CROWN PUBLICATIONS

# MODERN MINING

October 2022 | Vol 18 No 10

For people who are serious about mining

- **Shanta Gold eyes 250 000 oz producer** status in five years
- **Digital mine provides** the competitive edge
- **MRTA uses technology** to enhance safety
- **Kal Tire pioneers** industry leading solutions

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### ON THE COVER

Axis House is gearing to launch a suite of products for the platinum group metals, gold and industrial metals markets. See story on page 8.

COMMENT

# Mining delivers a sterling performance

Nellie Moodley

With so many things not working in this country (power, water, networks, etc), it is good to know that the mining sector continues to keep the cogs of the economy ticking over.

According to PwC's newly launched *SA Mine 2022* report, the mining sector has delivered a sterling performance, exceeding expectations on most fronts with distributions to shareholders more than doubling to R190 bn, while capital expenditure grew by 36% and taxes paid increased by 14%.

Growing demand for commodities in the sector saw record rand prices for the platinum group metals basket, iron ore and coal, while most other South African commodity prices remained at relatively high rand levels.

PwC's Sizwe Masondo explained that after dropping by 11% in 2020 as a result of the adverse impacts of the Covid-19 pandemic and associated lockdowns, local mining production increased by 12% in 2021.

"By mid-2021, mine output volumes were back to pre-pandemic levels. However, mining activity experienced several challenges in the first half of 2022, resulting in mining output falling by 7% y-o-y in the first six months of the year."

However, commodity-driven input costs, including energy, global inflation and the weaker rand, although positive for rand commodity prices, are increasing input costs.

PwC advises that these higher costs are further impacted by lower production levels which increase unit costs. As such, there is "expectation of a significant erosion of margins in the near term, which will impact the performance in 2023".

This windfall has seen the mining industry, over the past 12 months, increase its commitment to capital expenditure, which bodes well for the overall economy and for the communities surrounding mining operations, suppliers, labourers and government.

On the topic of exponential growth, our cover story, Axis House, which celebrates 21 years in business this month, is aggressively targeting precious metals profitability.

Aside from looking to enter new markets, the reagent specialist is gearing to launch a suite of products for the platinum group metals (PGM), gold and industrial metals markets (pg 8).

For this edition, *Modern Mining* also caught up with East-African gold miner, Shanta Gold, which has its eyes set on becoming a 250 000 oz producer in the next five years. The company presently produces 75 000 oz pa from its flagship New Luika Gold Mine in Southwestern Tanzania and is looking for further precious ounces from its Singida gold mine currently under construction and its exploration asset, West Kenya project (pg 14).

Meanwhile, innovative technology developments continue to underpin progress in health and safety, with Murray & Roberts Training Academy (MRTA), a division of Murray & Roberts Cementation, researching smart eyewear that will allow for virtual on-the-job training and pave the way for cost-effective training and skills development on a mass level.

The training specialist hopes to have a smart eyewear prototype developed and available for use before the end of the year (pg 18).

It is interesting to note that while many in the mining sector still perceive it as a sector that is slow to change, PwC's Ian Mackay points out that South Africa consists of many top-notch digital mines that compete head-to-head with some of the best mines in the world. "Adoption of digital technologies across mines is near universal with distinct goals attached to their progress," he says.

On the topic of innovation, the Electra Mining Africa 2022 event showcased a long list of latest product developments. *Modern Mining* was on hand to witness a number of these, including the launch of Sandvik's 65 tonne battery electric truck, Tomra's new COM XRT 300 /FR final recovery sorter and Kal Tire's tyre innovations. Motor and controls manufacturer Zest WEG also used the event to announce the launch of a new assembly line for its low voltage premium efficiency WEG IE3 electric motors at its facility in Longlake, east of Johannesburg. ■

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**Circulation:** Brenda Grossmann
**Published monthly by: Crown Publications (Pty) Ltd**
P O Box 140, Bedfordview, 2008
Tel: (+27 11) 622-4770 Fax: (+27 11) 615-6108
e-mail: mining@crown.co.za www.modernminingmagazine.co.za

**Printed by:** Tandym Print



Average circulation
April-June 2022: 12 617

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# Hummingbird Resources Kouroussa Gold Mine construction >50% complete

Construction on AIM-listed Hummingbird Resources Kouroussa Gold Mine, in Guinea, is progressing apace with development and construction of the company's second gold mine over 50% complete. The project remains on time and budget to achieve first gold pour by the end of Q2 2023 – which will more than double Hummingbird's gold production profile, the company said.

Kouroussa Gold Mine construction moves apace.

Key construction updates include:

- ❑ Five CIL tanks and two leach tanks have been erected
- ❑ Plant workshop completed and processing plant store nearing completion
- ❑ Mining camp earthworks and all concrete slabs for building infrastructure completed
- ❑ Civil works in progress in the following areas: oxide ore crushing, reclaim, milling, reagents, oxygen plant, detox, and services
- ❑ Structural steel installation and preassemblies commenced on the oxygen plant and reagent areas

Dan Betts, CEO of Hummingbird Resources, commented: "Hummingbird continues to move towards our key strategic goal of being a multi-asset, multi-jurisdiction gold producer with a key milestone of over 50% of construction now completed at our second gold mine, Kouroussa, located in the prolific Siguiri Basin in Guinea. In addition, the latest assay results from our 2021 infill drilling campaign are very positive in terms of grade profile and the confidence levels they provide us as we move towards beginning to mine at Kouroussa later this year, ahead of the all-important first gold pour by end of Q2, 2023." ■

## Exxaro's Zelmia Botha is SAIMM'S new president

Exxaro Resources commissioning manager, Zelmia Botha, was appointed as the new president of the South African Institute of Mining and Metallurgy (SAIMM). Botha's appointment is a proud moment for Exxaro as she is only the fourth woman to head this prestigious 125-year-old organisation since its inception in 1894, the miner said. Botha's position at SAIMM will inspire women to continue to seek opportunities in the mining sector and occupy leadership positions. "As it stands, women only make up 20% of engineers in South Africa," said Botha. ■

## Bengwenyama PGM drilling programme intersects UG2 Reef

Drilling programme at the Bengwenyama PGM delivers positive results.

ASX-listed Southern Palladium recently commenced a Phase 1 drilling programme at the Bengwenyama PGM project located on the Eastern Limb of the Bushveld Complex, in South Africa.

The company confirmed that drillhole E062 had intersected the first UG2 reef at 31.2 m below surface as part of the drilling programme. The mother-hole was completed on 1 September 2022 with an end-of-hole depth of 119.8 m.

Assaying of the reef will commence once all deflections, logging and core scanning are complete. The samples will be sent to ALS Chemex South Africa, the company said. ■

# **Minerals Council South Africa** collaborates in fight against illegal mining

The Minerals Council South Africa and its members have increased their collaboration with the government's security cluster in the fight against illegal mining. The South African mining sector is facing an unprecedented crisis in crime. The threat to the mining industry, and the broader country, is very real, resulting in deaths of mine employees and illegal miners, closures of operations, and losses to the fiscus of billions of rands, the council said.

The consequences of the illegal activities go beyond financial considerations. The negative criminal enterprises are not only attacking the mining industry, they also target Transnet's rail infrastructure and Eskom, effectively sabotaging the economy of the country. The mining industry lost revenue of R35 billion in 2021 because rail deliveries of minerals fell short of targeted tonnages.

The Minerals Council reiterated its call for:

- ❑ The establishment of a specialist, well-resourced and dedicated mining police task force focused on mining-related crimes.
- ❑ Urgent changes to the law to define illegal mining as a recognised criminal activity with strict penalties.
- ❑ Improved crime intelligence to ensure the leaders of the criminal syndicates behind illegal mining are arrested and prosecuted.
- ❑ Fresh engagement with the DMRE about how to deal with 6 100 derelict and ownerless mines as well as old mine dumps within the regulator's remit.

Illegal mining is costing the fiscus billions of rands in lost revenue.

- ❑ Expedite the inclusion of artisanal and small-scale miners in the formal economy. This does not include legalising illegal miners, who are engaged in criminal activities. ■

# **President Ramaphosa opens Sandvik's new** Khomanani facility

Sandvik Mining and Rock Solutions in southern Africa has transitioned its operations to Khomanani, its new high-tech head office facility, workshop and manufacturing complex in Kempton Park, Johannesburg. The facility, officially opened by President Cyril Ramaphosa, represents an investment of R350-million. Khomanani, which accommodates around 500 Sandvik employees, consolidates the operations previously undertaken at five separate sites. The company now has its soft rock, hard rock and surface businesses all under one roof. Khomanani is one of Sandvik's biggest and most advanced facilities globally and has the ability to produce underground loaders with over 60 % local content, allowing them to be designated as 'Proudly South African'. Sandvik, committed to sustainability, has developed its BEV range of trucks and loaders. The TH665B truck with a payload capacity of 65 tonne was unveiled at Electra Mining Africa 2022. Commercial production of the unit, which ranks as the largest capacity BEV truck in the world, is planned for late 2023. ■

President Cyril Ramaphosa opens Sandvik's new Khomanani facility.

## WPIC appoints Trevor Raymond as CEO

The World Platinum Investment Council (WPIC) has appointed Trevor Raymond as its new CEO, effective from 1 October 2022. Raymond has been a core member of the leadership team at WPIC since 2014, most recently leading the organisation's global research and investor development functions. The new appointment follows the decision by CEO Paul Wilson to retire, after founding the council and leading it for eight successful years. Commenting on Raymond's appointment, Roger Baxter, chairman of WPIC said: "Trevor has been a strong executive contributor to WPIC from its earliest origins in 2014. He and his colleagues David Badham and Weibin Deng have been instrumental in the establishment of the World Platinum Investment Council and its success to date under Paul's leadership." ■

# DMRE rules in favour of Steenkampskraal in prospecting right appeal

The Department of Mineral Resources and Energy (DMRE) has dismissed an appeal lodged against the decision of the Regional Manager: Western Cape Region of the DMRE to reject the appellant's prospecting right application in respect of Portion 1 of the Farm Steenkamps Kraal 70. Currently, Steenkampskraal Monazite Mine (SMM) has the right to mine all the minerals in the 474-hectare mining right (MR) area, except diamonds and oil.

The Mineral and Petroleum Resources Development Act 28 of 2002 (MPRDA) prohibits the acceptance of the prospecting right application where there is a right granted to another entity for the same mineral and land.

Chairman of Steenkampskraal Holdings, Trevor Blench, said: "We welcome the decision and at no stage were we concerned about the DMRE not dismissing the appeal."

SMM has invested a total of about $50-million to bring the mine back into production. ■

Steenkampskraal operations.

# Orezone pours first gold at the Bomboré Mine

TXS-listed Orezone Gold has poured first gold from its Bomboré Mine, located in Burkina Faso.

The construction of the Bomboré Mine was completed under budget, on time, and with no lost time injuries, the company said. Commissioning of the process plant commenced in late July with ore introduced into the circuit near the end of August. The plant continues to operate well with all systems functioning as designed, resulting in gold recoveries slightly above expectations. Current mill feed is a combination of direct tipped ore from the pits and from stockpiles at the ROM pad. Mining operations are performing as planned and will ramp up as the mine enters commercial production, expected in early Q4-2022.

CEO Patrick Downey stated: "In a short span of twenty months, we have successfully financed and constructed this Greenfield project, mined over 15.7-million tonnes of material, including 5.8-million tonnes of ore, while maintaining the health and safety of our workforce." ■

First gold poured at the Bomboré Mine.

## Jagersfontein relief fund launched

The Minerals Council South Africa recently launched an internal emergency Minerals Council Jagersfontein Relief Fund for its members to contribute towards urgent humanitarian assistance, the clean-up of the affected area, and assistance with the reconstruction of infrastructure after the collapse of a tailings dam at the Free State town. The collapse of the tailings dam on 11 September 2022 resulted in one death and injuries to nearly 100 people as well as damage to 35 dwellings and extensive infrastructural damage. While the owners of the Jagersfontein assets are not Minerals Council members, the council sent a senior technical team to the site to assess the damage and establish what the industry could do to assist families and the affected communities. The Minerals Council set a target of R50-million for the Jagersfontein Relief Fund and it has requested contributions from its member companies and associations. ■

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# Axis House targets precious metals

**October 2022 heralds a milestone for reagent specialist Axis House, which celebrates 21 years in business having grown from a four-person small business to one with 120 mavens and in-country specialists across a geographical footprint spanning Africa, Australia, South America, Europe, and the Middle East. By *Nelendhre Moodley*.**

Coupled with its milestone celebration, the company is gearing to launch a suite of products for the platinum group metals (PGM), gold and industrial metals markets, MD Justine Stubbs-Hult and technical manager Bernard Oostendorp tell *Modern Mining*.

