rig.

“Our Rhino machine has been in operation in Australia, Europe and West Africa for the last 10-years and has proven its capability over and over again. On the back of this success, we are now looking to introduce the machine to the South African mining sector,” Pule reveals.

Locally, Sandvik does recognise that South Africa’s mines have their own unique challenges and complexities and

**M**echanised raise boring has become a relatively common slot opening methodology – generally used when an existing mine develops further or expands – and typically for the large-scale development of ventilation shafts, ore passes, etc. The

Slot drilling operation	Conventional raise borer	Mobile raise borer <sup>1</sup>	Rhino 100 <sup>2</sup> Highly mobile raise borer
Monthly production	up to 140m	155	336
Number of slots/month	5	6-7	14-15

**Table 1.** Comparison of slot drilling productivity. The data comparing “Mobile raise borer” and “Rhino 100 highly mobile raise borer” are from the same mine in Western Australia since 2016. The data presents averages over several months in the same conditions. Conventional raise borer results are an achievement by an experienced crew in a typical mine.

so the company is currently building simulations and models using its Trans4Mine resources. "This will enable us to showcase how the Rhino can operate effectively taking an individual mine's production requirements into account," Pule states.

With a fair number of 'massive mines' (large-scale ore bodies) in the gold, copper and PGM sectors, he is confident that the machine will gain significant traction in the South African mining sector over the next three to five years. It will be manufactured in Finland at Tampere Production facilities but will be supported locally with after-service and spare parts from South Africa following extensive upskilling of local technicians and Sandvik staff. "As a production tool, we cannot allow for unplanned downtime due the consequences this has on an entire mining operation," Pule highlights.

"Ultimately, we believe this machine will become the international standard for slot drilling as it demonstrates and embraces a new mining generation."

### Battery operated the next best thing in drilling technology

The Rhino machine is only one example of Sandvik's commitment to delivering value-add to the industry through drilling technology innovation.

"We are now in a position following 10 years of research and development to grow the battery operated underground drilling machines – the DD422iE is the pioneer of battery operated rigs for underground face drilling in high profile mines. It will be followed by the battery operated bolting and long-hole drilling applications," Pule reveals.

While these battery operated drill rigs will still deliver production benefits for miners, they

The Rhino 100 reduces the time to drill a typical 660 – 1 060 mm slot hole, of 20 m in length, from roughly five days to just one,

SALTIEL PULE



↓ The Rhino 100 offers significant time saving advantages

respond first and foremost to another major challenge in the underground mining space – improving health conditions for miners by reducing diesel fume particulate matter which mining workforces are constantly exposed to – in other words, zero emissions.

Having tested various prototypes for the last few years in Canada, Pule says the technology is now ready off the shelf for high profile equipment.

Battery operated machinery offers a wide variety of benefits beyond improving environmental conditions.

"For safety first, the thermal energy cannot escape battery packs. Further to this, the batteries are constructed from sodium and nickel. The battery functions like a vacuum, containing temperatures of up to 250°C within the battery, leaving its exterior completely cool to the touch during maintenance," Pule explains.

Charging the drill requires only a 220 V plug or charging whilst drilling. Full charge should be done at least once a week – which can coincide with scheduled maintenance. "With a maximum of four battery packs per drill, this will equate to about 4 km of tramming at a steep incline and up to 18 km on flat ground."

Operating a drill without using diesel is in itself a massive cost saver – which extends further considering no spare parts or other hydrocarbons logistics and holdings. The savings continue to be realised throughout the lifecycle of the drill – which is anticipated to last between five and 10 years.

There is a question from industry needing to understand whether South Africa is ready for battery operated machinery in terms of skills and maintenance. "Naturally Sandvik can assist in training and maintenance as our clients require," Pule confirms. **MRA**







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Drilling in remote locations requires careful management of scarce resources



# Record depths

More than 1 km drilled in only nine days

Recently hard-rock drilling equipment specialist **Mincon South Africa** supported South African drilling company **Torque Africa Exploration** at a Greenfields exploration drill site in the Northern Cape, South Africa, to reach depths of 1 019 m in only nine days.

For the project, a Mincon reverse-circulation (RC) system was used, and with this new benchmark, the world of exploration drilling can now match diamond coring systems to a 1 km depth, with all the advantages of air-powered RC systems.

