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A winning partnership: SA Industrial Energy Efficiency Project



This month:

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a win-win

SA's energy supply: a multi-faceted
approach

Modern safety chamber
technology



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Energy management and optimisation initiatives: reasons for celebration

Peter Middleton

COMMENT

On October 14, I joined the virtual awards ceremony for the 2020 AEE International Awards, which recognise outstanding energy-related achievements of the association's members across the world. The AEE is the Association of Energy Engineers, a non-profit professional society with over 18 000 members in more than 100 countries. Its mission? To promote the scientific and educational interests of those engaged in the energy industry and to foster action for sustainable development.

Our cover and cover story for this issue feature the excellent news that this year's AEE International Energy Project of the Year award, the highest international accolade for an energy programme, went to South Africa's Industrial Energy Efficiency (IEE) Project. This for its efforts to transform energy use patterns in South African industry, by mainstreaming energy management systems and pioneering energy training and professional development across economic sectors.

The beginning of the IEE Project in 2009/2010 coincides with when I first started editing *MechChem Africa/Mechanical Technology*. For all of that time, we have been covering energy management and efficiency strategies and successes, initially through pumping specialist Harry Rosen of TASONline, who has long argued for the adoption of the systems approach to improving the efficiency and reliability of pumping circuits. For several years now, Rosen, who is a UNIDO International Pump Expert with the IEE Project, has been one of our columnists. We met when his company was still organising the International Pump Users Conference (IPUC), which is also where I first became aware of ISO 50001, the Energy Management system standard.

The Mining and Industrial Energy Optimisation (MIEO) seminars also began at about that time, supported through the Association for Energy Efficiency and Eskom's Demand-Side Management initiative. It was Harry Rosen who alerted me to them, and through these seminars we met and presented stories from Mario Kuisis of Martec, Wayne Jacobs from Atlas Copco, Murray Jooste from Weir Minerals and many more, all of whom were regular MIEO roadshow presenters.

Until Eskom load shedding began in January 2008, energy efficiency was low on the priority list of industrial plant managers. Alf Hartzenburg of the CSIR's National Cleaner Production Centre and the national manager of the IEE Project describes the introduc-

tion of load shedding as the 'burning platform' that focused minds to the need for change. Initially, though, the rushed response was all about generation – the Integrated Resource Plan (IRP); Medupi, Kusile and the nuclear programme – with every industrial site that could afford it installing backup diesel generators.

Thanks to the persistent efforts by all those who were part of, or participated in, the IEE Project in South Africa, a real mindset shift has occurred. As well as the undisputed environmental benefits, the value of energy efficiency in terms of energy security, plant productivity and lower operating costs, is now undisputed.

Hartzenburg also talks about the new career opportunities that have been created in South Africa for energy engineers, which were unheard of in this country a decade ago. In this month's Power generation, petrochemical and sustainable energy management feature, we interview one of these new energy professionals, Tygue Theron of Energy Partners (EP) Intelligence. He describes a modern and holistic approach to energy, which starts with behaviour-based 'war on waste' initiatives, followed by energy optimisation investments in technologies such as high efficiency refrigeration systems.

Also, investments in EP's suggested solutions and energy management services are now routinely funded via power purchase or shared savings agreements, which completely remove any doubt about the worth of adopting the energy management approach.

Also in this issue, Energy leader for Zutari, Paul Nel, talks about his company's renewable energy journey and its "return home" to Africa. "The energy crisis is driving positive change and our energy mix is going to look different and better in the future," Nel says. In terms of the energy mix going forward, he adds "...the answer has to be renewables, with a healthy dose of gas in the medium term to provide on-demand dispatchable power," he says.

I attended the AEE 2020 Awards via Zoom. We were asked to leave the video on to give a sense of an audience. Not having to wear shoes or even trousers was joked about, but our presenter from the US was in a Tuxedo at 4:00 am. Clapping felt rather odd, but so did popping into the kitchen for a cup of tea.

But in the words of Alf Hartzenburg, "I was blown away that a project born in South Africa had achieved such high international status against the best international competition in the world." So was I, Alf, so was I.

It made me very glad. □



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SA wins highest international energy project award

Following the 2020 Association of Energy Engineers (AEE) International Awards ceremony on October 14, *MechChem Africa* talks to Alfred Hartzenburg, national project manager of South Africa's National Industrial Energy Efficiency (IEE) Project, about why it was a worthy winner and the project's ongoing importance for South Africa.

At the 2020 Association of Energy Engineers (AEE) International Awards ceremony held via a global virtual ceremony on October 14, The International Energy Project of the Year award, the highest international accolade for an energy programme, was won by the South African National Industrial Energy Efficiency Project (IEE Project).

South Africa's IEE Project, which has been led since 2010 by the National Cleaner Production Centre South Africa (NCPC-SA) and the United Nations Industrial Development Organization (UNIDO), received the award in recognition of its successful efforts to transform energy use patterns in South African industry, by mainstreaming energy management systems and pioneering energy training and professional development across economic sectors.

Since its first implementation projects in 2011, the IEE Project team has assisted industrial companies to save 6.5 TWh of energy, translating to cumulative cost savings of R5.3-billion in these companies. "This is approximately equivalent to five years of Eskom load shedding at the recently-experienced highest rates (1.325 TWh/year in 2019)," Hartzenburg points out.

"At the end of the day, energy efficiency is about doing basic things better, which is not always that exciting. But our relentless

pursuit of project outputs in the energy space has laid the groundwork for a multitude of achievements. We are so proud that, after more than 10 years of hard work and against the best initiatives the world has to offer, our IEE Project has been acknowledged as exceptional," he says.

The NCPC-SA was first conceived in 2002 at the worldwide sustainable summit in Johannesburg and founded with financial aid from the Austrian and Swiss Governments. "Our mission was to reduce waste streams in three areas, water, energy and materials. We have since added industrial symbiosis and reuse, but essentially our core purpose is unchanged," he tells *MechChem Africa*.

He says that the rolling blackouts of 2007/2008 were a wake up call for the 'bewildered' industrial community in South Africa. At the same time, with growth in energy demand having shifted towards non-OECD countries, international bodies started to help developing countries to better manage energy use.

"After the blackouts, the Department of Mineral Resources and Energy met with UNIDO to draft a project plan and, in 2010, the IEE-Project was launched through the NCPC-SA, with funding from the British (DFID) and Swiss (SECO) funding agencies and additional contributions from our own Department of Trade, Industry and Competition (the dtic).



"This was a world first and it became the model for the rest of world, which now has IEE projects in 30 different countries," Hartzenburg says.

Initially, the project encountered great suspicion: "Why are you talking to us, why are you not talking to Eskom?" was routinely asked at industry sites. He tells of an early experience at Johnson Matthey's Germiston factory, the producer of platinum group catalysts for catalytic converters and hydrogen fuel cells. "Our consultant made an appointment, was met in reception and given three minutes to present our case.

"That was in 2012. One year later, an energy management system was implemented and the company had saved 9.4 GWh of energy, worth R8.7-million at that time. Two years later, the Germiston factory was ISO 50001-certified, and in 2016 we were called back to capture the good work done. By then, Johnson Matthey had reduced its total demand by 30%. As a result, the British head office asked the Germiston plant to lead international energy management initiatives across the company's nine other plants," Hartzenburg recalls.

Many of the early interventions were simple: Alarms to indicate when there was no load on conveyors, for example, reminding someone to manually switch the motor off. Compressed air systems were optimised and leaks were proactively found and repaired. The Johnson Matthey plant also invested R600 000 to refurbish a calcining oven to improve insulation and temperature control, which added a significant percentage to the initial R8.7-million in savings," Hartzenburg informs *MechChem Africa*.

"Because our energy was cheap, industry had become wasteful. The start of load shedding created the 'burning platform' that focused the minds of plant management to the need for change. For ArcelorMittal, for example, softening steel prices, shrinking market share and rising costs of input energy – coking coal and electricity – were key drivers



The IEE Project team has assisted industrial companies to save 6.5 TWh of energy, translating to cumulative cost savings of R5.3-billion and a reduction in greenhouse gas emissions of 6.4-million tCO₂e.

for management to adopt different attitudes.

“Through the Mining and Industrial Energy Optimisation (MIEO) seminars, we presented the key shift from installing more energy efficient components such as IE3 motors, to looking for bigger gains by making improvements to whole production and energy usage systems. This is now widely embraced and we can confidently say we have changed the way things are done. By first looking at the specific energy needs of the process, we can make bigger changes to efficiency, removing throttling controls on pumps and fans, for example, and using VSDs to run the motors at slower speeds. Low cost system-wide initiatives routinely achieve savings of 15 to 35% across a whole plant,” he notes.

He says that South Africa was ripe for these interventions. At a steel mill, for example, a chiller and a pump farm were being used to supply cooling water for a hot strip mill. The water was being taken down 18 °C, but then transported through half a kilometre of uninsulated piping before getting to the mill,” he recalls.

The initial IEE Project was funded until 2014, but the work was too compelling, so it was extended for a further year. “After that, the implementing agent UNIDO went to the World Bank’s Global Environmental Facility (GEF), which agreed to fund a second phase of the project for a further five years, taking us to where we are today,” he continues.

The second phase had two very sharp focus areas: To overcome finance issues, a financial mechanism was added to accelerate implementation. “We also started to implement gender mainstreaming as a sharp focus, not only to encourage women to become active participants in industry, but to balance the roles and skills sets of women and men in the workplace. Today, 67% of the IEE Project team are women and the IEE Project pioneered a very successful Women in Energy movement.

A mid-term review by UNIDO in 2019 indicated that while the project was exceptional in its focus on meeting KPIs, it was very mature in that it had adapted to changing conditions. By way of example, Hartzenburg says one of the KPIs was to extend the offering of energy systems optimisation and energy management training courses to include TVET colleges. “When the TVET policy changed, we engaged with the universities of technology instead – CPUT, TUT, VUT, MUT – to offer our training courses as post-graduate modules.

“We also trained college lecturers to become ISO 50001 energy management trainers. As a result, our training is now able to bridge the gap between graduates and plant technicians, giving engineers some practical know-how and the technicians the background theory needed to understand their systems,” he adds.



While conducting an assessment during fan expert training at a sinter plant, Alf Hartzenburg inserts a pitot tube into one of the duct holes of a dedusting fan system.

Due to the success of IEE Project energy management and energy systems optimisation courses, new employment and career opportunities have also been spawned. “We now have an energy management business services sector. Before the IEE Project was launched, we had a database of about nine consultants. Today we can draw on more than 100 energy experts, mostly trained by us,” he points out.