"Following our decision five years ago to expand our footprint beyond our traditional markets of copper, cobalt, nickel and zinc where we initially targeted the Democratic Republic of Congo and Zambia, both of which host numerous copper-cobalt projects, we have since developed a suite of products specifically for the PGM, gold, and industrial metals markets. Over the past two years we undertook extensive trials and product tests and are now in the final stages of extended trials. We are gearing to launch the new suite of products to the broader market in the next few months," says Stubbs.

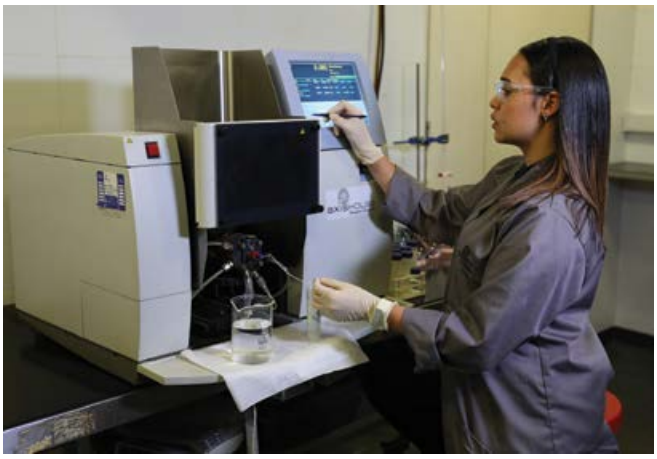
Below: Axis House product range aims to unlock efficiencies in the copper, cobalt, nickel and zinc sectors.

Axis House cut its teeth on a product range aimed at unlocking efficiencies in the copper, cobalt, nickel and zinc sectors, which firmly placed the reagent specialist as an industry leader in its segment.

"As part of our diversification strategy we took into account South Africa's resource richness – and looked to key minerals produced locally – taking cognizance of its role as a leading producer of platinum and a key producer of gold and chrome. The country is home to almost 80% of the world's platinum – found predominantly along the Eastern and Western limb of the Igneous Bushveld Complex, which spans the North West and Limpopo Provinces – as well as extensive chrome and PGM tailings retreatment dumps waiting for just the right reagent to unlock the precious palladium and rhodium content, among others. Our oxide collector AM810, which has until now been used in the copper flotation process, has undergone short trial testing at PGM plants and is currently undergoing long trials at key PGM mining projects. To date, the AM810 has delivered significant results and mining houses where the product is being tested are eager to participate in more extensive trials taking up to two months to ensure that the exceptional results achieved are sufficiently ratified."

According to Oostendorp, the North West province is home to highly oxidised PGMs and, thus far, has achieved limited success in floating its material. However, the company's newly developed suite of PGM reagents (AM810, DPG-12 and MPG-2) is set to be a game-changer, as it is able to dramatically improve recoveries, grades and almost double output, especially on difficult to float, oxidised material.

The PGM reagent range was developed to include collectors, for both sulphide and oxidized



# profitability

minerals, as well as depressants and frothers suitable for PGM ores. More recently, Axis House has been putting the AM810 reagent through its paces at a PGM mine in Brits in the Northwest Province, specifically targeting the oxidised minerals. The mine, which has been on care and maintenance since 2013, recently re-engineered the operation to be more cost effective.

As part of its drive to keep costs to a minimum, the PGM and chrome miner was one of the first in line to test the AM810 reagent at its flagship operation and has since been achieving excellent results.

"Aside from having undertaken extensive lab tests on the material sourced from the miner's tailings storage facility, Axis House also undertook plant trials, over a few weeks, and is now running extensive trial tests spanning up to two months. We are confident of being able to improve on the first set of grades, which have already delivered impressive results," explains Stubbs.

Providing some background to the project, Oostendorp says that the processing plant at the mine consists of two separate plants – one targeting a more abrasive application while the scavenger circuit aims at a much finer material.

"Owing to the low PGM basket price in 2012, the miner was forced to shut down the plant as it ceased to be economical. However, following improved platinum prices, the mine recently restarted and with the AM810 and DPG-12 delivering outstanding results, the scavenger plant will no longer sit idle but ramp up production and hence increase profitability for the mine." Axis House is also in the process of developing a suitable selective frother at the Cape Town laboratory, to further minimise any Chromite entrained to the PGM concentrate.

In addition to being trialled at the chrome and PGM operation, the suite of PGM flotation reagents is also being tested on ore from platinum producers in the area, including at a number of mid-tier and junior miners as well as by a large-scale operator. Collectors, frothers and flocculants are the main products currently being tested.

A microflotation unit being put to work.

Explaining the testing process, Stubbs says that products are initially tested at both the client's lab and at Axis House's facilities in Cape Town and Johannesburg, followed by pilot plant trials and then onto full-scale plant, for a short period of a few weeks and then by an extensive trial lasting up to two months.



Below left and right: Axis House's new suite of PGM flotation reagents is being tested on ore from platinum producers.

The company has developed a range of products suitable for industrial metals, including rare-earth elements.

*The newly developed suite of PGM reagents (AM810, DPG-12 and MPG-2) dramatically improves recoveries and grades, and almost doubles output.*

"Once tested at the laboratory, the product is adjusted for use at the processing plant. The primary aim is to understand how the reagent reacts on different ore feeds coming through the plant and the variation of the feed over time. Apart from its compatibility with the plant equipment, the reagents have to be compatible with any other chemicals being used in the processing plant as well as any downstream processes," stresses Oostendorp.

For the chemical's solutions provider, the relationship with the client extends beyond selling a product. Axis House provides onsite product training for plant operators at each shift to ensure the plant operates optimally.

Axis house technical staff are always present on site during the initial stages of trialling a product to ensure that plant operators and metallurgists are comfortable with handling and using the product. Conveying any new dosing or operating parameters during shift changes is important to ensure that a plant trial is successful, and the Axis House technical team is present during these shift changes.

Having gone through the full trial testing programme, the chrome and platinum miner in the Northwest Province will start full scale use of the AM810 reagent from September onwards.

## Improving profitability

South Africa is littered with thousands of tailings storage facilities and mining houses have long indicated their interest in reprocessing the tailings, which contain high concentrations of high-value PGMs and thereby add to their bottom line.

"In the case of copper recovery of just 1 – 3%, the margins escalate significantly and in the case of PGMs, the recovery of palladium or rhodium, even at a minimum level, adds greatly to the miners' profitability," says Stubbs.

Although companies achieve between 30 – 35% recoveries from the tailings, the use of the AM810 reagent during the test phase indicates recovery rates of between 55% and 60% – almost double what the client was achieving. Similar recovery improvements were achieved during the testing phase with DPG-12 on the scavenger circuit. The chemical properties of AM810 and DPG-12 also allow for clients to reduce frother consumption and still maintain improved mass pull and recovery.

The AM810 and DPG-12 reagents have been fully tested on both sulphide and oxide materials and will be ready for commercialisation in early 2023. In projects involving Platreef ores, MPG-2, a PGM sulphide collector, was also successfully tested on ROM feed and commercialising this collector is planned for 2023.

"If mines are able to recover almost all of the PGMs before they reach the tailings storage facility, then everyone is a winner," says Stubbs.

## Golden opportunity

Although South Africa has fallen from being the world's leading gold producer, it continues to

produce significant quantities of gold accounting for some 4.2% of the world's gold production in 2019. This offers reagent specialist Axis House the opportunity to develop products able to liberate greater quantities of the precious metal.

According to Oostendorp, in tandem with the development of a new suite of collectors, depressants and frothers for the PGM and chrome markets, the company has developed a new suite of products for the gold industry market.

"We developed a new range of reagents for the gold sector, including an exciting cyanide replacement product (D20M3) used in the gold leaching process. The low hazardous product replaces the current cyanide offering and provides major benefits from a safety point of view as it is able to remove much of the cyanide found in effluents before the effluents are disposed. The D20M3 is currently being trialled at several gold operations and the product will be commercialised early next year."

Together with this, the reagent specialist has also developed a range of products suitable for industrial metals, including rare-earth elements. The reagents are specifically targeted to recovery of the major Rare Earth Elements (REE) containing ores such as Monazite, Bastnaesite and Apatite.

## Axis House promotes safety

Over the years, Axis House has invested heavily in improving its product range and remains clearly focused on safety.

According to Oostendorp, the company developed its range of frothers to be non-hazardous, offering a much higher flash point when compared to traditional frothers. This is important for miners operating in extremely hot areas, such as north of Perth which experiences excessively hot weather conditions in summer, such that warehouses containing flammable products often go up in flames.

"Axis House frothers are not only high-performance robust products, but they have also been developed to have a high flash point which ensures that products don't self-combust and are therefore safe to store, especially in hot weather."

## Expanding into new locations

Although Axis House traditionally supplied products to the DRC and Zambia, the company considers the whole of the southern African region as an active territory and remains well placed to service these markets either from its Cape Town or Johannesburg offices.

Three years ago, the company initiated a serious play for the north African and Middle Eastern markets and established an office in Turkey in 2019, targeting Turkey, Lebanon, Morocco and Tunisia's industrial metals market as it sought to service the phosphate and fluorspar markets with its collectors and de-cadmiation product range.

Axis house technical staff are always present on site during the initial stages of trialing a product.

At the same time, the company also made a play for the European market, with an initial foray into Spain in 2019, just at the onset of the Covid-19 pandemic.

"As a new kid on the block, it was an extremely challenging time to be knocking on doors, especially when the hard-lockdowns in Europe thwarted our efforts. We have since made headway into Spain and Portugal and, over the next three years, plan to fully establish our presence in the European market with warehousing, distribution, and manufacturing facilities in strategic locations," says Stubbs.

The company already has a footprint in Australia, having entered the market in 2009 when it acquired a metallurgical laboratory in Gosford NSW to service the mining industry.

Says Stubbs: "In 2014 we grew the business in Australia and appointed a strong sales team to promote our product range. We created special frother blends to accommodate the Australian ore types. However, we are now finding that with the change in ore variations, many of the products that worked efficiently in the past, need to be adapted to the changing processing needs of these industries."

Further to this, the reagent specialist plans to revisit the South American market where it had a presence from 2011 to 2017. It subsequently pulled out of the region as it did not have sufficient capacity to properly focus on growing its presence in the area and took the decision to re-enter the market when the time was right and it had the right team in place.

"Once the territories we have entered into are running efficiently, we will re-engage the South American market and believe that by 2023 we will be sufficiently freed up to do so," says Stubbs.

The proudly South African company is also working on servicing its neighbours, having established a firm presence in Botswana, Namibia and Zimbabwe. ■

*The reagent specialist has developed a new range of reagents for the gold sector, including an exciting cyanide replacement product (D20M3) used in the gold leaching process.*

# Green agenda drives demand for Industrial Minerals

*By Alana van Wouw, market analyst at Crane Ridge*

**Industrial Minerals, though often an overlooked, are key to creating a steady foundation for construction, manufacturing, and agricultural industries to thrive.**

2020-21 was all about coping with Covid-19 and responding to the pandemic's ramifications and the subsequent recovering market demand. In 2021-22 we have seen a continuation of this recovery trend, adversely affected by the conflict in Russia and Ukraine.

The Russia-Ukraine war has had a significant impact on the Industrial Minerals industry as, according to Galos (2010), there are around 40 recognised refractory and ball clay deposits in Ukraine – representing >600 million tonnes in resources and approximately 20 deposits of kaolinite clays with 360 million tonnes in resources under exploitation. Ukraine ball clay production has been reported at levels averaging 4 mtpa. In 2019, the Ukraine ball clay export markets totalled 4,823,361 tonnes (81% world share).

China's mineral supply has been impacted by inconsistency in volumes, quality and prices as the result of ongoing lockdown strategies. Factors affecting supply are attributed to ongoing environmental and other government controls, as well as periodic bans on explosives use in certain areas; mining and exploration licence difficulties; and supply sector reform and consolidation, all of which have been exacerbated by the exhaustion of high-quality reserves.