Between 10 and 15 February 2020, work began on setting up the site for exploration drilling. Nardus Bezuidenhout, director of Torque Africa Exploration, moved in on site with a Thor 8000 RC truck-mounted drill rig – a proven powerhouse in deep-hole drilling. Joining the main rig on site was a fleet of support vehicles, including rod carrier trucks, compressors, water and fuel tankers as well as a full team of staff to support the operation.

With the nearest town more than 120 km away, it's no small undertaking to set up camp in the middle of nowhere. Even with extensive planning and logistics, fuel and water are precious resources that cannot be wasted. As the old adage goes, time is money, and the longer these resources are on site, the higher the total cost of the project would be. When drilling exploration holes to 1 000 m or more, it's not uncommon to be on site for up to three months. That's a lot of time, money, and careful management of scarce resources.

For this project Torque Africa Exploration elected to use the latest products in the Mincon MR range of exploration tools. These reverse-circulation (RC) tools use a variation of the familiar air-powered down-the-hole (DTH) hammer, but designed to flush cuttings through an inner tube. Until recently, such air-powered RC systems were only used for exploration drilling up to 500 or 600 m but changes to Mincon's RC hammers allow for companies to drill much deeper.

Drilling commenced on 17 February 2020, using a Mincon MR120 RC hammer and a 143 mm drill bit. Slow, methodical progress was made to ensure everything was safe and functioning as intended. After reaching a depth of 114 m the team retrieved the drill string from the hole, after which the first 4 m of the hole was reamed and widened to install a temporary casing. This was done to stabilise the soft ground near the surface, thus preventing hole collapse. When



drilling resumed the team used a new, 140 mm RC drill bit, equipped with polycrystalline diamond-impregnated carbide (PCD) buttons.

“When we chose drill string components, we opted for Mincon’s bits with PCD carbides. Since we were drilling into granite we wanted extreme durability and reduced downtime associated with bit changes or bit sharpening,” explains Bezuidenhout.

### Rapid and steady progress

Over the next four days, the average progress was approximately 120 m per day, which included retrieving the drill string at 637 m in order to change sample tubes and swapping to a new, 137 mm RC drill bit – both being wear components.

The process of retrieving a drill string is straightforward, but time-consuming. After lifting each pipe out of the hole it needs to be unscrewed, removed, and the remaining pipes reattached. This is repeated, 6 m at a time, for the entire length of the drill string – more than 600 m at this point. Deep-hole drilling projects can become incredibly expensive if multiple drill-string retrievals are required, but this can be offset by using durable, reliable equipment that consistently delivers high levels of performance.

On day eight of the project, Torque Africa Exploration resumed drilling with a fresh 137 mm drill bit – only the third bit required for the project. In order to reduce time on site, a decision was also made to move to a 24-hour drilling schedule.


Rapid progress was made: In just two days the team powered through 382 m of hard granite and rushing groundwater to reach a depth of 1 019 m – thus making this one of the deepest exploration holes drilled using air RC tools. With the target depth reached, the drill string was retrieved for its final inspection, and this showed only expected wear and no failures.

Once retrieved, a post-drilling survey was conducted to verify the depth and straightness of the shaft, with the survey report indicating a

“

Since we were drilling into granite, we wanted extreme durability and reduced downtime associated with bit changes or bit sharpening,”

**NARDUS BEZUIDENHOUT**



→ Mincon drill bits with diamond-impregnated carbide buttons

hole deviation of only 0.83 degrees. This exceeds the performance of competing technologies and proves yet another benefit of air RC systems.

A record-depth hole drilled in record time would be a pointless achievement if sample cuttings were unusable, though. Fortunately, this is where the air RC approach has yet another advantage: Consistently returning uncontaminated sample cuttings to the surface. This is due to cuttings being flushed up through a sample tube rather than being exposed to the drilled hole.

Samples continued to be collected even after encountering extensive groundwater at 886 m. For every metre drilled, a sample was collected, bagged, and tagged, allowing geologists to analyse the ground conditions and mineral content.