Looking to the future, Hartzenburg notes that mature companies are now experiencing diminishing returns from conventional optimisation strategies, so the IEE Project has begun helping them to implement cleaner energy combinations of PV solar, wind, natural gas engines and energy storage: hybrid solutions that not only reduce emissions and improve energy efficiency, they also reduce dependence on an unreliable electricity grid.

“We are also harnessing the power of digitalisation and 4IR to find and respond to energy saving opportunities, and we are starting to see some global best practice examples. We can now predict the failure of steam traps before they fail and cause production losses, and use connected pressure, temperature and flow monitoring to rapidly respond to changes in a plant’s demand for steam,” explains Hartzenburg.

Another less heralded role of the NCPC-SA is the support for the South African Government to develop better energy policies. “We engage in processes such as the IRP, the National Energy Efficiency Strategy, 12% tax incentives and the dtic’s Green Cape Renewable

Energy Master Plan, for example,” he adds.

While the IEE Project will not be extended beyond 2021: “We can’t stop doing the good things we are doing. So we have developed a plan to keep the NCPC-SA as a driver of energy efficiency initiatives – because we have a long journey ahead of us.

“Listening to the AEE virtual awards ceremony, I was blown away that a project born in South Africa had achieved such high international status against the best international competition in the world,” he says.

Concluding, Hartzenburg asks: “What might have happened to South Africa’s electricity grid and its industries had the NCPC-SA and the IEE Project not been around?” □



South Africa’s IEE Project received the Best International Project Award in recognition of its successful efforts to mainstream energy management systems and pioneer energy training and professional development.

The thyssenkrupp HPGR Pro: fit for the future

With the release of the HPGR Pro, thyssenkrupp is taking crushing and grinding circuits to new levels of operational efficiency: higher throughput, improved product quality, and reliability with much lower production costs. *MechChem Africa* talks to Gerhard Van Wyk, the process manager for thyssenkrupp Industrial Solutions in South Africa.



“For decades, our high-pressure grinding roll (HPGR) has been the machine of choice for efficient, high-pressure grinding and processing of ores. But our new thyssenkrupp HPGR Pro takes grinding to the next level,” begins Van Wyk. “Through a multitude of innovations and features, minerals processing plants now have access to better-than-ever throughput, product quality and machine reliability, which can significantly improve production efficiencies and reduce operating costs – and all of these things are as necessary now as they have ever been,” he tells *MechChem Africa*.

Globally, van Wyk says that HPGRs started to be introduced in the cement and diamond industries in the mid to late 1980s. In hard rock applications, their use has steadily grown, especially since 2006 with the commissioning of the first thyssenkrupp HPGR at a large copper mine in Peru, which was soon followed in 2007 when a leading South African platinum producer began to investigate replacing problematic SAG mills at its Limpopo mine in South Africa.

This mine was struggling to get its semi-autogenous grinding (SAG) mill to do con-

ventional fine crushing of the very competent Platreef ore. The low efficiency of this tertiary crushing stage was causing bottlenecks on the feed line into the ball-mill.

This drove the mine to investigate a more efficient comminution technology for its new North concentrator plant. After extensive work, an HPGR-based circuit was selected and commissioned in 2007. Originally designed for 20 000 t/day, the later addition of variable speed drives enabled a production increase of 20 to 33% above nameplate capacity.

“We have been installing solutions such as these for over 40 years and, worldwide, we now have over 150 HPGR installations for hard rock applications and more than 300 in the cement industry. Over the years, we have made steady improvements, but the new HPGR Pro combines the best modern innovations to create a more efficient and economical solution than ever,” he explains, adding the complete HPGR Pro package typically offers 20% more throughput, 15% energy savings, and rolls that last up to 30% longer.

Turning attention to the specific innovations included in the new thyssenkrupp HPGR Pro, Van Wyk says that several individual de-

sign improvements have been incorporated, which all deliver operational performance enhancements.

Rotating side plates

The throughput improvement is largely as a result of the shift from using conventional static cheek plates to rotating side plates to keep the feed material running in a uniform line in the gap between the rolls. “Rotating side-plates on fixed grinding rolls improve material feed by up to 20% in terms of throughput. What’s more, the machine’s specific energy consumption is reduced by around 15%,” Van Wyk tells *MechChem Africa*.

Explaining why, he says the more dynamic and sealed rotating side plates enable better grinding at the roll edges. “They enable crushing across the full length of the roll, which not only crushes more material, but the pressure is better distributed across the grinding rolls. The side plates rotate with the roll, unlike the static cheek plates that reduce the speed of the material close to the edge, which reduces the pressure and increases wear.

“Traditional HPGRs produce higher pressures in the centre, tapering off towards the roll edges. Rotating plates reduce peak central



Oil lubrication enables better control of bearing temperatures, since the oil can be circulated through the bearings and back through an oil cooling and filtration system.

pressure while raising the effective crushing area, hence the rolls can process more feed using less energy," he explains.

"And rotating plates can be retrofitted to any of our legacy HPGRs," Van Wyk adds. "As with all of our HPGR Pro innovations, they have been designed as potential add-ons to installed units. By just adding rotating plates, existing thyssenkrupp HPGRs can either be set up to produce more downstream material of the same cut size or to run at the same feed rate with a finer cut size," he notes.

In terms of wear life, the uniform pressure profile in the milling gap results in better grinding and more even roll wear. This prolongs the service life of the rolls by up to 30%. "The rotating plate design with lower peak pressure reduces the 'bathtub effect' on the rolls, which enables them to be replaced less frequently. So the HPGR Pro can run for longer with less downtime," he explains

Controlled mechanical skew limitation for greater safety

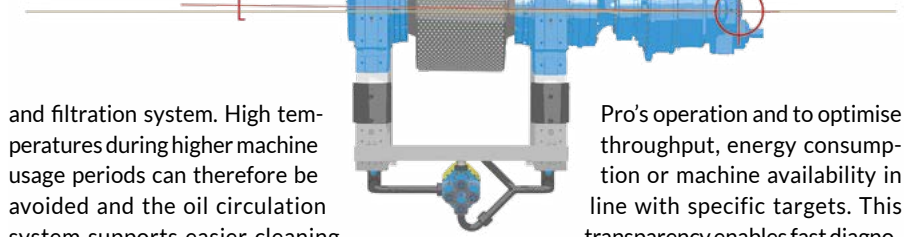
While many believe that roller skew should be completely prevented, Van Wyk argues that a certain amount of skew is beneficial, because it ensures uniform grinding. "A small and limited amount of skewing enables the HPGR to compensate for different nip-in conditions on either side of the rolls, due to feed segregation, for example," he explains.

"The new and uniquely controlled mechanical skew limitation built into the HPGR Pro allows skew but prevents excessive skew, making sure that damage cannot occur while enabling enough skew to promote grinding uniformity," he says. The skew limiting device also prevents excessive forces going through the bearings, which can easily occur when skewing is suppressed.

Oil lubrication for increased availability

With the HPGR Pro, the roll bearings are now being lubricated with oil instead of grease. This enables better control of temperatures, since the oil can be circulated through the bearings and back through an oil cooling

A uniquely controlled mechanical skew limitation makes sure that damage cannot occur while enabling enough skew to promote grinding uniformity.



and filtration system. High temperatures during higher machine usage periods can therefore be avoided and the oil circulation system supports easier cleaning. Optimised bearing seals, oil quality monitoring and continual filtering also reduce contamination and allow the oil to be used for longer, reducing costs and environmental impacts.

Laser-based stud damage detection

"The availability of the HPGR Pro is increased even further through our unique stud detection system. While the machine is operating, the surface of the rolls is automatically monitored and measured by a laser, constantly informing the operator about the state of the studs and the rolls," Van Wyk continues.

The stud detection system is used to predict the best possible time for roller replacement. "And there is no longer a need to routinely stop the machine for precautionary inspections, which saves valuable time and money."

Analytics and machine learning

Continual optimisation via data analysis has been incorporated into the thyssenkrupp HPGR Pro by adding modern sensor technology and an Advanced Machine Protection System. "Based on our specialist expertise, we are able to use data collected to automatically ensure that any installed HPGR Pro runs at its optimum operating point. This prevents overloading and vibrations, and ensures production is optimised.

"What's more, our global specialists collect and process the machine data to enable us to continuously improve a particular HPGR

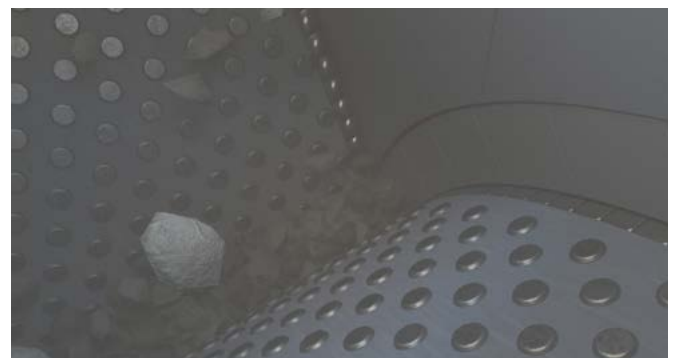
Pro's operation and to optimise throughput, energy consumption or machine availability in line with specific targets. This transparency enables fast diagnosis and root cause analysis," says Van Wyk.

In summary, he notes that the new thyssenkrupp HPGR Pro is:

- More efficient than ever: It offers best possible grinding outcomes with up to 20% more throughput thanks to optimised material feed and reduced wear and tear.
- More reliable than ever: It delivers higher machine availability through increased transparency on roller status, predictive maintenance of machine components such as bearings, combined with fast, professional service at any location worldwide.
- More high-end than ever: State-of-the-art sensor technology and data analysis gives greater transparency and ongoing optimisation, resulting in an even better performance and higher productivity through continual roller monitoring while the machine is in operation.

Concluding, he reminds us that all of the new HPGR Pro features can be retrofitted to thyssenkrupp legacy units, and customers may pick and choose which combination of upgrades best suits their needs.

"Customers and HPGR operators can rely on our full support in equipping existing machines with the latest technical features from the HPGR Pro, making machines that are fit for the future. Through our local network of service centres and specialists, thyssenkrupp is able to offer rapid support, wherever and whenever it is needed," Van Wyk assures. □



Left: Some key innovations incorporated into the new thyssenkrupp HPGR Pro include rotating side plates; controlled skew limitation; oil-based bearing lubrication; laser-based stud damage detection; smart analytics and machine learning. **Right:** Rotating side plates reduce peak central pressure while raising the effective crushing area.

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Game-changing pulping chute at Ekapa

A scrubbing innovation by Multotec Wear Linings is proving to be a game-changer in the diamond industry. A pulping chute is being used to wash re-crushed fine production material after it has passed through the tertiary crushing circuit (HPGRs). John Britton, Multotec Wear Linings' projects sales manager explains.