China's Covid-19 restrictions continue to have adverse effects on logistics and port congestion, resulting in significant increases in freight prices. This, combined with recovery in the domestic market: in both established and new hi-tech manufacturing, has had an additional tightening effect.

Despite all the challenges, the markets have seen a steady growth in non-metallic mineral mining and quarrying, up by 27.90% in the last five years, and manufacturing industries are up by 32.16%, giving an overall increase in non-metallic industries.

## Industrial Minerals: Demand and supply dynamics

On a positive note, demand remains strong and growth markets, particularly for 'critical raw materials', appear to be soaring, while prospects for industrial mineral development are receiving a boost. The main drivers of this increase in development are their use in environmental impact mitigation technology and protocols in decarbonisation through energy conservation.

## Mineral development boom

The consequence of the China situation could herald a new lease of life for industrial mineral project developers outside of China, particularly those minerals for which China was dominant in supply.

Based on the Major import's sources 2017-2021 – USGS 2022 data, South Africa could be an up-and-coming country for Industrial Minerals as it hosts several undeveloped deposits.

The real challenges will be in trying to maintain logistic supply lines at reasonable rates for at least another year of turmoil in the shipping market.


Location of key industrial minerals operations.

## Industrial Minerals: Factors to watch

All eyes should be on 'green' mining and a sustainable future, when it comes to Industrial Minerals as a great deal of research is underway using Industrial Minerals to improve plant health

and water quality; mitigate toxic spills; clean up industrial brownfields and reverse acid rain damage in forests and wetlands.

A leading example is Canadian Wollastonite, which is currently working with more than a dozen universities researching new applications. Africa has several Wollastonite deposits.

Key developments that could add to a 'greener' approach in the mining industries are the following (source from Canadian Wollastonite):

China's minerals exports are estimated to be around 10% of world exports (based on 2019 data).

### Synthetic slag conditioning:

The steel industry uses synthetic slag formulations to control temperature, oxidation and waste during the smelting process. Products such as high calcium quicklime and silica sand can be partially replaced with wollastonite and dolomitic rock, and quicklime partially replaced with diopside. This lowers the melting point and requires less flux to achieve the desired viscosity, while reducing the amount of $C0_2$ normally released by the lime-based ingredients.

### Cement production:

The production of conventional cement is energy intensive and releases large amounts of $C0_2$. Wollastonite and the surrounding calcium magnesium silicate are non-$C0_2$ emitting, single sources of calcium and silicone oxides. Bench trials results showed the following benefits:

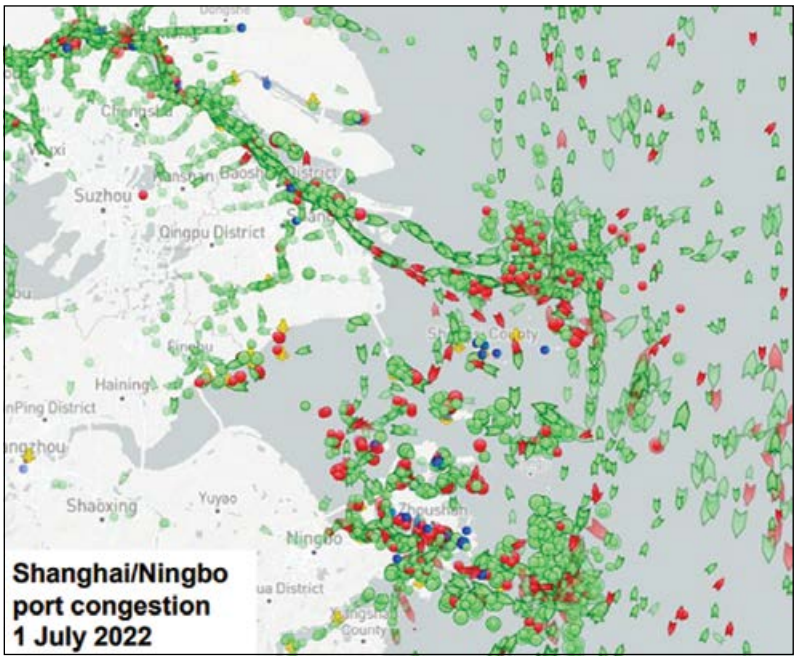
Reduced $C0_2$: Early trials show a 30% substitution of wollastonite ore results in combined calcination and energy related $C0_2$ reduction of 24%.

Energy efficient: Cement clinker made with 44% wollastonite in a coal fired process required less fuel because of lower reaction temperatures and resulted in an additional 44 kg $C0_2$ savings per ton of cement.

Greater performance: Experimental analyses on strength, texture and free lime for wollastonite-based cement showed better results than conventional samples.

Use of Wollastonite for tailing waste management enriched in Mn (II) and Zn (II). A study conducted by, the Department of Mining Engineering, Institute of Technology, Banaras Hindu University, Varanasi-221005, India has indicated that wollastonite may be used as an efficient adsorbent for the treatment of Mn (II) and Zn (II) bearing waste streams.

Wollastonite has a good adsorption capacity for Mn (II) and significant adsorption for Zn (II). This is evident in the existing system due to the formation of monolayer coverage of the adsorbate species at the outer surface of mineral particle. The data obtained may prove important for use in designing and fabricating a treatment plant for tailing waste management where the effluent is enriched in manganese and zinc contaminants.




28 April 2022: 24.3% of all container vessels waiting outside ports globally are waiting outside China's ports (Windward)


Africa has several Wollastonite deposits as indicated on the map.

In conclusion, Industrial Minerals are developing into a robust industry and economic advances and political pressure to go 'green' will ultimately place this industry in the spotlight. ■

# Shanta Gold eyes 250 000 oz producer

**East-African gold miner Shanta Gold, which presently produces 75 000 oz pa from its flagship New Luika Gold Mine in Southwestern Tanzania, is eyeing further precious ounces from its Singida gold mine currently under construction and its exploration asset, West Kenya project, in the next five years, CEO Eric Zurrin tells *Modern Mining*. By *Nelendhre Moodley*.**

Shanta Gold's New Luika operations.

Alongside its Tanzanian assets, the New Luika Gold Mine (New Luika) and the Singida Gold Project, Shanta Gold acquired the high-grade West Kenya Project in Kenya, in 2020.

"We currently produce 75 000 ozpa from New Luika Gold Mine with Singida scheduled to add 30 000 – 35 000 oz annualized beginning next year when the mine comes into production, which brings the total to 110 000 ozpa. But, we believe the West Kenya project – our third asset – will be a game changer, which will add a further 100-150 000 oz to annual production. This is part of our five-year play book, which targets the collective production of up to 250 000 oz per annum."

Although the East African miner has been a consistent gold producer for the past ten years, Zurrin notes that its assets are undervalued and plans, over the next few years, to take its projects up the value curve to demonstrate the inherent value of its portfolio.

"We believe our assets have the potential of five times their future value. The good news is that this provides us with a huge opportunity to unlock the value in what we already own."

*"We believe our assets have the potential of five times their future value. The good news is that this provides us with a huge opportunity to unlock the value in what we already own."*

## New Luika – Shanta's bedrock and springboard to growth

The AIM-listed entity's New Luika gold mine is the cornerstone of the miner's portfolio with its production and revenue generation underpinning the company's growth aspirations while offering options for new opportunities beyond the project's own growth.

The New Luika mine – Tanzania's fourth largest gold mine – commenced production in 2012 and in July this year extended the life of mine to 2027.

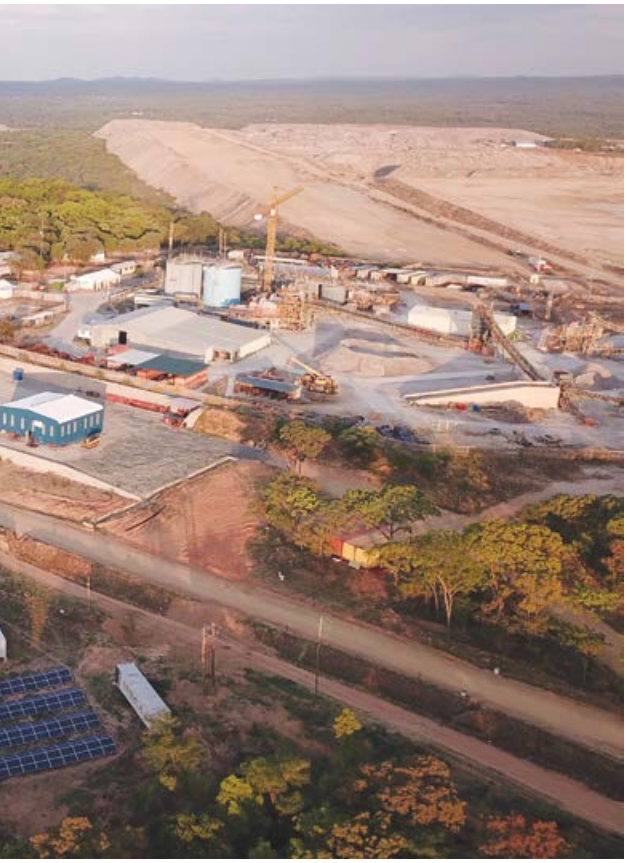
Since 2017, the company has been upgrading the reserve and resource base through its exploration initiatives with the aim of extending the mine life.

According to Zurrin, New Luika's mining licence hosts ten separate deposits which allow the miner to expand its resource-base.

"The New Luika resource consists of ten separate deposits and each of these collectively contributes to a consolidated mine plan. However, it is important to note that each one of those deposits has its own individual exploration potential, and over the next few

Metso-manufactured crushing circuit at Singida.

# **status** in the next five years



months, we will be drilling close to 20 000 metres, across many of the deposits, particularly Luika South which forms a big part of future production, and also exploring across the Luika gold fields," explains Zurrin.

New Luika is an open pit and underground mining operation that employs around 900 people, including contractors, the majority of which are Tanzanians (99%).

The miner is on track to deliver between 68 and 76 000 oz of gold production this year.

"Our strong belief in working closely with our key stakeholders and our affable relationships with local governments and the communities surrounding our projects place us in a very strong position as we engage with our stakeholders."

### Sustainability at the core of New Luika

On the back of the miner's strong commitment to community initiatives and sustainability, it was recently awarded first place in the 2022 International Mineral and Mining Investment Conference for Outstanding Performance in 2021 CSR Projects in Tanzania.

"We recognise the potentially significant impact that our business has on the communities in which we operate. We strive to empower these communities by investing in programmes that help the long-term sustainable development of the community, its people, and the local economy."

According to Zurrin, Shanta Gold's strong focus on local procurement sees the miner spending over four fifths of every dollar on local procurement, thereby uplifting the Tanzanian economy, with the remaining "20% spent on equipment that cannot be procured locally".

As part of Shanta Gold's community sustainability strategy, which is focused around supporting livelihoods, the company established projects that help the community earn a living as well as initiatives related to health and water.

Apart from providing education and training for local farmers, teaching them how to grow crops such as maize, the miner also arranged for an off-take market for their produce. To date, the company has paid for the training of over 3 000 farmers.

Further to this, the miner recently rolled out a water pipeline project that connected the Mbangala village, located 5 km from the mine, to the water from the Luika River Dam. This transformational project sees more than 7 600 people with permanent access to water.

"Since it started operating ten years ago, the New Luika mine has, aside from community upliftment projects, contributed around $150-million US dollars

*"The New Luika resource consists of ten separate deposits and each of these collectively contributes to a consolidated mine plan."*

NCP-manufactured grinding circuit installation at Singida.

Zone 1 of the Gold Tree Pit at Singida.

*"We recognise the potentially significant impact that our business has on the communities in which we operate. We strive to empower these communities by investing in programmes that help the long-term sustainable development of the community, its people, and the local economy."*

to the Tanzanian government coffers, in the form of various taxes and royalties.

### Singida construction update

Shanta Gold's second mine in Tanzania, the Singida gold mine, began construction in late 2020 and is set for production in Q1 2023. This mine will transform the company into a +100 000 oz/pa producer and offer a diversified resource base.

As at September, construction on the Singida mine had surpassed the 70% mark.

Providing a construction update, Zurrin explains that a brand-new processing plant has already been erected and the tailings storage facility embankment walls completed with more than 8 000 oz of run-of-mine material stockpiled and awaiting processing. The camp is fully operational with all the infrastructure support in place.

Further to this, the crusher had already been cold commissioned, with hot commissioning scheduled for Q4 along with the mill.

