MechChem AFRICA

MAY-JUNE 2022

CROWN PUBLICATIONS

This month:

- Metrics for maximising uptime and asset value
- Drilling projects showcase state-of-the-art
- Ventilation and cooling in Mexico's mines
- Automation technology for sustainable packaging

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CROWN PUBLICATIONS

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World class innovations launched in SA

Peter Middleton

COMMENT

On Friday May 6, I logged into a virtual launch event being held at Anglo American's Mogalakwena PGM mine in Limpopo, South Africa. Being introduced was the world's first 510 t ultra-class load haul mining truck to be fuelled by hydrogen and electrically driven via hydrogen fuel cells.

With a payload of 290 t and a drivetrain that can deliver 2.0 MW of power from 800 kW of fuel cells and 1.2 MW of battery storage, the vehicle is the largest hydrogen powered truck ever converted to run on hydrogen.

Called nuGen™, the vehicle was engineered in-house to enable the entire open cast mining fleet in Anglo American to be converted from diesel to hydrogen. It delivers a zero-emission haulage solution that, on this truck alone, saves 3 000 ℓ of diesel consumption per day at Mogalakwena, displacing 8.0 t of CO_2. If implemented on all of the trucks at an average sized open cast mine, 120 000 t of CO_2 emissions per year can be avoided, and there are over 1 000 such mines worldwide.

For any hydrogen vehicle to be truly zero-emission, however, renewable energy sources must be used to produce 'green' hydrogen. Also required is vehicle refuelling infrastructure, all of which is under development as part Anglo American's FutureSmart Mining™ initiative.

In partnership with Engie, Anglo American has been building a hydrogen production, storage and refuelling complex at Mogalakwena that incorporates the largest electrolyser in Africa. Powered by an onsite solar PV plant, this electrolyser and its surrounding infrastructure uses water to produce pressurised hydrogen for refuelling the mine's nuGen trucks.

"The launch of the nuGen truck is truly remarkable and it is a huge milestone on our journey as a country to creating an industry, but also an economy, that is more sustainable, more innovative and resourceful," said South African President Cyril Ramaphosa speaking from Mogalakwena. "It is a smart step for Anglo American, but it is a giant leap for South Africa's hydrogen economy into the future," he noted.

"Today's launch of the world's largest truck powered by green hydrogen – that will be produced, yes, at the mine – also shows us that the energy economy is beckoning us: as a country and as an industry. The hydrogen economy has definitely arrived for South Africa and today we celebrate its arrival," Ramaphosa said.

In terms of broader national development, he notes that the Department of Science and Innovation, Anglo American and Engie, amongst others, are in partnership into the development of a Hydrogen Valley to capitalise on the country's PGM resources and its renewable energy potential. The aim is to revitalise and decarbonise key industrial sectors along an economic corridor that extends from the mines in Limpopo, down through Johannesburg and onto the KwaZulu-Natal coast, potentially contributing some R57-billion to South African GDP by 2050.

This with a view to making South Africa a real centre-of-excellence for green hydrogen production and export. "Just as finding new mineral deposits leads to new demand in various parts of the country, so will the green hydrogen economy spawn new industries and associated economic activity, leading to the improvement of the lives of our people. This is the beginning of the future that we envisage in the new development plan," notes President Ramaphosa.

On April 26 at another PGM mine in Limpopo, Master Drilling hosted an event at Northam Platinum's Zondereinde mine to celebrate the final breakthrough of a new 4.8 m diameter, 1 380 m mine shaft – which has broken Master Drilling's previous world record for the deepest raised-bore mine shaft ever constructed.

Master Drilling's first world record was established in 2012 with the 1.07 km pilot hole at Lonmin for a 5.5 m ventilation shaft; and today, with over 140 raise boring rigs operating in over 20 countries across the world, the South African company is considered to be a world leader in this technology. "Key to success is the accuracy we achieved, which is all down to the pilot hole that deviated by less than 140 mm from a true vertical line across its entire depth – a minute amount," said Master Drilling CEO, Danie Pretorius.

In addition, in talking to Darryl MacDougall of Verder Pumps South Africa he relates that back in the day, South Africa, through Verder SA's Daan Louw, was instrumental in assisting the factory in the United Kingdom to design the Verder Dura range of peristaltic hose pumps to best meet typical mining requirements here in South Africa. This has culminated in the recent release of the range's latest evolution, the Verderflex Dura 65, which offers 20% better performance on the same footprint.

While it is not a surprise that the South African mining industry has become a world leader in shaft and underground tunnel construction, it is heartening that the industry can also lead the world in terms of future-focused green technologies.

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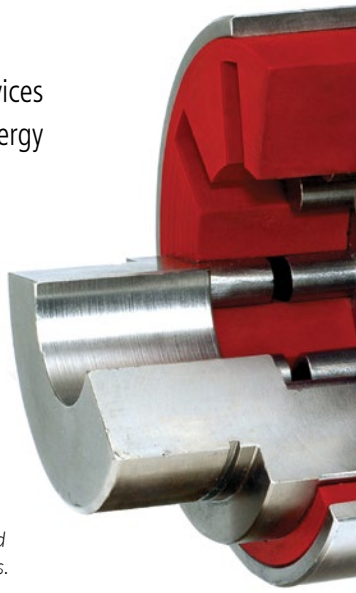
Looking Forward VEGA

Structured BMG programmes for reliability, optimised productivity and extended life

Leading engineering solutions specialist BMG provides the engineering components and support services that, if coupled with a structured maintenance programme, will ensure high productivity, reduced energy consumption, minimal downtime and long service life of systems.



BMG's Timken Quick-Flex couplings, which require minimal maintenance, are ideal for applications such as large hydraulic pumps, industrial gearboxes, compressors, vibrating screens and mine ventilation fans.

BMG is a complete process solutions provider to all industrial sectors, which means companies can access quality branded products and essential support services from a single, reliable supplier. This integrated approach guarantees lower production costs and higher efficiencies.

"We believe the introduction of a structured maintenance management programme, which can be implemented in-house or partially outsourced to a professional organisation, is critical to maximising production efficiencies in industry," says Carlo Beukes, group sales development manager for BMG.

Maintenance of machinery can be a very expensive exercise, not only in terms of the cost of spare parts and labour, but also due to lost production because of plant stoppages. Careful consideration therefore needs to be given to disciplined inspections and planned maintenance of plant and production machinery.

Care in the initial designing and manufacturing stages of the plant, the selection of compatible quality branded mating components, professional installation – with particular attention to meticulous alignment of coupled components – will ensure reduced downtime, lower maintenance requirements and therefore lower operating costs.

"BMG's proactive maintenance, which encompasses predictive maintenance services including condition monitoring and oil analysis, is enhanced by advanced technical and design support across all functional disciplines. Services include mobile breakdown, repair and maintenance support, which all help production plants to get up and running as quickly as possible following a breakdown," says Beukes.

The importance of lubrication

The negative effects of friction and the resulting wear on moving components such as bearings, girth gears and industrial chain are significantly reduced by the selection and use of the correct lubrication. Although a general multipurpose grease or oil is sometimes adequate, more arduous operating conditions demand purpose specific lubricants. Factors that need to be considered include operating speed, ambient temperature, load, vibration and environmental conditions.

Through a wide range of energy efficient products, including synthetic oils, lubricants and bespoke lubrication systems, along with the support of a technically competent team, the company is able help plant operators to make these more difficult lubricant choices.

BMG's specialist technical division also offers an oil analysis service, which includes laboratory-based sampling and analysis, as well as on site analysis, filtration and flushing. Other services include technical applications consulting, product and system design, product quality control and assurance, as well as condition monitoring services.

Condition monitoring identifies lubrication problems, misalignment and vibration issues and also helps in identifying the causes of damage, so that units can be fixed before further destruction occurs. The service more than pays for itself through reduced downtime, more efficient production and maintenance cost savings.

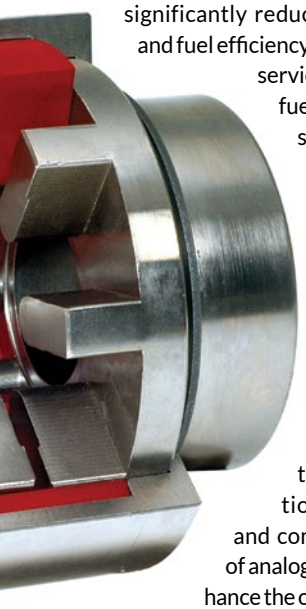
Filtration solutions

BMG Fluid Technology's filtration solutions comprise a wide range of fluid power components and systems, which are supported by the team's broad technical capabilities to ensure fluids, including oil, fuel and lubricant oil, operate within required cleanliness standards.

"Proficient filtration disciplines in all industries – especially in chemical and corrosive environments and for arduous mining conditions – are critical for dependable performance, high efficiency and extended service life of machinery, equipment and vehicles," explains Willie Lamprecht, BMG's business unit manager for Low Pressure Fluid Technology. "Without a structured control and contamination prevention programme, premature equipment failure is likely to occur, leading to unnecessary downtime and costly

BMG provides plant maintenance solutions that are ideally coupled with a structured maintenance programme.

replacement of parts. "Optimum filtration performance, in conjunction with lower differential pressures (ΔP) through the system, significantly reduce energy consumption and fuel efficiency. BMG's fluid technology services include solutions for fuel and industrial filtration systems, hydraulics and pneumatics, lubrication, hydraulic hose and fittings, as well as instrumentation, pumps and industrial valves," notes Lamprecht.



Predictive solutions for drives

BMG's NORD predictive maintenance solutions offer fast, efficient and comprehensive evaluation of analogue and digital data to enhance the operational efficiency and safety of machines. "BMG specialists use predictive maintenance as a methodical extension of condition-based maintenance, with the prime objective of proactively maintaining machinery and equipment and the early detection of operational changes.

"Our NORD status-oriented maintenance system replaces traditional time-based maintenance to enhance the performance of the gear units, electric motors and frequency inverters, for increased efficiency of the entire plant as well as reduced downtime," explains Deon Crous, national product specialist for NORD Drive Systems.

"Digitalisation boosts the added value our customers can derive from drive data, especially when used to monitor critical applications where a drive failure may cause severe damage," says Crous.

BMG's NORD drives for condition monitoring are based on intelligent algorithms and software in an Industrial Internet of Things (IIoT) environment, where networked drive units collect condition data in the inverter's integrated Programmable Logic Controller (PLC) and pre-process it, together with data from connected sensors and actuators.

"An important advantage of this system is it offers our customers dependable data analysis, rather than raw data. Results of pre-processed or complete data can be optionally transmitted to an edge device, from which the data from all subsystems is managed and evaluated. This information is then available as pre-selected and edited smart data for further use and clear visualisation," explains Crous.

A common application example is the sensorless determination of the optimum oil change period based on the oil temperature, which is the key indicator of oil ageing in gear units. This information is used in conjunction with gear unit parameters and specific operational parameters to precisely calculate the most appropriate oil change time, without the need for any additional sensors.

The company's electromechanical specialists are able to extend and adjust NORD drive equipment for specific automation tasks, including drive monitoring, drive control and process control. The team is also able to advise customers about the correct PLC software architecture for any application.

Power transmission solutions

Stock availability and a wide range of standardised power transmission components, which are machined to accept taper-lock sleeves with bore sizes to suit a range of standard shafts, make for easy access and fitting of components to the shafts of machinery, such as motors and gearboxes. Components, such as vee belts, sprockets, couplings, slat top chain, belt systems, taper bushes, belt and chain tensioners and geared motors, accommodate broad power input and torque capacity requirements, as well as a wide speed range.

The accurate installation of correct power transmission equipment ensures long-term savings in equipment replacement costs, as well as reduced plant downtime and maintenance requirements. When alignment has been meticulously completed, it is critical that all components are securely located and doweled. This will ensure reduced wear, resulting in lower power losses, improved efficiency and the elimination of vibration. The net effect is an extended operating life for all drive components.

In belt and chain drives, the correct tensioning and accurate alignment of pulleys or sprockets also extends operating life and, as a result of reduced friction, lowers power consumption. Many chain drives also require correct lubrication to ensure trouble-free and efficient operation.

Tsubaki's lube-free roller chain, however, is ideal for use in industries where clean environments are required and where product contamination cannot be tolerated, in food processing, pharmaceutical and electronics' manufacturing, for example. Tsubaki's Lambda chain is also suitable for environments where abrasive contamination is prominent, as is the case in wood processing and the paper and packaging industries.

Similarly, Timken Quick-Flex couplings require minimal maintenance and are able to be used in a wide range of critical applications, including hydraulic pumps, motors, industrial gearboxes, compressors, vibrating screens and ventilation fans. These couplings are designed to accommodate shaft misalignment within the drive and to also dampen vibration and torque fluctuations. "Quick-Flex drive couplings can directly replace virtually any similarly sized coupling. They require no lubrication and are also easy to install and maintain," says Brandon Bouillon, product manager for BMG's Power Transmission division.

Through its offering of a wide range of high-quality engineering components, along with associated structured maintenance and service programmes, BMG strives to keep plants free of the breakdowns and stoppages that unnecessarily affect efficiency and productivity.

"We are committed to ensuring every plant keeps operating by providing 24-hour customer process support for production efficiency and structured reliability-centred maintenance programmes," concludes Carlo Beukes.

www.bmgworld.net

BMG's NORD predictive maintenance solutions offer fast, efficient and comprehensive evaluation of analogue and digital data, to enhance the operational efficiency and safety of machines.

Metso Metrics: for maximising uptime and asset value

Pilot Crushtec's Jorge Abelho talks about the advantages of using Metso Minerals' advanced primary jaw crushers, secondary cone crushers and vibrating screens, and the role played by Metso Metrics in protecting these machines, preventing unplanned downtime and delivering value for money.

Pilot Crushtec, as the exclusive South African dealer of Metso's range of cutting-edge crushing and screening technologies, is now able to incorporate and support the Metso Metrics condition monitoring and data analytics platform for these flagship processing machines. "Particularly useful for mobile Lokotrack units, which are fast becoming preferred across the world, Metso now incorporates the state-of-the-art Metso Metrics digital asset tracking system that uses up to 90 sensors to continuously monitor every aspect of a machine's condition and performance," begins Jorge Abelho, director of Technical Support at Pilot Crushtec.

"These machines are at the forefront of minerals processing technology, using digital and connected technology to control every aspect of operation to deliver best possible production efficiencies, reliability and value," he says.

Citing the Metso LT330D and the LT220D secondary cone crushers with built-in vibrating screens, Abelho says the all-in-one hybrid machines are now becoming very popular across Africa. "These are high capacity crushers with a 3-deck dual slope screen and a patented centrifugal conveyor on the same chassis, so they can be transported across and between sites in one piece. They can be powered by electricity when the grid is available, saving up to 40% on fuel costs, and can be seamlessly coupled to other Lokotrack machines to expand delivery to the capacity required by mine operators," he notes.

"Buying machines like these requires a massive investment in capital equipment, so customers need assurances about investment returns. Along with the sale, we therefore incorporate technologies and establish programmes to ensure that customers get the maximum life and uptime out of their machines, while delivering the run-of-mine output required as continuously as possible. "Ultimately, for African and Southern African mining applications, there is far more long-term value in investing in better machines that are reliable and robust than in attempting to limit the initial investment at the expense of shorter life and high maintenance and downtime costs," he argues, adding that this truth is leading to Metso machines becoming first-choice duty mining machines.

Metso Metrics

While it has become an option for premium mining machines to incorporate remote monitoring via cellular, Wi-Fi or satellite networks, Pilot Crushtec incorporates Metro Metrics as standard on all Metso LT and ST machines it sells and supports, whether they are mobile or static. "Every aspect of the health of the Metso machines we now sell is continuously monitored, with data being routinely collected, uploaded

The Lokotrack® LT330D™ is equipped with the versatile and reliable Nordberg® GP330™ cone crushing unit, which is suitable for even the most difficult aggregates production.

and analysed – and we use a satellite-based setup, which is really good because GPRS modems on remote sites in Africa are notoriously unreliable," Abelho continues.

Metso Metrics uses advanced sensors to collect data from machines in operation, some of which are relatively standard, such as flow, level, pressure, and temperature sensors coming directly from the instrumentation, but each machine also has a set of customised sensor systems to monitor specific health and performance issues, fuel consumption rates, idle time, leak detection, wear rates, load characteristics and throughput efficiency. "By monitoring every aspect of a machine in operation, we can take proactive and preventive action as soon as a sensor identifies a problem," notes Abelho.

Metso Metrics provides four levels of insight on equipment and operations:

- **Analytics** on the machine and processes, which uses the data collected to analyse the real machine performance against daily, weekly and monthly KPIs for various aspects of the machine, from vibration to throughput efficiency. This is aimed at helping operators to make the right decision at the right time.
- **Condition monitoring** to increase visibility: In monitoring machine health Metso experts have determined thresholds for every piece of data, as well as how each part should optimally interact with the other.
- **Predictive maintenance** through artificial intelligence (AI): Machine learning algorithms and AI are used to detect and predict machine failures. This helps to ensure that machine uptime and availability are maximised, while crushing and screening processes are optimised.
- **Process engineering** to maximise overall efficiency: Preventing unplanned downtime is key, as is maximising usage when equipment is up-and-running, while Metso's continuous OEM support helps drive down to the real roots of reliability.

Metso's IC controller and interface on every machine logs faults for each parameter, enabling onsite maintenance technicians and managers to see if something has changed or been changed. "If an operator changes the setup on the machine, it records who made the change and when, so a full operational record is easily available.

"And what I really like about Metrics is that Metso has gone the next level. When a mine orders a machine, it is usually customised to meet the ore and throughput needs, and customer preferences; a customer can ask for a certain electric mode and a cavity profile, which makes every machine slightly different.

"Each unit has its own serial number, though, linked to its own parts manual. Metrics ties that into its database so, when the machine is due for service, all the filters and service parts for that customised machine can easily be listed and supplied to the service technician. This is awesome!" he exclaims.

Pilot Crushtec's expert personnel are on hand to service and repair all crushing, screening and materials handling products.

The Lokotrack® LT220D™ mobile cone crusher combines a cone crusher and a screen on the same chassis. When used for secondary or tertiary crushing, this machine can produce up to three calibrated end products.

In addition, he continues, especially during the warranty period, the OEM will want specific checks to be done and records of these must be kept to validate the warranty. Metso Metrics maintains an electronic logbook, so the maintenance technician simply logs into the Metrics system on the machine when it's due for a service. He can see the error codes and then, after completing the service, fill in the report page summarising the maintenance done. "And the full history can be quickly accessed at any time to see what else needs to be looked at to ensure machine availability," Abelho explains.

Pilot Crushtec Equipment Protection Services (EPS)

"Our Equipment Protection Services (EPS) offering is an additional layer of protection that relies on the expertise of Pilot Crushtec's highly trained service personnel to help operators to better manage their equipment.

"These machines all have wear components that will need replacing, and components will eventually suffer from end-of-life fatigue. At Pilot Crushtec, we now have five Certified Inspectors (CIs), who have been trained by our Metso specialists colleagues in Finland. These inspectors are critical to ensure Metrics and the processing machine are being optimally used to deliver reliability and performance. They are the people who catch problems early," Abelho says.

"They will typically travel to site once a year or every 1 000 hours to check how the machine is being used and to look for any early signs of wear or fatigue. These visits coincide with major services on the machines and we find they add a lot of value," he adds.