A revolutionary new concept in fines scrubbing has been installed by Ekapa Minerals at its Combined Treatment Plant (CTP) in Kimberley for the processing of virgin underground kimberlite as well as for retreating tailings.

The innovation, developed by Multotec Wear Linings, uses a pulping chute to scrub and wash re-crushed product after it has passed through high-pressure grinding rolls (HPGR) in the tertiary crushing circuit. The important advantage here, according to Multotec Wear Linings projects sales manager, John Britton, is that it performs the scrubbing action faster and more efficiently than a traditional rotary scrubber would, and at a much lower cost.

Multotec commissioned two of these pulping chutes at Ekapa Minerals in late-2019, where they have been operating consistently and in line with expectations. With the use of patented wave generators, the pulping chute uses the gravitational energy from the slurry flow to create a constant turbulent mixing action that releases the mud, clay and slime sticking to the kimberlite particles.

According to Kimberly Ekapa Mine (KEM) CEO Jahn Hohne, the pulping chutes are a welcome contribution to the company's cost saving efforts and a clear demonstration of Multotec's expertise in developing value-adding solutions in the mining sector.

"The dual chute pulping plant is ideally suited to de-conglomerating the HPGR cake product and is exceeding expectations in efficiency and effectiveness at over 600 tph, which has significantly relieved overloading on the existing pair of CTP scrubbers. The net result is a meaningful increase of up to 20% throughput capacity for the entire processing plant, which substantially improves economies of scale at CTP, feeding directly onto the bottom line," he says.

Britton highlights the efficiency of the system, which is able to aggressively scrub the material in just three to four seconds as it passes through the chute. This represents just a fraction of the usual retention time in a rotary scrubber, which is three to four minutes. He also emphasises the drastic reduction in running cost that the pulping chute achieves.

"From our experience of plant layouts and flow diagrams, it is clear that fines scrubbers



are significant contributors to a plant's capital, operating and maintenance costs," he says. "Scrubbers are equipped with large drives with gears and gearboxes to rotate the drum. They are high consumers of power and require mechanical component maintenance, which means higher operating costs."

Substantial structures and supports are also needed for the scrubber and its drive mechanisms. "In designing the pulping chute, Multotec sought a simplified solution," Britton says. In addition to improving scrubbing efficiency, the objective included reducing the cost of replacing scrubber liners and the downtime this demanded. The cost of replacing the steel shell of a scrubber – which is constantly subject to stress, wear and fatigue – was another cost considered when designing an alternative.

The pulping chute, by contrast, is a stationary and much simplified innovation that targets scrubbing fines sized at less than 32 mm. Slurry deflectors located at the top end of the scrubbing chute direct part of the slurry away from the scrubbing chute floor. This curls into an arch until it flows backwards into the approaching slurry, creating the turbulent scrubbing effect.

"We custom-design the chutes to suit the application and can increase chute capacity to up to 800 tons per hour," says Britton. "This is achieved with no moving parts, bearings, hydraulic packs or girth gears: the only power required is to supply material and water to the receiving chute. These actions are required to feed the scrubber, then gravity takes over and provides the required energy."

Maintenance is also streamlined by designing the chute in segments. Should one segment be wearing more than others, it can quickly be removed and replaced – putting the chute back into operation while the original segment is refurbished as a spare.

Britton notes that the pulping chute has drawn interest from other diamond producers in southern Africa, Australia and Canada. It can also be applied in commodity sectors such as coal, platinum, chrome, iron ore and mineral sands.



Left: The Multotec pulping chutes consists of patented wave generators, using energy from the slurry flow to create a turbulent mixing action to release mud, clay and slime sticking to the kimberlite particles.
Right: The chute is designed into segments that are quicker to remove and replace during maintenance.

www.multotec.com

Coal mines need lower costs, raised productivity



Kwatani partners with majors and junior miners alike, offering two distinct equipment ranges tailored to each segment's specific requirements and capital budgets. With over 44 years of local and global experience, this vibrating screen specialist has a strong product footprint. Frengelina Mabotja, capital sales engineer at Kwatani, talks about the company's offering to the coal industry.

Despite South Africa's energy supply being heavily reliant on coal, weak prices and more demanding mining conditions are putting pressure on coal mines and their suppliers to do more with less.

"Coal prices are low and any recovery in the short term is very unlikely," says Frengelina Mabotja, senior metallurgist and capital sales engineer at vibrating screen specialist, Kwatani. "Going forward, as coal seams with more overburden have to be mined, surface mining will potentially become much more expensive."

Adding to the coal industry's challenges is the unwillingness of many lenders to fund new coal plants and expansions, leading to great uncertainty. The result is a strong drive for ongoing cost reduction and increased productivity across both majors and juniors in the sector, says Mabotja.

"While most of SA's coal supply is produced

by a handful of major mining houses, Eskom has in recent years sought to develop the junior market with black ownership," she says. "Kwatani partners with majors and junior miners alike, offering two distinct equipment ranges tailored to each segment's specific requirements and capital budgets."

With its 44 years of local and global experience, Kwatani provides customised, cost effective processing solutions for mines' specific needs. She notes that vibrating equipment requirements can vary significantly between a smaller-scale junior miner and a long-life major. This is in terms of the equipment's size, operating lifespan, tonnage throughput, efficiency and yield requirements.

"Apart from the initial capital expenditure, mines' process equipment has an enormous influence on their production efficiency, tonnage and operating cost," she says. "Our long-lasting, robust vibrating screen and feeders are designed for continuous tonnage

throughput and high efficiency. This reduces the processing cost per ton and the overall cost of the machine over its lifetime."

For the large mine segment, Kwatani's designs have included high capacity and performance screens such as its 4.3 m wide banana screen. Its brute force grizzly feeders for run-of-mine (ROM) operations are capable of sizing and feeding material at up to 2 000 tph, even from high drop-heights.

"Our engineering team has optimised the structural integrity, weight distribution and lifespan of this equipment," says Mabotja. "We have many of our 4.3 m wide banana screens operating at the largest opencast coal complex in the world."

At the same time, Kwatani supplies screening equipment below 2.4 m wide for smaller-scale, modular plants processing up to 250 tph. These units are tailored to budget and provided within short delivery times.

www.kwatani.co.za



A robust grizzly coal screen designed and manufactured in South Africa by Kwatani.

Chutes cut dust levels at platinum mines

Using the latest dust measuring technology, Weba Chute Systems has been able to demonstrate to platinum mining customers how its custom-engineered chutes significantly reduce dust at transfer points.

WebaChuteSystems has been conducting tests at platinum mines to quantify reductions in dust at transfer points when using custom-engineered chutes.

“We conducted dust assessments at mines in South Africa and Zimbabwe,” says Izak Potgieter, systems manager at Weba Chute Systems. “The aim was to compare the impact of our designs on material flow and dust levels.”

At the site in Zimbabwe, considerable dust levels were being created at bunker discharge chutes. Material of up to 500 mm in size was moving through at a rate of 600 tonnes per hour.

“The material flow was the biggest factor generating dust in the conventional chute, as material was not flowing as evenly as it should,” says Potgieter. “This created a lot of energy for the dust particles to expand into the surrounding atmosphere.”

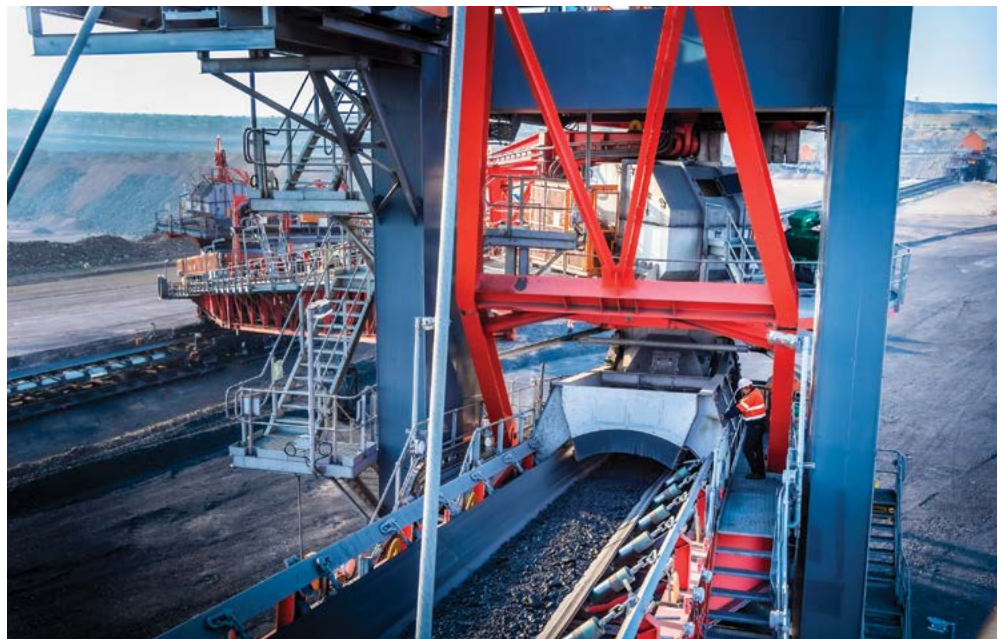
The installation of the Weba chute – with its engineered design for optimal flow control – reduced the dust levels by about 40%. By controlling the velocity of material, the design not only cuts dust creation but also reduces impact and wear for increased productivity and less downtime for maintenance.

At the South African operation, the tests were done at a transfer point in the milling plant where an average tonnage of 190 tonnes per hour was being moved. Despite the use of water sprays, the existing chute was still creating considerable amounts of dust. The installation of a custom-engineered Weba chute was able to reduce dust levels by 15%.

“Dust levels have been shown to have a serious impact on human health, especially smaller particle sizes of 0.3 micron,” Potgieter says. “Health effects of dust relate mainly to particle size and dust may contain microscopic solids or liquid droplets that are small enough to get into the lungs and cause serious health problems.”



A Weba Chute Systems engineer doing particle measurement in high humidity areas to verify the impact on health and safety.



Engineered Weba chutes ensure zero spillage, which is key to reducing dust at transfer points.

Spores and contaminants associated with dust and aerosol can also adversely impact human health, causing a range of issues from respiratory infections to toxic exposure. Weba Chute Systems develops bespoke solutions for customers' transfer points, using its

experience and years of research and development. When required, discrete element modelling is employed as a verification tool for designs, confirming its suitability before installation.

www.webachutes.com



A WINNING PARTNERSHIP SA INDUSTRIAL ENERGY EFFICIENCY PROJECT

The SA Industrial Energy Efficiency Project, run since 2010 by the National Cleaner Production Centre (NCPC-SA) and the United Nations Industrial Development organization (UNIDO), has won the global Association of Energy Engineers (AEE) International Energy Project of the Year Award for 2020.