Located 800 km from the New Luika mine, the Singida project offers the communities surrounding the project the same transformational change that comes with the development of a new mine, including employment opportunities and the potential to diversify the regional livelihood. The project currently employs 325 Tanzanians.

"Once in production, Shanta Gold will own a mine within the greenstone belt. From a gold mining perspective, greenstone geology is most exciting given its potential to deliver a much larger project than initially estimated. The upside is around exploration where, historically, Singida has had limited exploration in the way of drilling and reserve additions. Singida offers us the opportunity to expand the current footprint through exploration initiatives once the project becomes cash generative."

Within the Singida mining license, which spans roughly 30 km$^2$, there exist seven deposits located across a 5 km strike, with each deposit having the potential to contribute additional ounces to the resource and reserve base.

According to Zurrin, once in production, the company will undertake further drilling to prove the theory that the seven deposits are possibly contiguous and offer the opportunity to establish an underground operation.

"However, the prerequisite to establishing an underground operation, other than proving the theory, is the requirement for high grades. The good news is that the results received from the drilling programme undertaken 18 months ago are very encouraging."

"It is interesting to note," he says, "that during the latest drilling programme, high grade drilling intersections of 6 g/t and higher were encountered at depth. More work and more investment will be needed to firm up the resource once Singida is cash generative."

At its peak, Singida, which has a current reserve-based life of mine of seven years, will produce around 40 000 ozpa.

### West Kenya – a game-changing asset in the making

Shanta Gold acquired the West Kenya Project, formerly owned by gold major Barrick Gold, in late 2020. It is believed to be among the highest-grade gold projects in Africa.

At the time of the acquisition, the project had a high-grade NI 43-101 compliant inferred resource of 1 182 000-ounce grading 12,6 g/t at the Isulu/Bushiangala deposit. This resource has since been increased through Shanta's drilling campaigns and now stands at 1.55 million oz grading 6.18 g/t including an indicated resource of 378.000 oz grading 11.7 g/t.

The West Kenya Project brings with it numerous benefits including a major presence in a geologically rich and underexplored greenstone gold region, the opportunity to expand Shanta's operating presence in East Africa, and a diversified portfolio delivering long-term growth. It increases Shanta's group-wide high-quality gold resource inventory to over 3 moz contained gold.

The project covers about 1 162 km$^2$ of the highly prospective Lake Victoria greenstone gold field in western Kenya. At present, two potential mining centres have been identified on the West Kenya Project, namely Liranda Potential Mining Centre (Isulu-Bushiangala is the main resource-stage target) and Ramula Potential Mining Centre (Ramula is a new resource-stage target).

"West Kenya is well positioned in the premier gold mining jurisdiction of the Lake Victoria greenstone

gold field, which hosts some of the best assets in the world including the likes of Barrick Gold's North Mara gold mine and AngloGold Ashanti's Geita Gold mine," explains Zurrin.

When Shanta acquired the West Kenya project, it had on hand 200 000 metres of drilling. Over the next year, the company will focus on developing the project and expanding the resource to offer a higher confidence level as the miner firms the resource into measured and indicated categories.

Shanta Gold has earmarked $10-million per annum to exploration drilling, with the aim of taking the project through to feasibility study stage and mine construction and production – all in the next three to five years.

Zurrin cites a scoping study published two years ago, which indicated that the West Kenya project could be developed into a producing mine in the next four years.

The company is rolling out its 2022 drilling campaign at West Kenya project – a two-pronged project focused on upgrading existing resources to the indicated category and resource expansion across its numerous targets.

"The latest phase of drilling at West Kenya has continued to deliver consistently high-grade results that are indicative of the vast potential West Kenya offers in the Shanta Gold growth story. Aside from intersecting grades of 11 g/t and 11,7 g/t which is exceptional when compared to global average of around ½ g/t, the drill programme identified visible gold in 15 intersections across 35 holes drilled. Visible gold, including spectacular occurrences, has been identified in 53 intersections across 142 holes drilled since January 2021," concludes Zurrin. ■

Installation of the CIL tanks at Singida.

# MRTA uses technology to enhance safety

**Research into the development of smart eyewear that will allow for virtual on-the-job training paves the way for Murray & Roberts Training Academy (MRTA), a division of Murray & Roberts Cementation, to offer cost-effective training and skills development on a mass level. By *Nelendhre Moodley*.**

Tony Pretorius, Murray & Roberts Cementation education, development and training executive.

"Using smart eyewear, we will be able to see, communicate, correct and develop people as and when they perform their tasks," engineering company Murray & Roberts Cementation education, development and training executive Tony Pretorius tells *Modern Mining* in an exclusive interview.

The training specialist hopes to have a smart eyewear prototype developed and available for use before year-end.

The MRTA provides various technological platforms for the delivery of theory, risk-based training and practical skills training and workplace experience, to ensure that it "arrives at a well-rounded person who can apply competence while simultaneously meeting production demands".

"We believe," says Pretorius, "that this novel technology will unlock opportunities to reduce the cost of dispatching resources to the various regions and allow us to extend our service offerings more widely. This is an important step in making the service offering more accessible given that training and upskilling is an expensive endeavour, particularly for small-scale and junior miners."

Owing to high training costs, MRTA is often approached by small-scale and mid-tier mining companies to run training courses from satellite training centres at the miner's various mining operations or to provide initial training from its Murray and Roberts training campus in Carletonville.

MRTA is registered with the Department of High Education and accredited with the Mining Qualifications Authority.

## 4IR paves the way

In targeting a more extensive outreach, the training specialist is relying on Fourth Industrial Revolution (4IR) technologies that provide feed-back in real time, such as online e-learning, which is far removed from the traditional paper-based portfolio of evidence, as a platform to expand its offering.

"Traditionally artisans were equipped with a toolbox. But in today's world, a typical tablet computer is recognised as a tool of trade that helps solve equipment problems using smart technology, such as Blackbox computerised systems, to establish the 'health' of each machine, and notify the technician when the machine is due for a service, for example," Pretorius explains.

Aside from incorporating paperless training management systems and the inclusion of extensive multimedia to support linear flow of content in e-learning, Pretorius notes that the recent adoption of mass assessment clicker tools is becoming integral to the scalability of training.

"The clicker-based system deploys clicker tools, which encourage the training and assessment of large groups of people simultaneously. Clicker tool handsets incorporate digits typically like a game-show with trainees required to choose a preferred answer using the clicker tool. The technology allows for mass training and speedy assessment," he says.

MRTA also incorporates into its material a series of virtual reality modules for mechanised supervisors, operators and engineering support services as well as the use of 2D and 3D interactive touch screens, for instance, in supervisor training on areas such as strata control programmes, ventilation and gases, cycle planning for shift bosses and emergency response planning.

"Our programmes are designed to enable facilitators to immerse learners in the content through interaction, enabling them to draw, plan and play together. Facilitators are also able to demonstrate 2D and 3D content, showing angles never seen before and making obscure ideas visual and easy for learners to understand," explains Pretorius.

Aside from upskilling and training miners and those already employed at mines, the MRTA also caters for graduates and undergraduates from universities who enlist at the MRTA for vocational experience and to gain exposure on the full value chain of underground hard rock mining.

Graduates undertaking vocational training at MRTA are given insight into the full spectrum of


MRTA's scope of training services include shaft sinking, mining services, conventional and mechanised mining.

underground mining, from how shafts are sunk to the process of developing towards the orebody.

"This exposure is extremely useful to the students because, while they undertake their studies," says Pretorius, "they don't often get the opportunity to experience what mining actually entails across its entire value chain." MRTA employs around five to 10 graduates each year to participate in its mining internship programmes, which give them insight into the requirements of obtaining a blasting certificate – a minimum requirement necessary for the progression of their careers into supervisory and management positions.

According to Pretorius, the division continues to invest heavily in new learning methodologies and equipment to enhance training and skills development and, over the years, has invested millions of rands to align with new learning methodologies and systems.

### A clear focus on health and safety

The mining industry continues with efforts to improve the health and safety of workers in the mining environment, rolling out initiatives that are underpinned by research to reach its target of zero harm. But is zero harm achievable in the high-risk mining environment?

According to Pretorius, zero harm in the mining industry is definitely achievable. He cites Murray & Roberts Cementation as an example of a company operating in the mining space, which has recently reached 6-million fatality free shifts.

"This fatality-free milestone," he explains, "is the first ever achieved in our history and goes to show that we have been able to execute numerous projects at no cost to any lives. The drive for zero harm at Murray & Roberts as a group is an aspiration that is led from the top by our CEO, Henry Laas. Safety is at the heart of what we do – the safety of the people who work at Murry and Roberts, and those of our industry."

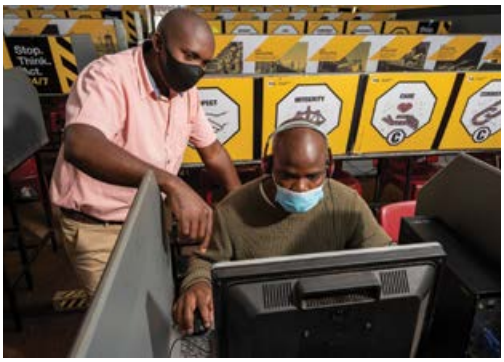
According to Pretorius, the design and development of all MRTA courses incorporates a risk-based approach and hence covers applicable health, safety, environment and quality aspects of learning at each level.

"We apply," he says, "a situational leadership model into the fabric of our training, and spend as much time on the passive learning concepts (theory) as we do on augmenting active learning with practical experiential learning. The aim is to ensure that people understand the true dangers of the work associated with mining, so that they are aware and prepared for the dangers that beset the industry."

MRTA's popular programmes include, but are not limited to, mechanised mining-type skills, unemployed youth development HSE learnership, the Blasting Certificate, Shaft Sinking Apprenticeship and workplace experience programmes, offering vocational training for students from various universities.

"The MRTA has made a significant impact on the mining sector – having trained around 1 500 jobless learners from various areas of our operations over past five years with around 75% of them taking up new and exciting careers in the industry," Pretorius concludes. ■

The 'vibrant learnership' at MRTA incorporates an extended reality framework which follows a typical situational learnership.



MRTA offers programmes which incorporate e-learning solutions.

By hovering over a particular component on your machine, the VR platform will highlight that component on the schematic.

## MRTA

- Murray & Roberts Training Academy (MRTA) is registered with the Department of Higher Education and accredited with the Mining Qualifications Authority for various underground hard rock mining skills programmes.
- Its scope of training services includes, but is not limited to, shaft sinking, mining services, conventional and mechanised mining, engineering, and a host of safety, health and environment full- and part time qualifications.
- MRTA has the capacity to train 450 learners and has accommodation for around 400 learners residing on campus at any time.
- On average, MRTA trains around 2 650 learners a year.

# PDS role grows in mine safety and beyond

**According to Booyco Electronics, there is a growing urgency, as a vital element of the broader safety drive, in the application of proximity detection systems (PDS) on South African mines.**

Anton Lourens, CEO of Booyco Electronics.

"The attention being paid to PDS today goes beyond even the direct avoidance of accidents," says Anton Lourens, CEO of Booyco Electronics. "PDS is increasingly part of the development of 'digital twin' simulations, where mines are analysing big data to understand their operations better."

In both surface and underground operations, mine management is embracing data solutions to improve safety on site. By leveraging digital technology, mines are essentially creating a simulated version of their mining operations, says Lourens. This allows more detailed observation of what is really happening on the mine and, ideally, is being based on real-time information.

"The location-based data provided by PDS technology, for instance, gives a powerful dimension to traffic management flow analysis and future planning," he says. "This has been shown to enhance safety practices on surface and underground mines."

By locating vehicles and personnel in real time, mines are better able to analyse traffic movement patterns. This, he says, is a crucial first step in traffic management strategies that keep people as far away as possible from trackless mining machinery (TMM). It can also, of course, help prevent machine-to-machine collisions. He highlights that effective PDS solutions are based on the careful identification of high-risk areas, followed by the mitigation of significant risk.

By locating vehicles and personnel in real time, mines are better able to analyse traffic movement patterns.

"Mines develop their codes of practice (COP) based on their assessment of risk," he says. "These practices then specify the conditions required – such as the speed of vehicles in certain areas – to mitigate the identified risks."

The COP will be specific to each mining operation, he emphasises, as no mines have identical conditions. This is why the big data derived from PDS is so important, as it gives detailed insight into actual traffic conditions, and into the hot spot areas that these traffic movements generate.