As an example, he says that a Pilot Crushtec Metso Certified Inspector on a 2 000 hour service visit recently found a leak on one of the vibrating motors of the screen. "Although it was just the leak, he proactively scheduled a change out on the unit and, when it was pulled off, careful examination indicted the vibrator was on the verge of a catastrophic failure that would have caused unscheduled and extended downtime. Rico inspections regularly help us to avert issues such as these," he says.

"While many OEMs operating in South Africa will charge a monthly fee for remote monitoring and protection services, Metso machines come with Metrics built into every unit and, to ensure operators realise the full value, we are also looking at embedding the cost of our Pilot Crushtec EPS services into the initial contract, at least for the full warranty period," Jorge Abelho concludes.

www.pilotcrushtec.com

Bearing remanufacture supports circular economy

SKF is seeing rapid double-digit growth for bearing remanufacturing services compared to two years ago. The main reason for choosing remanufactured bearings over new ones has historically been cost, but this has changed as companies seek more sustainable production processes to support a circular economy.

Remanufacturing bearing units increases the usability of the bearings and delivers significant environmental benefits. The carbon footprint of a remanufactured bearing can be up to 90% less than a new one, depending on the amount of remanufacturing required, and the process consumes up to 90% less energy.

SKF provides remanufacturing services for bearings as part of its offering of trouble-free rotating shaft solutions. Hannes Leopoldseder, from the SKF remanufacturing unit in Steyr, Austria, says: "Double-digit growth for our remanufacturing services is coming from all major industries such as metals, pulp and paper, mining and energy across Europe, the Middle East and Africa."

Although energy and material efficiency are obvious, for most customers cost benefits used to be crucial in the decision to remanufacture bearings. This has changed. As a result of the 2016 Paris Climate Agreement, many countries' ambitions to accelerate incentives for a circular economy, are showing tangible results in the market. More companies are considering how their entire supply chain can help reduce their overall impact on the climate. The desire to change from a linear to a more circular economy is significant.

"The focus on sustainability has increased significantly, among large and small companies. We are receiving more questions from customers about sustainable services such as remanufacturing as part of the need to maintain a sustainable operation in the production facility", says Leopoldseder.

Janne Westerlund, Head of Engineering, Services & Solutions for the Swedish industrial market, says: "We are identifying great business opportunities in industrial markets. Combining sustainable products and services in a cohesive offer to reduce the impact on the environment is increasingly requested by our customers. This is evidenced by a rapid growth in sales for remanufactured bearings over the past two years.

Quadrupled sales

In 2020, SKF in Sweden invested in the Circular Economy concept. A local unit close to customers was established to enable circular solutions with the capacity to remanufacture 13 000 bearings per year.

Focusing not only on remanufacturing bearings, but also on bearing units, bearing housings, sealing solutions and lubrication management, sales have quadrupled in two years and demand continues to increase.

"The SKF Circular Economy Centre offers customers a comprehensive service where we quantify green value, such as reduced energy consumption, CO_2 impact and reduced lubricant consumption, with economic value, such as increased production and reduced costs. To support this, we have developed calculation models that show how many kilos of CO_2 emissions the customer can avoid by becoming a partner with SKF," says Westerlund.

Today, SKF has more than 15 remanufacturing centres across the global, with SKF South Africa having offered the service since 2008.

www.skf.com

SKF bearing remanufacturing services' rapid double-digit growth supports the circular economy.

SKF's bearing remanufacturing facility in South Africa.

WearCheck: Empowering the maintenance workforce

Steven Lumley of WearCheck presents an outline of the company's training offering and urges companies operating in all industries to invest in their maintenance staff so as to optimise condition monitoring programmes and maximise returns on equipment investments.

WearCheck training consultant Jan Backer (second from left) conducts oil analysis training courses in Klipspruit for delegates from Moolmans.

The condition monitoring sector is one that is constantly evolving and developing to incorporate innovation and boost efficiency. It is for this reason that ongoing training is essential to keep maintenance crews at the forefront of technological advancements within the industry.

WearCheck's technical manager, Steven Lumley, who oversees the company's training programme, believes that companies where staff are not well trained in the latest maintenance techniques will be hampered by the diminishing effectiveness of their condition monitoring programme. Says Lumley, "We urge companies operating in all industries to invest in training their staff to optimise their return on investment in condition monitoring. All WearCheck's courses comply with lockdown regulations to ensure the safety of delegates and staff. Please contact us to confirm whether the courses will be held at a venue or online, as we strive to comply with pandemic regulations."

Oil analysis and condition monitoring training courses are targeted at maintenance practitioners operating at various levels within an organisation. Many of these courses earn valuable CPD (continuing professional development) points for delegates.

Oil analysis courses are run at two levels, Oil Analysis 1: Understanding oil and its analysis; and Oil Analysis 2: Report interpretation. A specialist two day workshop on Wind Turbine Oil Analysis is also available.

Other condition monitoring training courses run by WearCheck include: Precision Shaft Alignment; Precision Balancing; Vibration Analysis (ISO CAT I, ISO CAT II and ISO CAT III); Asset Reliability Practitioner courses at advocate (ARP-A), engineer (ARP-E) and leader (ARP-L) levels; as well as WearCheck Practical (English/Zulu), WearCheck Customised and Asset Reliability Practitioner courses.

WearCheck has been an accredited training partner for the internationally-acclaimed Mobius Institute since 2015. Mobius condition monitoring courses are presented at various venues throughout Africa, and many of them have an online option. When booking, please confirm date and venue, as some of these details may change due to COVID-19 restrictions.

For more information or to book a Mobius training course, please contact Louis Peacock on +27 82 4949461 or louisp@wearcheck.co.za.

www.wearcheck.co.za

Boniface Yuwama (second from left) handles sales and technical support for WearCheck Zambia. Here he is conducting training for delegates from Unitrans in Zambia.

Complex breakdown repair of 30 MW generator rotor

Marthinusen & Coutts (M&C) recently repaired the rotor of an aging 30 MW generator, which had failed during operation at Sappi's Saiccor pulp mill in Umkomaas, KwaZulu-Natal. Rudi Els, general manager of the Power Generation & Large Motor facility at M&C tells the story.

Over a period of less than five months, Marthinusen & Coutts (M&C) has performed comprehensive repairs to the rotor of an aging 30 MW generator, which had failed during operation at Sappi's Saiccor pulp mill in Umkomaas, KwaZulu-Natal.

The Jeumont Schneider 31 250 kVA 2-pole generator had been operating in the mill for over 30 years. M&C took delivery of the 12 t rotor at its Power Generation & Large Motor repair facility in Benoni for investigation and repair in August last year.

The scope of work by M&C was monitored and witnessed at hold points by client third party rotating equipment specialist, Sebenzana Consulting, and the Sappi Mill's Regional Head Office Engineers.

The investigation revealed a zero value for the insulation resistance in the rotor, due to arcing having occurred between one of the coils and the coil retaining ring. Severe arcing on the rotor body landing had also occurred. Tests conducted by the investigation team established that the arcing had been caused by negative phase sequence currents.

"In addition, there was an open circuit in one of the rotor coils that had resulted from thermal cycling fatigue, as well as damage to the windings caused by overheating, resulting from the overhang insulation having shifted over time, thereby blocking ventilation access to the windings," says Rudi Els, general manager of the Power Generation & Large Motor facility at M&C.

The repair procedures carried out on the rotor to enable the generator to be returned to service in the mill included:

- Complete rewinding of the rotor using new locally-manufactured windings to replace the old. The rewinding process, which included brazing a total of 2 500 joints, took four weeks to perform, working double-shifts throughout that period.
- Manufacturing two new coil retaining rings (CRRs) by a reverse engineering process, including drilling 132 ventilation holes in each. "These were made of forgings that we arranged to have manufactured in Germany according to our specifications. Our sister division ACTOM Turbo Machines then machined the forgings and drilled the ventilation holes in the CRRs," Els explains.
- Designing and manufacturing a damper winding for the rotor to prevent any recurrence of arcing on the rotor body landing and on the CRRs. The rotor had not originally been fitted with a damper winding. "The introduction of a damper winding meant we also had to drill ventilation holes in the damper circuit to line up with the CRRs' ventilation holes," said Rudi.

The rotor damping circuit winding was designed by Sebenzana Consulting and fabricated by M&C subcontractors.

The repair process was concluded by performing a high-speed balancing procedure on the rotor. It was returned to the Sappi plant a week before Christmas last year and recommissioned at the plant on Christmas Day.

"This once again demonstrates M&C's widely-recognised capability to perform complex repairs in quick time," Rudi concludes.

www.mandc.co.za

Sappi's 30 MW generator rotor undergoing dimensional checks in M&C's 140 t precision lathe that can handle 40 t work pieces that are 11 m long with a swing of 3.2 m.

A new benchmark for filtration

Pratley Marketing Director Eldon Kruger, talks about the new company's Percolite® filter aid, a new benchmark for a host of food-grade and industrial fluids.

The fundamental problem posed by traditional filtration is how to maximise clarity and flow rate, which are two desirable yet conflicting parameters. Percolite® filter aid from Pratley achieves just that, says Pratley Marketing Director Eldon Kruger. "The accurate size classification and the unique structure of Percolite® filter aid leads to one of the highest flow-rate to clarity ratios possible," he says.

Percolite® is a natural product, which means no taste, colours or odours are transferred to the filtered product. Due to its low density, Percolite® has a high flow rate combined with exceptional clarity. Percolite® can be used with oils, wine, fruit juices, pharmaceuticals, chemicals and industrial filtration applications.

"From experience, current filtration mediums can easily be switched to Percolite® without impact on the performance of the process," says Kruger. This is particularly true for customers converting from Diatomaceous earth filter aids to Percolite®.

Apart from the health hazards and high prices associated with Diatomaceous earth, customers who have converted to Percolite® observe lower pressure differentials across their filter cake, ultimately translating to higher production outputs. Percolite® densities are also in the region of 50% less than Diatomaceous earth. The cost-saving when converting to Percolite® is therefore significant.

Pratley has a state-of-the-art filter aid production facility that is among the most advanced on the African continent, where proprietary technology is used to processe Perlite raw material to produce the high-quality filter aid using an ISO 9001-2015-certified manufacturing process.

Percolite® meets the standards listed in the food chemicals codex published by the US National Academy of Sciences and is a Halaal certified product. Pratley is also a member of the International Perlite Institute.

An advanced R&D laboratory supervises the quality control of the final product and ensures stringent quality control. It also allows Pratley to thoroughly analyse customer liquids to recommend the most suitable Percolite® grade for the job.

Grades can be manufactured and tested to meet customer requirements and Percolite® applies to almost any industry requiring fine liquid/solid separation.

Pratley's Percolite® filter aid is ideal for use in brewing applications.

Pratley has supply depots located in Gauteng, Cape Town, Durban and Port Elizabeth offering countrywide sales and support. The product is professionally packed and supplied in food-safe packaging.

www.pratleyminerals.com

Pumping innovations from Verder Pumps South Africa

MechChem Africa talks to Darryl MacDougall, Managing Director of Verder Pumps South Africa, about recent innovations: the newly designed Verderflex Dura 65 peristaltic hose pump; the Verderair e-PURE electrically driven double diaphragm pump; and the addition of JABSCO Rotary Lobe pumps for the food, beverage and pharmaceutical markets.

While Verder Pumps South Africa (VPSA) is a sub-division of the global Verder Group company, Verder Liquids, the local entity has played a key role in the development of the company's products, most notably its Verderflex Dura range of peristaltic hose pumps for the mining and minerals processing industries.

"Just to take you back in history a little, Verder Pumps South Africa was instrumental in developing the Verderflex Dura pump range, up to and including the Dura 55," begins MacDougall.

"Daan Louw of Verder SA was instrumental in assisting the factory in the United Kingdom to design the Verder Dura range so that it met typical mining requirements here in South Africa. In addition, our previous South African Marketing Manager was the originator of the Dura name and she was given the responsibility of launching the VerderFlex Dura pump range into Europe.

"So VPSA played a key role in one of the global group's flagship products."

In recent months, Verder has launched an upgraded Dura 55 HF, which has a slightly larger internal hose diameter that drops the pressure a little to give a better flow rate. "This is a new hose combination rather than a new pump design, and this pump remains essentially the same as the one developed using Daan Louw's input," MacDougall says.

Earlier this year, however, a completely redesigned Verderflex D65 was launched, which is the latest evolution of the Dura range and will soon replace the Verderflex VF65.

Verderflex Dura 65

Verder's new D65 peristaltic hose pump has exactly the same footprint as its predecessor, but offers 20% better flow rates, and this has been achieved by lengthening the swept volume of the hose. "The internal geometry has been changed so that the shoes make contact with the hose 20% earlier, which results in 20% more volume being pumped through the hose per stroke," explains MacDougall. "We've also changed the gearbox and rotor mounting so the gearbox no longer carries the full rotor load. We have done this by adding an internal bearing and bearing housing to fully support the rotor that drives the shoes around the peristaltic hose. We have also changed the drive shaft sealing arrangement so that, should a hose burst, the slurry being pumped is prevented from entering the pump's gearbox," he explains, adding that this improves the lifespan of the gearbox and solves a problem that has long been associated with all peristaltic pumps.

"The design change also enables us to easily replace the gearbox with a smaller gearbox, for lighter dosing duties, which was not possible on the previous version," he continues.

The new design, which uses the same hose as the VF65, also extends hose life by 20%, resulting in downtime and maintenance cost advantages. "Through better all-round engineering design, the D65 delivers much better pumping performance at lower than ever costs of ownership," argues MacDougall.

Other new design details include: an access hatch to clean the hose track; a lifting eye on the front plate to make the unit safer to work on; a ball valve on the drain port; and an angled metal filling port for the glycerine hose lubricant. "These small improvements all deliver operational advantages without impacting value for money," he tells *MechChem Africa*.

He further reveals that the success of the D65 development is being followed up by the replacement of the VerderFlex VF80 pump with the Dura D80. All the same advantages will be offered at a higher flow capacity, with the new D80 using the same hose sizes as the VF80.

Another novel Verder solution in the pipeline that hasn't yet been released to the market is the Verder DS5000 tube pump for precision dosing. "This will target minerals processing markets where accurate quantities of reagents such as flocculants need to be added for applications such as underflow thickening or flotation," notes MacDougall.

The Verderair e-PURE diaphragm pump

On the diaphragm pump side, MacDougall says a new Verderair e-PURE electrically driven double diaphragm pump has also just been released. "We have long been a specialist in air operated diaphragm pumps, but this version is electrically operated. It means that an air supply is not needed for operation, which improves reli-

The completely redesigned Verderflex D65 – which has the same footprint and uses the same hose as its predecessor, the VF65 – offers a 20% better flow rate while also extending hose life by 20%.

ability and reduces running costs significantly."

"We call these 'PURE' pumps because the wet-end is manufactured from pure materials chosen for their temperature, abrasion or corrosion resistance: pure polypropylene or PTFE, for example. The pure materials are also very easy to clean as they tend not to get impregnated with slurry media," he says.

On the new Verder e-PURE pump, the ball check non-return valve typically used on diaphragm pumps has been replaced with a flapper valve, which is better for pumping slurries or media containing solids. The biggest pump in this range can handle 100ℓ/min (6.0 m^3/h) and there are material options for a number of exotic liquids.

Citing an early success, MacDougall says four of these pumps have been sold to a copper processor in the Congo to pump sulphuric acid wash-down waste from a sump. "In this application acid spillage from delivery vehicles is washed down into a sump. Our e-PURE pumps are being used to transfer this toxic slurry into waste collection vehicles. The highly corrosive acid can get extremely hot due to the exothermic reaction with the washdown water, and it also picks up grit, which makes our new e-PURE solution with its flapper valve and PTFE contact material an ideal pump for the task," he tells *MechChem Africa*.

JABSCO rotary lobe pumps

In addition, MacDougall points out that Verder recently acquired the JABSCO rotary lobe pump business. "This gives us a stronger offering for the local food, beverage and pharmaceutical markets, where clean-in-place/sterilise-in-place routines are essential for hygiene and food safety.

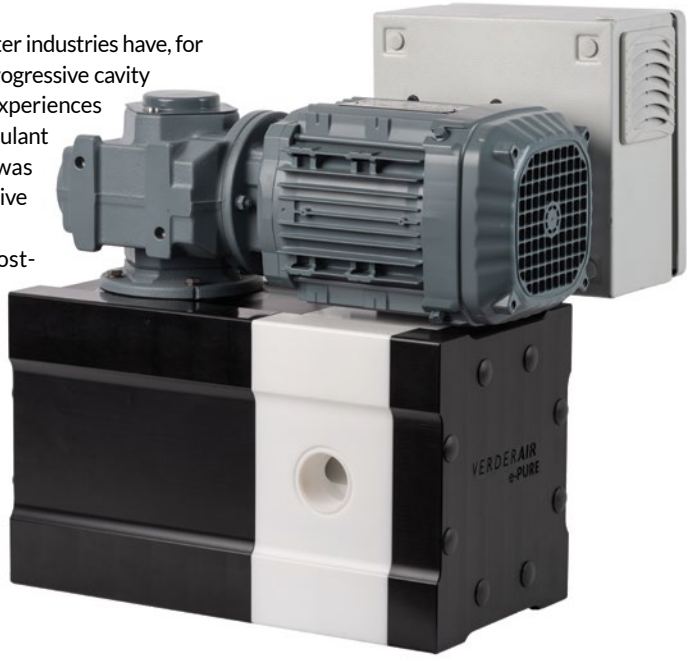
"Rotary lobe pumps are ideal for transferring viscous substances such as peanut butter, yeast and mayonnaise. They are manufactured to hygienic standards using polished 316 stainless steel and we can offer various combinations of mechanical seals to cater for a wide range of media types," he notes. Looking at future growth potential, MacDougall points out that the water and wastewater industry could benefit significantly from Verder's dosing experience in the mining and minerals processing industries.

"To add reagents to thickeners and clarifiers, the water and wastewater industries have, for many years, relied on progressive cavity pumps. We have had experiences where 15% of the flocculant being used at a plant was being lost in the progressive cavity pump being used.

"By using a small cost-effective peristaltic hose pump, which will prevent flocculant shear just as well as a progressive cavity pump, the cost of maintenance will reduce significantly, dosing accuracy will improve and the amount of wasted flocculant will decrease dramatically," he suggests.

"Using our pumps, we can far more efficiently manage dosing applications at wastewater plants, just as we do on the Copper mines in DRC where we have racks of Dura 25s being used to dose reagents at massive flotation plants. We have the modern solutions that wastewater treatment plants need, and it is a business area we are very interested in growing," MacDougall concludes.

www.verder.co.za



The new Verderair e-PURE electrically driven double diaphragm pump has also just been released.

On the copper mines in DRC, racks of Dura 25 hose pumps are being used to dose reagents at massive flotation plants. These pumps can also far more efficiently manage dosing applications at wastewater treatment plants.

Full water management offering from **Weir Minerals Africa**

Weir Minerals Africa's product and service offering aims to assist mines to reduce their overall water consumption while optimising usage requirements.

Optimising water usage is a priority for Weir Minerals Africa. It is an area that can often be overlooked but contributes significantly to a mine's Environmental Social and Governance (ESG) drive as well as its bottom line. "Our product and service offering aims to assist mines to reduce their overall water consumption while optimising their usage requirements," says Marnus Koorts, pumps general manager.

He says that when assisting a mine with its water requirements, Weir Minerals Africa's starting point is to gain an understanding of the mine's often unique challenges: for example, seepage in unknown areas and water accumulation. "An evaluation of the site often reveals unexpected outcomes and enables us put together a tailor-made solution designed to integrate into existing infrastructure and resolve the problem areas," he says.