The AEE's International Awards recognize achievements in energy around the world. "Energy Project of the Year: International" covers energy management projects developed and implemented outside the United States.

SINCE ITS INCEPTION IN 2010, THE IEE PROJECT HAS ASSISTED INDUSTRIAL COMPANIES IN ACHIEVING THE FOLLOWING:



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energy saved



6.4 million tCO₂e
GHG mitigated



ZAR 5.3 billion
cumulative cost savings

For more information about the IEE Project visit: www.ncpc.co.za

Email ncpc@csir.co.za to find out how to get help to transform your company's energy use.

The IEE Project is a national partnership initiative with international implementing and funding partners:



Digitalising minerals processing for more control

Mining's accelerated move toward digital solutions since the outbreak of the COVID-19 pandemic is being supported by FLSmidth's decades of research and development. The company has over 80 projects underway to improve its mining-related offerings.

Terence Osborn, FLSmidth's director of product and account management for sub-Saharan Africa and the Middle East, highlights R&D as the lifeblood of the company's new technologies. So much so, that it has some 80 projects underway to improve its mining-related offerings.

"The power of digital technology is certainly a key element of these efforts," says Osborn. "Together with our Blue Box digital concept, based on our ECS/ControlCenter™, which is a cybersecure interface between our equipment and cloud data storage, we use our SiteConnect™ mobile app to monitor

the performance of equipment and process plants in real time. The ECS/ControlCenter™ V8 process control platform sits at the heart of our digital vision, a key component in our growing portfolio of digital solutions and services, which we call ENABLR."

An example of this applied capability is an FLSmidth REFLUX® Classifier modular plant operating on a South African mine. Using SiteConnect, operations managers can have real-time access to over a hundred operational parameters on the plant. Data analytics linked to the cloud data can also generate time-based trends for instant viewing on the app.

"We have also developed SmartCyclone™ technology for our hydrocyclones," Osborn notes. "This innovation uses sensors to detect wear and roping, a condition that reduces separation efficiency. By sending an alert when certain operating parameters are breached, the system ensures optimal efficiency is maintained, even as slurry conditions in the circuit vary."

He highlights that the com-



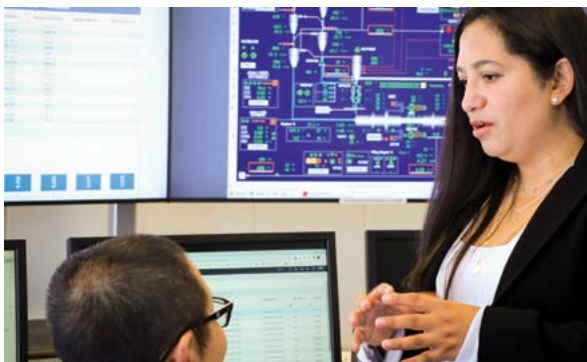
Terence Osborn, FLSmidth's director of product and account management for sub-Saharan Africa and the Middle East.

pany's machine-level solutions are offered as part of plant and process packages. At both plant and process level, there are also FLSmidth's advanced ECS/ProcessExpert® solutions, which facilitate not just monitoring and control, but advanced optimisation enabled by state-of-the-art AI technologies.

"It is important to remember that control systems need to be flexible, so they adapt to customers' needs and to their existing systems," he says. "With FLSmidth's depth of expertise in software engineering and machine control, we can ensure that our machine-level systems connect with all market leading control systems – to seamlessly deliver the data that mines need for effective decision-making."

The company's R&D pushes the boundaries of performance in a range of mineral processing fields. These include advancing its lamella plate technology in mineral separation applications, adapting its vertical roller mill for dry grinding in mining, and extending wear life of pumps with new polymers.

www.flsmidth.com



With its decades of product development, FLSmidth is well placed to offer customer remote monitoring, control and process optimisation.

Mobile drum tipper with safety cage

Flexicon's new mobile TIP-TITE® Drum Tipper with safety cage allows hands-free, automated dumping of bulk solid materials from 115 to 200ℓ drums throughout the plant, with no dusting or danger associated with sudden shifting of contents.

The three-sided carbon steel cage with safety interlocked doors is mounted on a mobile frame with quick-acting jack screws for stability. A platform raises the drum hydraulically, creating a dust-tight seal between the rim of the drum and the underside of a discharge cone.

A second hydraulic cylinder then tips the platform-hood assembly, stopping it at dump angles of 45, 60 or 90 degrees with a motion-dampening feature, causing the spout of

the discharge cone to mate with a gasketed receiving ring on the lid of an enclosed hopper that charges a flexible screw conveyor.

A pneumatically-actuated slide gate at the spout can be opened once the discharge cone has sealed to the receiving ring to discharge material, and then closed before returning the drum to its original position, with no dust emitted throughout the cycle.

Constructed of carbon steel with stainless steel material contact surfaces, the unit is also available in an all-stainless steel finish that meets food, dairy or pharmaceutical standards. Optional cone

adapters allow for safe, dust-tight dumping of small-diameter drums and pails.

www.flexicon.co.za



Flexicon's new mobile TIP-TITE® Drum Tipper with safety-interlocked cage.

Performance-based maintenance: a win-win financial model

MechChem Africa talks to Burak Ozyurt, managing director for SKF in Southern Africa, about a new approach to delivering maintenance services in the region. Using remote diagnostics and several new onsite innovations, SKF is currently able to deliver long-term maintenance solutions that require no upfront investment from plant operators.

Burak Ozyurt believes that the maintenance maturity level of many industries in the Southern African region is not yet where it ought to be. This is due to a set of complex factors such as skills gaps, restrained business environments, remote locations and often harsh operating environments, this in spite of the many, multinational OEMs operating in the region. “This often leads to short-term maintenance decisions on the ground, which is never ideal for the long-term health or financial viability of industrial plants in Southern Africa,” he says.

“Localisation is also seen as making it harder to raise maintenance maturity levels,” he continues, “but all multinational service providers trade by the same rules, making competition fair. This is particularly true when considering the use of advanced connected technologies for monitoring the health of plant equipment, establishing

maintenance needs and intervening early to avoid unscheduled shutdowns,” he says.

“Remote monitoring equipment tends to be from overseas and expensive, but it pleases me to see that, in Southern Africa as a whole, SKF is among a few companies capable of delivering these new technologies in this tough and competitive environment. We are receiving increasing numbers of enquiries for vibration analysis, oil analysis and thermography services,” he adds.

Having established a remote diagnostic centre (RDC) in its new Marlin Road premises in Johannesburg, SKF has started doing conformity checks to establish the viability of doing remote condition monitoring for plants across the region. “Our findings are very exciting. By installing condition monitoring and lubrication equipment that connects to our RDC, there becomes much less need for our staff to travel to remote sites. This is excellent for clients, particularly in the current climate, for health and safety reasons as well as for cost efficiency, travel and labour cost reductions and for governance of the control of data. It gives clients the opportunity to outsource these often complex and costly

tasks to experts, who are able to shave costs by working remotely and collectively,” Ozyurt explains.

With the newly established Remote Diagnostic Centre, SKF now has a number of data analysts who are able to provide state-of-the-art diagnostics about the condition of the assets being remotely monitored. “We have also invested further in technologies such as lubrication, which is very important for heavy equipment such as the mills and



crushers typically used on remote mines in Africa. In 2015, we acquired the specialist services of Lincoln Lubrication Systems and Management Services, which we have merged into the broader remote maintenance offering. This is a major step forward in terms of raising the maintenance and asset management maturity in the region,” he continues.

In addition to Lincoln Lubrication, Ozyurt says that SKF has also recently acquired Recond Oil, a company that specialises in the manufacture of oil cleaning and recirculation. “In keeping with the modern concept of the circular economy, Recond Oil has developed its business around overcoming the environmental harm of having to dispose of used oil. The company manufactures mobile machines that clean and recirculate the millions of litres of oil used on large sites, which not only results in better environmental compliance, but huge savings in operational costs accrue for operators,” he explains.

To these systems, SKF adds fully automated Lincoln lubrication systems, which enables large remote sites to overcome the ongoing need for maintenance personnel to manually lubricate their rotating equipment. “With our remote diagnostic capability, we are now able to combine all of these modern offerings to offer routine, customised and remote care of plant equipment,” says Ozyurt.

Describing how SKF is making these options affordable, he says that COVID-19 has demanded a new approach. “We are now on the edge of a massive economic crisis, with budget freezes on capex and opex. We at SKF have, therefore, developed a performance-based financial model that does not require any upfront investment from clients,” he assures.



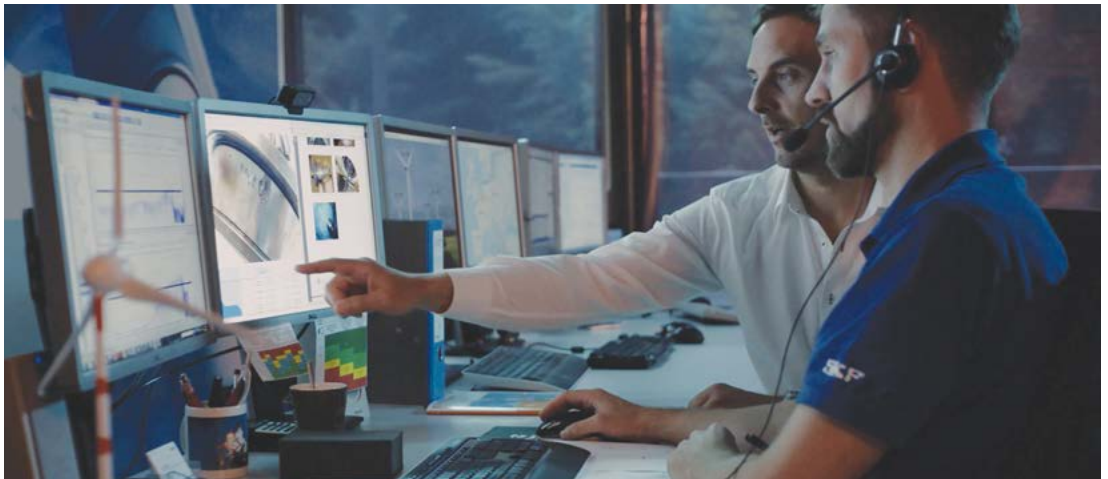
Lincoln Lubrication Systems and Management Services has been merged into SKF's broader remote maintenance offering to raise maintenance and asset management maturity in the region.