"An example of this is the Booyco Electronics Asset Management System (BEAMS) software suite, essentially a central information hub giving mines greater insight into their operations' interactions," he says. "By analysing large amounts of data from vehicles, unsafe patterns of behaviour can be identified, to which mines can respond through interventions that enhance safety."

The data collected will reflect 'hot spots' for potential collisions, giving management the opportunity to improve safety through adapting the traffic management plan. There are also broader benefits to the operation, as this data is relevant to productivity as well.

"Real-time vehicle location generates data that can create productivity reports, for example, as the

Extensive testing is conducted in the facility to ensure all products are fully functional before dispatch to customers.

information shines light on operational aspects such as standing time and availability," he says, adding that where management can pick up these problems, they can identify proactive solutions.

The exponential rate at which technology is generally developing globally is also leading to more data for PDS suppliers to analyse, test and improve their solutions. Lourens notes that the growing global application of PDS is putting more systems into action, and a great deal is being learned very quickly. As the number of PDS users expands, technologies can be proven and improved in relatively short timeframes.

Underlying much of this progress has been the facilitation provided by the Earth Moving Equipment Safety Round Table (EMESRT), a global initiative of major mining companies to improve mine safety. Since around 2013, EMESRT has guided the process of achieving compatibility between PDS systems and the OEMs of trackless mining machines.

At the forefront of PDS technology since 2006, Booyco Electronics has been a collaborator with, and keen supporter of, the EMESRT process.

"EMESRT initiated an industry project to improve vehicle interaction controls – based on Design Philosophy 5 (DP-5) on Machine Operation and Control," he says. "This project first built up a series of operational scenarios that mines faced with ensuring safe TMM movement. Subsequently a Minerals Council task team has coordinated and then created a set of performance requirements for evaluating commercial PDS technologies."

Among the most exciting aspects of advancing industrial technology is the field of sensors, says Lourens. Booyco Electronics has designed its evolving CXS range of PDS solutions to allow for the easy addition of sensors to the system architecture. Through various combinations of sensing technologies, the company can deploy specific and flexible solutions that add to safer working environments for different customer requirements.

"This gives us the choice of using long-distance detection technology, or a close-up and more accurate sensing approach," he says. "These options allow us to provide our customers with the most suitable technologies for underground and surface operations."

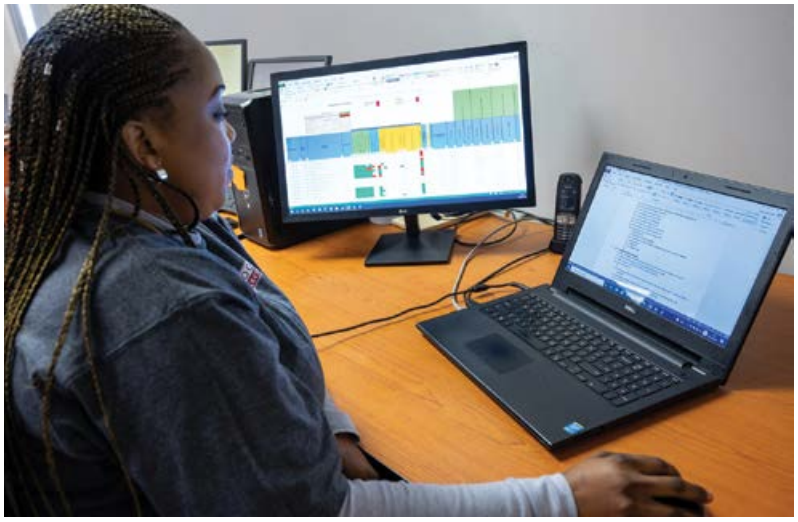
He points to a platinum mining customer in the Steelpoort area of South Africa where Booyco

Above: According to Booyco Electronics, there is a growing urgency in the application of PDS on South African mines.

Left: The core function of PDS and CPS technology is detecting and avoiding collisions.

Electronics is serving the mine's surface and underground requirements. Working closely with the customer, a rigorous assessment of solutions is conducted on a regular basis – with constant improvements being made to raise the performance bar.

"It is important to realise the integral connection



The location-based data provided by PDS technology gives a powerful dimension to traffic management flow analysis and future planning.

The data generated from PDS and CPS technology facilitates insight into a mining operation's interaction.

between safety and productivity," he says. "If a PDS can ensure more certainty that people are not in a hazardous position relative to moving vehicles, then the whole operation can become more streamlined."

In this way, the customer can gain significant productivity from raising safety levels through PDS applications. As a case in point, the functionality of Booyco Electronics' latest CXS versions give warnings to operators and pedestrians to indicate the degree of hazard in the zone they occupy. Instead of just activating a single warning – say, a red-light warning – the CXS system can offer gradations of pedestrian warning.

"This means that the warning can be green, yellow and finally red, which alerts a mine employee to increasing levels of risk – prompting an earlier response," says Lourens. "The result is that production is not hindered unnecessarily by a warning, but at the same time there is no compromise on safety standards."

South Africa has made a significant international contribution to mine safety through PDS, partly as a result of our current mining legislation making PDS mandatory under certain conditions. The pioneering work by local technology companies like Booyco Electronics is now raising increased interest abroad. The company already supplies PDS solutions to customers in Africa, Australia, South America and Europe.

This interest is being spurred by the involvement of the International Council on Mining and Metals (ICMM) – representing the largest global mining firms. Since 2017, the ICMM has been involved in the Innovation for Cleaner, Safer Vehicles (ICSV) programme. This initiative promotes collision avoidance technology, which can eliminate fatalities from vehicle interactions, and the ICMM is working towards making this technology available to mining companies by 2025.

"The most effective way for Booyco Electronics to share the benefits of PDS globally is through collaborative technology partners," he says. "These partners, who include system integrators, understand their local markets, culture and values – making them best placed to meet international customer needs."

This approach aligns with Booyco Electronics' view that any successful PDS roll-out must be well thought out and planned in detail. The scoping, implementation, management of change and integration of PDS is a complex and ongoing process, explains Lourens.

"The supplier and customer need to approach this as a project, from investigation and selection to implementation and assessment," he concludes. "Risk mitigation through PDS cannot be rushed, especially after a safety incident leading to a partial or total mine shutdown." ■

# Using tech to separate people from moving

*By Dave Harasym, Martin Engineering*

**Whatever you're processing, your conveyor belt network is the critical artery that moves material from raw feed to end product, which means conveyor performance is key to productivity and profitability. Keeping belts running efficiently demands that they are well-maintained to ensure they remain free from carryback, spillage and build-up that would otherwise cause excess wear and unscheduled down time.**

Conveyors are also among the most dynamic and hazardous machinery in any processing plant, and manually inspecting and maintaining each component of a conveyor belt system across a wide area can be time-consuming, labour intensive and, crucially, involves significant exposure to risk.

Even though the entire operation's success depends on conveyor performance, the importance of well-maintained belt cleaners to overall productivity is rarely understood or prioritised by busy plant maintenance teams, unless they have a specially trained resident expert in conveyors. It is little wonder, therefore, that maintenance of components such as conveyor belt cleaners often get pushed to the bottom of the 'to do' list.

Until recently, the only way for maintenance contractors and in-house teams to identify what servicing was needed was to go physically to each belt cleaner location, taking all the necessary steps to address the significant hazards involved in inspection – from working in confined spaces with the risk of entrapment to working at height, from manually lifting and handling heavy guards or other equipment to dealing with fugitive dust and avoiding slips, trips and falls. These can all be documented in risk assessments and properly managed through safe work processes, but safety requires time and effort, including getting the correct permits issued, conveyors locked out and stored energy released from the belt. A major production plant can have in excess of a hundred conveyors, multiplying the risk and the time needed just to complete belt cleaner inspections – and that's before any servicing has taken place.

*The sensor unit transmits data on blade wear life to a central on-site 'gateway' device which sends the information to the cloud.*

Users of remote monitoring systems can access condition data on their mobile phones.

Because of the level of exposure to hazards – even to simply inspect belt cleaners – Martin Engineering began looking at how this common task could be made safer and more efficient; the same objectives that are behind everything the company does. The premise was that the number of inspection visits – and therefore the exposure to risk – could be reduced significantly through the application of Industry 4.0 technology, the so-called Fourth Industrial Revolution, by allowing service technicians to monitor the condition of each belt cleaner remotely, rather than having to visit each location physically.

Remote monitoring is already well established in some manufacturing sectors, and this tried-and-tested technology was adapted for use with conveyor belt cleaners. The result, after several years of research, was the development of the Martin N2® remote monitoring system, which tracks the condition of each blade. The system features a Position Indicator (PI) – a polyurethane collar embedded with a wireless sensor unit – fitted to each primary belt cleaner. The sensor unit transmits data on blade wear life to a central on-site 'gateway' device which sends the information to the cloud. From there users can access belt cleaner condition data in one place on an easy-to-use mobile app or desktop dashboard which predicts the re-tensioning cycle for each belt cleaner, and indicates when servicing should be scheduled or performed immediately.

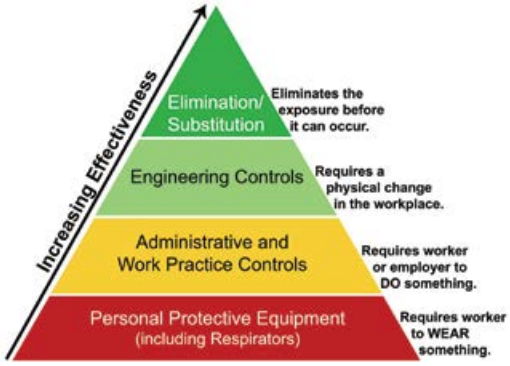
The smart thing about this kind of remote monitoring is that it goes straight to the top of the health and safety 'hierarchy of controls', eliminating needless inspection visits and significantly reducing the interaction between people and conveyors. Technicians need only visit conveyors when the system shows a belt cleaner needs attention, and often this can be planned for an already scheduled shutdown. It's the ideal solution, especially for large-scale mines, quarries and processing plants, which have numerous difficult-to-access belt conveyors distributed over a large production site.

Long-term trials have clearly shown the health and safety benefits of using remote technology for belt cleaners – a reduction in service visits, lower frequency of hazard exposure, increased up-time and fewer near misses related to maintenance. And the system is now in commercial use in a dozen countries, delivering results for mining operations, producers of steel and other metals, cement, lime and aggregates, among others.

In addition, fewer site visits means fewer

# conveyors

Clean conveyors are key to achieving optimum plant performance.




Hierarchy of controls - remote monitoring with N2 delivers optimum control of risk by eliminating exposure before it can occur.

Above: Service teams can use remote monitoring data to visit the belt cleaner blades most in need of attention.

Left: The N2® PI is a polyurethane collar embedded with a sensor unit that fits onto the end of the belt cleaner mainframe.

instances of interaction between moving equipment and workers on foot, less worker exposure to dusty, noisy environments, and less paperwork associated with physical inspections. When service visits are necessary, these can be planned in advance to coincide with other plant maintenance, allowing time for effective safe systems of work to be put in place. Further, by minimising stoppages, with technicians only visiting belt cleaners that the system indicates need servicing, tensions between maintenance and production teams have been seen to diminish – less workplace stress can only be a good thing!

The N2 system is simple and low-risk to install. The gateway unit is the only element of the system that requires a mains power supply and is typically fitted at an elevated location within the plant – where the cell signal is strongest. The polyurethane collar of each PI fits over the exposed end of a belt cleaner mainframe (an extension component is available if the mainframe has been cut flush to the conveyor housing). Once the sensor unit is fitted with two AA batteries, each device is registered through the mobile app in a matter of seconds.

Now that remote monitoring technology is proven and growing in use worldwide, work is well underway on the next stages of development. Several avenues are being explored, including trials that combine the Position Indicator with an 'auto tensioner' on a belt cleaner. Not only does that eliminate physical inspection of belt cleaners, but also eliminates the need for them to be manually re-tensioned – a move that could further reduce visits to each belt cleaner by a factor of up to seven times on average. Another next step could include integrating N2 data into existing plant monitoring systems to allow belt cleaner condition to be tracked on the same central dashboard as other plant performance data.

Since its establishment in 1944, Martin Engineering has strived to enable industries to move from reactive maintenance to preventive and now predictive condition-based maintenance. The overarching aim has always been to reduce the need for workers to carry out routine maintenance that puts them at risk of harm whilst at the same time delivering better productivity.