Koorts' colleague, Christian Stehle, who is head of engineering at Weir Minerals Africa, emphasises that the delivery of such solutions is generated in collaboration with the company's in-house engineering team, an offering few OEMs provide. "When dealing with water it is important to understand that it is a dynamic situation where changes can be frequent. Our team understand this and knows how to manage it with the support of our extensive product range."

So strong is Weir Minerals' engineering capability that it has coined the term 'engineered to order', a phrase that demonstrates its focus on delivering customised integrated solutions.

The company designs and engineers a full range of dewatering pumps and equipment under well-known brands Multiflo®, Warman®, Envirotech® and GEHO®, which are suitable for any dewatering, drainage or water transfer application, providing optimum pumping performance in the most arduous conditions in applications all over the world.

These dewatering pumps are part of Weir Minerals Africa's extensive range of mine and dewatering products, including Cavex® hydrocyclones, Enduron® dewatering screens, speciality Linatex® hoses, Isogate® valves, and tailored Multiflo® pontoons and barges. Following a partnership agreement with Andritz, the company also offers the Isodry® brand. This incorporates a range of equipment that has been specifically developed to deliver first class solid-liquid mechanical separation for the mining and aggregates industries including thickeners, filter presses, centrifuges and vacuum belt filters.

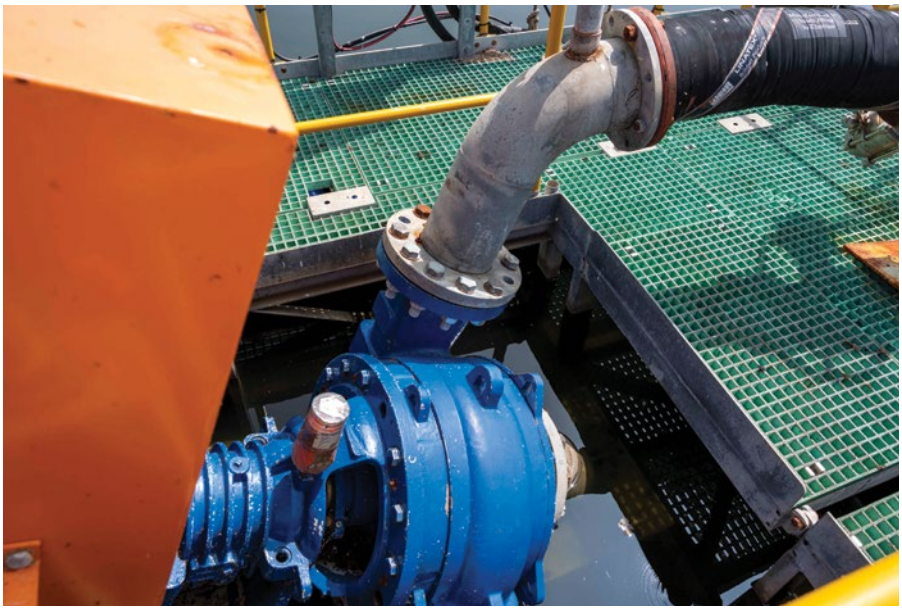
Both Stehle and Koorts confirm that Weir Minerals Africa, together with all Weir Group companies, have, are and remain invested in technology – because this, too, assists with any sustainability drive, particularly when used in conjunction with water management solutions.

A prime example of the company's dedication to providing technology-driven solutions is Synertrex®, an intelligent analytics platform that can easily be integrated into existing systems.

It helps operators to understand wear rates, forecast replacement-part timing and assists in making decisions to improve overall efficiency without unexpected downtime.

www.minerals.weir

Weir Minerals offers engineered to order pontoon barges to suit its customers' dewatering requirements.



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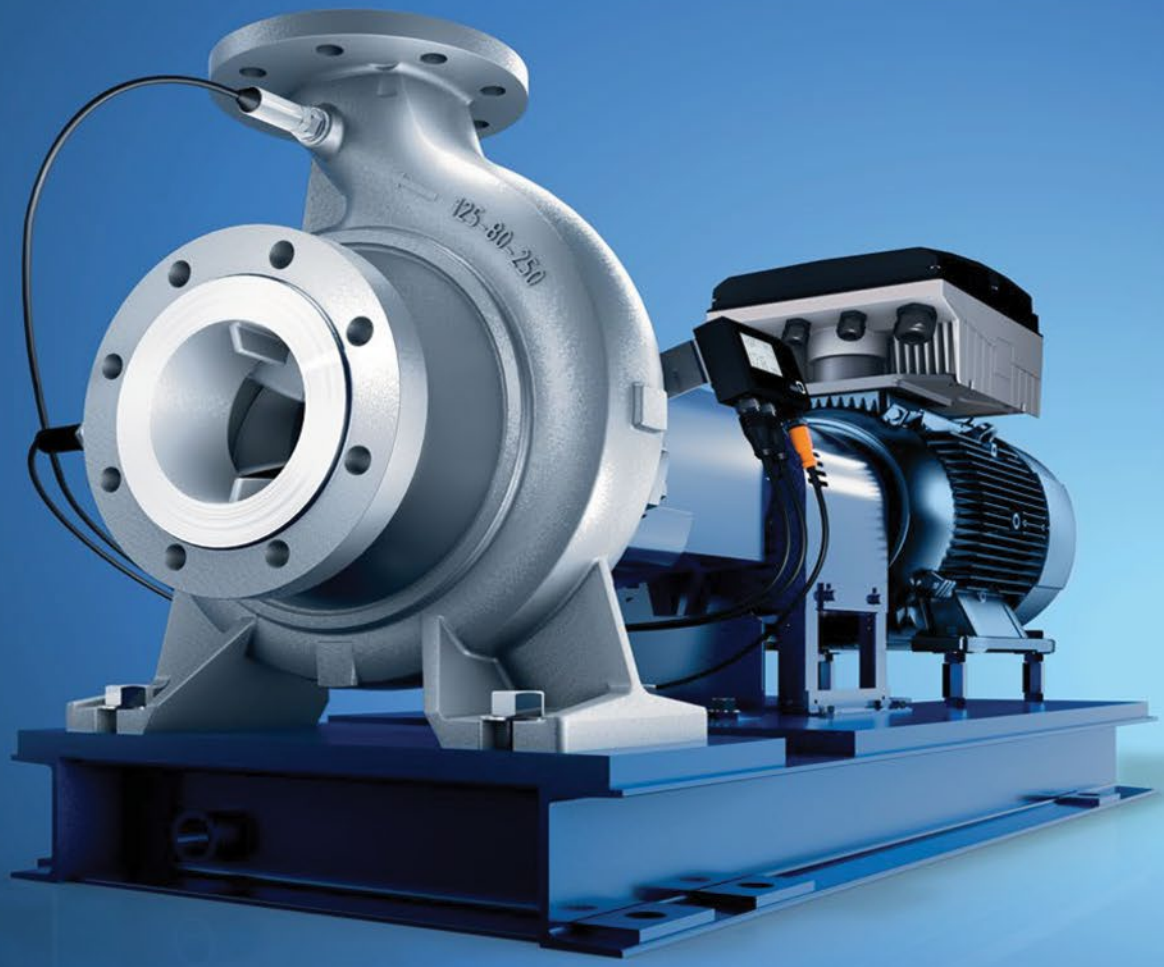

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IPT gets pumps and support closer to customers

Revamping its distributorship base in recent years has given submersible pump specialist Integrated Pump Technology a solid foundation to support customers around sub-Saharan Africa. A key focus has been on mining areas, and the expansion has included new distributors in a number of southern African countries.

Strengthening its distributorship footprint since 2014, Integrated Pump Technology today has a network across sub-Saharan Africa to assure customers of the supply and services they need.

According to Jordan Marsh, general manager at Integrated Pump Technology, the company focuses heavily on the mining sector so has chosen its distributors mainly from local firms with strong links to mines. Integrated Pump Technology is perhaps most well known as the distributor of the tough Grindex submersible pump range.

"It has been an exciting couple of years for us, in which we have appointed new distributors in Zimbabwe, Namibia, Zambia and the Democratic Republic of Congo (DRC)," says Marsh. "We have also added to our network a distributor for the Klerksdorp gold mining region, that will cover Welkom and the Free State area."

This accelerates the response time to customers, with distributors carrying a stock of basic spare parts and liaising directly with a key account manager from head office for technical and marketing support. The careful choice of distributors has ensured the right skills are available to help customers select and operate the optimal pump for the task.

"We provide our network with in-depth training on our specific products, and ongoing advice and guidance wherever they need it," he says. "Our collaborative strategy also means that a key account manager will regularly accompany distributors on their visits to the end-customer."

Marsh highlights that customers should feel well supported by both the distributor and the OEM, to be confident of optimal uptime and performance from their pump fleet.

Manufactured in Sweden, Grindex pumps are used in tough environments such as mining, construction and marine applications.

Integrated Pump Technology's overall network comprises 14 distributors to cover the main geographic areas of activity, with certain very busy mining areas – such as the Northern Cape and Rustenburg – being served by more than one.

www.pump-technology.com

Pump station failure calls for rapid dewatering response

There was no time to lose when dewatering specialist Integrated Pump Rental recently took a call from a long-standing customer; a vital pump station had gone down and they needed help urgently.

"The customer's pump station was being refurbished, and its two pumps unexpectedly went down," recalls Andre Strydom, rental development manager at Integrated Pump Rental. "These pumps performed a critical function for the customer, maintaining a constant flow of 200 m^3/h per pump over a one kilometre distance."

What was required was an urgent water bypass solution to take over this duty while the in-situ pumps were attended to, enabling the pump station refurbishment to go ahead. Within a day of the customer's call, the nature of the application had been assessed and the quotation sent out. This was quickly followed up with the despatch of Integrated Pump Rental's dewatering solution to site, where its pumps were rapidly commissioned.

"Having taken the call on day one, we had the pumps selected, delivered, commissioned and operational by day two," says Strydom. The solution included the deployment of two diesel driven Allight Sykes high head dewatering pump sets, providing bypass water lines. These rental pump sets operated 24 hours per day to maintain the required flow rate through the pipelines.

Integrated Pump Rental selected, delivered, commissioned and had two Allight Sykes dewatering pump sets to provide bypass water lines at the customer's pump station.

"One of our primary advantages is that we can react with speed to our customers' emergency dewatering situations," he says. "This is because we operate a large and varied fleet of diesel driven dewatering pump sets, which are capable of dealing with different sizes of applications – each with its own operational requirements and site conditions."

The two high head dewatering rental pumps remained on site until the pump station was completed and commissioned.

www.pumprental.co.za

SEW-EURODRIVE delivers for WWTP upgrade

A Wastewater Treatment Plant (WWTP) in the Western Cape is undergoing a R1.7-billion upgrade. Currently treating 72 Mℓ/day, the new plant will be more reliable and efficient with a further 18 Mℓ/day of additional capacity. Willem Strydom, sales manager, highlights SEW-EURODRIVE's contribution to the project.

The Western Cape's wastewater treatment plants (WWTPs) are being upgraded as part of a broader global initiative to fight pollution in the world's oceans. The 26 plants involved were built in back in the 1950s and 60s and are in dire need of modernisation. The plants are all to be expanded and rehabilitated as part of a €2.0-billion investment in the Province's water infrastructure.

"At one of the largest of these plants, a mostly brand-new modern waterworks is being constructed that not only prevents routine overflows of untreated sewage into the sea, but is also more modern, energy efficient and reliable," says SEW-EURODRIVE sales manager Willem Strydom.

According to Strydom, SEW-EURODRIVE's product portfolio of industrial gear units has been widely specified for use by several of the contractors on the project, "but our direct role is for the supply of 20 units for each of the new aeration tanks on the plant."

Aeration, he explains, is the fourth stage of the treatment process. "The first stage involves bar screening, which removes large pieces of debris and solid objects. A further screening stage then removes finer solids, before the water is passed into primary clarifiers, which remove both inorganic solids floating on top of the water and those that settle to the bottom of the tank.

"The wastewater, which now contains mostly fine organic matter, is then passed through a bank of aeration tanks, where oxygen and activated sludge combine to 'consume' the organic contaminants in the water, converting them into carbon dioxide and water," Strydom explains.

Once the water has passed through a series of aerators, it looks as clear as drinking water, but still contains fine suspended solids, so the water is passed into a secondary clarifier.

Coagulants are added to bind the particles, which then settle leaving relatively pure water at the top of the tank. "From there, the water goes through stage six for chlorination and disinfection and, after testing and analysis, it can be safely discharged or recycled," he adds.

SEW-EURODRIVE MC Series drives

"For the aeration drives for this WWTP upgrade, we were approached by one of our local treatment plant OEMs back in 2018. Through this OEM, we are supplying 20 units and, while these are not complete turnkey solutions, we are assembling them as pre-engineered drives with the gearboxes, motors and couplings mounted onto custom-designed baseplates, so that, once onsite, it is very easy to couple each drive to the aeration impeller," he continues.

At the heart of the 20 aeration units SEW-EURODRIVE is suppling are its MC Series range of parallel shaft industrial gear units, which have been specifically designed for aeration and mixing applications. "Of the 20 units, ten are 75 kW units, four are 55 kW and the remaining six are 90 kW drives," he says.

"A key feature of these MC units is their extended bearing distance (EBD), which is purpose designed for shaft loading from agitating, mixing and aerating applications, which transfer very high axial and radial loads back into the gearbox.

"EBD helps to stiffen the shaft to resist these loads, significantly reducing the radial movements seen by the seals, bearings and gears, resulting in better reliability, less wear and longer life," Strydom says.

Other key features of the MC Series include:

- An especially compact parallel shaft design.
- A one-piece, robust mono block, which enables horizontal, vertical and upright assembly.
- An optional 'drywell' seal, which reliably prevents oil leakage from the output shaft.
- Easy customisation with the range's modular concept for achieving optimal gear ratios.
- Additional optional equipment such as motor adapters, belt drives and backstops.

"Following the scare in Western Cape in 2018, when cities in the region were just 90 days away from turning off the taps, municipalities in all provinces are now looking to modernise their wastewater infrastructures. We are currently involved in several of these new opportunities.

"As well as restoring our water quality and security, water infrastructure projects have a lot to offer the South African economy, most notably, investments – and these projects are happening," Strydom concludes.

www.sew.co.za

SEW-EURODRIVE is suppling 20 of its MC Series parallel shaft industrial gear units (inset) for the aeration tanks of an upgraded wastwater treatment plant in the Western Cape.

MULTOTEC'S RAMA: a giant step in precision sampling

Multotec's Realtime Automated Metallurgical Accounting (RAMA™) system brings three sampling disciplines – metallurgical accounting slurry sampling, sub-sampling, and preparation and analysis – into one solution. It promises to deliver significant value by unlocking higher mineral content through improved grade control and recovery, as well as by optimising the consumption of reagents.

Modisaotsile Nyokong, process manager at Multotec.

Willem Slabbert, sampling and magnetics product specialist at Multotec.

With its latest sampling system that aligns with metallurgical accounting standards, minerals processing equipment leader Multotec now offers unprecedented levels of accuracy for effective plant optimisation.

The company's Realtime Automated Metallurgical Accounting (RAMA™) system promises to deliver significant value by unlocking higher mineral content through improved grade control and recovery, as well as by optimising the consumption of reagents. The system essentially brings three sampling disciplines – metallurgical accounting slurry sampling; sub-sampling; and preparation and analysis – into one solution.

"By integrating our advanced samplers with a sample preparation system that meets metallurgical accounting standards, we can feed online analysers with a fully representative and accurate sample," says Modisaotsile Nyokong, process manager at Multotec. "While analysers can be accurate instruments, they cannot provide meaningful results if they are fed with inaccurate samples."

Nyokong points out that the RAMA™ online analysis feed preparation system extracts regular and full sample increments from slurry flow streams according to AMIRA P754 metal accounting standards, the best practice standard for Theory of Sampling (TOS) compliance. This eliminates more than 80% of the total sampling error and allows real time process control to be conducted to the highest standard.

"Samples are extracted from the production flow using automated mechanical samplers, which are Theory of Sampling (TOS) compliant," he says. "This is achieved by taking full cross-cut samples that are representative of the flow stream."

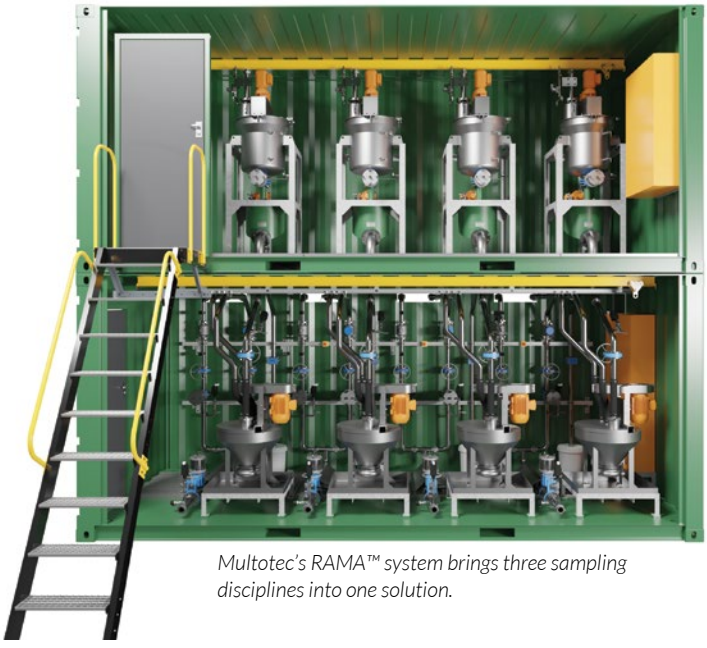
The analysed slurry is therefore unbiased, presenting an accurate reflection of all the key parameters such as particle size, slurry density, settling velocity and mineral grade. He explains that process control samplers – including pressure pipe, poppet and shark fin type samplers – have traditionally been used to feed online analysers. However, these primary samplers do not comply with the TOS, with the result that poorly represented samples are analysed with high levels of precision – which is a futile exercise.

"Our advantage with the RAMA™ system lies with feeding representative samples to online analysers, using correct sampler designs," says Nyokong. "This produces real time results that represent the flow stream and are free of error or statistically significant bias."

Multotec's slurry sample preparation solution prepares and treats each analysis stream in its own line, making it ideally suited to analysers that deal with streams individually – avoiding cross-contamination. Where multiple streams are analysed through the same analyser source and detectors, some cross contamination of streams can occur with different grades or mineral properties. This undermines the accuracy of the result.

Over an analyser multi-stream cycle, the RAMA™ system can collect composite samples for each stream, says Willem Slabbert, sampling and magnetics product specialist at Multotec. This means that the analyser does not measure the instantaneous off-take stream 'sample' from the traditional in-line continuous discharge like process control samplers – which is only done about 30 minutes apart.