“What we say to clients is let SKF develop and install customised remote monitoring, oil reconditioning and lubrication systems, systems based on most critical needs and which we all feel will have the most positive reliability and cost benefits for the plant. We then test the system out and, by monitoring the benefits and their cost implications, we finance the investment through shared savings,” he explains.

“We call this a performance-based model, because, while SKF will fund the initial investment, there are no fixed repayments. Instead, the monthly premium is calculated directly from the savings achieved. This means clients cannot lose by adopting one of our solutions. Performance-based financing offers them the opportunity to save huge amount of money for many years, without having to invest anything upfront.

“Also, of course, this completely removes the investment risk. SKF takes direct responsibility for making the system worthwhile. If no savings accrue, then no payments are due,” he adds.

To deliver this service, SKF has invested in its Remote Diagnostic Centre and the associated advanced and connected vibration, thermography, oil analysis and other condition monitoring technologies; the lubrication business unit, which includes Lincoln Lubrication Systems and Recond Oil; its bearing remanu-



By installing condition monitoring and lubrication equipment that connects to an SKF remote diagnostics centre (RDC), there becomes much less need for staff to travel to remote sites.

facturing and refurbishment centres; and its multi-million rand new South African facility in Marlin Road. “More importantly, we have employed over 50 diagnostic and applications engineers throughout Southern Africa and established a world-class Merseta- and BINDT-accredited training facility for skills development.

“These investments make us 100% confident that we can deliver on the promise of better efficiencies and lower costs, so that performance-based financing can immediately reduce maintenance costs and substantially reduce long-term operational costs for our clients,” says Ozyurt.

While bearings are SKF’s core products, Burak Ozyurt explains that they can never be treated as stand-alone products. Incorrect lubrication, too little or too much; poor sealing that allows dust to contaminate the lubricant; or connected equipment such as gearboxes or

power transmission components being misaligned, all cause bearing damage. “You can’t look after a bearing on a rotating machine without also looking after everything else connected on the same shaft,” he points out.

“If a vibration is detected, it might come from a neighbouring power transmission unit, or from the ground or from under/over lubrication or from misalignment and it may mean that the bearing is nearing the end of its life. Remote diagnostics specialists can identify the exact cause quickly, while also recommending a maintenance response,” he explains.

“We are now combining all our value propositions to enable us to deliver a totally new business model to the African market, a performance-based model that is customised to every operator’s unique needs and costed according to the improved performance we can deliver for them,” Ozyurt concludes. □

SKF Vibracon for diamond mining vessel

SKF provided the ideal solution for a diamond mining vessel in the form of a tailored chocking design that uses SKF Vibracon to facilitate the mounting and alignment of the motor and gearbox responsible for the forward and reverse thrust of the propellers.

“Our customer approached us to see if we were able to provide a chocking solution using SKF Vibracon units as ‘precise-fitting spacers’ between a gearbox and collision chocks,” explains SKF sales engineer, Zachry Viljoen. “The engineer wanted us to look into the possibility of using Vibracon in a horizontal orientation after having seen a photo in marketing material of a horizontally-mounted Vibracon unit developed by an SKF team in the Netherlands.

“However, the local application was more complicated as it would be subjected to very high propeller thrust loads of 180 kN, which

a horizontal Vibracon application would not be able to handle. We therefore decided to collaborate with the Vibracon team in the Netherlands to find the best possible solution for our customer.”

The final solution, consisting of four SKF Vibracon units acting as foundation bolts on each corner of the electric motor, was ultimately chosen by the engineering company responsible for the maintenance work on the vessel.

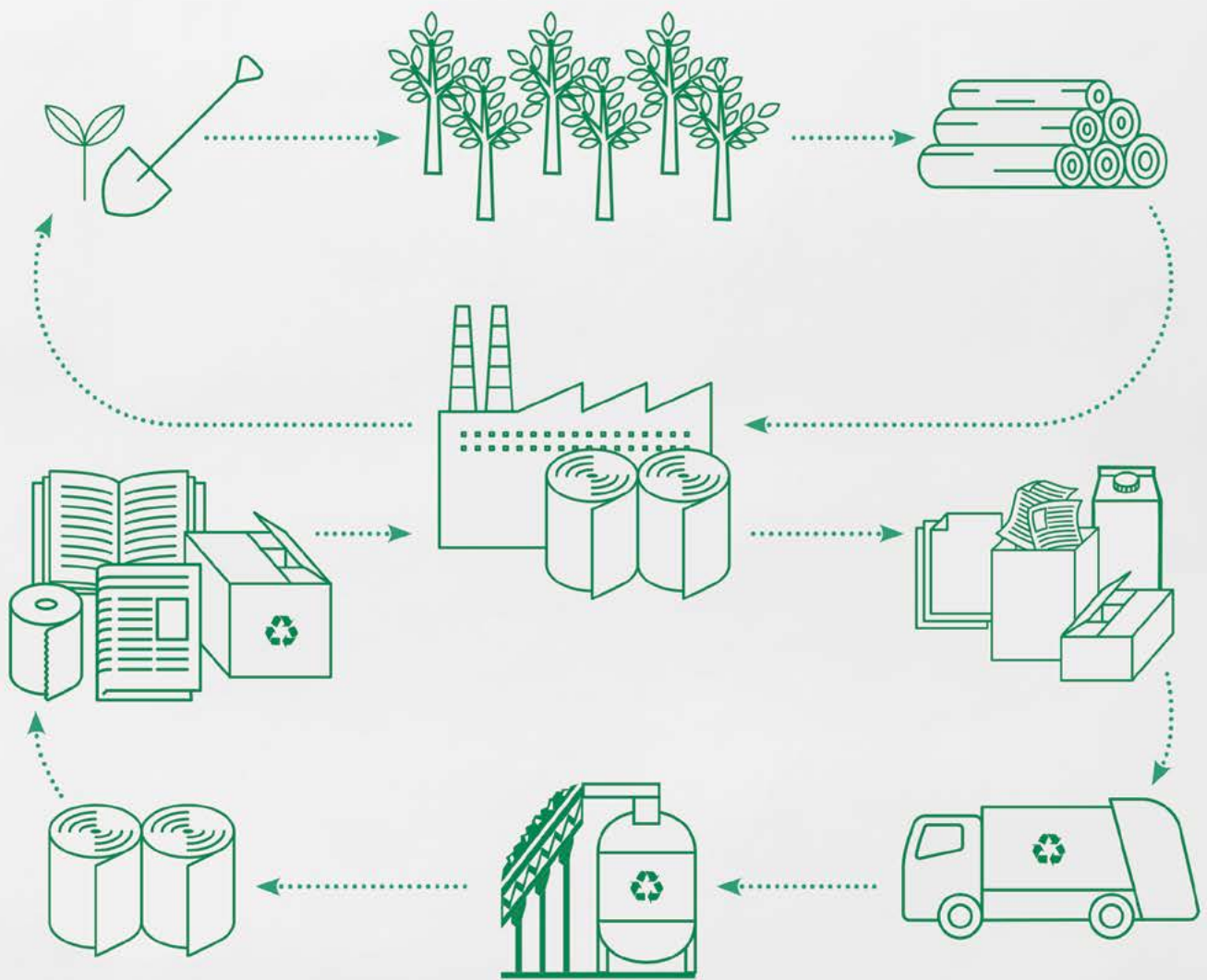
SKF Vibracon provided the technical solution to install and prevent movement of equipment. The unit can typically be used for aligning plant equipment that is regularly removed and reinstalled. The adjustable Vibracon unit makes the task of aligning equipment quicker and easier.

As part of the chocking solution, Vibracon can be purchased in different sizes and used

in conjunction with other chocking solutions such as epoxy casting. “This is where SKF’s expertise and know-how comes into play as we are able to accurately assess the application and find the optimal solution for our customers,” notes Viljoen. □



SKF Vibracon facilitates easy mounting and alignment of plant equipment that is regularly removed and reinstalled.



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PAPER
 MANUFACTURERS ASSOCIATION
 OF SOUTH AFRICA (PAMSA)

Garlock bearing isolators for exceptional bearing protection

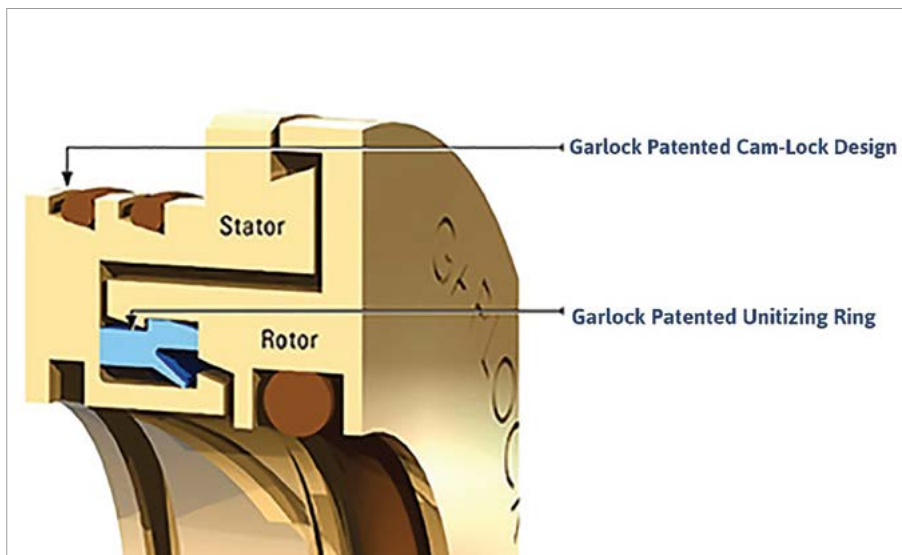
BMG's range of Garlock Klozure® bearing isolators offers dependable protection for pumps, electric motors, gear boxes, fans and other bearing-supported industrial equipment used in harsh applications.

Garlock Klozure bearing isolators, with an engineered labyrinth design, have been developed to retain bearing lubrication to IP 66 ratings, preventing contaminants such as moisture, dust and dirt from penetrating the primary seal or bearing houses.

BMG specialists recommend the use of Garlock Klozure bearing isolators as an efficient alternative to conventional radial lip seals for bearing protection.

"Traditional radial lip seals – which are unidirectional seals that require professional installation – simply cannot offer the necessary bearing protection performance required in harsh conditions and do not ensure extended service life provided by bearing isolators," explains Wayne Holton, BMG's business unit manager, Bearings, Seals and Gaskets division. "Notable features of BMG's Garlock Klozure bearing isolators include advanced labyrinth technology, encompassing non-contact seals with no wear components, which ensure long service life and reduced drag on the shaft for lower power consumption.