Inspecting and servicing belt cleaners no longer needs to be a repetitive, labour intensive and physical task. Now, service personnel can simply look at their mobile phones or laptops to see what's happening with every belt cleaner in their plant, then plan and carry out maintenance, re-ensioning or replacement based on the data provided. The next generation of innovation to make bulk materials processing safer and more efficient is here. ■

*The N2 system is simple and low-risk to install. The gateway unit is the only element of the system that requires a mains power supply and is typically fitted at an elevated location within the plant – where the cell signal is strongest.*

# Digital mine provides the competitive edge

**The South African mining industry has long been perceived as one that is slow to change, however, PwC's advisory technical consulting senior manager, Ian Mackay, and Africa energy, utilities and resources leader, Andries Rossouw, advise that this is not the case. Rather, the country has many top-notch digital mines that compete head-to-head with some of the best mines in the world. By *Nelendhre Moodley*.**

PwC's Africa energy, utilities and resources leader, Andries Rossouw.

PwC's advisory technical consulting senior manager, Ian Mackay.

"Adoption of digital technologies across mines is near universal with distinct goals attached to their progress. However, digital adoption in underground operations occurs to a lesser extent (simply because of the extremely high cost of adding fibre or internet underground) than in open-cast operations, which have embraced the integration of the Internet of Things and robotics into the fabric of the mining operation. As it stands, some of our coal mines are as close to being fully digital as can possibly be achieved," says Mackay.

He adds that nearly all South African mines visited had adopted strong digital programmes, with the majority of opencast mines fully embracing the digital mine concept and having evolved to become highly digital operations.

For old conventional deep underground mines though, it is not feasible to digitise the entire operation and so miners implement online/offline systems that synchronise to the server once miners reach the surface of the operations.

Mackay explains that the adoption of digital transformation has been driven by the "enormously influential backdrop of political turmoil in Europe and the Covid pandemic which have forced miners to question a number of their long-held assumptions, including those related to complex single source supply chains and just-in-time production methods.

"In the face of these global challenges, the assumptions are failing to hold weight, and in a bid to mitigate some of the challenges, miners have been forced to adapt. For instance, it has become necessary for miners to stockpile product in order to deal with supply chain constraints. Aside from export container availability and the mounting cost of containers, which has risen from $800 prior to Covid to $8 200 per container, product takes twice as long to reach its destination."

## Unlocking benefits of digital mine

"Importantly," he says, "digital mine help miners to squeeze the value of every rand spent and assists them to take corrective action very quickly."

For an industry that faces a typical 2 – 3% annual cost inflation, digital mine has facilitated a significant upside.

Machine learning tools paired with artificial intelligence in supply chain programmes have helped miners realise the lessons learned from global manufacturing, of cost efficiency of up to 6% per annum.

By constantly evolving and optimising supply chains, the mining industry continues to lower costs, improve efficiencies and productivity, and ultimately, the bottom line. "For example," says Mackay, "through the use of digital technologies, one of the junior mining houses interviewed has unlocked additional value by harnessing data analysis, and has subsequently been handsomely rewarded."

Adoption of digital technologies across mines is near universal.

In order to better understand its dosing requirements, the company made the decision to take chemical (flocculant and reagent) readings at 15 second intervals, which revealed that the miner had been overdosing the minerals process.

Upon this realisation, the miner reduced its chemical dosage to the required quantity, which has saved the company thousands of rands.

"By employing technology to better understand its operation, the miner has been able to adjust the amount of product

It is not feasible to digitise entire underground operations.

required and saved the company 40% per annum in chemical input – this has delivered massive savings for the entity," explains Mackay.

Furthermore, digital transformation allows miners to synthesis large volumes of data turned into actionable information.

From a planning point of view, digital adoption aids in removing the cumbersome requirement of determining which products need to be ordered in which quantities, taking into account long lead times by auto-suggesting based on what materials have been consumed to date and ordering based on future projected use as aligned to new project requirements, among others.

"The biggest advantage right now for mines adopting digital is that it helps miners survive the current challenging circumstances by allowing them to better predict aspects such as their bill of materials, and by taking proactive steps to connect with the necessary suppliers around the world, to determine if they have stock on hand. Digital transformation has been instrumental in allowing for transparency and product tracking while en-route."

Companies that promote a culture of innovation and have a willingness to test new programmes have unlocked significant savings.

"These days miners are much more receptive to new ideas and have faith that young people are more au fait with the latest technology. Young graduates have become a source of inspiration as they are able to unlock vital solutions through the use of technology," says Mackay.

The reasons for adopting technology have also evolved. Mining houses previously relied on technology primarily for cost leadership efficiency and profitability. However, over the past few years there has been a move to adopting digital to drive sustainability and ensure that issues related to the environment, social governance and stakeholders, are at the top of the agenda.

This change in attitude is underpinned by the global ESG drive, which focuses on stakeholder capital and ensures that employees and the communities are involved in key decisions, such as capital outlay for aspects including the sinking of new shafts.

## Underground mining

South Africa, which is built on mining, sees the country being home to some of the world's deepest gold mines with some shafts extending as much as 4 km in depth.

Given this depth of mines, adopting extensive digital outlay is not a feasible option for underground operations with tunnel networks extending over 180 km.

However, miners are finding innovative ways to implement technology in underground operations, including relying on ruggedized devices that synchronise when miners return to surface instead of traditional methods of capturing information in notebooks, for example.

Furthermore, an increasing number of miners are

Miners are finding innovative ways to implement technology in underground operations.

integrating 3D modelling with 3D planning models to advise on the best way to proceed with underground developments, such as roof-bolting.

"A number of miners are relying on high-definition photos stitched into a single image to provide the most effective mine development options, with software programmes to identify the most favourable options for mine developments. For example, by using a pair of AI glasses or a fixed ruggedized device, the roof bolt technician is able to view the hanging wall and the identification points the software has marked off for the placement of each roof bolt, thereby ensuring accurate bolt placements," explains Mackay.

Through the use of technology, the planning process, which normally takes 7 – 8 hours, can now be completed in a matter of minutes. "When the roof bolter arrives, his instructions related to the support are ready and waiting."

## Safety

The mining industry's drive to zero harm firmly places safety as a priority and sees an increasing number of mining houses turning to technology to unlock predictive safety programmes.

According to Andries Rossouw, miners are relying on technology to promote safe working environments by using sensors and proximity detection systems, amongst others, in underground operations.

"Mining houses, Rossouw says, "are using data gathered from sensors in underground operations together with data collated from ruggedized devices with information from key personnel, such as mine shift supervisors, rock engineers or geologists, as the backdrop for identifying whether work sites are safe to enter, particularly after blast sessions."

The availability of different sources of information helps to highlight challenges and issues faced during the shift and enables mine managers to make informed decisions on whether to relocate workers to different work areas in the case of a suspected safety challenge. Having data on hand helps miners to make informed decisions and to err on the side of caution without impacting production.

Explains Mackay: "One of the reasons for collecting digital information is that it can be used as a learning tool over time. Once we understand what happens before, during and after an incident, the system can be programmed to flag conditions that have the potential to result in harmful incidents, such as fall of ground events. In this way, miners are taking a proactive stance to implement predictive safety mechanisms."

Moreover, miners are turning to technology and automation as they look to remove workers from danger zones. Advanced technology allows for machines and equipment to be remotely operated, which ensures workers return home safely.

"South African miners have embraced technology and are unlocking numerous benefits, such as improved production, safer working areas and increased cost savings. In essence, technology is helping miners extract more metal at greater speeds and at a reduced cost, which is what miners are looking to achieve," concludes Mackay. ■

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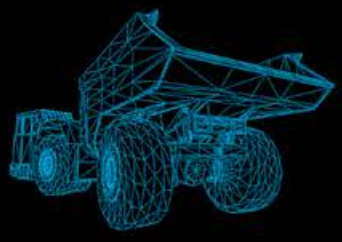

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# Electra Mining Africa 2022: A great success

**Celebrating 50 years this year, Electra Mining Africa saw thousands of buyers and sellers coming together at the Expo Centre in Nasrec, Johannesburg from 5-9 September.**

"It was amazing to be back after four-year years and we were blown away," says Gary Corin, managing director of Specialised Exhibitions, a division of the Montgomery Group. "The industry came out in full force in support of the show with over 650 exhibitors occupying just less than 30 000 square metres of indoor and outdoor exhibition space, and with over 30 000 visitors through the gates.

"The quality of stands was outstanding with exhibitors representing large and medium companies as well as start-ups and SMMEs all at this year's Electra Mining Africa. Some companies have exhibited with us for the 50 years of the event; many starting with a nine square metre stand and at this event, a number had a couple of hundred square metre, designer stands."

Above: Over thirty thousand visitors attended Electra Mining Africa.

Below: Buyers were able to get up close to the products, machinery and equipment at the show.

Many innovative new products, services and technologies were launched at the exhibition. Congratulations go to ABC Ventilation Systems, the overall winner of the Electra Mining Africa 2022 Innovation and New Products Awards for its latest innovation. The company also won the 'Local Manufacturing Innovation: New Product Mining category Award'. On receiving the awards, Terry Pearce, MD of ABC Ventilation Systems said that "Running a business in South Africa is tough and an award like this makes the past 16 years worthwhile."



Top industry speakers presented at the SAIMechE Seminar Theatre during the five-day show.

Recognising the high levels of innovation at the show, this year's Electra Mining had 21 entries that were adjudicated with 18 winners and runners-up named, including the overall winner. These were across various local and international manufacturing categories. The awards were adjudicated by SACEEC's CEO Eric Bruggeman.

The forklift driver competition, organised in conjunction with Lifting Africa and the Lifting Equipment Engineering Association of SA (LEEASA), saw many forklift operators, all in possession of a valid forklift license, competing for the coveted title of Forklift Driver Champion. The winner of the competition was Ian Roux who received the Champions trophy and a cash prize of fifteen thousand rands.

The automation technology hall, a new addition to the show, drew significant interest with the automation focused free-to-attend seminars also popular amongst visitors. The seminars were hosted by the Society for Automation Instrumentation Mechatronics and Control (SAIMC).

International participation included the Austrian, German and Italian Pavilions as well as exhibitors from India, Chile, France, Australia, USA, Taiwan, Turkey, Switzerland, UK, Poland and Canada.

"As a 5-in-1 trade show experience, it covered everything from mining, electrical and automation to manufacturing, power and transport. The feedback we've been getting is so positive, with the message that 'business is back'. There could be no better endorsement of the show than the almost 50% of exhibitors who rebooked their stands for the 2024 show, before the gates had closed on the 2022 show," says Charlene Hefer, portfolio director at Specialised Exhibitions.

Electra Mining Africa 2024 is scheduled to take place at the Expo Centre in Nasrec, Johannesburg, from 2-6 September 2024. ■

# Zest weg launches new motor assembly line

**Motor and controls manufacturer Zest WEG recently launched a new assembly line for its low voltage (LV) premium efficiency WEG IE3 electric motors at its facility in Longlake, east of Johannesburg.**

Eduardo Werninghaus, CEO at Zest WEG.

Zest WEG CEO Eduardo Werninghaus says the addition of the new facility is an important contribution to local manufacturing capacity in South Africa. It improves flexibility in the company's electric motor supply chain, and ensures prompt delivery times for customers. The line produces WEG W22 IE3 LV motors in various sizes, offering high reliability in all applications.

"As a Level 1 B-BBEE company, our commitment to transformation includes continuous promotion of local manufacture," said Werninghaus. "Our focus on premium efficiency IE3 motors is also significant as it helps drive energy efficiency – a key sustainability goal for mines and other industries."

According to Sindi Mbhalati, operations executive at Zest WEG, the assembly line required considerable investment in equipment. This included jib cranes for easier materials handling, an air reticulation system to feed compressed air to the pneumatic tools on the line as well as to the spray booth and packaging equipment, enhancing the efficiency of the production processes, and a state-of-the-art test panel.

"Further ensuring operational efficiency, the line was capacitated with the very latest equipment including a heating and greasing facility as well as rotor assembly C-hooks," says Mbhalati. "In addition, and most importantly, the assembly line has been engineered to allow multiple shifts to be worked should it become necessary to increase capacity and output. This type of futureproofing to accommodate market demands is in line with Zest WEG's commitment to its customers."

The facility has created several new jobs within the business. Most of the new employees are dedicated to the W22 motor assembly line, while some are shared with the company's various production lines.