“It’s clear that Mincon’s engineers have listened to drillers and designed a product that has major benefits for deep-hole RC drilling, without the higher cost of alternative approaches,” concludes Bezuidenhout. **MRA**



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# New Cat MD6380 rotary blasthole drill

Powerful and precise

Drill on drill bench



Designed for large blasthole production drilling, **Caterpillar's** latest ultra-class drill, the **MD6380**, provides the optimal mix of on-board air, feed force, rotary torque and machine mobility. With a hole diameter range of 251 to 381 mm, single-pass hole depth of 19.8 m and multi-pass hole depth of 39.5 m, the new drill is designed for large-scale mining.

The MD6380 powertrain is designed to efficiently manage loads generated by the compressor and hydraulics, delivering superior fuel economy. The drill's compressor is configured with electronic regulation and variable volume air control, allowing the driller to perfectly match compressor output to drill tool and application needs. It also lowers stand-by pressures while the machine is in idle, further improving fuel efficiency.

The MD6380 is capable of pulldown force of 49 895 kg and rotation torque of as much as 20 880 Nm. The proven Cat 3512C diesel engine produces 960 kW and delivers emissions performance equivalent to the US EPA Tier 2 and EU Stage II. The powertrain offers extended durability and high availability to help boost utilization and lower costs.

The MD6380 is controlled through proven Cat electronics. Integrated machine protective features and



interlocks help keep operators safe and the machine up and running by preventing potential failures or misuse. With a Cat electronic technician, troubleshooting is quick and easy. Drill electronics also provide a common platform for the integration of automation solutions.

The MD6380 features a spacious cab that offers superior operator comfort and machine control. Intuitive multifunction joystick controls and touchscreens promote efficient operation. Display screens are adjustable to suit the driller's reach and line of sight. The driller can easily tram from a seated position. With a full-length driller window, large pane glass around the cab and four standard high-definition cameras, operators have excellent views of key areas.

The machine also features Drill Assist, which delivers automated functions including auto level, auto

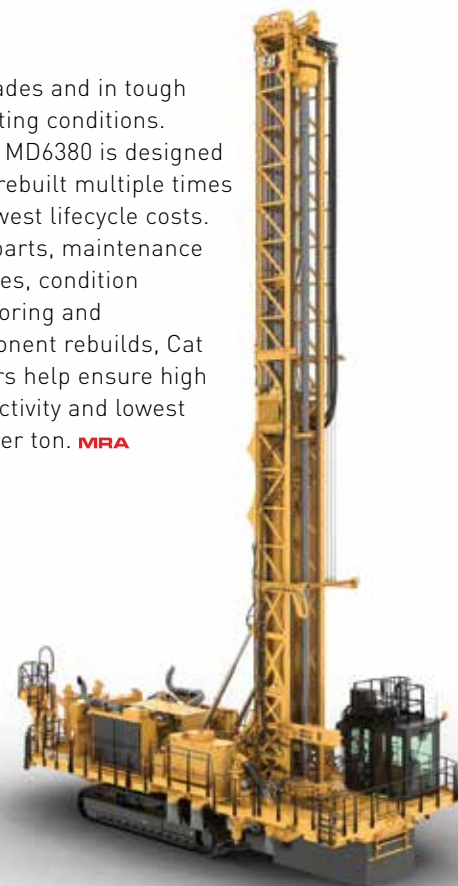
retract jacks, auto raise and lower mast, and auto drill. The drill depth monitoring system helps to reduce both over- and under-drilling.

The MD6380 incorporates Cat Terrain for drilling. The proven MineStar technology provides precise hole location, production reporting and strata reporting. Terrain seamlessly connects to Cat Command, offering a path to remote operation and autonomous drilling.

The drill features a best-in-class working envelope with a low centre of gravity and ample approach angles. These attributes give the machine superior manoeuvrability, allowing it to navigate quickly and efficiently hole-to-hole and bench-to-bench. The Cat excavator-style undercarriage has grease lubricated track pins, positive pin retention and automatic track chain tensioning – all to help the undercarriage deliver extended durability and optimal performance

on grades and in tough operating conditions.