"Common industry challenges include premature bearing damage, which shortens the mean time between failure (MTBF); and the ingress of contamination such as moisture, dust and dirt into the bearing housing, which



BMG's Garlock Klozure® bearing isolators are an efficient alternative to conventional radial lip seals. They offer dependable protection for pumps, electric motors, gear boxes, fans and other bearing-supported industrial equipment used in harsh applications.

causes seal degradation and thus leakage. This poses a safety hazard and could also be harmful to the environment," Holton says.

Shaft grooving from conventional lip seals is not only costly to repair, but this damage also decreases MTBF. "Bearing isolators, which offer consistent sealing performance, play an important role in protecting bearings to prevent downtime and extend service life, even in arduous operating conditions."

BMG's Garlock GUARDIAN™ metallic bearing isolators provide bidirectional sealing, offering both ingress and egress protection and are suitable for electric motors, pumps, gearboxes and plunger blocks being used in dirty, dusty and wet environments. These robust bearing isolators have a patented cam-lock system, with excellent bore retention, compared with standard bearing isolator designs.

GUARDIAN bearing isolators with a bronzerotor and stator are available for shaft sizes of between .625" and 22.250". This system has been designed for easy installation by hand, without the need for an arbor press or special tools, which can generate bronze shavings that cause bore scoring.

A patented PTFE unitising ring – which is a machined component with tight tolerance to maintain a labyrinth – eliminates metal-to-metal contact between the rotor and stator. In conventional systems, simple O-ring designs lack axial reinforcement, which means rotation and misalignment between the rotor and stator during normal operation cause the O-ring to shred and metal shavings to damage the expensive bearings.

Unlike radial lip seals, Garlock bearing isolators require no repairs for shaft grooving or for seal housings. Bearing isolators are also compliant with global safety and industry manufacturing standards.

BMG's comprehensive range of Garlock seals and sealing products, with a user-friendly design and advanced materials, ensure dependable sealing in all industrial sectors, including chemical and petrochemical, pulp and paper, power generation, electronics, food and pharmaceuticals, as well as steel mills, mining and OEMs.

All Garlock components undergo stringent field and in-house testing to ensure safe and reliable use, as well as extended service life in all applications. The BMG team is also available to assist industry with the correct selection of seals and gaskets, to ensure optimum safety, reliable fluid sealing solutions and optimum care for the environment.

www.bmgworld.net



Forever forward with Bonfiglioli

Henco du Plooy, the newly appointed managing director of Bonfiglioli South Africa, talks about the heritage and future vision of the global designer, manufacturer and distributor of gearmotors, drive systems, planetary gearboxes and inverters.

“Globally, Bonfiglioli serves more industries and applications than any other drive manufacturer and we are a market leader in many sectors,” says Du Plooy. “We design, manufacture and distribute tailored drive solutions for all kinds of applications that impact daily life: the food we consume, the roads we drive on, the clothes we wear and the lights in our homes,” he begins.

Established in 1956, Bonfiglioli operates in 21 countries, has 14 production facilities and a global network of 500 distributors and 3 770 employees. “Our South Africa operations have enjoyed great success for more than 30 years, which we attribute to the guaranteed product and service quality that we offer our customers and partners, along with our commitment to excellence, innovation and sustainability,” he suggests.

In today’s highly competitive market, customers expect optimal fit-for-purpose

solutions, he continues, which Bonfiglioli can offer thanks to the skills of its people and an extensive product range. “By collaborating, innovating and acting together with our partners, we strive to identify new opportunities for tomorrow. Through customer trust and loyalty, Bonfiglioli has been able to continue to grow in this period of volatility, uncertainty, complexity and ambiguity (VUCA), with several projects and strategic initiatives having been introduced,” he tells *MechChem Africa*.

The most notable recent project was the €60-million investment in EVO in Italy, the largest-ever Bonfiglioli manufacturing facility. Sustainable with zero impact on the environment, this plant offers a production capacity of 800 000 units a year and employs 600 workers. The compactness of the building, its external structure, the use of high performance energy systems and the production of energy from renewable sources are some of the characteristics that contribute to making it a near zero energy building.



“For us, EVO is far more than just an innovative plant, it is a philosophy based on evolution, continuous growth and improvement. It represents our future goal for significant transformation and growth, lays the foundation for the Bonfiglioli Group’s leap into digitalisation and signals our determination to realign production to Industry 4.0 – because all our partners deserve more than standard.

“At Bonfiglioli we are constantly innovating. We understand that continuous development in skills and technology is what is required to be a strategic partner to the best manufacturing companies in the world,” Du Plooy concludes.

www.bonfiglioli.com



Infrastructure maintenance should not be up for debate

“South Africa is starting to experience the real cost of decades of inadequate infrastructure maintenance as the latest round of load shedding batters an already fragile economy,” Raymond Obermeyer, managing director of SEW-Eurodrive, urges operators to take the danger seriously.

Load shedding costs the country significantly in terms of lost revenue. According to the CSIR, in 2019, the South African economy lost between R59-billion and R118-billion due to 530 hours of planned power cuts. Estimations are that Stage 2 load shedding costs the country approximately R2-billion a day. That’s a cost the country can ill-afford in the wake of the devastating economic impact resulting from the lockdown implemented in an effort to contain the spread of the COVID-19 virus.

Compounding the economic cost is the fact that persistent load shedding impacts investor confidence and poses a significant risk to already struggling small businesses.

Inadequate maintenance, however, has not only occurred at the country’s power utility but also within the water, waste management, sanitation and road sectors, amongst others.

President of the South African Road Federation (SARF) and CEO of the Southern African Bitumen Association (SABITA), Saied Solomons, has been quoted as saying that roads that are not properly and timeously maintained are costing South Africa billions of rands and negatively affecting the economy and society.

In the same vein, a failure to maintain water infrastructure at municipal level is resulting in reports of sewage leaking into water sources, poorly maintained water purification plants and frequent water cuts in some areas of the country. Recent reports indicate that 35% of the country’s safe drinking water is lost due to leakages and aging infrastructure.

Efficiently functioning infrastructure is critical if South Africa is to achieve any kind of economic recovery. Functioning infrastructure provides economic opportunities, acts as a catalyst for generating economic growth and ultimately allows for much needed job creation.

Having the requisite budget in place to construct the required infrastructure, however, is only the start. Once construction has

been completed, regular maintenance has to be factored in. By its very nature infrastructure consists of expensive assets, which, once developed, require ongoing investment and maintenance to ensure they are optimally functional for as long as possible.

A country’s economic health is closely linked to well-functioning infrastructure, a trend that is confirmed by those countries that tend to do well in global competitiveness rankings. Cause for concern, therefore, is the fact that this year South Africa’s global competitiveness ranking dipped yet again, falling three places to 59th out of 63 countries, according to the latest World Competitiveness Yearbook, (WCY).

The ranking, an annual report that ranks the competitiveness of 63 selected countries and is regarded as the leading survey of competitiveness, is compiled by Swiss-based Institute of Management Development (IMD).

Raising the alarm in terms of the dire state of the country’s public infrastructure, the South African Institute of Civil Engineering (SAICE) 2017 Infrastructure Report Card for South Africa (the most recent survey), awarded the country’s public infrastructure an overall grade of D+. A D-rating indicates that, overall, the country’s infrastructure is at risk of failure, is not coping with demand and is poorly maintained.

This poor state of affairs is the result of a combination of several factors including limited resources, public sector restructuring, inefficiency, skills shortages, less than optimum governance and inadequate maintenance.

South Africa cannot afford for its public infrastructure to fail. In order to provide the right conditions for economic growth we need to ensure that our infrastructure is fit for purpose and functioning efficiently. However, without a proactive maintenance programme in place infrastructure failures will continue to hamper the country’s ability to recover economically.

www.sew-eurodrive.co.za

The most compact bell-housing solution

Typically used for underground conveyors with limited height restraints, SEW-Eurodrive’s purpose built bell-housing solution can also be utilised for overland conveyors, in-plant conveyors and on stacker or reclaimer drives.

The unique feature of the solution lies in the fact that there is less likelihood misalignment will occur given that a flange is used between the gearbox and motor. This means it won’t require any re-alignment even after transportation and installation.

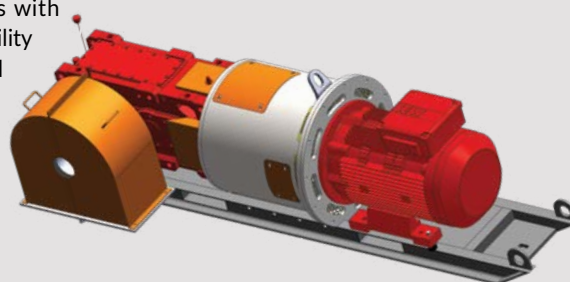
The solid flange between the motor and the gearbox has machined locating points for mounting the gearbox and the motor, while the skid allows the gearbox to be dragged

underground to the installation point.

SEW-Eurodrive’s bell-housing solution is locally manufactured, while the gearbox is locally assembled from normally available stock. The solution comes with awarding winning serviceability anywhere in the world and it is suitable for all environments and conveying needs including chrome, platinum and coal mining.

The company recently supplied six of these solutions with 110 kW motors and X series gearboxes to a

coal mine in Mpumalanga, while other coal mines in the same province have been supplied with numerous complete units delivering from 110-200 kW of power. □



SEW-Eurodrive’s bell-housing solution is locally manufactured, while the gearbox is locally assembled from normally available stock.

Towards uninterrupted production processes

This article summarises the comprehensive range of hydraulic analysis, diagnosis, repair, refurbishment, testing and certification services available across Africa from Bosch Rexroth South Africa Group Companies, Hytec South Africa and Hytec Engineering.

Unscheduled and extended downtime are two setbacks that production managers do their best to avoid. To help facilitate increased uptime in all hydraulic equipment, machinery and applications, Group Companies Hytec South Africa and Hytec Engineering offer comprehensive hydraulic repair services for the Group's entire hydraulics range. These are done out of Bosch Rexroth SA's new-world class facility in Kempton Park

Repair services for hydraulic pumps, motors, gearboxes and valves fall within the scope of Hytec South Africa, while Hytec Engineering, as Group specialist in hydraulic cylinders, repairs and refurbishes all OEM cylinders distributed by Bosch Rexroth South Africa. All repairs and refurbishments are according to Bosch Rexroth specifications, which include OEM specifications, with all work and componentry warrantied for 12 months.