"To ensure the highest quality standards in the assembly process, Zest WEG put new staff through extensive technical and process training relevant to the new line," she says. "This included in-depth product and component training, as well as the operation of the specialised test panel."

Among the components Zest WEG procures for assembly are rotors, stators and bearings. These are produced mainly at WEG's extensive manufacturing facilities in Brazil, under stringent quality conditions, and are thoroughly tested before shipment to Zest WEG. Smaller components are sourced from local suppliers wherever possible, in line with the company's supply chain development policy.

Left: Sindi Mbhalati, Operations Executive at Zest WEG (right) and a colleague at the assembly line, during the process of the first motor being produced.

"Governed by our ISO 9001 quality certification, the new assembly line is closely monitored by our dedicated quality department," says Mbhalati. "All motors are tested and quality inspected prior to dispatch to customers."

Zest WEG's extensive manufacturing base in South Africa means that it achieves almost 90% local content capability for its transformers and more than 70% local content capability for other products such as E-houses and panels. These products form part of the company's wide range of solutions, including energy generation, electrical infrastructure, automation and generator sets. ■

The very first rotor being positioned.

# Kal Tire pioneers industry leading solutions

**Canadian tyre specialist Kal Tire's innovative tyre solutions, which are underpinned by support for customers' ESG commitments, received an enthusiastic reception at the recent Electra Mining Africa 2022 event, with attendees keen to partner with the tyre specialist for access to its cutting-edge technologies. By *Nelendhre Moodley*.**

According to John Martin, vice president, Southern Africa, Kal Tire Mining Tire Group's range of technologically advanced solutions has amassed interest at the very highest echelons of management, including group CEOs of major mining companies in South Africa.

The company used Electra Mining Africa to showcase a number of industry leading technologies, including prototypes of two first-of-their-kind tools that enhance safety and productivity – the wheel inspection unit and the Kal Clamp. The Kal Clamp is a remote controlled device designed to effortlessly remove the final bolts in the wheel removal process from a safe distance.

Also on display were Kal Tire's expanded carbon emissions reporting programme (Maple Program), a recycling solution that promotes a circular economy, and an autonomous tyre inspection system.

## Pioneering innovations

Given that earthmoving equipment is subjected to ever-increasing loads and speeds, with wheels at risk of fractures in high stress areas, it is imperative to have regular checks on these expensive components, says Martin.

For non-destructive testing, mining houses currently transport mining equipment wheels, which often weigh in the region of two to three metric tons, over extensive distances and, in the process, significant transport costs can be incurred.


Kal Tire's booth at the Electra Mining Africa 2022 event.

Kal Tire has developed an onsite inspection tool which allows the tyre services provider to test the reliability of the wheel onsite.

The pioneering solution, called the Wheel Inspection tool, relies on a mobile unit to scan and flag cracks along weld lines or ring grooves that could potentially compromise wheel integrity and safety.

"The data provided by the tool is used to advise the client on whether the wheel is in good working order, or potentially compromised in any way. The results of the scan will define whether the wheel can still be used, whether it requires repairs, or if it potentially needs to be scrapped. Aside from realising a massive cost saving in terms of fuel, travel and time, the client indirectly reduces its carbon footprint and thereby the mine's overall rate of carbon emissions due to the elimination of long and costly transportation," explains Martin.

The prototype tool, which was on display at Electra Mining Africa, is at development stage and will only be put into commercial use in 2023.

"We need to make a few minor adjustments and amendments to the product before it is commercialised," says Martin, adding that the Wheel Inspection tool was a crowd pleaser and attracted significant attention at the Kal Tire stand.

Complementing the Wheel Inspection tool is Kal Tire's Kal Clamp, a tool that offers a step-change in the tyre removal process.

Using the Kal Clamp, technicians are able to safely perform the last and most dangerous step in removing or installing an OTR tyre by using the remote-controlled clamp which secures and then releases the last two-wheel bolts in a safe and controlled manner.

"Typically, for this final step in the tyre removal process, technicians must stand between the tyre manipulator bearing the weight of the assembly, and the wheel assembly – an extremely risky exercise. With this device, the technician is removed from the danger zone and uses the remote-controlled clamp to release the wheel from the piece of equipment," explains Martin.

While many attendees were keen to acquire the devices, Martin was quick to point out that the innovative solutions were not necessarily for sale, but offered as part of Kal Tire's on-site services offering.

"It is not just about the innovation or the tool, it is about the quality and width of services that we offer –from tyre recycling, to safety and improved


Kal Tire's Maple Program is based on its custom-built carbon calculator.

productivity, cost reduction and management of the total cost of ownership reduction, all of which is packaged into the service we offer. These innovative technologies, developed in-house, are part of our service offering."

## Kal Tire in the driving seat

Also on display at the event, Kal Tire showcased its autonomous tyre inspection system – a partnership with Australian company Pitcrew.ai.

The autonomous tyre inspection station combines Thermographie (thermal imaging cameras) and artificial intelligence (AI) to monitor OTR tyres in mining operations and feed data into Kal Tire's Tire Operations & Management System (TOMS), where a business rule engine takes care of work order creation and automation using customer specific maintenance targets to ensure right amount of work at a time.

"By adopting the Pitcrew tool, mining houses are able to use strategically placed autonomous inspection stations to monitor and track tyre health. Instead of halting trucks to initiate physical tyre inspections, the company installs a set of camera monitors which record the condition of each tyre as the trucks pass through," explains Martin.

Christian Erdelyi, Kal Tire's Mining Tire Group manager, mining technology solutions, says that by integrating the thermal imaging technology of Pitcrew.ai with TOMS, potential issues on the outsides of the tyres are detected early on. Armed with this information, TOMS is able to speedily automate the critical next steps, such as work orders, for closer inspection, or tyre change outs based on site specific business rules.

"With TOMS, work orders can be released within a minute of the completion of the real time truck inspection; unlike paper, which often sees work orders taking days to process, or is misplaced."

The autonomous tyre inspection systems are now in use at sites in Canada, Australia, Chile and soon in Mozambique.

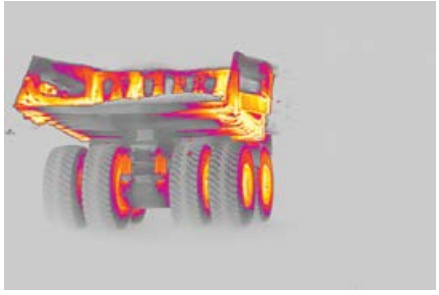
"On its own, TOMS is a powerful productivity tool that supports near-instant visibility and a focus on planned tyre work," reiterates Erdelyi.

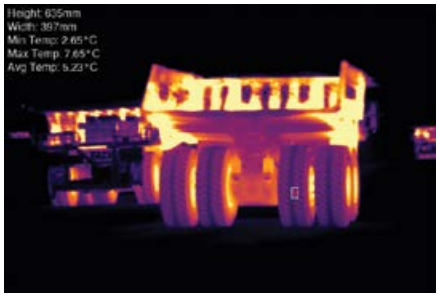
This drive to aid its customers meet their ESG

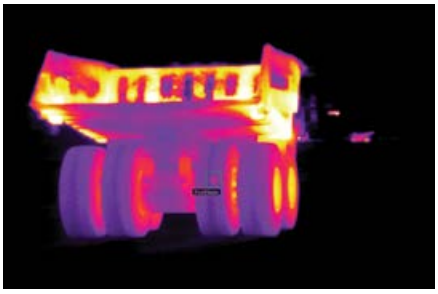

Above and left: Kal Tire's Kal Clamp offers a step-change in the tyre removal process.

Left: Kal Tire's Tire Operations & Management System (TOMS).

Kal Tire showcases its autonomous tyre inspection system - Pitcrew.ai.






Kal Tire's Autonomous Inspection Station.

targets has seen Kal Tire's tyre supplier, Maxam, innovate a compounding process for improved tyre durability, performance and thereby longevity.

"Maxam has developed a new way of mixing tyre compounds that allows for better compound distribution in the rubber, which ultimately enhances tyre efficiency and performance," explains Martin.

The Maxam tyre is manufactured by a Chinese manufacturer in its Vietnam facility, and the latest compounding technology is already being tested in a few operations – and delivering very promising results – around the world.

The first batch of innovative Maxam tyres, which are exclusive to Kal Tire in South Africa, arrived in the country in September and are scheduled for introduction to onsite testing during the course of October and November.

"We will find out within the next 6 –12 months how these tyres have performed against those that are manufactured using standard compounds," says Martin.

Meanwhile, Kal Tire's stance on ESG has seen the company promoting its Maple Program, an initiative which provides proven data on carbon saving initiatives, such as re-treading. The initiative aims to extend the service life of tyres, often by thousands of hours, and thereby reduce the total cost of ownership.

"Carbon tax is not a reality in most African countries but it is in Europe, South America and Chile, which raises, to our customer base, the significance of the Maple Program in practically demonstrating a lower carbon footprint," explains Martin.

While the environmental benefits of these offerings have been widely understood, there has previously been no proven way to quantify actual environmental savings.

Kal Tire's Maple Program, based on its custom-built carbon calculator, uses data related to carbon and oil savings achieved when using Kal Tire's sustainable tire solutions to calculate the $CO_2$ savings.

Accredited and certified by SCS Global Services, a leader in third-party environmental certification, Kal Tire's carbon calculator calculates the oil and carbon emissions saved in raw material consumption and in production energy during re-treading or repair when compared to producing a new tire.

Launched in 2019, the Maple Program was first rolled out in Chile and is now being rolled out to other regions in which Kal Tire operates.

"Kal Tire issues customers with an annual certificate that validates the carbon savings contribution. This becomes increasingly important for Scope 3, which is only just beginning to be addressed. Scope 3 takes into account the downstream aspect of an organisation and includes the complete value chain including the suppliers used."

Customers receive annual certificates containing accredited data about the fuel and carbon emissions savings when using sustainability solutions such as re-treading, Ultra Repair™, and now conventional repairs to OTR tyre sizes 49" and up.

Tyres with large but less complex injuries can effectively be restored and returned to service through the patch and process of conventional repairs, which are performed often in every region Kal Tire operates.

"With our sustainability solutions included in the Maple Program, we provide an important and accessible way for mines to reduce costs and their carbon footprints while extending tyre life," says Martin.

To meet the growing demand for OTR tyre repairs, especially in the thriving copper and ore region of the Northern Cape, Kal Tire recently opened a new branch and repair facility in Hotazel. Additionally, in Mozambique, a new tyre repair facility is busy helping customers keep tyres in production.

Further to this, Kal Tire has successfully opened a mining tyre recycling facility using thermal conversion technology, and showcased a video of this facility at Electra Mining Africa.

After several years of research and development, this facility opened in northern Chile in 2021, and converts scrap OTR tyres into reusable products. The technology uses heat in the absence of oxygen to convert tyres into their base elements (fuel oil, steel and carbon black). Nearly 100% of the tyre can be reused.

"The journey in Chile shows us here in southern Africa what's possible when stakeholders unite and commit to solutions at the top of the recycling hierarchy," says Martin. "This solution promotes a circular economy, it's scalable and it can be implemented anywhere." ■

# **TOMRA's latest sorter showcased** at Electra Mining

**Sensor-based sorting technology specialist, TOMRA Mining, recently showcased its compact COM XRT 300 /FR final recovery sorter at Electra Mining Africa 2022. The product was launched to the market late last year. *Modern Mining* spoke to TOMRA Mining diamond segment manager, Corné de Jager about the mining industry's interest in its latest technology.**


Corné de Jager with the compact COM XRT 300 /FR final recovery sorter at Electra Mining Africa 2022.

"Aside from TOMRA's live demonstrations of the COM XRT 300 /FR at its Hamburg and Johannesburg offices, we recently showcased the product at Electra Mining Africa 2022. This is the first time that TOMRA has brought its revolutionary final recovery sorter to an exhibition and undertaken live demonstrations with ore, diamonds and diamond tracers. The aim was to give customers an opportunity to experience the sorter's unique benefits. The demonstrations attracted large numbers of attendees, who were intrigued by the easy-to-handle, compact machine, which is able to recover more than 99% of diamonds, with a very small amount of gangue, from large quantities of ore."