The MD6380 is designed to be rebuilt multiple times for lowest lifecycle costs. With parts, maintenance services, condition monitoring and component rebuilds, Cat dealers help ensure high productivity and lowest cost per ton. **MRA**



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Diamond core drilling programme



# Licensing and permitting

## Ensuring a successful diamond core drilling programme

**By Thomas Feehan, business development manager at Boart Longyear**

The only thing consistent about licensing and permitting is how inconsistent and variable it is from place to place. Laws, regulations, permits, licensing, and requirements can be different based on the country, province, city, and land ownership. Consequently, there is a significant grey area when discussing the broader topic of licensing and permitting to help ensure a successful diamond core drilling project.

### Risks

Designing and planning a drilling project can be a complex exercise. Many risk factors should be considered to mitigate issues that could impact productivity and/or budgets. Some of these factors include permitting and licensing which could ultimately impede the progress and success of the project.

After careful planning, there is a healthy amount of cautious optimism that everything has been properly addressed and planned for; however, there is always that small chance something was missed. Mistakes or missteps can be costly if your project doesn't have everything in place when it comes to licensing and permitting.

While it doesn't happen often, paying a drilling contractor stand-by rates waiting for a project that's been scheduled, but not properly authorised or permitted, takes money from the project itself.

How much more exploration could have been achieved with the money lost by paying for services and support that cannot move forward because a project is delayed on a technicality – usually paperwork? There's a risk of reputation as well. Costly mistakes are not great for anyone's career or a company's reputation regardless of the jurisdiction.

### Challenges

When planning a drilling project, it is highly recommended that you ensure all licence and permit requirements are met before the drill crew and necessary equipment mobilises. Boart Longyear therefore maintains working relationships with local consulting and engineering firms as well as government agencies and you should too.

Meanwhile, drill pad layout can be just as critical to a safe, smooth, and

successful drilling programme. A drill pad setup where safety or productivity is compromised can result in wasted expense and possibly lead to an accident. Not having permits with the right amount of surface disturbance for the project is a risk that can be mitigated with communication. A miscalculation in required disturbance area can lead to holes being removed from the scope of the project to remain in compliance with regulators.

Working diligently with all stakeholders in the permitting application process helps ensure the exploration/project teams and the environmental/permitting teams are on the same page. A simple oversight or misunderstanding can possibly delay site mobilisation or start-up. Ideally, these conversations should happen early in the planning stages of the drilling programme.





← **100% hands-free rod** handling technology allows Boart Longyear drilling crews to meet strict safety requirements



One of the biggest challenges of licensing and permitting for a diamond core drilling project is timing,

**THOMAS FEEHAN**



Boart Longyear can assist with equipment specifications in order to prepare the proper size drill pads and access roads. That way, a budget estimate for all aspects of the work can be adequately prepared to complete a project safely and effectively.

One of the biggest challenges of licensing and permitting for a diamond core drilling project is timing. Depending on workload and resources, government entities are not typically known for their speed. Early planning and working with experts can ensure the timing of licensing and permitting doesn't affect your project start date. Obtaining most permits and licenses takes longer than expected in most cases. Proper planning and early submission to agencies are highly recommended.

### Solutions

Boart Longyear, if asked, can direct clients to a number of qualified groups in order to plan and help permit their drilling programmes before sending out requests for proposals. It also works closely with a variety of consulting groups for clients that are in need of expert and sometimes urgent support. **MRA**

### About the author

Feehan holds a Bachelor's Degree in Geology, a Master's Degree in Hydrogeology, and a Master's Degree in Business. He has 30 years of experience in mining with 26 of those years specialising in drilling programmes for lithium brines, mineral exploration, geotechnical/slope stability investigations, mining-related hydrogeology, mine dewatering, water supply and water disposal. He has successfully managed significant drilling programmes in Asia, North America, Central America, and South America.



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# Blast planning

## Taken to new heights

As part of its continuous development of digital solutions, blasting specialist **BME** has further enhanced its **BLASTMAP** blast planning tool with an added burden relief timing module.

→ BME's BLASTMAP



“

**A**s an enabling tool for our well-accepted AXXIS electronic initiation system, BLASTMAP now has a powerful burden relief feature that gives the blaster better control over the shape and movement of the blasted rock muckpile,” says D. Scott Scovira, global manager: blasting science at BME.

Scovira emphasises that burden relief is fundamental to good blast design, as a blaster needs to shape the muckpile to optimise the efficiency of the excavation fleet.