"Our hydraulic repair services are all ISO-accredited and cater to any application," points out Ian Kidson, repairs manager, Hytec South Africa. "From highly complex hydraulic systems specifically designed to meet stringent requirements of local and international

customers, to simple componentry that is fit for purpose, our service and hydraulic repair offering is always OEM-compliant."

In addition to ISO compliance, Hytec South Africa and Hytec Engineering are Bosch Rexroth-Certified Service Centres of Competence. This certification, renewable every four years, certifies that these two Group companies have the processes, infrastructure, qualification and management abilities to perform service work to quality standards specified by the worldwide Bosch Rexroth Service Centre grades. These two companies, along with Group Company Tectra Automation, are the only Bosch Rexroth-Certified Service Centres of Competence in Africa.

Repair capabilities

All hydraulic equipment undergoing repair or refurbishment is subjected to calibration, analysis and fault-finding, with engineers and technicians accessing all specifications including OEM specifications from Bosch Rexroth's SAP system. "The information includes parts lists, repair procedures and e-learning, which provides specifics on methods to repair units



to OEM standards," Kidson explains.

All parts are inspected for wear and damage and affected components replaced with new ones, while all seals, bearings and bolts are mandatory replacements, regardless of condition. The hydraulic equipment receives OEM replacement parts, manufactured by Bosch Rexroth Germany. Exchange units for all of these applications, barring hydraulic valves, are on-hand for qualifying customers, significantly decreasing any downtime caused by critical faulty equipment.

The gearbox repairs facility carries out repairs to Bosch Rexroth gearboxes and other mobile shovel gearboxes, including ZF, O&K, Stiebel, Siebenaar and Zollern brands. "Only original parts are used for replacement," Kidson points out. "Although, on the rare occasion and only in consultation with the customer, parts can be repaired or manufactured using reputable gear manufacturing companies."



Bosch Rexroth pump and motor test stations, from 90 kW to 600 kW, are connected to CADASYs, Bosch Rexroth's data acquisition and recording system.

Hytec Engineering retains an extensive and comprehensive stockholding of refurbished cylinders, which facilitates its cylinder exchange programme. "Under this offering we are in a position to immediately replace damaged or worn cylinders so clients avoid waiting for lengthy repair procedures," points out Andre Lindeque, General Manager Hytec Engineering.

Hydraulic cylinder test benches

Hytec Engineering has three hydraulic cylinder test benches, ensuring its cylinder repair and refurbishment capacity and capabilities cater to the requirements of numerous cylinder types and sizes. The smallest of the three test benches is for high flow and low pressure testing, capable of 102 l/min at a maximum pressure of 10 MPA, after which high pressure testing up to 55 MPA can be done, along with end-of-stroke and mid-stroke testing.

A fully automated test bench that tests up to 42 MPa is also used, and cylinder specifications are selected via software for this method, with each cylinder individually tested. A laser guided system records closed centres, stroke and open centres, with mid- and end of stroke tests also conducted. All recordings and values are included in the client report.

"The most recent addition to our test bench range is the Micron technologies stripping bench," Lindeque says. "It has been designed for stripping and reassembling larger cylinders and, using Hytec technology, it performs autonomous testing." Designed by Group Company Tectra Automation, the stripping bench incorporates a laser creep measurement function, which ensures zero by-pass

in the mid-stroke position pressure test. Both single- and double-acting cylinders can be tested on this bench.

Hytec Engineering recently acquired a Hydrotechnik data logger, allowing the company to precisely measure movement, pressure deviations, cushioning functions and the performance of all cylinder functions during testing.

Comprehensive hydraulic pump and motor testing

Four pump and motor test stations, from 90 kW to 600 kW, are used on the pumps and motors. Each test station is connected to data recording stations, including CADASY, a Bosch Rexroth data acquisition system to which Bosch Rexroth South Africa has access. All results are saved to the Bosch Rexroth server for easy retrieval worldwide.

Two valve test stations are used for this service offering, one for standard valves and the other to test proportional and servo valves. The proportional and servo test station is also connected to a Bosch Rexroth data acquisition system where test data is acquired and reports compiled and stored.

Catering to onsite hydraulic repair requirements, Hytec South Africa operates a fleet of service vehicles equipped to conduct onsite services, as well as to analyse, fault-find, repair, and to carry out hydraulic system installations. "Our onsite service and repair offering is augmented by containerised hose workshops, primarily aimed at the mining industry," says



Piet Knoesen, service manager for Hytec South Africa.

Developed and implemented by Group Company Hytec Services Africa (HSA), containerised hose workshops provide a comprehensive mine site hose and fittings service to Bosch Rexroth's mining customers across Africa. Its focus goes beyond hydraulic hose and fittings, it acts as an onsite branch that helps facilitate onsite hydraulic repairs at mine sites too," Kidson elaborates.

Workshop services include the hydraulic cylinder service exchange programme and the supply of new pumps, filtration systems, drives, valves, piston motors and hydraulic maintenance tools, or providing services for them.

The Bosch Rexroth South Africa Group of Companies, previously the Hytec Group, is Africa's largest fluid power and automation company. Collectively, the Group sources, markets and distributes over 30 international hydraulic, pneumatic and automation brands via a network of 40 sales and service branches across sub-Saharan Africa.

www.boschrexroth.africa

SMC launches LSP1 liquid dispensing pump

SMC Corporation is excited to announce the addition of the LSP1 solenoid-type diaphragm pump to its range of automation products. This compact liquid dispensing pump can dispense stable and repeatable volumes of liquid in very small quantities per shot – down to as little as 5.0 µl.

The product has been introduced in response to market demand for an accurate, low flow rate dispensing pump, mainly for use in medical and analytical devices. The pumps' solenoids operate on 12 Vdc or 24 Vdc and are available in three freely adjustable dispensing ranges: 5.0 to 50 µl, 50 to 100 µl, and 100 to 200 µl, all with a ±1% repeatability. "Being able to adjust the dispensing volume is important for designers faced with many operating conditions, such as differences in suction height and pipe size used, for example," says SMC South Africa product manager, Ernst Smith.

Water, deionised water, reagents or cleaning liquids can all be dispensed with SMC's LSP1 dispensing pump, since the fluid contact materials are resistant to these fluids.

Depending on the type of liquid pumped, the pump body material selected can be either polyether ether ketone (PEEK) or polypropylene (PP), while the built-in check valves and diaphragms are available in ethylene propylene diene (EPDM) or fluoroelastomer (FKM) rubber for maximum resistance to reagents.

"Selecting the best-suited body material for the pump and making use of a special diaphragm support mechanism will also ensure a long trouble-free service life for these units," says Smith.

The LSP1 liquid pump is self-priming, meaning it can suck liquid up to 1.5 m from a dry pipe condition at the start of the process.

Once the pump is filled with liquid, the suction height can be extended to 3.5 m.

The unit's physical size of around 70 mm has a space saving benefit, making it possible to be installed in very compact spaces.

Possible applications include: very accurately dispensing small amounts of product in a sample analyser; for cleaning processes such as clean-in-place (CIP), where individual lines can be cleaned with accurately measured amounts of fluid instead of having to use a bigger pump and trying to control the fluid volume by switching 2-port process valves.

"For any small volume liquid dispensing application that has to be very accurate, adjustable, resistant to several different chemicals, and offers a long service life, SMC's new LSP1 liquid dispensing pump is probably the best solution on offer," Smith concludes. □

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VTEM Motion Terminal with Motion Apps

Festo's VTEM Motion Terminal, along with associated Motion Apps, are revolutionising Industry 4.0. Pneumatics has now become even simpler thanks to this versatile, flexible and programmable system.

The Festo VTEM Motion Terminal offers unique benefits in Industrial Automation. The VTEM is ideal for fast reconfiguration of production equipment for format changes of products or packaging. The valve terminal can perform this application in minutes with simple software adjustments to change process parameters. Users can assign the valve function easily through a PC or machine control system.

Additionally, the terminal can perform a vast number of tasks with a single valve, such as regulating airflow and pressure to make both fast, soft and precise motion sequences possible without needing additional automation components.

Reduced engineering costs during design and upgrades: Pneumatic functions are linked to Motion Apps rather than mechanical hardware. This means that engineering expenses can be reduced during the machine's design and development phase, which typically accounts for 25 to 30% of total costs. Since future modifications involve changes to

software instead of hardware, follow-up costs are also reduced.

Improve productivity: With cyber-physical systems like the Festo Motion Terminal, one can easily change or modify pneumatic functions via the software – even during operation. The system remains up and running, and any new or improved functions can easily be obtained through simple software updates. Keeping the system up-to-date is also streamlined and simplified at all phases of a product's lifecycle.

Eliminate time-consuming manual configurations: Coordinating individual process steps, such as setting the travel speeds of cylinders, is often a time-consuming process in conventional mechatronic systems. CPS solutions, on the other hand, don't have complex manual setting processes. With the Festo Motion Terminal, for example, you can define the travel speed of each cylinder and rule out tampering in just a few clicks, saving



Using the a VTEM Motion App from Festo's App World portal, and Festo's VTEM Motion Terminal, a machine developer can easily create a basic machine type and equip it with different features to meet customer requirements.

between three and four minutes of setting time per flow control valve.

Minimise mistakes with fewer components: The Festo Motion Terminal carries out the functions of other components, reducing numbers of parts and therefore lowering risks of mistakes. One valve slice, for example, can replace up to 50 individual components, including shock absorbers, additional pressure sensors and more.

In this digital century, it is essential for businesses in Industrial Automation to embrace new digital developments such as the VTEM. This helps businesses to stay ahead of their competition and boost customer confidence. The Festo solution is assisting customers in getting digital through its technological advancements. □

CLAWVAC, a dry claw pump for robust rough vacuum

Leybold has introduced an uncomplicated dry rough vacuum CLAWVAC pump that is ideal for use in food processing, packaging and environmental technology applications, most notably for drying and sterilisation processes.

Uncomplicated and easily maintained

The pump's simplicity and reliability can be attributed to its operating principle: A pair of claw rotors rotate in the pump stator completely free of contact and wear. The rotors made of stainless steel while a coated corrosion-resistant vacuum chamber enables reliable operation under harsh process conditions.

The modular pump design allows quick dismantling and cleaning of the pump chamber and silencer. Apart from a 20 000 hour oil and lipseal replacement, no further regular maintenance is required, regardless of the application.

During disassembly for cleaning the claws, the rotors can be removed without having to readjust the synchronisation. This relieves customers using pumps for rough and dirty

processes from having to synchronise regularly. The CLAWVAC is set-up for quick component replacement, which ensures minimal downtime and lowest possible service costs.