"Rather, it measures the performance of each stream through multiple composite samples taken over the 30 minute interval,"

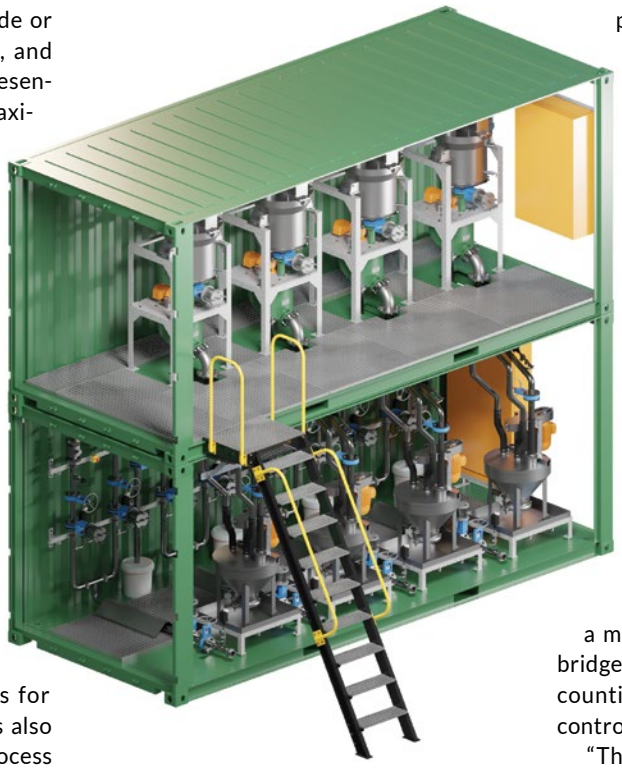


Multotec's RAMA™ system brings three sampling disciplines into one solution.

says Slabbert. "This reduces the grade or quality variability per flow stream, and gives the plant manager a more representative monitoring of minimum and maximum process conditions – with precise values."

The problem with 'snapshot' sampling of process control samplers is that stream properties can fluctuate before and after the analysis. This fluctuation is therefore not captured in the results. By contrast, the RAMA™ system's composite sample accounts for all process variations over the analysis period.

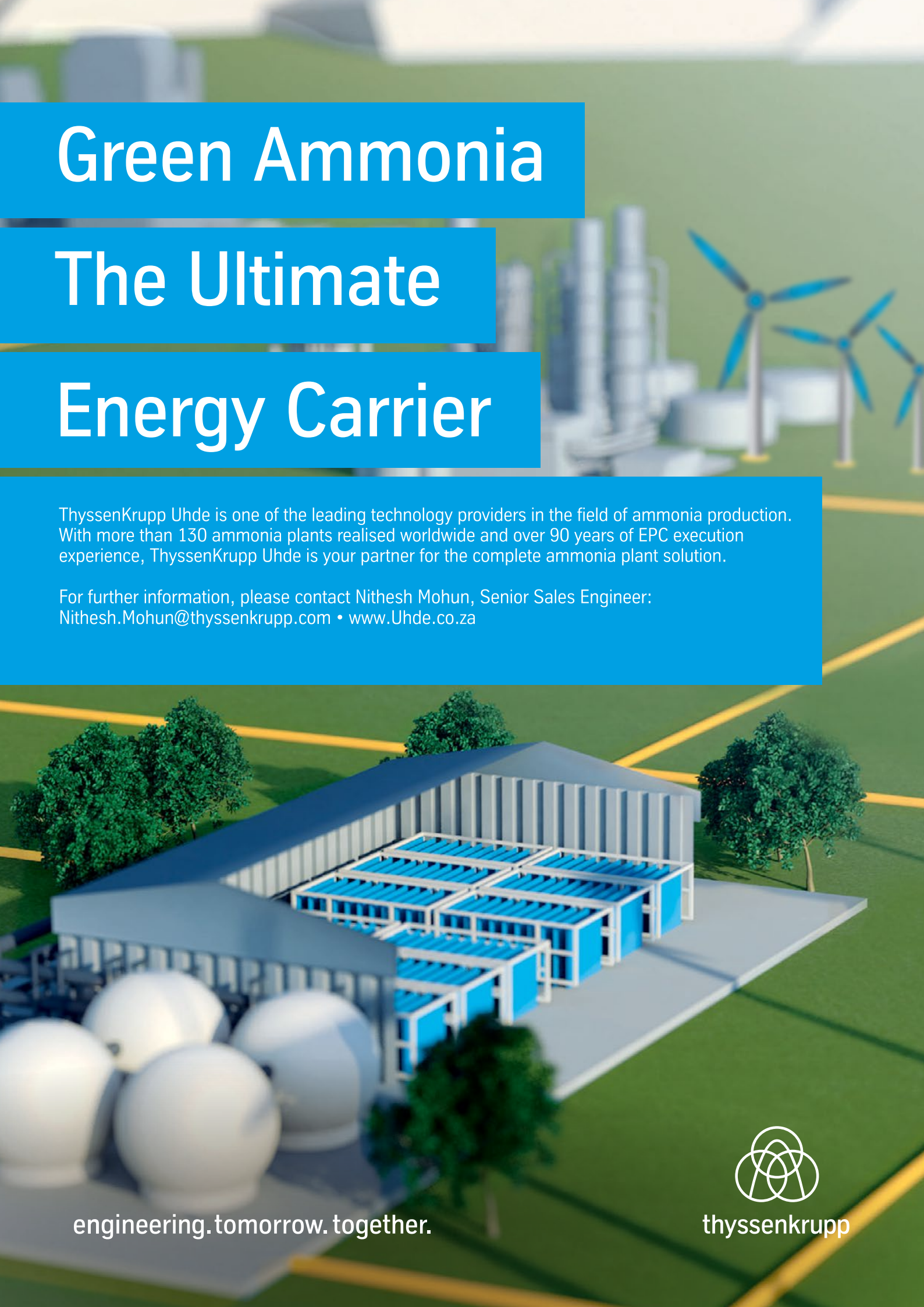
Slabbert reiterates that sample analysis results are only as good as the sample presented for analysis, pointing out that this applies as much to online analysers for process control as it does to conventional laboratory analysis for metallurgical accounting. "RAMA™ is also a cost saving solution, as separate process control samplers are no longer required," he says. "The sampler's purpose in our system is doubled up for both metal accounting and for process control – without the need for any compromise." Configured in a containerised and modular design, RAMA™ is a compact and mobile system. This allows for easy installation and retrofitting into any plant operation – where it can feed any type of online analyser. It can also be readily transported and commissioned, with flexibility for expansion where necessary. Layout options are available for plants which have primary and secondary sampling with subsequent containerised sample preparation stations, as well as for those with primary sampling only and separate secondary sampling preparation. The RAMA™ system allows analysers, for the first time, to be fed with representative samples taken from the production flow stream. The innovative combination of existing equipment with a proven track record into a modular, containerised solution will bridge the gap between metallurgical accounting accuracy and accurate process control.



Multotec's RAMA™ system is a cost-saving solution since separate control samplers are no longer required.

"The advantages of this novel, global best practices sampling combination in process control applications will unlock value in terms of both analyser calibration as well as optimal, dynamic process performance," Slabbert concludes.

www.multotec.com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Kwatani screens support golden opportunity in Namibia

An innovative expansion at a Namibian gold mine is to boost production by 50%, with vibrating screen specialist Kwatani on hand with its world class vibrating screens and feeder solutions. Kwatani is well known in Namibia and has worked with this customer and its EPC contractors for almost three years on the project, ensuring the best possible result.

Namibia's bustling mining scene is seeing an exciting expansion and technological innovation at a leading gold mining operation, with Kwatani supplying five mill discharge screens – all custom designed and manufactured at its Gauteng facilities.

Kim Schoepflin, CEO of Kwatani, says her company has a long history in Namibia and a strong footprint across various commodities there – including an established presence at this gold mine. It has worked with the engineering, procurement and construction (EPC) contractor and the end-customer for two to three years on conceptualising the optimal solution.

"The mine is gearing up to increase its production by 50%, to take advantage of the strong gold price," says Schoepflin. "Our role was to ensure that our discharge screens met their exact process requirements – with efficiencies of up to 95% – while delivering mechanical integrity for minimal maintenance downtime."

The expansion includes the installation of two latest-technology mills – a high-pressure grinding roll (HPGR) and a vertical mill – which will boost production while reducing energy demand. Kwatani's mill discharge screens, each measuring 3.0 m wide by 8.0 m long, will handle the coarse and fine material from the HPGR and the vertical mill, respectively. The company will also supply three silo feeders of 1.2 m by 2.5 m in size, to feed material from the silo to conveyors.

"Our screen design optimises the retention time on the deck, allowing for better screening and stratification," she says. "Due to the volume of slurry and water sprayed onto the screens, the added retention time assists with better drainage at lower cut points."

The single deck Kwatani screens being prepped for final testing before being transported to site.

The coarse screens were designed at a decline, and feature a larger screening media aperture with higher amplitude and stroke. Together with lower speed, this achieves better screening efficiency for the coarser particles. The fine horizontal screens, with smaller aperture screening media for the finer feed, were designed with a higher speed and lower amplitude and stroke; this will optimise the screening efficiency of the finer feed to these screens.

She also highlights the attention paid to the isolation of the vibrating screens. In this case, Kwatani engineers selected rubber buffers, which have higher dynamic loads but are more suited to wet applications and screens with a heavier mass.

"The number and type of buffers were defined according to the mass of the screens," says Schoepflin. "The selection of rubber buffers for larger screens also assists with start-up and shutdown time, allowing the screens to come to rest more effectively."

For these five screens, Kwatani designed and supplied custom counter-balance frames to minimise the dynamic load to the plant infrastructure. The company's screen technology includes designing its exciters in-house. This ensures that screens receive the necessary G-forces for optimal material stratification and screening, matching customers' process requirements with the best possible efficiencies.

"To make sure our screens cope with the high capacity demands of modern processing plants, we rigorously test all units in our in-house testing facility before dispatch," she said. "These units began their journey to Namibia at the end of November 2021, and our team will support the commissioning when the customer requires."

www.kwatani.co.za

Zondereinde project showcases state-of-the-art

Master Drilling CEO, Danie Pretorius, talks about his company's recent success in completing the world's deepest raised-bore shaft construction project.

With over 140 raise boring rigs operating in over 20 countries across the world, Master Drilling is considered to be the world leader in this technology.

On April 26, 2022, Master Drilling hosted an event at Northam Platinum's Zondereinde mine to celebrate the final breakthrough of the new 4.8 m diameter, 1 380 m mine shaft – the world's deepest raised-bore shaft construction project ever completed.

Danie Pretorius, Master Drilling CEO and a mechanical engineer, started this business in 1986 with a key focus on raise boring of mine shafts and related services. The first of Master Drilling's self-designed raised bore drilling rigs came into operation in South Africa in 1988 and its first world record was established in 2012 with the 1.07 km pilot hole at Lonmin for a 5.5 m ventilation shaft; and today, with over 140 raise boring rigs operating in over 23 countries across the world, Master Drilling is considered to be the world leader in this technology.

At 1 380 m deep, Shaft 3 at Zondereinde, a PGM mine in Northam in the Limpopo Province of South Africa, has now set a new world record for the longest and most directionally accurate raise bore shaft ever drilled. "Never before in the history of the world has a 1 380 vertical shaft been raised bored. So that was something significant for us at Master Drilling," says Danie Pretorius.

Key to this success is the accuracy achieved, which is all down to the pilot hole that deviated by less than 140 mm from a true vertical line across its entire depth, a miniscule amount. Completed back in July 2020, this first stage of the project set its own world record for raised bore pilot drilling.

"Another key Zondereinde success was the timing. We finished the project within budget and within the planned timeframe, which is a remarkable achievement for such a lengthy project. This should be ticking a lot of boxes for future miners all over the world seeking to explore and access new ore bodies or to economically establish ventilation shafts," he adds.

In terms of costs, Pretorius points out that a shaft of that size and depth would take the best part of five to seven years to construct using conventional shaft sinking, drill and blast methods. Using the raised bore technique, the time was slashed to just two years seven months (31 months), costing less than 15% of that estimated for shaft sinking using drill and blast construction methods.

"With respect to safety, time, and costs, this was a remarkable achievement, and we are sure that a number of mining houses will be looking at this closely before making decisions about new large diameter, extra-long raised bore mine shafts," he notes.

Digital initiatives

Pretorius also points out that Master Drilling continues to seek ways of keeping abreast of modern innovations. "We have also recently invested in two companies in the digital space: AVA Solutions and the A&R Group. These companies have nothing to do with what we have been doing for the past 30 or years, but we thought we needed to align ourselves to today's digital world to support where the mining industry is going with respect to big data and AI," he says.

A&R Group specialises in intelligent digital safety devices and management systems such as tracking and proximity systems for un-

Master Drilling CEO, Danie Pretorius, at the breakthrough event at Northam Platinum's Zondereinde PGM mine celebrating the completion of the world's deepest raised-bore shaft construction project.

derground rail and trackless equipment, while AVA Solutions (AVA) is a specialist in data-driven mining fleet management solutions. AVA's low-cost Software as a Service (SaaS) platform is currently being used to analyse and track load and haul vehicles across 28 different sites in five countries.

"Safety is the critical aspect of underground mining success and the use of software, AI and big data for proximity detection, condition monitoring and production efficiency are fast becoming key aspects to improving this industry.

Pretorius concludes: "Using state-of-the-art solutions such as these, we at Master Drilling are proudly supporting our clients' unique needs with in-house designed and manufactured equipment, which we support with ever advancing training, tracking and maintenance capabilities."

www.masterdrilling.com

At 1 380 m deep, Shaft 3 at Zondereinde in the Limpopo Province of South Africa has set a new world record for the longest raise bore shaft ever built.

Alternative energy solutions crucial for future of mining

Mining is a power-intense industry. And because sites are often in remote areas, the potential shortfall of available grid power introduces further complexity into operations. This has resulted in mines relying on fossil-based fuel sources such as diesel or coal, while supplementing these with massive on-site diesel generators. "To counteract the high cost and environmental impact of these traditional approaches, there is a rising interest in adopting hybrid energy solutions, "says Dinesh Buldoo, director of Power at WSP in Africa.

He says that mining companies across Africa are looking to invest in standalone or micro-grid hybrid power solutions that incorporate some form of alternative energy resource, such as gas or renewable energy options like solar or wind to address off-peak demand. "These enable mines to address the risk associated with grid power interruptions or find a workable solution where grid power access is not available. They can also offset the unstable costs and risks associated with their reliance on and access to diesel," says Buldoo.

"At a time when the focus is on ESG (environment, social and governance), using hybrid power solutions can also see mines positively contribute to the carbon reduction of their operations," he adds.

The benefits of adopting renewable energy resources in hybrid power generation solutions are clear. For one, they are a cleaner fuel source. Environmental pollution from solar or wind energy is far lower than technologies that rely on combustion of fossil fuels.

They are also more sustainable. As long as the sun shines and the wind blows, the energy produced can be harnessed to send power across the grid. "Simply put, renewable energy resources are cost effective. With constant developments and advances in the technology, the upfront capital investment to build a solar or wind farm is becoming increasingly affordable," argues Dinesh Buldoo.

Renewable power plants can be deployed close to the source of demand through micro-generation. This also means that the renewable power plant will feed the mine with the power supply that it needs for its operations and at a locked-in price.

"Mining companies are under immense pressure to address climate risk by reducing greenhouse gases and the impact of their operations on the environment. By adopting alternative power solutions, mining companies will not only be in a better position to secure their supply but, by integrating cleaner alternative energy sources, also support decarbonisation strategies and therein meet the mine's ESG commitments," he notes.

Adoption is still in the early days, but it is gaining traction, he continues. "In Chile, for instance, BHP, Anglo American and Antofagasta Minerals have all asserted their plans to power their local operations entirely from renewable resources. Brazilian mining company Vale has committed to reaching 100% renewable self-generation by 2025 in Brazil, and 100% of renewable electricity consumption globally by 2030," he says.

Africa still has some way to go before the trend becomes mainstream but, as more multinational operations roll these solutions out as part of their transition plans, it is only a matter of time before mines in Africa starts embracing this as well.

Additionally, hydrogen as energy storage and clean hydrogen technologies can help the major electricity systems and domestic sectors to decarbonise. Heavy vehicles powered by hydrogen fuel cells could meet the increasing demand for zero emissions transport, with the advantage of long range, rapid refuelling and moderate costs. Replacing natural gas with hydrogen could in many cases decarbonise direct combustion at less cost than electrification.

"One of the biggest business opportunities for renewable energy is certainly off-grid mines. This holds potential to reduce pressure on national and regional grids. Where mining sites are in very remote locations, renewables offer more cost-efficient solutions to establish independent power plants and micro-grids that can feed the mine with the power supply it needs – as well as potentially supply power to communities and small industries in the surrounding areas.

"Ultimately, mines can ill afford to continue with the energy status quo. They must embrace cleaner, alternative energy sooner rather than later if they are to ensure the longevity of operations within the current pressurised ESG environment," concludes WSP's Dinesh Buldoo. ❑

Dinesh Buldoo, Director for Power at WSP in Africa.

SA research on new ways to refine zinc

The Africa Desk of the International Zinc Association (IZA) has secured funding from Vedanta SA and Duferco Steel Processing for research on new clean, green and low-energy zinc refining, which may result in a new zinc refinery in the Saldanha Bay IDZ.

The International Zinc Association (IZA) Africa Desk is tasked with revitalising the zinc industry in South Africa by increasing awareness and benefits of zinc and its applications, ultimately to increase uptake. As part of this mission, the Africa Desk has secured significant research funding to investigate the feasibility of new zinc refining processes to meet South Africa's own demand for refined zinc, whilst using locally produced ore and concentrates.

Should the research develop a winning chemical engineering solution, then an ideal location for a new zinc refinery could be Saldanha Bay, which is an Industrial Development Zone (IDZ) on the doorstep of a zinc ore export port and close to a big refined-zinc user.

"The funding has been secured from within South Africa. The sponsors are very keen to see that we can develop our own capability within South Africa to produce special high-grade refined zinc and, at the same time, support a fundamental chemical engineering research and developing postgraduate programme," reports IZA Africa Desk spokesperson Simon Norton.

Two industrial sponsors are participating in the project, namely Vedanta South Africa, an IZA member, and Duferco Steel Processing, which galvanizes steel in Saldanha Bay. "We are very proud of these future-thinking sponsors. Not only are they supporting fundamental research in South Africa, they are also supporting a 'green' future for minerals processing," emphasises Norton.

The research will focus on developing and understanding novel refining processes to significantly reduce the external power input compared to traditional pyrometallurgical processes. This will allow for economically viable production of special high-grade (SHG) refined zinc. Ore beneficiation may be further maximised by producing refined by-products such as silver and rare earth elements. "The proposed operation will also have a considerably reduced carbon footprint," adds Norton.

The research work will be carried out at the University of Cape Town (UCT) in its state-of-the-art Department of Chemical Engineering under the leadership of Professor Jochen Petersen. In its proposal, entitled 'Concept and prefeasibility study of a small-scale zinc refinery in South Africa considering novel processes', UCT notes that the development of a small-scale, relatively simple and energy-efficient process to recover zinc from polymetallic local concentrates 'is a considerable challenge, given the limitations of existing processes'.

The research will be carried out at UCT's Department of Chemical Engineering under the leadership of Prof Jochen Petersen.

In support of this 'back to the drawing board' approach to novel development processes that have never been commercialised to date, IZA Africa Desk launched its campaign for research funding in 2021. The exciting news is that Vedanta South Africa will sponsor a desktop study of a wide variety of zinc processes, while Duferco Steel Processing is funding laboratory-scale research on zinc process chemistry.

According to the research team, the experimental study will carefully explore the in-principle feasibility of a novel flowsheet for refined zinc production and by-product recovery from local ore concentrate materials, with the express emphasis on reduced and/or renewable energy input, as well as reduced carbon and environmental footprints.

The driving force behind the research goes back to Exxaro's Zincor refinery on the East Rand, the only one of its kind in South Africa, which was closed down in 2011. Its yearly production of 117 000 tons of refined zinc was entirely for local consumption by hot dip galvanizers and continuous wire and sheet galvanizers. Applications ranged from shopping centre roofing to underground mining steel structures, structural steel, railway pylons and fencing. Despite Zincor's output, South Africa still had to import 10 000 t to 20 000 t of additional refined zinc for the country's galvanizing requirements.