TOMRA's latest sorter completes TOMRA's diamond recovery solution as it now offers a full X-Ray transmission (XRT) technology solution range to sort particles in bulk concentrations from +4-100 mm, with the larger XRT sorters, to +2-32 mm particles in a final recovery or sort house application. The COM XRT 300 /FR sorter is especially handy for small capacity explorers looking for a compact machine.

"Electra Mining 2022 was an extremely well attended event with the number of visitors from South Africa and abroad far exceeding our expectations. We engaged with numerous visitors and TOMRA is grateful for the phenomenal feedback on our high efficiency product, which delivers extremely low amounts of gangue in the diamond concentrate. In fact, we received serious interest in the product with numerous follow-up requests. We look forward to turning these into product sales and successful installations," she said.

### Advantages of the TOMRA COM XRT 300 /FR sorter

TOMRA's latest sorter is extremely competitive in terms of its capabilities and pricing, and it provides a high level of accuracy. It replaces multiple conventional sorting stages with a single machine.

According to De Jager, the X-Ray camera which uses DUOLINE® sensor technology focuses on a single, constant property of the material – atomic density – hence detecting any type of diamond, irrespective of its coating or luminescence profile. The efficient alignment of the x-ray source, ultra-high resolution sensor technology and fine nozzles results in an ultra-high diamond by weight concentrate and a guaranteed > 99% diamond recovery.

"If capacity requirements allow, single-feed batch processing of various size fractions vía a single unit is possible as the unit is supplied with various size fractions programs within its sorting range of 2-32 mm. Secondly, the unit can easily be repurposed and/or relocated for a different size fraction within this size


Attendees at the Electra Mining event were intrigued by the easy-to-handle, compact machine.

TOMRA product at the Lesotho Diamond Mine.

The Lesotho Legend was recovered from the Gem Diamond's mine in Lesotho.

range in the event that projects or project objectives change," explains De Jager.

Coupled with the benefits of cloud computing (Tomra Insight), the COM XRT 300 /FR is the last piece within TOMRA's recovery process to produce an ultra-high diamond by weight concentrate with an exceptionally low yield.

The product significantly reduces hand sorting – this translates to less human error, simplified security requirements and lower security risks.

In essence, the COM XRT 300 /FR final recovery sorter offers higher efficiency, better grade, simplified security requirements, fewer sorting stages and a smaller footprint.

## High market demand for the COM XRT 300 /FR sorter

Backed by these benefits, the COM XRT 300 /FR was sold even before it was launched last year, with the first three diamond sorters procured by customers who had achieved success with previous TOMRA sorters.

"Gem Diamonds was so impressed with TOMRA's XRT technology that it purchased one of the first three sorters before it was showcased to the market. As a result, the Letšeng mine became home to the first unit installed in the world," says De Jager.

She explains that given new products need time to permeate into the industry to become the norm, there is still significant potential for the industry to adopt TOMRA's revolutionary product. ■

# South Africa is in desperate need of minerals legislation overhaul

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

Ross Harvey, director of research and programmes at GGA.

South Africa's economy is not in a healthy state. Consumer price inflation (CPI) is likely to hit 8% (well above the 6% upper limit envisaged by the Reserve Bank), and economists expect producer price inflation (PPI) to reach 18%. Household wealth, simultaneously, has declined from R16.98 trillion to R15.75 trillion in the second quarter. This is significant because changes in real household wealth correlate strongly with changes in real household consumption expenditure. Interest rate changes – to tame inflation – similarly reduce available cash flow for middle-class households, which worsens the expenditure picture. Household expenditure is important because of what economists call the 'multiplier effect' – every rand that is spent has a positive ripple effect throughout the economy. Moreover, this is wealth contraction primarily among the narrow portion of the tax base that funds government expenditure, including extensive welfare grants.

Interest rates are a rather blunt instrument to tame inflation. Nonetheless, they appear to be somewhat effective, all else being equal, thanks to a competent Monetary Policy Committee and an independent Reserve Bank that refuses political interference. The Reserve Bank recently hiked the repo rate to 5.5%, with commercial banks correspondingly increasing the lending rate to 9%. Despite arguments to the contrary, it seems that this is designed to attract 'hot money' – liquid capital seeking returns on short-term Treasury bonds. This increases demand for the Rand, which in turn ameliorates import-driven inflation but makes our exports less competitive in the process (except for raw material exports, which are priced in US dollars). However, the US Fed has also been hiking interest rates to try and tame domestic inflation post-Covid, which limits the volume of funds likely to chase Rand-based returns. It also signals the possibility of global stagflation – high inflation with no accompanying economic growth. This, of course, has been exacerbated by the negative spill-over effects of the Russia-Ukraine war and pre-war Covid-related global supply chain disruptions.

Government needs to overhaul minerals legislation to increase the investment-attractiveness of the sector.

South Africa possesses abundant supplies of manganese, chrome, platinum group metals and iron ore.

## So, what of South Africa's prospects in this bleak global outlook?

Attracting investment is a crucial precursor to economic growth. This point cannot be overstated. Without sustainable growth, premature deindustrialisation cannot be reversed. Premature deindustrialisation is the process by which emerging economies transition out of manufacturing and into low value-add services at lower rates of median per capita income, and historically sooner, than their industrialised counterparts. Manufacturing remains the primary channel through which labour is absorbed. With an employment rate that is expected to breach 35% again in the next Labour Force Survey, it is critical that we grow the manufacturing sector in South Africa as a matter of priority. Manufacturing growth, however, is a mere pipedream unless the conditions for attracting sustained investment are created. Some economists are of the view that we can spend our way out of trouble. The problem with that unfettered Keynesian outlook, though, is that it assumes too much. We do not have a strong enough economy to sustain higher debt levels, nor will expenditure itself somehow create structural growth conditions.

What is required is careful thinking about where best to start. And it remains the case that harnessing the growth potential of South Africa's mining sector is crucial to attracting investment that could lead to spinoff manufacturing growth. The proposition is threefold:

- First, South Africa possesses among the world's most abundant supplies of manganese, chrome, platinum group metals and iron ore. These are critical minerals for the global energy and transport revolutions.
- Second, South Africa still possesses technical expertise that is globally unparalleled, though more investment is required to strengthen this.
- Third, South Africa could become a mining equipment-manufacturing and services hub that powers the entire region.

Before any of this potential can be realised, however, we require a minerals legislation overhaul. The last piece of apartheid mining legislation (1990) was clearly designed to keep mineral rights in the hands of the privileged few. The 2002 Mineral and Petroleum Resources Development Act (MPRDA), enacted in 2004, was consequently designed to reverse this skewed ownership. It placed sub-soil mineral wealth in the hands of the state, making the state the 'custodian' of the country's minerals. In practice, however, this led to serious problems. The concept of state custodianship is shaky, and the idea of sub-soil mineral rights belonging to the state has created serious complexity for mining firms and local communities alike. It is a form of resource nationalism, which some have referred to as expropriation by stealth. Thankfully, expropriation per se has not materialised, but there were problems in transitioning from old to new order rights, and plenty of room for corruption in the process.

Aside from the deep difficulty of mineral rights being unclear, the MPRDA has gone through several iterations of amendments, many of which were bizarre. Almost all of them landed up going back to the drawing board because the changes could not pass constitutional muster. Such constant changes opened the door to unproductive rent-seeking, though, and administrative competence was hollowed out of the Department during the Zuma years. Unfortunately, there has not been nearly enough improvement since Gwede Mantashe took over from the previous minister, Mosebenzi Zwane. For instance, a basic online cadastre has still not been adopted or implemented, despite this having been repeatedly promised. This simple device would ensure that all licence allocations are transparently recorded for everyone to see. Moreover, turnaround times for licensing applications remain unacceptably slow.

There are numerous other difficulties that will be addressed in future columns. In the meanwhile, the take home point is that the government has to begin the hard work of overhauling the country's minerals legislation to increase the investment-attractiveness of the sector. If South Africa is to capitalise on global trajectories towards lower-carbon growth, we must grow the non-fossil fuel sector of our mining industry. Without this, sustained manufacturing (connected to a growing mining industry) that provides employment and grows us out of stagflation, will not materialise. ■

# BME's AXXIS Silver debuts at sub-zero Lesotho mine

High in the mountain kingdom of Lesotho, explosives and blasting specialist BME recently achieved the first blast outside of South Africa with its new AXXIS Silver electronic initiation system. BME is assisting a diamond mining customer to conduct quality blasts in all weather conditions. According to BME's AXXIS support manager Hennie du Preez, BME has been active on this mine since 2016. Located at an altitude of over 3 000 metres, the operation frequently experiences snow and sub-zero temperatures.

"This means blasting under challenging conditions, including extreme cold, snow and ice," said Du Preez. The AXXIS Silver initiation system employed at the mine is a leaner version of BME's flagship product AXXIS Titanium. The company conducts the priming, logging and firing of the blasts, and ensures a regular supply of emulsions to the site. "Among the benefits of AXXIS Silver is its thin, copper-cladded downline wire, which de-coils easily for use in small diameter holes – even when they are waterlogged," he said. "Due to their robust quality, our electronic detonators were able to remain in the holes for two days before blasting, in temperatures below zero, where the hole collars froze solid." ■

BME's AXXIS Silver debuts at Lesotho mine.

# Verder launches the Verderflex Ds500

Verder Liquids, a division of Verder Group, recently launched its Verderflex Ds500 – a metering and dosing pump designed specifically to challenge traditional technological solutions to chemical dosing in municipal and industrial pumping applications. The principle behind this technology is to improve the accuracy and save the end user money by looking at Total Cost of Ownership (TCO), which equals upfront costs and lifetime operation. For the end user it is not just buying the pump but the working life and all it entails, i.e., service, tool free maintenance and chemical usage, the company said. ■

Verderflex Ds500 – a new metering and dosing pump.

# ELB Equipment receives accolade at GEHL conference

Equipment supplier, ELB Equipment, clenched another international accolade when it was awarded the status of partner dealer at the recent GEHL conference in France. “Being awarded with the status of partner dealer is a great honour for ELB Equipment. Our business model is that of a multi-brand franchise and securing our relationship with a brand that shares our ideals and has a heritage older than our own is imperative to upholding that business model,” said Keon Kardolus, earthmoving and construction sales manager.

ELB has been distributing GEHL equipment since 2018. The product range includes backhoe loaders, skid steer loaders, telescopic handlers and articulated wheel loaders.

“The criteria to becoming a GEHL partner dealer is not simply achieving a specific sales volume or having a good relationship with your dealer manager, but rather touches on all aspects of the business. ELB Equipment went through a strenuous dealer elevation process that focused on service levels, spare parts, technical as well as company image to name a few,” Kardolus said. ■

ELB Equipment awarded partner dealer status.

# Doosan to launch new 4x4 DA45-7 ADT at Bauma 2022

Equipment producer Doosan is set to launch the company’s new 4x4 articulated dump truck (ADT) at Bauma 2022. The new 4x4 version of the DA45-7 ADT is intended to compete with rigid dump trucks (RDTs) in the 40-tonne class. “With superior operation on poorer roads, smoother surfaces and steeper terrain, the aim of our new 4x4 machine is to challenge RDTs in the 40-tonne class, by providing a dumper product that delivers much more than RDTs,” says Beka Nemstsveridze, ADT product manager at Doosan. As well as performing better in conditions that are tough for RDTs, the new 4x4 DA45-7 ADT has a width of less than 4 m to avoid the need for special transportation, and offers a better turning radius than a comparable RDT. The shorter turning radius and the design of the rear dumper unit, which is more suited to carrying flat and heavy rocks, provide particular advantages in the mining and tunnelling industries, the company said. ■

Doonan’s new 4x4 ADT.

# Epiroc introduces the Automatic Bit Changer

Epiroc, a productivity partner for the mining and infrastructure industries, has introduced the Automatic Bit Changer (ABC) for hands-free bit changes on Pit Viper 270 and Pit Viper 290 series drill rigs used in rotary drilling. The Automatic Bit Changer option is designed to change rotary tricone bits significantly faster than manual exchanges and eliminates human interaction with the drill string for a safer, more efficient way to operate a drill fleet, the company said. “Early collaboration with customers and cross-functional teams resulted in an auto bit changer that is repeatable, keeps the operator out of the line of fire, and improves machine uptime,” said Matthew Fosler, senior design engineer, surface division. Epiroc’s Automatic Bit Changer decreases downtime and eases operator workloads. The carousel design allows up to four bits to be changed easily, significantly faster and safer than a single manual exchange. ■

Epiroc launches new Automatic Bit Charger.

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