“If the mine is using a loader and truck fleet, for instance, the blasted rock will need to be laid out lower – and longer burden relief times tend to be used in the blast,” he said. “For a truck and shovel configuration, on the other hand, the muckpile would need to be

stacked up higher, usually requiring tighter burden relief times.”

The new feature augments a range of BLASTMAP tools that have added value to BME’s customers for many years, integrating with BME’s AXXIS and XPLOLOG systems. AXXIS allows blast technicians to programme a detonator with the desired time delay, while XPLOLOG allows users to view, capture and sync drill and blast data to a cloud database for real-time access to preparation progress on the blast block.

The capabilities of BLASTMAP include initiation timing design, initiation sequence simulation, blasthole loading design, fragmentation distribution predictions, vibration prediction and blasted rock range prediction.

While initiation timing design enables the design of blast initiation sequences and facilitates

programming of the AXXIS system, the initiation sequence simulation allows the user to check for correct hole firing sequence and pick up any potential out-of-sequence firings. The blasthole loading design module – covering the explosive load, booster and initiation system – is also capable of designing decked hole loading.

For fragmentation prediction – where one of three equations may be chosen – the software allows site-specific or general rock properties to be entered into an editable rock properties database. Additionally, the fragmentation models may be calibrated with data from physical fragmentation distribution measurements.

“Fragmentation distribution is vital to quality blasting, going hand in hand with a mine’s machine productivity in loading and hauling,” Scovira notes. “One step further is to optimise fragmentation distribution for the crushing and milling circuit, to improve throughput and recoveries.”

The vibration prediction tool, which generates a predictive isomap of vibration levels around the blast, ensures that blast vibrations do not exceed regulatory or self-imposed environmental constraints. BLASTMAP also includes an advance through-seam design module, to design explosive loads and initiation times in multiple dipping coal strata.

Tinus Strauss, senior software engineer at BME, highlights that BLASTMAP can use data from a range of sources.

“Data can easily be imported from third-party software through our import wizard,” says Strauss. “This allows any text-based file to be used – as well as specific formats like DXF files – conveying data on parameters such as block-out lines on benches, hole depths and charge.” **MRA**



# Automatic energy optimisation

Millions saved on annual operating costs



↑ The process cooling water (PCW) system has saved the company millions in operational costs

**AEL Intelligent Blasting's** nitric acid plant in Johannesburg, South Africa, has saved a massive R3.6 million on annual operating costs, thanks to an upgrade from direct-on-line operation to **Danfoss's** VLT drive control of electric pumps and motors.

The 720 Mtpd nitric acid plant supplies other AEL divisions serving mining operations with chemicals and explosives, nationally and internationally. The plant has improved its reliability by upgrading the process water cooling system, and has reduced energy consumption by 500 kWh hourly, in the process.

For many years, motors and pumps in the process cooling water (PCW) system operated direct-on-line. With the upgrade, AEL Intelligent Blasting aimed to improve efficiency and reliability by introducing AC drive motor control. It chose VLT AQUA Drive FC 202 and VLT HVAC Drive FC 102 drives from Danfoss, based on their ability to ensure stable

operation despite unreliable mains power supply.

These drives offer automatic energy optimisation and kinetic back-up features to support highly efficient and reliable plant operation. During the upgrade, there was no disruption of operations as pre-installation of all equipment was performed with wires run to and from the MCC. The final connections were made during a planned shutdown for a catalyst change out.

### Fast payback time

Since the upgrade, AEL Intelligent Blasting has been able to reduce the electricity consumption from the two fans by 200 kWh combined and by another 300 kWh on the motors.

"Because we linked everything to our distributed control system (DCS) we were able to use the drives to reach a nice sweet spot of running the pumps and fans on the cooling system so as not to drop efficiency or negatively impact on plant production or quality, but still maintaining an energy saving of around 360 kWh. The resultant payback period was about 18 months," adds Eben Jacobs, AEL process and control engineer.

The total savings on operating costs, based on an average electricity charge of 85 c/kWh, are roughly  $(200 + 300) \times 8560 \text{ hr} \times 0.85 = \text{R}3.6 \text{ million}$ . The remarkable payback time of only 18 months reflects the vast improvement in process cooling water efficiency enjoyed by AEL Intelligent Blasting. **MRA**

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