Prior to 2011, South African consumption of refined zinc peaked at over 130 000 tons per annum. However, this has now plunged to only 47 000 t in 2020, a significant drop that Norton attributes to a decline in mining, construction and industrial activity in the country. "IZA Africa Desk is thus working hard to get the use of refined zinc growing again in South Africa," says Norton.

Recently, South African galvanizers experienced a severe shortage in the refined zinc supply due to four zinc refineries in Europe closing down. "The situation is compounded by the fact that base metal traders worldwide are selling zinc to Europe at inflated prices, rather than to South Africa at normal market prices," notes Norton.

New zinc process chemistry is critical for investment in zinc refining in South Africa to support the government's mooted R100-billion Infrastructure Plan. "We have an unreliable power supply in South Africa and urgently need to find novel low-power methods to refine zinc. This also means we have to harness our local research teams, develop our own expertise, and hopefully come up with a zero power 'green' zinc refining process," concludes Norton.

www.zinc.org

A customised Bonfiglioli mining solution for flotation cells

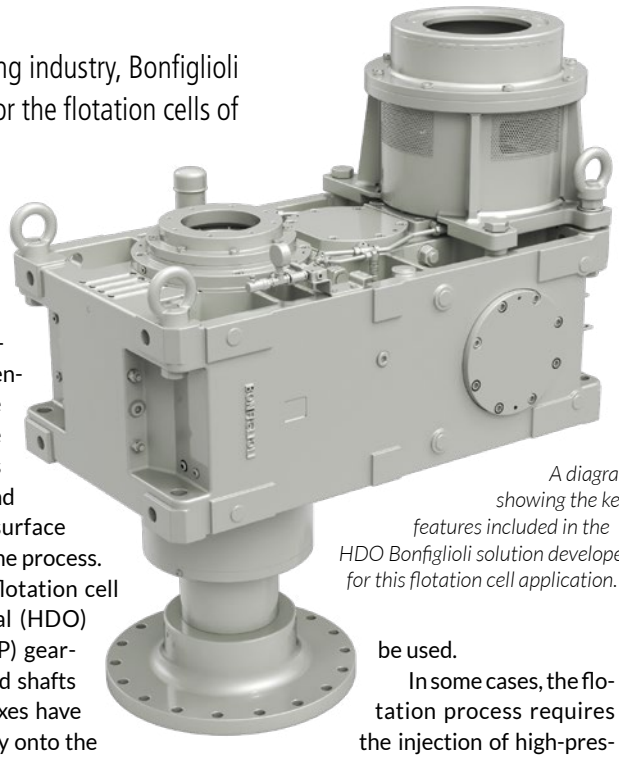
As an example of its customised drive solutions offering to the mining industry, Bonfiglioli has recently developed and installed a purpose-built impeller drive for the flotation cells of a local mine's processing circuit.

Bonfiglioli is very active in the global mining industry and, as a result of various product developments, has built a solid reputation over time in this sector. The specialist drive systems company offers a wide range of solutions from its range of planetary, right angle bevel-helical and parallel shaft helical series gearboxes for mining applications.

Mining, by its very nature, is a tough environment and mines are often situated in extremely remote locations, which demands that very reliable equipment that is up to the task at hand, is offered. For this reason, Bonfiglioli's commercial and technical departments work very closely with OEM partners to identify their needs for a particular application. In addition to the conditions of the location where the equipment is to be operated, an in depth study of the machine application is a prerequisite.

A recent project involving flotation cells is a typical application where a partnership with a multinational mining OEM resulted in the development of a drive system solution that optimises the performance of the client's minerals recovery operation.

Flotation cells consist mainly of a large tank where an impeller keeps a water and material slurry in suspension at high speed. The use of specific chemical reagents and the possible addition of air into the mixture enhances the separation of the ore from the liquid slurry. The ore creates foam that floats to the surface of the tank and is then extracted from the surface and sent to the next step of the process. The agitating impeller of a flotation cell requires either bevel helical (HDO) or parallel shaft helical (HDP) gearboxes with vertical low-speed shafts to drive them. These gearboxes have the impeller mounted directly onto the output shaft.



A diagram showing the key features included in the HDO Bonfiglioli solution developed for this flotation cell application.

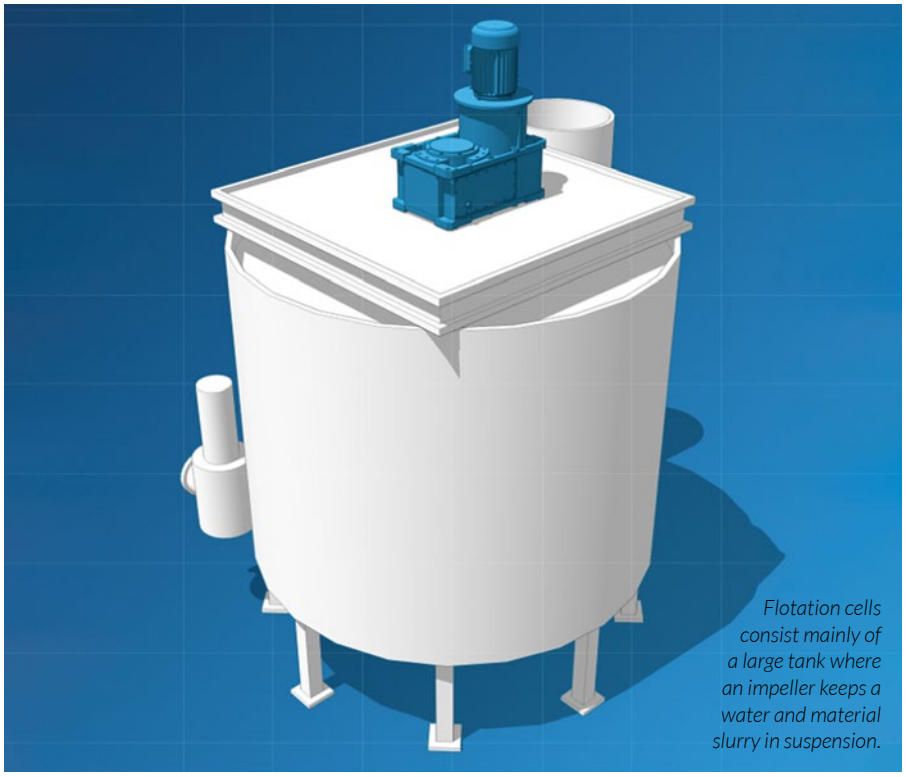
The resulting loads generated by the impeller are generally at a position some way below the shoulder of the output shaft, which results in high stresses being applied to the shaft. The output shaft must therefore be reinforced with an extended bearing span and larger bearings to withstand the high generated loads. An increased shaft diameter may also be used.

In some cases, the flotation process requires the injection of high-pressure air to maximise the separation of the product material from the water. In this case, the gearbox must be equipped with a special pass-through hole in the output shaft to allow for an air pipe connection at the top of the gearbox.

For the Bonfiglioli solution developed for this application, a compact piping system was incorporated into the gearbox housing at strategic points to ensure perfect lubrication of all bearings and gears, which are lubricated with oil that is free of impurities thanks to a filtering system installed in the circuit and monitored by pressure and temperature sensors. All of this is managed by a mechanical pump driven by the gearbox itself, which ensures greater reliability than an electrically driven lubrication pump.

There is often also a requirement that the flotation process be free from contamination. This can be guaranteed if the gearbox is assembled with a drywell configuration. The final bearing on the output shaft, which is reinforced to withstand the high radial and axial loads of the moving impeller, is closed off from the main gear unit in a grease filled chamber. This in turn prevents oil leaks and thus makes the gearbox drip-proof.

As well as flotation cell solutions for the mining sector, Bonfiglioli can also develop customised solutions for dewatering – using belt filters or spiral classifiers; and thickener solutions. This on top of its wide range of materials handling and mobile mining equipment offerings. ❑



Flotation cells consist mainly of a large tank where an impeller keeps a water and material slurry in suspension.

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Laser scanning enhances TK Uhde modularisation offering

The thyssenkrupp Uhde (TK Uhde) management team explains how laser scanning technologies and the company's renowned plant engineering know-how are being combined to enhance the company's brownfield plant modularisation offering.



TK Uhde management team members: Ranka Sofijanic, Rajend Govender and Yurisha Singh.

Laser scanning forms part of thyssenkrupp Uhde's EPC offering for plant conversions, revamps and modification projects. "We use laser scanning for indoor applications and where higher accuracy is required," explains Ranka Sofijanic, manager of Plant Layout and Piping at TK Uhde SA. Six years ago, she says, TK Uhde also started using drones fitted with laser and thermal scanning technologies for external applications where an accuracy of within 10 mm is acceptable, which further enhances the company's scanning services.

"Drones provide easy, safe access to difficult-to-reach areas and hazardous environments. This makes them a valuable tool for outdoor monitoring, bigger inspection jobs and scanning of existing plant environments. They are ideal for jobs where a piping system needs to be connected between an existing plant and a new extension, for example," she says.

Scanning results are directly transferred into the company's E3D plant modelling software from Aviva to serve as an ideal basis for planning work at specific sites.

"TK Uhde specialists know which areas have to be scanned with which sensors, which enables us to accurately and safely guide drones to important areas," notes Sofijanic. Recent examples include the scanning for condition assessment and rebuilding of towers up to 80 m high, as well as for build and work planning in a congested refinery environment. "We have successfully applied laser scanning technology on numerous brownfield projects for the petrochemical, energy and mining industries across the African continent," she says.

Plant modularisation

"Most of our work still comes from traditional brown-field sites, which are some of the toughest environments to work in, particularly in Africa," continues Rajend Govender, CEO of TK Uhde SA. "This opens up the opportunity to adopt the modular plant approach, which is not new to us," says the CEO, a chemical process technology specialist with 20 years of experience with the company.

"We have long been designing and building complete modular plants or sections of plant off-site under controlled conditions that are not subject to the congested and risky environment of a typical operational plant. Much of our current work involves installing purpose designed and manufactured modular replacement units," he tells *MechChem Africa*.

Sofijanic continues: "We are typically working on congested petrochemical plants that were originally stick-built, onsite. Upgrading such sites means that work has to be done between the surrounding units, often while the plant is still live, which makes safety aspects critical.

"By taking the modular approach, a whole plant upgrade can be built offsite on a skid, in an open and far safer environment. No hot work permits are required, there is no congestion and no live plant to work around, and no additional man-hours need to be added to guarantee meeting deadlines," she argues.

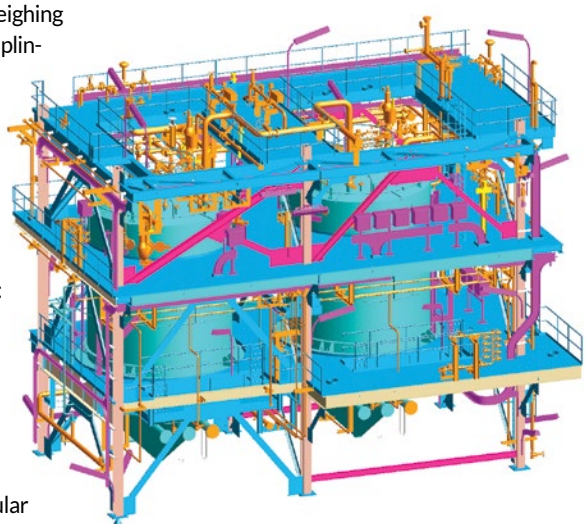
She describes the success of a modular plant upgrade for a coal tar filtration (CTFE) plant. "This project comprised 25 modules weighing up to 250 t. Modules involved multi-disciplinary pre-installation, which included all piping, mechanical, instrumentation, electrical and structural needs, and these were all built off-site, transported and installed in the live plant before being connected up," she recalls.

Yurisha Singh, senior proposals engineer for the company, continues: "We have also just completed a 65 t module for Natref, which was built and tested off-site before being shifted into place by a self-propelled modular transporter (SPMT), while observing all COVID restrictions and without any delivery time delays." she says. "A modular plant is much more than a replica of a stick-build onsite construction that is built offsite, though. Modular plant has to be purpose designed with structural integrity so that it can be safely and easily transported, placed and connected-up onsite in a 'plug-and-play' manner. Our design skills and experience in doing this routinely give us a competitive advantage," notes Singh.

According to Govender, complementary skills sets such as laser scanning expertise are important. "We have the modern resources and capability to scan an existing site in 3D before we start. This enables us to identify the exact space available and the exact positions for interconnection with the existing on-site plant. This allows us to design and build a perfectly customised module off-site that not only meets the upgrade requirements of the plant but, on installation, the unit will plug into the existing plant like a block of Lego," he explains.

"Through our ability to professionally integrate laser scanning and drone technologies into our modularisation offering, we are extending our service portfolio, enhancing our long-term customer relationships and opening up new business opportunities," concludes Sofijanic.

www.Uhde.co.za



Ventilation and cooling in Mexico's mines

South African mine ventilation specialist BBE, with 20 years of designing, commissioning, and troubleshooting critical ventilation systems in South Africa's deep and hot gold, platinum and copper mines, is putting its experience to beneficial use across the globe, currently in Mexico, where mines are getting deeper. Director and Senior Engineer at BBE, Ross Wilson, explains.

Mexico is a country with a long and rich mining history, and a mining industry currently experiencing a period of rapid growth. Exploration projects are discovering new and exciting ore bodies with the potential of sustaining future mining operations. Existing underground mines have been shallow relative to the deep and hot gold and platinum mines of South Africa, but this is changing as the shallower orebodies become mined out and mines start to exploit deeper areas.

What does it take to properly ventilate and cool a mine as exploration and maturation modify the variables? In Mexico, a land rich in silver, gold, zinc, and other valuable metals and minerals, mining rights owners are beginning to wrestle with these issues.

According to Ross Wilson, director and senior engineer at BBE, the landscape and environmental conditions in Mexico are different from those found in South Africa. With many of the deepest mines in the world, cooling and ventilation has, for decades, been indispensable to safe operations in South African mines. "It's a non-negotiable consideration in every stage of the mine's growth and lifecycle. However, in Mexico, mines are only just starting to grapple with the issue," says Wilson.

Two recent projects by BBE in Mexico – one for a new mine and another for a mine reaching the end of its planned life – illustrate how different timelines, budgets, mine legacy issues and factors such as terrain impact successful design.

Feline agility? Super-compact, modular design

In the Mexican state of Chihuahua, a new underground silver, gold and zinc mine is being established. While the deepest ore can be found at the shallow depth of 500 m below surface, unusually hot ground water at temperatures of up to 55 °C is a challenge. BBE was asked to assist with the original mine design, and it was clear from the start that mine cooling would be required to provide acceptable underground temperatures.

However, the mountainous geography, remote site and short design life called for an innovative cooling system design. The 13-year design lifespan was far shorter than a typical South African cooling system and was the result of the rapid mechanised mining method used on the mine. The outcome was a modular design that is also one of the most compact in the mining industry.

"The BBE ventilation system design for the mine included two surface air cooling systems and three surface main fan stations," notes Wilson. "We did the process design as well as the mechanical, civil, electrical and control engineering design. We aided with procurement and construction from a network of local Mexican suppliers, and we were on-site

The main fan stations are dual axial fan systems with a total air flow of 240 m^3/s at a total pressure of 1.8 kPa.

to assist with commissioning." The project was implemented with the mine who managed the construction project.

"Given the constraints of the surface geography, both surface air cooling systems and surface fan stations had to be compact. The mine provided raised boreholes in locations that suited the underground mine, but not necessarily the reality on the surface. One air cooling system was on a ridge while the other in a valley. A modular approach was adopted to provide flexibility to accommodate the surface geography, save costs and minimise site construction time," says Wilson.

Mining operations and cooling systems are often designed to last for 30 years or longer and are typically expensive bespoke designs that make extensive use of concrete structures and take a long time to construct. In recognition of the 13-year design life, the BBE design made extensive use of lighter weight prefabricated steel structures. This allowed the cooling system to be constructed rapidly. This approach will also allow a breakdown of the structure for reuse at different locations in future, contributing to the sustainability of the mine's operations.

The air-cooling systems are designed to provide 4.5 MW of refrigeration duty and cool 200 m^3/s of ambient air from 19.5 °C to 12.0 °C wet bulb. The system is efficient with a total absorbed electrical power of about 900 kW at the design duty. The main fan stations are dual axial fan systems with a total air flow of 240 m^3/s at a total pressure of 1.8 kPa.

"While the cooling system will deliver the specified cooling capacity, the full benefits will only be realised with careful management of the underground ventilation system and control of the hot groundwater. This will remain an operating challenge for the mine," adds Wilson.

Given the constraints of the surface geography, both surface air cooling systems and surface fan stations had to be compact.

A modular approach was adopted for the surface air cooling systems to provide flexibility to accommodate the surface geography, save costs and minimise site construction time.

Making an older mine profitable and safe

BBE also experienced a ventilation planning challenge at another project in Mexico, this time at a more mature mine.

The second cooling and ventilation project was a solution for a silver mine that commenced operations in the 1920s. A short-term solution was urgently needed to lower rising underground air temperatures and enable production to continue in deeper areas. The build was a brownfields site with many existing structures and constraints.

Wilson adds: "The challenges the mines face are not only related to depth and heat but also to inadequate ventilation planning. In shallow mines, ventilation is easy and can be achieved without careful ongoing planning and design. However, as mines develop and become deeper the underground ventilation systems, which include fans and ducts to direct air flow, need to be updated and to grow with the mine. An effective, efficient underground ventilation system could even eliminate the requirement for a cooling system altogether; but as a minimum, it is a precursor to the effective operation of any cooling system."

BBE's assessment indicated that a surface air cooling system and two large underground fans would be needed to lower rising underground air temperatures. For this project, BBE's responsibility included the design, construction, and commissioning of the cooling system, including arranging shipping and delivery to site. A modular design, making extensive use of prefabricated steel structures, was again specified.

"We provided assistance throughout the project, including a full-time on-site supervisor responsible for quality, safety and schedule," notes Wilson.

"If the life of the mine is extended to mine the existing deeper ore bodies, which is expected, the mine will need to design and construct a new ventilation and cooling system. BBE would welcome the opportunity to assist." Key challenges faced by BBE on both projects were long lead times for delivery of equipment sourced from outside of Mexico: refrigeration machines, electrical equipment and underground fans. Local equipment suppliers and construction companies were found to be more cost effective with shorter lead times than international competitors.

"Mexico is an industrial powerhouse with an established professional mining industry, but the mines are starting to grapple with problems that South African mines have experienced for decades," says Wilson. "Experience from South Africa cannot always be directly applied to another country, but experience can accelerate progress and we enjoy learning with our clients."

"As Mexico's mines get deeper and hotter, they will need to take a professional and conscientious approach to ventilation," advises Wilson. "BBE is establishing itself in the region and hopes to help our Mexican clients to mine safely and profitably."

www.bbe.co.za

TLT-Turbo Africa accelerates growth & reach

Following unprecedented resilience throughout the past 18 months, TLT-Turbo Africa is now accelerating global growth with the signing of six new major clients and the retention of 20 existing clients who have submitted new orders to be filled in the year ahead.

TLT-Turbo Africa has secured orders from six new major clients in the copper, platinum, and gold sectors for the supply of mining ventilation equipment. These include clients based in Australia, USA and Kazakhstan. The contracts continue TLT-Turbo Africa's successful track record of delivering advanced, efficient, and high-performance surface, underground and auxiliary mining ventilation solutions both in Africa and globally for almost two decades.

Closer to home, TLT-Turbo Africa has retained 20 clients in mining, mineral processing and the automotive industry – predominantly based in the sub-Saharan region. "These clients return to us based on the performance of our products and the ways in which they have enhanced their operations and reduced their operational costs. This coupled with our service delivery track record, continuous customer engagement and competitive pricing has helped us to secure returning revenue from clients who have become more like partners to us over the years," says Vusi Madlopha, TLT-Turbo Africa head of sales and business development. According to Madlopha, TLT-Turbo Africa has managed to maintain and expand their market share despite the challenges presented by the global COVID-19 pandemic. "We've focused on our strategy on increasing sales and maintaining the quality of our product offering. Our strategy also included growth into new territories outside Africa using the global network of our parent company, TLT-Turbo GmbH. 2021 posed unique supply chain challenges that affected the whole world. Our internal processes allowed for efficient use of limited resources to produce quality products for our customers throughout the year."

TLT-Turbo's mine ventilation solutions have become known for innovation and the ability to meet the most complex mine ventilation requirements.

A major contributing factor to their success, adds Madlopha, was the leadership of TLT-Turbo Africa managing director, Christo Gelderblom, whose vision is to position the company as a global supplier of air movement technology.

"Over the last few years, TLT-Turbo Africa has meaningfully scaled our core portfolio of mining ventilation solutions, invested in the research and development needed to advance our technology, and enhanced our customer consultation and care culture.

"We have listened to our clients and the faith they have in us is echoed in the respect we have for their expertise and input. The fact that our clients continue to come back to us proves their confidence in the next chapter for TLT-Turbo Africa," Gelderblom asserts.

Looking at what's next in the year ahead, Madlopha explains that in addition to continuous enhancement of the company's existing mine ventilation offering, TLT-Turbo will be enhancing its product offering to include mechanical vapour recompression, which will expand its reach into new applications.

"As we enter 2022, we look forward to expanding our product offering to evaporation technologies and industrial process plants. Mining will always be our backbone, so we will also focus on strengthening our relationships with all our mining customers through our sales networks within the SSA region, and globally," he concludes.

www.tlt-turbo.africa.

Local HVAC expert works to global rail standards

While Booyco Engineering has been designing HVAC systems for South Africa's rail industry for over three decades, it has also been serving the world's largest rail players for more than 15 years by meeting their exacting standards, including design, development, qualification and documentation.

Booyco Engineering's HVAC solutions have matched the demands of leading international rail industry players.

"Having developed HVAC systems for the defence and mining sector, we understand the requirements for designing and manufacturing products for harsh operating conditions," says Grant Miller, executive director at Booyco Engineering. "Our customised HVAC solutions for the local rail sector were based on our proven expertise."

About 15 years ago, the company raised the bar even further working with large rail multi-nationals based in Europe, the US and China. Its local office of engineers and designers began aligning its engineering design and development processes with international rail industry standards.

"When South Africa's rail utility started to move towards a more standards-driven approach, we ensured we were up to speed with all the standards and specifications that the world's leading players required," says Miller. "This meant that we were already familiar with the way of working required to meet the demanding standards specified by multi-national rail companies."

This includes conducting extensive vibration and shock testing, airborne and structure borne noise testing, electromagnetic compatibility (EMC) testing, and high and low temperature and humidity cycling testing specifically to the standards of the rail sector. To fully leverage its expertise, Booyco Engineering's in-house resources include over R8 million worth of specialised Computational Fluid Dynamics (CFD) and Finite Element Analysis (FEA) software for modelling factors such as the strength of components and structure-borne vibration. "For instance, these tools allow us to demonstrate to rail companies that our HVAC systems will not transmit vibrations, which could create resonance in the train's structure," he says. "Our digital design verification using CFD and FEA allows us to ensure that the physical tests conducted are more or less a formality, saving time and money."

Among the global rail standards against which Booyco Engineering has qualified its HVAC products are EN14750 thermal comfort in urban and suburban rolling stock, EN14813 thermal comfort in driving cabs, EN13129 thermal comfort in main line rolling stock, EN61373 for shock and vibration tests, EN15085 for welding qualification, EN50155 for the electronic equipment qualification and EN50121 for EMC compliance testing, all of which are standards developed specifically for the rail industry.

Once big global players could see the company's level of professionalism and conformity with the highest standards, it was also asked to design a cooling tower for an electric locomotive. To date, it is the only South African firm that has successfully designed and manufactured this equipment locally, adding significantly to the railway's South African local content targets.

"Stepping down and converting the catenary voltage in a locomotive generates considerable heat of up to 400 kW," he says. "Our cooling tower design is capable of effectively ejecting that heat in a +50°C ambient through the radiators at an airflow rate of 10 cubic metres per second."

He emphasises that the cooling tower order was another important indicator of the company's extensive local design and manufacturing capacity, placing it in a strong position to serve the country's needs while meeting global industry standards. ❑

OceaniQ™: an innovation for the offshore environment

Hitachi Energy recently launched a new transformer solution for floating applications, which is the first entry into the company's OceaniQ™ portfolio of solutions to address the unique challenges of the offshore environment.

OceaniQ™ transformers and shunt reactors are key in grid infrastructure to enable the transmission of electricity generated in offshore wind farms. This full and qualified range of equipment has been developed in partnership with the forefront floating offshore developers.

The Hitachi Energy OceaniQ™ portfolio for the offshore energy environment was recently showcased at the annual WindEurope event in Bilbao, Spain. The global technology and market leader in power grids, has created OceaniQ to help accelerate the clean energy transition. OceaniQ will result in greater volumes of wind power being efficiently harvested and integrated into the world's energy system.

Combining cross-industry competence from the power and marine sectors, OceaniQ addresses applications for fixed platforms, floating structures and sub-sea power systems for wind, marine and other offshore operators. Hitachi Energy rigorously designs its OceaniQ products, services and solutions, which are designed to solve the specific needs of offshore energy operators, in collaboration with customers and partners.

Key characteristics of OceaniQ solutions feature a modular design to enable timely installation and the ability to quickly connect energy assets to onshore networks. OceaniQ solutions take advantage of digitalisation, enabling safe and secure remote monitoring and other services such as predictive maintenance. Designs are also ruggedised to withstand harsh marine conditions, minimising the need for physical service over their lifetime. OceaniQ solutions also embody the rigorous application of lifecycle thinking.

OceaniQ™ transformers for floating applications

The first products to be announced as part of the OceaniQ portfolio are Hitachi Energy's transformers for offshore floating applications. Since the first commercial projects in the early 1990s, offshore wind electricity generation has grown enormously, with currently more than 35 gigawatts of installed capacity worldwide.

Yet building offshore brings great challenges beyond the harsh salt-water environment and only a small fraction of the full capacity has been exploited. This is because many offshore areas do not have a suitable seabed and, beyond 60 m depths, are not optimal for fixed structures.

OceaniQ™ transformers and shunt reactors are key in grid infrastructure to enable the transmission of electricity generated in offshore wind farms. This full and qualified range of equipment has been developed in partnership with the forefront floating offshore developers. It brings in world-leading experience to meet requirements, featuring a lightweight, compact and modular design that comprises a specially-designed transformer, a tank and other components.

"In OceaniQ, our world-class engineers take pride in pioneering solutions that overcome harsh offshore conditions and, ultimately, help society move towards a carbon-neutral future," says Bruno Melles, managing director of Hitachi Energy's Transformers business. He adds: "Floating electrical systems are an important development in the evolution of the offshore renewable industry that will open up tremendous opportunities and unlock new business models that are built on clean power. OceaniQ is fully in the spirit of Hitachi Energy's Purpose, which is focused on advancing the sustainable energy future for all."

Alfredo Parres, head of Renewables at Hitachi Energy comments: "Wind power is one of Earth's bountiful and free-giving natural resources and, through the OceaniQ offshore portfolio, customers will be able to harness and integrate it more efficiently. Through OceaniQ, we are building a more sustainable, flexible and secure energy system by bringing together our experts in offshore applications and wind farm connections to develop and build the solutions needed for a more integrated, interconnected and high-quality power grid.

"I am excited to be discussing OceaniQ with customers at WindEurope and how, together, we can continue to pioneer technologies that maximise the full potential of offshore wind," he says.

This latest portfolio development from Hitachi Energy continues to demonstrate the company's commitment to pushing the boundaries of innovation for sustainable offshore energy environment solutions, adding to an already extensive offering. The company expects to announce new additions to the OceaniQ portfolio in the coming months.

The launch of OceaniQ follows the company's recent launches of IdentiQ™ – its digital twin solutions for HVDC and power quality – and EconiQ™ – its portfolio of solutions which are proven to deliver an exceptional environmental performance resulting in significant reductions in carbon footprint.

www.hitachienergy.com

"In OceaniQ, our world-class engineers take pride in pioneering solutions that overcome harsh offshore conditions and, ultimately, help society move towards a carbonneutral future," says Bruno Melles,

CHIETA confirms commitment to green hydrogen economy

In this article, Yershen Pillay, CEO of the Chemical Industries Education and Training Authority (CHIETA), outlines CHIETA's role in promoting the use of green hydrogen, most notably through a comprehensive study focusing on skills development and economic growth.

With projects such as a recently completed hydrogen production proof of concept (PoC) initiative in Vredendal in the Western Cape, it's safe to say that South Africa is well on its way to producing green hydrogen as part of its renewable energy portfolio.

To this end, the Chemical Industries Education and Training Authority (CHIETA) has embarked on an 18-month research project: A comprehensive study of hydrogen power in SA. "This will assist us in our efforts to support the Hydrogen Economy, identifying growth areas for skills and economic development," says Yershen Pillay, CEO of CHIETA.

"The study, which is already underway, is being conducted in partnership with research groups and is aimed not only at our own skills development targets but also at government's needs and those of companies of all sizes within the chemical industries," he adds.

A comprehensive study of hydrogen power will focus on:

- The collection and analysis of documents, baseline data and a literature review on the state of the Hydrogen Economy in South Africa.
- The production of a green hydrogen research report that responds to the project's objectives.

"We believe the project's outcomes and recommendations will not only assist government, through the Department of Science and Innovation (DSI) and chemical sector companies, but also support the country's Economic Reconstruction and Recovery Plan (ERRP).

"Furthermore, we are working on a Green Hydrogen Skills Plan for our petrochemicals sub-sector. This will allow us to identify the top-10 skills in the green hydrogen economy and close the hydrogen skills gap by ensuring that talent is locally produced," says Pillay.

"It's also encouraging to note that one of our member companies, Sasol, is already playing a leading role in the green hydrogen economy through its research partnership with the DSI and the Northern Cape Economic Development and Investment Promotion Agency (NCEDA). CHIETA will soon be collaborating with NCEDA to ensure a well-coordinated and shared response to skills planning for the green hydrogen economy," he continues.

The feasibility study for the production of green hydrogen in the Namakwa Special Economic Zone (SEZ) is being conducted at Boegoebaai, a port located in the local municipality of Richtersveld. "As our biggest member company and largest skills levy contributor, Sasol hopes to establish the port as a global centre for green hydrogen production," he adds.

Through projects and initiatives such as Sasol's Boegoebaai research, a roadmap is being crafted that will stand the chemical industry in good stead and position the country as a global leader in the production of green

hydrogen energy. CHIETA will also actively be pursuing a green hydrogen research chair position in collaboration with public institutions to advance excellence and innovation in green hydrogen for the future development of scarce skills. "We will be investing more than R5-million into the CHIETA Green Hydrogen Research Chair as part of our increasing investment into research and development.

"As the chemical industry, we have a significant role to play in what is undoubtedly the next step in the evolution of renewable energy, not only the continent, but across the globe," concludes CHIETA's CEO. ❑

Ideal for solar installations

COMTEST, Fluke's Local Channel Partner, has introduced the new Fluke 393 FC clamp meter with iFlex, the world's only 1 500 V CAT III, IP54-rated, thin jaw clamp meter. With its CAT III 1 500 V/CAT IV 600 V safety rating, the 393 FC provides exceptional safety for work in dc environments of up to 1 500 volts, such as solar arrays, wind power farms, electric railways, and data-centre battery banks for uninterruptible power supplies.

The thin jaw allows this Fluke meter to be used in combiner boxes, inverters and tight spaces, making it ideal for solar energy applications. The meter measures up to 1 500 V dc, 1 000 V ac, and up to 999.9 A dc or ac through the clamp jaw. The included iFlex flexible current probe extends ac current measurements up to 2 500 A.

When measuring ac current, the iFlex probe can be twisted through extremely small spaces giving technicians access to cables that would otherwise be difficult or impossible to clamp a probe around.

"The Fluke 393 FC delivers unparalleled safety and performance in 1 500 V dc environments, such solar energy plants," says Susan Isaac, product manager for the Fluke 393. "It was designed specifically to address the unique challenges solar technicians deal with every day, helping them to get their jobs done faster and more safely.

"The 393 FC is the latest addition to the Fluke portfolio of test tools for the solar energy industry. Fluke tools operate reliably in the extreme environments — dusty, wet, cold and hot — that solar professionals work in, and are tested to survive falling that can occur in this field work," Isaac concludes.

www.comtest.co.za

Making heating and cooling energy efficient

A day of the year has been allocated to the power of the sun, thanks to the UN Environment Programme (UNEP). International Day of the Sun on 03 May is meant to recognise and promote the expansion of this abundant renewable energy resource. South African National Energy Development Institute (SANEDI) outlines how switching to solar might take pressure off our energy grid while reducing carbon emissions.

International Day of the Sun also coincides with a major research collaboration to identify the optimal thermal technologies that companies and households can use as alternative sources of energy. The first of these collaborations will focus on solar water heating potential using different solar technology solutions.

The move by the South African National Energy Development Institute (SANEDI) and the Council for Scientific and Industrial Research (CSIR) could take huge pressure off the overstrained national electricity grid and enable easing of load shedding if companies switch to solar and related thermal heating and cooling technologies. Companies switching to low-carbon technologies would also shield themselves against high electricity tariff increases, save money, give themselves greater energy security, and contribute to reducing carbon emissions.

SANEDI and the CSIR have established a Thermal Laboratory that will test and compare a range of low carbon technologies and develop business cases for implementation of the most effective solutions at different scales, explains SANEDI Manager for Renewable Energy, Karen Surridge. "We want to identify the most savvy energy efficient thermal technologies to use for heating and cooling, tailored towards specific types of businesses, and present these to companies for evidence based consideration."

Heating and cooling are intensive users of energy. They often account for between 40% and 50% of the electricity costs in companies and households and they draw large amounts of electricity from the overstretched national grid if coal-based electricity is being used.

Technologies such as solar water heating have been shown to be highly energy efficient. Recent examples of this have been illustrated by the Southern African Solar Thermal Training and Demonstration Initiative (SOLTRAIN), funded by the Austrian Development Agency and in which SANEDI is a South African partner.

SANEDI, often under the banner of SOLTRAIN, is creating awareness of Renewable Energy (RE) and Energy Efficiency (EE), more specifically on solar water heating technology at military units in the Limpopo province of South Africa. After only two and half years of operation, this system is already making significant savings in electricity and water.

The project paved the way for other government entities to look into the installation of renewable energy technologies on a large scale for their facilities, including 'Decision Makers' seminars in which government entities were trained on the technologies and their benefits. The training for government was on Renewable Heating and Cooling, including high temperature applications.

Some of the many projects undertaken by SOLTRAIN include:

- Wits Junction student residence complex in Johannesburg estimates it will save R40-million in electricity and other costs over the 20-year lifespan of the combined solar water heating, co-generation and gas heating system it has installed. The complex consists of 14 buildings and provides accommodation for 1 103 students who use 94 000 litres of hot water per day.
- The SA National Defence Force has saved 490 500 kWh of energy and R1 079 100 in electricity costs after installing a relatively small (3 000 ℓ) solar water heating system at Air Force Base Hoedspruit in Limpopo.
- Centurion Building retirement residence in Sea Point, Cape Town, has saved at least 470 MWh of electricity and R220 000 in electricity costs since it replaced its electric boilers with a hybrid solar thermal and heat pump hot water system in 2018.
- Klein Karoo International (KKI), a major ostrich leather, feathers and meat producer based in Oudtshoorn in the Western Cape, replaced its fuel oil water heating system with a solar thermal plant and saved just over R413 000 in its first year of operation.
- Melomed Gatesville Hospital in Cape Town has saved R130 000 a year after switching to a hybrid solar water heating and heat pump system.

In addition to being involved in the SOLTRAIN initiative, SANEDI has also managed solar thermal projects on behalf of the Gauteng provincial government. These include installation of three 300 ℓ high pressure solar water heaters, which have reduced electricity costs at Frida Hartley Shelter for Women in Johannesburg from about R40 000 to R1 000 a month, and the fitting of solar water heaters that could save Sibonile Primary School an estimated R10 000 a month.

"Using solar thermal technology to reduce pressure on the national grid is not new but we need to revive it and realise how powerful it is as a means to save electricity, ease load shedding, alleviate pressure on the national grid, save money and reduce carbon emissions," says Surridge. "Solar thermal systems can be used at scale, from small household installations to large-scale industrial, commercial and agricultural installations. No matter how big or small your solar thermal system is, it will help to ensure you have hot water when you need it," she concludes.

www.sanedi.org.za.

Low-maintenance mini substations for SA's ageing infrastructure

Complicating South Africa's energy insecurity is the ageing fleet of mini substations up and down the streets of our cities and towns. Equipped with traditional oil-cooled technology, many of these 'mini subs' need replacement each year. "When they reach end-of-life," asks Trafo Power Solutions, "why not replace them with a safer dry-type transformer option that costs less to maintain?"

As South Africa's many thousands of oil-cooled mini substations reach the end of their operating lives, there is scope to replace them with a safer and more economical option, according to Trafo Power Solutions managing director David Claassen.

"These mini substations are located all along our urban streets, in shopping centres and around industrial areas – in close proximity to growing numbers of people," says Claassen. "As municipalities struggle to maintain these properly, they pose an increasing safety risk and become more expensive to service and repair as they get older."

He points out that oil-cooled transformers require regular testing and maintenance, including monitoring and replacement of oil at regular intervals to ensure effective cooling of the unit. Without this maintenance, the risk of failure or even explosion is increased.

"Dry-type transformers do not contain oil, being cooled by air moving over the components," he says. "This is one of the factors behind the significantly lower maintenance required by dry-type transformers, which of course translates into substantial cost savings over time."

Trafo Power Solutions supplies miniature substations from 200 kVA to 2 500 kVA – ranging from 3.3 kV to 33 kV on the MV side, and from 400 V to 1 000 V on the LV side.

The absence of oil makes dry-type transformers considerably safer, he explains, as indicated by these units' F1 fire rating. This means that they are resistant to flammability, are flame retardant and generate no harmful emissions.

Having no oil as a coolant also makes dry-type transformers less risky to the environment. The risk of oil spilling from an oil-cooled transformer – which can lead to the contamination of land and water – requires the construction of a bund wall. The dry-type option needs little of this kind of additional infrastructure, and so is more cost-effective to install.

"Trafo Power Solutions has worked extensively with developers of high-traffic infrastructure like shopping centres, ensuring the highest level of safety in mini substations located in high-density areas," he says. "We are well positioned to supply public utilities with the same benefits."

He notes that municipalities' financial resources to service and maintain substations are often severely stretched, so it makes sense for them to seek more economical alternatives. Dry-type transformers are almost maintenance-free, he explains, taking a considerable load off the owner's maintenance duties.

"We custom-design our solutions for dry-type miniature substations to meet customers' exacting requirements," says Claassen. "This includes any variation of medium voltage (MV) and low voltage (LV) needs and specific switchgear as well as customised control and protection options."

Trafo Power Solutions supplies miniature substations from 200 kVA to 2 500 kVA – ranging from 3.3 kV to 33 kV on the MV side, and from 400 V to 1 000 V on the LV side. These substations are rated up to IP65 ingress protection.

A 500 kVA dry-type mini substation being lifted into position at a commercial building site.

www.trafo.co.za

Orion Engineered Carbons makes Coega its Home

The Coega Development Corporation (CDC) has announced a R200-million investment in infrastructure to secure the supply of Carbon Black for the tyre manufacturing industry in the Eastern Cape province.

Pledging support for the tyre manufacturing industry in South Africa are, from left: Khwezi Tiya, CDC; Corning Painter, OEC Group Chief Executive; Mlungisi Mvoko, MEC for DEDEAT; and Fikile Majola, Deputy Minister of the dtic.

The Coega Development Corporation (CDC), the developer and operator of the 9003 ha Coega Special Economic Zone (SEZ) in Gqeberha (PE) in the Nelson Mandela Bay Municipality of South Africa has announced that more than R200-million has been invested by the Department of Trade, Industry and Competition (dtic) to facilitate a solution for Orion Engineered Carbons (OEC) in order to preserve jobs in the province and municipality and ensure the sustainability of the industry.

OEC is leading global producer and supplier of carbon black, a solid form of carbon produced as powder or pellets. The material is made to customers' exacting specifications and is an essential ingredient for manufacturing tyres for motor vehicles and trucks. Carbon Black strengthens the tyres and protects them from the damaging effects of UV light and ozone, leading to safer and more reliable vehicles.

The investment was announced at a Sod Turning ceremony attended by the Honourable Deputy Minister of the dtic, Fikile Majola and the MEC for the Eastern Cape Department of Economic Development, Environmental Affairs, and Tourism (DEDEAT), Mlungisi Mvoko, who were amongst the leaders of business in the Nelson Mandela Bay Municipality (NMBM).

Deputy Minister Majola, who officiated over the ceremony, welcomed the OEC investment, and emphasised its importance to the automotive and tyre industry in the country. He applauded the CDC and OEC as well as the TNPA for finding a solution that would be sustainable to the sector whilst saving thousands of jobs in the Eastern Cape.

The Coega Development Corporation, through support from the dtic, worked together with Orion Engineered Carbons South Africa (OEC SA) and Transnet National Ports Authority (TNPA) to provide OEC SA with a solution that is meant to keep its business sustainable. The solution seeks to save approximately 7 000 jobs in the Automotive and Tyre Manufacturing Industry in SA. This aligns very well with CDC's vision of being the leading catalyst for championing socio-economic development, and broader government objectives as set out in the Economic Reconstruction and Recovery Plan (ERRP) and other government Policy Prescripts.

Had it not been for the intervention, collaboration and support of the parties involved, the region would have lost a project of significant value, which would have led to an increase in unemployment, loss of government revenue and formed the perception that the region is an unattractive investment location.

Approximately 7 000 people are employed in the associated tyre manufacturing value chain, most of whom would have lost their employment. It is with thanks to the collaborative effort of the CDC, OEC, TNPA and the dtic that such a risk has been averted, and it is against this backdrop that the CDC sees all these parties as strategic stakeholders for this project.

The CEO of OEC, Corning Painter, emphasised the importance of the investment to the company and how it will stimulate the entire value chain of the automotive sector, including the tourism industry. The project entails the development of two 18 000 m^3 tanks with ancillary infrastructure for the storage and management of carbon black feedstock. A pipeline is proposed from the offloading berth within the Port of Ngqura to the new storage facility to supply feedstock/black oil to the OEC tanks. This project is in line with the OEC's vision to be the premium supplier of carbon black, generating long-term benefits for stakeholders while remaining committed to responsible business practices through a focus on team culture, reliability and sustainability.

The project will result in the construction of the storage facility and associated infrastructure and is estimated to create over 150 jobs over the next 10 months, 50 during the construction phase, and 100 permanent jobs during the operational phase of the project.

"The importance of this investment is it enables the continued production of automotive tyres in South Africa. OEC is a very important supplier of this product, but more important is the momentum of investment we expect to see in the next year or two as part of the economic, reconstruction and recovery plan and for us as Coega, because we are at the coal face of converting investment ideas into reality.

"We mobilise ourselves to respond to opportunities that attract more investors to the Coega SEZ," concludes Khwezi Tiya, CDC's CEO.

www.coega.co.za

EPR legislation a benefit, not a burden

As companies navigate the new mandatory extended producer responsibility (EPR) landscape, a leading recycler in the plastics value chain has revealed the unexpected ease in managing its new reporting and compliance requirements as a producer.

One of the biggest recyclers of PET plastic bottles on the African continent, Extrupet, has been guided in its journey by long-standing producer responsibility organisation PETCO. At the same time – and in a first for South Africa – Extrupet is helping its long-time partner to develop an additional end-use market for recycled PET (rPET) in the manufacture of rPET industrial strapping.

Plastic strapping is used extensively to secure unstable goods during transit. From a circular economy perspective, both PET bottles and PET strapping can be diverted from landfill and economically recovered and recycled into new products, without compromising the quality of the end product.

As a manufacturer of strapping, Extrupet, like other packaging producers, is now obligated either to join an existing producer responsibility organisation (PRO), start a new PRO or run an individual compliance scheme, as part of the National Environmental Management Waste Act (NEMWA) Section 18 mandatory EPR regulations, which came into effect on November 5 last year.

Extrupet is currently the only strapping producer registered to meet its mandatory EPR obligations with the Department of Forestry, Fisheries and the Environment.

In terms of the regulations, producers must take practical and financial responsibility for the full lifecycle of their products. This means designing packaging with recyclability and circularity in mind and also including more recycled content in their products.

"Many companies are still importing rPET strapping, so closing the loop locally provides another high-value end-use for rPET, aside from bottle-to-bottle recycling, or turning it into polyester staple fibre," said Extrupet joint managing director Chandru Wadhwani.

While clear PET plastic bottles have the highest commercial value for bottle-to-bottle recycling, Wadhwani explained that green and brown PET bottles have limited end-use products associated with them, because they discoloured the recyclate and could not be used for bottle-to-bottle recycling.

"In the past, plastic strapping has provided a viable end-use market for coloured rPET. As producers begin to move away from coloured to clear bottles for maximum recyclability, the clear bottles can now also serve as feedstock for strapping," he said. "I would like to encourage companies to support homegrown circular initiatives. The more end-use markets we develop for rPET, the more the benefits will be felt along the entire value chain – right down to the waste pickers."

Dilip Jade, technical director of PET recycler, Extrupet, examines the company's new Sima line in Cape Town, which produces various types of recycled PET (rPET) strapping.

PETCO CEO Cheri Scholtz said the Section 18 regulations essentially compelled all organisations and companies involved along the plastics value chain to work as a team to ensure that less waste ended up in landfill. In terms of the regulations, every brand owner, converter, or retailer that places more than 10 t/a of identified plastic packaging onto the consumer market is deemed a producer and is required to pay an EPR fee per tonne.

"It's a welcome step forward in creating a circular economy and ensuring a transparent system," said Scholtz.

The knock-on effect of mandatory EPR is set to be heightened investment in infrastructure to support the sustainability of the recycling sector – from the waste pickers who collect recyclables, to the buy-back centres who purchase and re-sell the materials, and the large-scale recyclers who turn these into recyclate that can be made into new products.

"Without EPR, we wouldn't be able to scale collection and recycling rates sufficiently to make a meaningful difference to the amount of packaging waste that ends up in the environment each year," she said.

Wadhwani said there was a delicate balance between collection, recycling capacity and demand for rPET in the recycling value chain. "As the only Section 18-registered strapping producer in South Africa, our strapping helps to maintain that balance by providing another end-use market for rPET. Growth in rPET production and consumption is ultimately key to ensuring the sustainability of both the PET and recycling industry," he said.

Describing the process of registering as a producer member of an experienced PRO like PETCO as "smooth and easy", Wadhwani said: "PETCO onboarded us seamlessly, guiding us through the process of setting and measuring targets, and making a potentially complex compliance process seem like plain sailing."

Scholtz attributed this ease to the knowledge and experience born of 17 years of operating as a voluntary EPR body. "We've always had audited collection and recycling figures, which allowed us to demonstrate a direct link between waste collection and recycling targets," she explained.

"Although PETCO will have to adapt slightly to meet mandatory EPR requirements and support new members in new ways, we do have the advantage of experience over other PROs who may just be getting started."

Strapping falls into the PET flexibles category where legislated targets state that 50% of the product must comprise rPET, 10% must be collected, and 9% recycled. PETCO and Extrupet will be working together to achieve these mandated targets. "Mandatory EPR has created a space for us to expand our services, starting with a natural extension of the post-consumer PET bottles by including the bottle caps and labels," Scholtz said.

"Extrupet's inclusion as a strapping producer also broadens PETCO's portfolio of products, for which we offer an EPR scheme," she concludes.

petco.co.za

The climate case for wood, pulp and paper

Tree breeding and sustainable intensification – planting more productive trees on less land – are actively being practised in South Africa. Photo courtesy of Mondi SA.

It's fair to assume that most people, when considering ways to fight climate change, don't immediately think of forestry. But there is a unique climate case for sustainable wood – it is the only material that can naturally and significantly decarbonise our planet by driving down demand for illegally harvested wood, while providing functional alternatives to non-renewable materials that have significantly higher environmental footprints.

"Debunking the notions that industrial forestry is a destructive force isn't easy, but the global forestry and forest products sector continues to tackle these misconceptions," says Jane Molony, executive director of the Paper Manufacturers Association of South Africa (PAMSA). "We stand firm in the fact that a holistic, sustainable and circular forest bioeconomy is essential to fighting climate change."

To understand why paper and wood products are vital to a lower carbon footprint, we can borrow from Nobel Prize-winning physicist Richard Feynman's assertion that trees don't grow from the ground, they grow from the air. The Food and Agriculture Organisation's (FAO) Forest Resource Assessment 2015 stated that world forests were sequestering close to 300 Gt of carbon.

Commercial forestry achieves this both through growing trees, which absorb carbon dioxide, but also by harvesting them at the right time, with carbon being stored in harvested wood products.

"Harvesting makes space for younger trees that take up more carbon dioxide than their older counterparts," says Molony, adding that the climate benefit is thus evident in two places. "Through a stable and increasing carbon storage in the forest itself, and in the forest products."

Molony notes, "Many vilify the forestry sector without understanding its renewability and circularity, and fail to recognise its ability to store carbon and crucially, how it helps to cut back on fossil fuels." That said, however, deforestation must be reduced in the context of indigenous or tropical forests and illegal wood trade.

Climate change is not caused by people in developing countries felling trees. Instead, it's caused by high- and middle-income countries burning fossils. We need to focus on displacing these fossil emissions by using wood's inherent power as the ultimate renewable.

"We do this, first, by increasing uptake of wood products in traditional markets. Organisations such as FAO recognise wood as a viable substitute for carbon-intensive materials such as steel and concrete in construction, and plastic and textiles in everyday applications. It is also present in everyday life in the form of paper, tissue, packaging and cellulose products," says Molony.

"Second, we need to explore the potential of wood fibre and process waste in new applications, such as the use of lignin for batteries for electronics, or extracting sugars and hemicellulose for bio-based chemicals.

"Third, we need to ensure we have enough trees to supply the increased demand for wood-based products."

South African ecosystems are not tree dominated. "We only have half a million hectares of indigenous forests, which are fragmented and occur along the south and eastern coastal inland mountains. Importantly, they are protected."

South Africa plants fast-growing exotic tree species to produce timber, and currently has 1.2-million hectares of these industrial plantations. Also, 25% of forestry-owned land is not planted with trees, but home to wetlands, grasslands, indigenous forests and areas of high conservation value.

Tree breeding and sustainable intensification – planting more productive trees on less land –are actively being practised in South Africa. The breeding, selecting and testing of new hybrid varieties is aimed at increasing pulp yield per hectare across diverse climatic regions. Trees are also bred for superior wood properties and resistance to biotic and abiotic threats including frost, drought, pests and diseases.

"As a sector, we can demonstrate that having commercial plantations has prevented the increased use, destruction and degradation of natural forests. This speaks to the heart of the way South African forests are managed – sustainably and responsibly," Molony says.

"Harvesting wood makes the circular bio-economy possible. If we don't have sustainably grown and sourced wood, we can't replace fossil-based products and do all of the things that climate adaptation demands," Molony concludes.

www.thepaperstory.co.za

World's first bioplastic bearing cage

Following its development in 2021 of the world's first bioplastic cage for rolling bearings, NSK can now reveal its initial product line-up. The new heat-resistant cage will be available on its 60 and 62 Series deep groove ball bearings, which are ideal for fan motors in air conditioners. Moving forward, NSK will continue expanding its product portfolio and the associated range of applications for OEMs looking to develop environmentally friendly products.

By manufacturing the bearing cage from a bioplastic material – which is derived from renewable biomass sources, mainly plants – it is possible to reduce lifecycle CO_2 emissions by 91% in comparison with conventional plastics made from fossil fuels, thus contributing to carbon-neutral initiatives. As a point of note, conventional bioplastic components have suffered from low heat resistance, but tests show that the cage material selected by NSK can withstand operating temperatures of up 120 °C.

Sales of new air conditioners are set to increase as they enter the price range of a growing number of households across Europe, while homes and workplaces with existing air conditioners are looking to upgrade due to the COVID-19 pandemic and the benefits that enhanced ventilation bring. Bearings are a key component within the fan motors of air conditioners.

By taking advantage of NSK 60 and 62 series deep groove ball bearings and the world's first 100% bioplastic cage brought to mass market, air conditioner OEMs can boost their sustainability credentials.

Moving forward NSK will continue expanding its use of bioplastics in products for other sectors, such as automotive, with a view to further reducing carbon emissions and contributing to the creation of a carbon-neutral society.

www.nskeurope.com

Load cells for tighter process control

Load cells aren't all alike, and taking a hard look at the differences can put users closer to total control. All weight–measurement functions start with a load cell, so it makes sense that a little difference there can have a large effect.

The hermetic seals that isolate the strain gauge from the harsh outer world make a good starting point. Vishay Revere seals have been engineered and perfected to withstand severe environmental abuse. Users may not always have to work in a caustic atmosphere, but it is reassuring to know that Vishay Revere load cells can – even if users simply need to hose things down once in a while.

Sealing actually takes place at two critical areas – where the strain gauge and element are isolated, and where the cable is brought out of the load cell – and both require special attention. It's an industry norm for manufacturers to use potting or epoxy for the element seal. Epoxy may test hermetic but it can, over the longer term, allow moisture to enter. Vishay Revere uses a precision, stainless-to-stainless weld for the element seal.

The cable-exit seal requires a different approach, because it involves dissimilar materials. Here Vishay Revere provides an extra-large, extra supportive compression seal to make sure users' load cells will be as secure ten years hence, as they are on the day of installation. The material that goes into the load cell is an important consideration, too. Vishay Revere offers most of its load cells in solid stainless steel, a far cry from simple plating. These are not just the products they sell for harsh environments; Vishay Revere believes that replacing a load cell is something users shouldn't have to think about more often than, say, every thirty or forty years.

Vishay Revere load cells seals have been engineered and perfected to withstand severe, long term environmental abuse.

For strain gauges, Vishay Revere has spent a lot of time perfecting materials and bonding techniques, and the result is evident in the accuracy and repeatability. The better the bond, the longer users can go on without losing calibration. Many of the Vishay Revere cells are still performing after 30 years in the field – and are still meeting specifications. That is rare unless the bond is very close to ideal to begin with, and stays that way.

www.instrotech.co.za

Tectra Automation appoints new Operations Manager

Tectra Automation has promoted Cobus Snyman to Operations Manager, effective January 2022.

Snyman began his career at Tectra Automation in 2010 as a workshop technician, building cylinders. Over the next few years, he gleaned substantial product knowledge in a project sales role until 2020, when he was appointed divisional manager, responsible for product divisions.

In his new role, Snyman manages the product divisions, warehouse, workshop, product support and local buying. He reports to Paul Springorum, General Manager of Tectra Automation.

"Snyman's management experience and extensive product knowledge will prove beneficial for Tectra Automation. We wish him all the best in his new role," says Chris Riley, Bosch Rexroth South Africa Group CEO.

www.boschrexroth.africa

SA rail and port upgrades essential for hub of Africa

Leading supplier Bearings International (BI) has welcomed the assertion by President Cyril Ramaphosa in his State of the Nation address on 10 February that the economy cannot grow without efficient ports and railways. "The functioning of our ports has declined relative to ports in other parts of the world and on the African continent. This constrains economic activity.

"Upgrading our ports is long overdue," says BI Business Development Leader Fred Aslett. "Our ports are something to be proud of as South Africa is known as the hub of Africa. Nowadays there is little faith in the ports that South Africa has to offer for imports and exports. An upgrade is therefore not only necessary but essential."

Offloading and loading cranes need to be refurbished to be able to deal with larger ships for a quicker turnaround which, in turn, necessitates upgrading the storage facilities and ancillary infrastructure.

"Exports from South Africa have seen a decline as our broken infrastructure has forced the rest of Africa to look elsewhere. Many companies in Africa that once relied on South Africa have now switched to other global supply networks," says Aslett.

Transnet is addressing these challenges and is currently focused on improving operational efficiencies at the ports by procuring additional equipment and implementing new systems to reduce congestion. Transnet has also developed partnerships with the private sector to address cable theft and vandalism on the freight rail network. This collaborative effort is already showing results in reduced disruptions to rail operations.

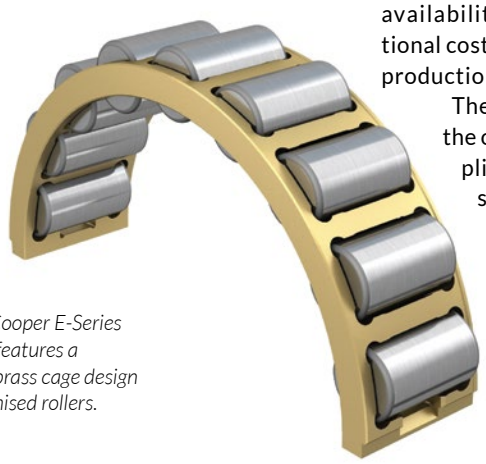
According to Ramaphosa, the government is prioritising infrastructure projects in energy, roads and water to support economic growth and improve quality of life for its citizens. In this regard, the Infrastructure Fund has received a R100-billion allocation from the fiscus over the next decade. It is now collaborating with State entities to prepare a pipeline of projects with an investment value of about R96-billion.

Several catalytic projects to the value of R21-billion are expected to start construction this year. Of this, R2.6-billion has been contributed by the government and the balance from the private sector and developmental finance institutions. The government will make an initial investment of R1.8-billion in bulk infrastructure, which will unlock seven private sector projects worth R133-billion.

For millions of South Africans in rural areas, roads and bridges provide access to markets, employment opportunities and social services.

www.bearings.co.za

New SKF Cooper E-Series



The new Cooper E-Series from SKF features a patented brass cage design with optimised rollers.

With the new Cooper E-Series, SKF has managed to make an already excellent product even better to deliver a host of additional cost-, time- and safety-related benefits that will optimise machine availability and uptime, reduce operational costs, and ultimately increase plant production.

The argument for split bearings as the optimum solution for certain applications is simple. When using a split bearing, the drive coupling or the cantilevered drive and gearbox do not need to be dismounted during bearing replacement. As very few changes are required to the shaft alignment or driveline, realignment can be avoided altogether. The bearings can thus easily be replaced in situ, making them especially suited for tight, difficult-to-access locations.

The new E-Series is dimensionally interchangeable as it incorporates an extended range of series 01 and 02 bearings in bore sizes up to 150 mm. This enables customers and end-users to conveniently replace existing 01 and 02 bearings with new bearings in the same dimensions.

The entire product range is available in sizes up to 300 mm, making the E-Series suitable for a wide range of applications on industrial and marine equipment including belt and screw conveyors, industrial fans, industrial drive shafts, water turbines and propeller shafts.

The upgrade also sees a unique and patented brass cage design with an optimised roller complement that delivers benefits such as increased carrying capacity, greater safety margins, longer L10 rating life and subsequent improved service life.

www.skf.com

Dolphin Coast Landfill Management awarded Level 1 B-BBEE status

Dolphin Coast Landfill Management (DCLM), operated by Veolia, advanced to Level 1 B-BBEE, the highest-ranking level, effective from 5 April 2022.

DCLM met all the perquisites for the advancement, having achieved 135% procurement. This percentage included compliance with criteria relating to ownership, management control, skills development, enterprise and supplier development, and socio-economic development.

"We are proud to be a Level 1 B-BBEE contributor within the Veolia group and look forward to continued transformation within our business and Southern Africa," says Nick Mannie, Managing Director, DCLM.

The advancement of DCLM's economic empowerment status supersedes its previous Level 3 B-BBEE status, awarded in 2020. Veolia group aims to be the benchmark company for ecological transformation by providing game-changing solutions that are both useful and practical for water, waste and energy management. In so doing, the company helps to develop access to new resources, while preserving and replenishing available resources.

www.veolia.com

Bosch Rexroth appoints first distributor in Zambia

Bosch Rexroth Africa Development has announced the appointment of Hazmat Innovations Limited as its first Zambian distributor. The company will offer the entire scope of Bosch Rexroth SA Group products and services to customers across the country.

This appointment enables Bosch Rexroth SA to increase its footprint in Zambia, covering all strategic market segments in the country's 10 provinces. "Hazmat Innovations' business strategy aligns closely with that of Bosch Rexroth, and our objective is to capitalise on the installed base in the Zambian market," explains Lennox Joubert, Business Development Manager, Bosch Rexroth Africa Development. "At least 15 major customers have been ear-marked to consolidate this drive."

Hazmat Innovations specialises in the repair, rebuild and supply of engineering products for heavy duty vehicles, mainly for mining houses and agriculture industries. It also offers support services in terms of skilled technicians and subcontract work to these market segments. The company became operational in 2004 and has an extensive footprint with 154 skilled employees stationed at various mining sites.

Hazmat Innovations has sufficient in-country capacity to carry out installations, commissioning and field services. It will also offer customers aftersales services and support. Bosch Rexroth Africa Development will provide in-country support as needed.

Hazmat Innovations will hold Bosch Rexroth distribution rights for one year to be reviewed on a yearly basis. Tailored training programmes are being offered to Hazmat Innovations employees, to empower them with further product knowledge and expertise. "Training will be held at Bosch Rexroth South Africa Training Department. We will also offer online training," adds Joubert.

Bosch Rexroth Africa Development is a Bosch Rexroth South Africa Group company.

www.boschrexroth.africa

Bosch Rexroth Africa Development has announced the appointment of its first distributor, Hazmat Innovations Limited, in Zambia. From left: Lennox Joubert, Business Development Manager, Bosch Rexroth Africa Development; Mike Munyoro, Hazmat Innovations Technical Director.

Epiroc wins order for battery-electric mining equipment

Epiroc has won a large order for battery-electric mining equipment from Assmang Proprietary Limited to be used at a manganese ore mine in South Africa. Assmang has ordered several of Epiroc's battery loaders and mine trucks – the Scooptram ST14 Battery and Minetruck MT42 Battery, respectively – that will be deployed at its Black Rock underground mine in the Northern Cape Province. The order was booked in the first quarter of 2022 and is valued at MSEK 120.

"Epiroc is proud to support Assmang on its journey toward lower emissions through the use of our cutting-edge battery-electric machines, while prioritising productivity and safety," says Helena Hedblom, Epiroc's President and CEO.

The order extends Assmang's and Epiroc's collaboration to use state-of-the-art solutions for optimised operations at the mine. Assmang previously ordered the same type of battery-electric machines for this mine, and in 2019 Assmang selected Epiroc's Mobilaris Mining Intelligence digital solution, which provides superior situational awareness of the mining operation in real-time.

The Scooptram ST14 Battery and Minetruck MT42 Battery machines, manufactured in Örebro, Sweden, are built to face the toughest conditions and are packed with intelligent features. They will be equipped with Collision Avoidance Systems as well as with the telematics system Certiq, which allows for automated monitoring of productivity and machine performance.

Congratulations to everyone involved!

www.epiroc.com

Water tanks to help fight COVID

In collaboration with Zutari and Hidro-Tech, Abeco Tanks has helped install two immense water tanks on the site of the Aspen Pharmacare manufacturing plant. One tank to hold 317 000 ℓ of treated water and the other for 108 000 ℓ of filtered water. This for use by Johnson and Johnson to manufacture its COVID vaccine in South Africa.Mannie Ramos Jnr, COO at Abeco Tanks comments, "The process of manufacturing the vaccine is complex. From growing the cells to preparing the vials and cooling the machinery that mass-produces and stores the product, almost every step of the 60-day timeline relies on the water in some way."

The tanks are part of the larger water treatment process, which stores, filters and treats the water before use in the vaccine manufacturing plant. The filtered water is processed through reverse osmosis, while treated water is chemically treated to achieve the correct ph balance.

Scientists use sterile water to dilute vaccines and essential stabilisers such as gelatine also need water. So, it is no wonder that biopharmaceutical manufacturing plants need water purification systems that are reliable, particularly in Africa.

abecotanks.co.za

Automation technology for sustainable packaging

Sustainability in the packaging industry is a key aspect of the fight against plastic waste and, ultimately, climate change. The challenges that this presents require flexible and powerful automation technology. OMRON, a global leader in industrial automation, presents some of the changes and technologies that offer solutions.

There is no question that too much plastic is produced and disposed of worldwide. Plastic production has increased exponentially in recent years – from 2.3-million tonnes in 1950 to 448-million tonnes in 2015, and this figure is expected to double again by 2050. Plastics often contain additives to make them stronger, more flexible and durable, and many of these extend the life of the material, driving up estimated decomposition times to over 400 years.

The packaging industry is one of the main contributors to this plastic glut and faces the mammoth task of developing sustainable alternatives, which minimise waste while saving energy and making better use of alternative energy sources.

The following strategies are currently seen as key to achieving more sustainable packaging:

Reducing packaging material use: Not only in terms of virgin plastics used for primary packaging, but also in the amount of protective secondary and final packaging used. Another driver is the elimination of the use of single-use packaging. Some strategies to tackle this issue include increasing the use and scaling of reusable and refillable systems; and redesigning packaging using alternative materials that facilitate recycling – by using materials that are biodegradable, compostable or have a lower impact on the environment if they end up in landfill.

OMRON and FlexLink have designed a collaborative (cobot) palletiser for industrial applications.

Packaging made from mono-materials is another strategy attracting increasing interest in the packaging industry. These have better recyclability, but migrating to them can be a challenging process that requires strict process control. Packaging equipment often needs to be adapted or customised to achieve advanced form, fill and seal processes that ensure equivalent package quality and performance.

All efforts to realise more sustainable packaging need to be accompanied by a waste collecting infrastructure that enables a waste-free or low-waste future along with an urgent behaviour change from consumers, industry, retailers and the entire circular economy.

New requirements for production facilities: Another key tactic for reducing the amount of plastic used in packaging is to shift from rigid to flexible packaging. Thinner walls, smaller sizes, narrower seams and lighter weights are a good way to reduce the amount of virgin plastic used in primary containers. Added to this is the use of mono-materials – paper based and biopolymers – as well as an increase in the proportion of recycled material in the primary, secondary and final packaging.

This has implications for processes and technologies on the factory floor that need to be revisited. For example, companies need to check the compatibility of their equipment and adjust settings if necessary. Lines need to be flexible to change over to new materials. Linking and managing new machine-to-machine information is required, while it is also necessary to control the performance of the machines under the new conditions to avoid rejects and material waste.

Ensure quality and safety of new materials: If more sustainable materials are used in packaging, it is still of the highest importance to ensure the quality of the product. On manufacturing lines, therefore, changing to more sustainable materials should be coupled with avoiding typical problems,

"We need to future-proof manufacturing with automation and robotics technology that can work flexibly with different materials."

such as material jams or tears, poor quality seals or incorrect labelling.

Traditional materials have different tear and puncture resistances, which implies that more precise control is needed during package forming, while shrink film made from recycled plastic has very different shrink properties compared to film made from virgin materials. These differences demand versatility, with accurate shrinking temperature control.

There are also aspects to consider in secondary packaging; reducing the melting points of adhesives when assembling and sealing cartons; adopting material reduction strategies such as lightweight corrugated materials; or unpacking and repacking the contents of a pallet with cartons made from more sustainable cardboard and other alternative materials.

Controlling packaging, sealing and labelling processes is OMRON's Sysmac, an integrated automation platform that provides complete control and management of automated plants.

Using automation to future-proof packaging

All these strategies require careful analysis to identify exactly what needs to be updated to ensure the ongoing quality and safety of the product. Ultimately, we need to future-proof manufacturing with automation and robotics technology that can work flexibly with different materials.

The following examples show some of the challenges companies may experience, along with the solutions already available from OMRON.

Film jamming: Thinner, recycled films are more sustainable, but can also tangle more quickly. Even slight changes in film thickness lead to uneven winding and unwinding and uneven tension on the film. This causes defects during pouch forming or sealing, such as curling, ripping, folding or sideways shifting and misalignment.

Correct handling with maximum throughput and minimum film consumption is key to overall OEE (original equipment effectiveness). Therefore, if creases are forming in the seal, operators should check for machine errors that are contributing to the film not being fed correctly. Examples include misaligned rollers, different feeding devices or sticky rollers that do not rotate freely.

OMRON's Film Tension Control System provides synchronised control of tension, feed and cut. This is complemented by (colour) mark detection for film compensation through motion control to ensure optimal unwinding of the roll. The OMROM Packaging Library offers a wide range of function blocks for film processing in vertical form, fill and sealing (VFFS) machines.

Film sealing: Thinner film materials offer lower costs and improved aesthetics. However, these materials are more sensitive to heat and susceptible to burn through when using traditional adhesives and sealing technologies. The actual sealing temperature must therefore be constantly and precisely controlled and automatically adjusted to avoid losing productivity or creating sealing defects that result in rejects and waste.

OMRON addresses this challenge with an AI-based temperature control algorithm synchronised with machine movement, and sensor technology that can be placed closer to the sealing bar. Noise is compensated for by an automatic filter adjustment function.

Quality control of packaging and labelling: Re-closable packaging or pouches with nozzles are increasingly replacing rigid plastic containers. Flexible packaging with new elements such as resealable closures place different demands on packaging integrity and quality testing. Thinner films, bio-based materials or those with a higher recycled content have a different thermal, elongation and puncture resistance profile. These differences can lead to irregularities in the shape and edges during forming and cutting.

More sustainable materials such as non-laminated or mono-materials also change shape and can reduce the fidelity or performance of label printing. Reading, checking or verifying label information on packaging is difficult when the shape is inconsistent or the print quality changes.

OMRON addresses this with its high-speed inspection system, a simple and scalable system suitable for multiple lines and transparent integration with robotic systems. OMRON's inspection system offers a multi-camera platform with a single controller for multiple-image capture at high speed to reliably detect potential defects. Advanced algorithms help to detect difficult-to-read characters, in variable light conditions and at high speeds.

New adhesives and glueing techniques: Eliminating tape and minimising adhesive use increases the recyclability of cartons. Removing the need for a silicone strip makes for 100% recyclable and biodegradable mono-material. To produce and seal cartons, companies are increasingly relying on reduced strategic application of adhesives. This requires a high level of precision and continuous quality control.

With its automated visual inspection system, OMRON supports accurate detection of glue patterns. The high resolution and brightness settings allow low-contrast defects to be detected, even in the toughest light conditions or when applied to difficult to detect materials.

Multi-material handling: Cardboard boxes made of recycled fibres have higher porosity and are more flexible. This makes it tricky to use traditional machines for manually unpacking and repacking boxes made of recycled cardboard without damaging them.

On the other hand, traditional palletising solutions are complicated to adapt and program, they take up a lot of space and cannot be relocated to another part of the plant. It is therefore advisable to have an integrated collaborative robot (cobot) solution with dedicated grippers, which can safely handle a wide range of irregular shapes and delicate objects with varying porosity levels.

OMRON offers a complete solution for sustainable packaging line automation that helps companies become more efficient and greener, utilising their machines for new recyclable materials and ensuring product quality.

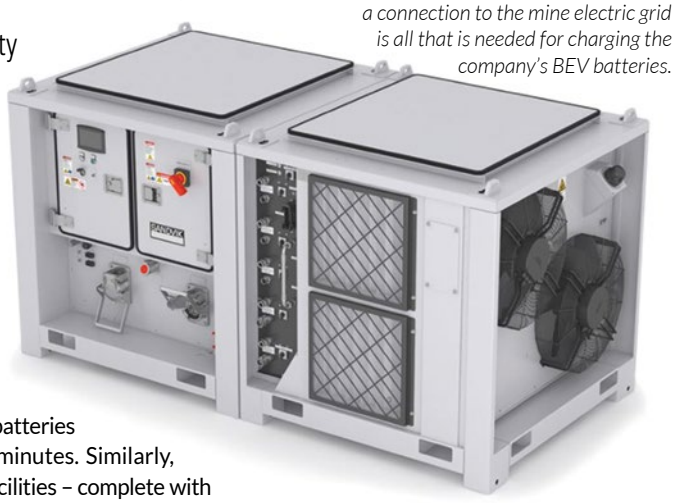
And controlling the whole packaging sealing and labelling process is OMRON's Sysmac, an integrated automation platform that provides complete control and management of automated plants. At the core of this platform, OMRON's Machine Controller series supports synchronous control of all machine devices and offers advanced features such as motion, robotics and database connectivity.

This multidisciplinary concept allows the solution architecture to be simplified, reducing programming effort and optimising productivity, further contributing to advancing sustainability in the packaging industry.

www.industrial.omron.co.za

Now is the time **for BEVs in mining**

With the mining industry searching eagerly for sustainability solutions and efficiency gains, battery electric vehicles (BEVs) are presenting exciting opportunities to raise the game. Sandvik Mining and Rock Solutions already has a range of battery-powered LHD (load haul dump) loaders in operation globally, and mines in southern Africa are now looking at how BEVs can serve their specific strategic priorities.



Sandvik's mobile charging station and a connection to the mine electric grid is all that is needed for charging the company's BEV batteries.

In the mine of the future, battery electric vehicles (BEVs) are poised to play a leading role in improving health and safety, boosting efficiencies and achieving sustainability goals.

With BEV technology at their disposal, southern African mines are now able to consider how to prepare themselves to best advantage, argues Deon Lambert, business line manager for load and haul at Sandvik Mining and Rock Solutions.

"For mines that are working towards carbon neutrality, there are options to combine on-mine renewable energy generation with BEVs," says Lambert. "In countries where grid power is unreliable, this strategy also holds the promise of more streamlined and uninterrupted operations."

With a solid reference base of its battery-powered LHDs and trucks already operating in the field, Sandvik Mining and Rock Solutions has made considerable progress in introducing BEV technology into mines. From 4 t LHDs in 2 to 3 m tunnels to 65 t trucks in 5 to 6 m tunnels, the BEV proposition is well-proven. The key, he says, is to ensure that there is the right level of site readiness before bringing any innovation into an existing process.

"For instance, it is clear that BEVs cannot on their own improve the carbon footprint of an older, cable-trailing fleet if the mine's source of electricity is still a coal-fired power grid," he notes.

Key to the enabling infrastructure for a productive BEV fleet is the necessary expertise for maintaining and servicing all technical aspects to achieve the expected performance levels. This process of skills development is well underway among Sandvik Mining and Rock Solutions people in southern Africa, and will be rolled out into an upskilling process for customer personnel.

"An advantage of our technology and design is that we minimise the new infrastructure that mines need to put in place to run our BEVs," he says. "Our LH518B underground loader, which will soon be introduced to this region, needs no cranes or forklifts to change the battery, for example."

Equipped with Sandvik's patented AutoConnect and AutoSwap functions, the loader can change batteries on its own in just six minutes. Similarly, the battery charging facilities – complete with cooling component – can be readily moved and installed to suit the location of the fleet. The charger is also designed to have only a light impact on the mine's electrical network.

Lambert highlights the importance of the extended technical support that Sandvik Mining and Rock Solutions can offer to mining customers who employ BEVs for the first time. Service level agreements can include close monitoring and maintenance of equipment, and options such as batteries-as-a-service rather than purchasing batteries.

"The entry of BEVs into our market is an exciting development for the future of mining," he says. "To fully leverage its value, though, we need strong partnerships at mine level for mines and suppliers to succeed in this technological journey together."

www.sandvik.com

Equipped with patented AutoConnect and AutoSwap functions, Sandvik's LH518B underground BEV loader can change batteries on its own in just six minutes.

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- Helped mitigate over **7 million tonnes of GHG emissions**
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2002 – 2022

The National Cleaner Production Centre South Africa (NCPC-SA) was established at the Joburg World Summit on Sustainable Development in September 2002. Its success since then has made it a true legacy project of the summit.

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CONVEY

FLEXI-DISC® Tubular Cable Conveyors gently slide fragile foods and non-foods through smooth stainless steel tubing routed horizontally, vertically or at any angle, over short or long distances, dust-free. Single or multiple inlets and outlets.

DUMP

FLEXICON® Manual Dumping Stations allow dust-free dumping of bulk material from bags and other containers. Automatic reverse-pulse filter cleaning allows continuous, efficient operation. Available with integral bag compactors for total dust containment.

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BULK-OUT® Bulk Bag Dischargers unload free- and non-free-flowing solids from bulk bags automatically. Allows untying, discharging, retying and collapsing of bulk bags—all dust-free. Available with weigh batching controls.

CONDITION

BLOCK-BUSTER® Bulk Bag Conditioners loosen materials that have solidified during storage and shipment. Variable height turntable positions bag for hydraulic rams with contoured conditioning plates to press bag on all sides at all heights.

FILL

SWING-DOWN®, REAR-POST and TWIN-CENTREPOST™ Bulk Bag Fillers can fill one bulk bag per week or 20 per hour at the lowest cost per bag. Numerous performance options. Available to industrial or sanitary standards.

CONVEY

FLEXICON® Flexible Screw Conveyors transport free- and non-free-flowing bulk solid materials from large pellets to sub-micron powders, including products that pack, cake or smear, with no separation of blends, dust-free at low cost. No bearings contact material. Easy to clean quickly, thoroughly.

CONVEY

PNEUMATI-CON® Pneumatic Conveying Systems move a broad range of bulk materials over short or long distances, between single or multiple inlet and discharge points in low to high capacities. Available as dilute-phase vacuum or positive pressure systems, fully integrated with your process.

TIP

TIP-TITE® Container Tippers dump bulk material from drums (shown), boxes or other containers into vessels up to 3 metres high. Dust-tight (shown) or open chute models improve efficiency and safety of an age-old task.

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