For packaging plants, pneumatic conveying lines or clamping devices on CNC machines, the multi-claw CLAWVAC systems are a reliable solution. This also applies to plastics processing machines, drying processes and central vacuum supplies.



Depending on the required flow rate, multi vacuum pumps systems can contain two to four CLAWVAC pumps in one housing.

Multiple pump systems

Depending on the required flow rate, systems

can contain two to four CLAWVAC pumps in one housing. CLAWVAC Systems only deliver the required vacuum, with one of the pumps under variable speed control.

This allows exact adjustment of the generated vacuum to meet demand. As well as controlling the speed of the variable pump, the intelligent control activates or deactivates other fixed speed pumps depending on the vacuum need. This reduces energy consumption and CO₂ emissions.

"The CLAWVAC design focuses strongly on customer needs: high redundancy level, minimal maintenance and stable vacuum supply, even in harsh environments," says Niels Gorrebeek, Leybold's product manager for rough vacuum. "With the CLAWVAC multiple pump system, Leybold houses all the necessary components under one acoustic enclosure to form a single compact, intelligent solution"

Leybold offers these space-saving systems for capacities of between 604 and 1 144 m³/h operating at 140 mbar absolute, the same pressures as individual units. □

Factory Automation: a new normal in food manufacturing

Food and beverage companies can now set a post COVID-19-course using automation to boost competitiveness and productivity. Omron Solution Partners Daniela Moles, from LCS Group and Alberto Giordani from Alfacod, explain.

The corona pandemic has posed immense challenges to companies of all sizes across all industries. According to Deloitte Global, food and beverage (F&B) companies are facing significantly reduced consumption as well as disrupted supply chains.

But how can manufacturers adapt their business strategies and production processes, factories and machinery to the new circumstances – both in terms of the pandemic and in the longer term? The current crisis offers a chance to rethink outdated procedures and to use automation to boost productivity, efficiency and quality. F&B companies that want to prepare for the future should be appraising the opportunities and possibilities that innovative robotics, sensor technology and holistic automation approaches provide. This project should consider four key market drivers and perspectives: workforce, product



Companies in the food industry need to look out for smart and connected systems, combining robotics, cobots, vision and sensor technology as well as strong data collection and analytical capabilities.

and packaging quality, production flexibility and sustainability.

Automation in this context does not only mean robotics or artificial intelligence, but a well-thought-out overall structure of fixed, collaborative and mobile robotics; monitoring and control technology; sensors; and vision technology tailored to the respective production requirements. The various stakeholders and market drivers should not be considered in isolation, but as a whole and integrated into the future production strategy.

Collaboration and factory harmony

There are millions of people employed in F&B sectors. This has an enormous impact on producers in terms of costs, but also primarily in terms of the health and safety of human resources.

The pandemic has led to developments such as social distancing and tighter safety regulations. Automation can help in overcoming this challenge while also improving security and efficiency in the longer term. An example is a cobot or mobile robot solution that can relieve employees from challenging and repetitive tasks so they can focus on more value-added and fulfilling roles.

Daniela Moles explains it as follows:

“We carried out a project where we implemented a fully automatic system for the handling of heavy rolls of fabric that weigh up to 30 kg. These rolls were previously handled by humans. Automating this exhausting task meant the company could support its employees while also boosting efficiency and productivity.”

The value of automation is in the mix of humans plus machines, robots and artificial intelligence. Collaboration is key. “While robots show their advantages when it comes to speed and accuracy, human colleagues can take care of business-critical issues, customer communication and daily individual tasks. Regarding the important aspect of return on investment, companies should increasingly focus on releasing human labour to do value-added tasks, which is absolutely crucial for producers going forward.

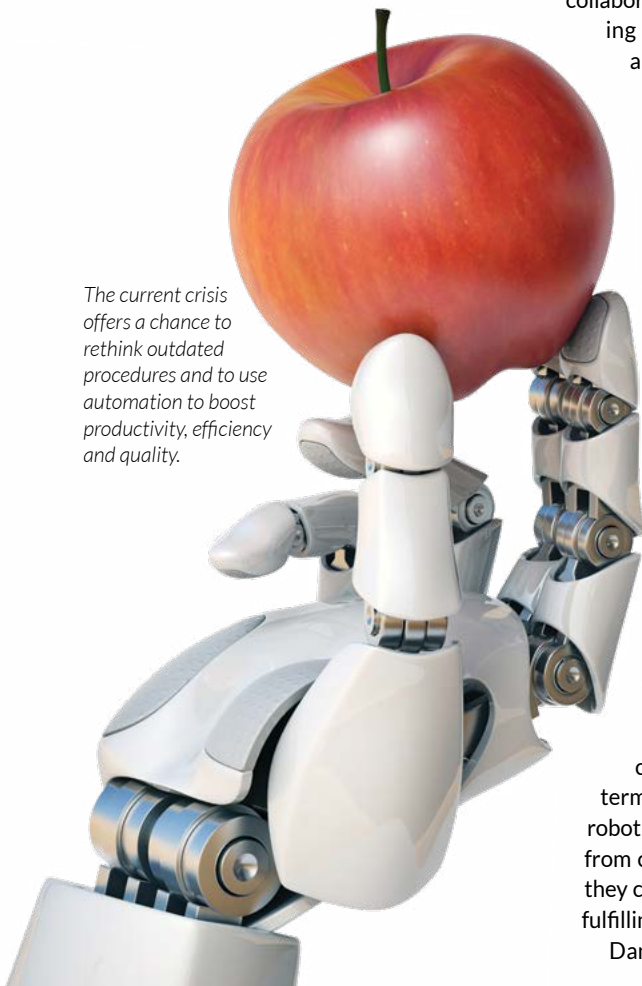
Collaborative and mobile robots working alongside their human colleagues assisting in lifting or transporting goods, material and also fulfilling tasks employees can't do because of distance or safety rules.

Product quality and traceability

Product and production quality, as well as traceability, are further aspects that are increasingly important for manufacturers and customers alike. Barcode quality is one example. Regulations from international organisations such as ISO or GS1 are widely adopted, but in addition there may be further project specific specifications driven by suppliers and customers.

This leads to a need for reliable systems

The current crisis offers a chance to rethink outdated procedures and to use automation to boost productivity, efficiency and quality.



and tools that ensure a bar code is correct and readable. Solutions can be adapted so they can also check pack design aspects and package integrity and completeness.

Alberto Giordani from Omron Solutions Partner Alfacod explains: Innovative solutions can be used to track food quality and when it is beginning to decrease, before it's too late. Preventive maintenance actions can then be planned to avoid potentially costly errors. In the food industry, it is useful to check labels while they are printed with an integrated barcode verifier. Customers, especially large distribution companies, want to receive all products with the correct information, labelling and barcodes. If this information is wrong or incomplete, they may return the goods or levy a fine on the supplier.

Information taken from the packaging in the form of bar codes is also becoming increasingly useful for consumers at the point of purchase. When reading the code at a self-scanning system at a retailer, information about allergens or other specific ingredients such as gluten can be made available. Consumers are, to a greater extent, taking an interest in information such as country of origin. Manufacturers want to engage with consumers via the information provided on the item.

There is a close link between automation and traceability, ultimately protecting the brand reputation of the producer and reducing costs.

Another simple example is a verification solution using vision systems or RFID, which, if linked into the production management software, can help to reduce issues connected with false codes or labels.

Flexibility in future food manufacturing

Whereas in other industries, 'Batch Size 1' is a trending topic and goal for manufacturers, the food and beverage industries are still very closely connected to volumes. It remains a priority to be more flexible and agile, however, to fulfil growing customer demand and changing regulations.

Many solutions still rely on inflexible conveyor systems, whereas mobile robots provide the manufacturer with the flexibility to move stock and consumables to the required locations at the right time. Cobots are very easy to train, easy to deploy, and transport-



There is an increasing need for reliable systems and tools that ensure a bar code is correct and readable. Solutions such as Omron's MicroHAWK barcode reader can be adapted so they can also check pack design aspects and package integrity and completeness.

able, making them a useful companion in achieving more flexibility.

Daniela Moles describes an LCS customer producing coffee pods: "This customer receives requests for several different pod products and combinations: normal plastic or reusable, eco-friendly, different colours and different sizes. A fleet of Omron's mobile robots helps manage fluctuating demand and combinations of different requests, assisting the customer to achieve a more flexible environment within the plant. This ability to adapt and evolve will become even more important in the future."

Omron Mobile robots can change routes quickly, dynamically avoiding obstacles or working on different priorities. They can be customised with special add-ons and accessories that allow for even more flexibility. The latest solution from Omron combines cobot and mobile technology to offer a mobile manipulator or MoMa solution.

Sustainable food manufacturing

According to Price, Waterhouse and Cooper, three quarters of supermarket customers want to buy products with as little packaging as possible. Packaging also protects the item and informs the customer, so it is a balance between differing drivers. It will come as no surprise that flexible plastic or flexible packaging is still expected to grow in the future. For this reason, companies in the F&B industry must increasingly think about the materials they use for packaging their products.

Automation is closely connected with sustainability. Automation can control tem-

perature and pressures, ensuring a product is correctly packaged, reducing waste and scrap, for example.

Producers must consider multiple variables, however, such as packaging thickness, ambient temperature and packaging film speeds. This approach requires a system to capture data in real-time, analyse it and make decisions. If we are able to process and read through this data, all the information needed to work better and implement a sustainable future is accessible.

An innovative example is Omron's Sysmac AI Controller, a smart Artificial Intelligence solution that collects, analyses and utilises data on 'Edge' devices within a controller to prolong equipment longevity and detect abnormalities. It combines control functions of manufacturing lines and equipment with AI processing at manufacturing sites in real time.

Real-time insights driving the future food factory

In the light of the COVID-19 pandemic, companies in the food industry are now called upon to look at systems and technologies that reduce the workload on employees, increase the quality of their processes and products, and act more flexibly and sustainably.

They need to look out for smart and connected systems, combining robotics, cobots, vision and sensor technology as well as strong data collection and analytical capabilities, human machine interaction and full traceability to provide them with real-time insights for a successful and customer-focused future.

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E+H invests in young talent

Endress+Hauser places a high value on vocational training, as demonstrated by the steady increase in the number of opportunities for vocational school and college students. This year, 58 young people are to start apprenticeships with Endress+Hauser in the Swiss-German-French border region.

Endress+Hauser's apprenticeship programme is concentrated at two locations in Maulburg, Germany and Reinach, Switzerland. The two production sites are currently training around 150 young people in all apprenticeship years, and in a total of 12 professions.

Added to that are students from the dual education colleges and the StudiumPlus programme, which involves a combination of university studies and vocational training. "Training and educating young people for a profession is part of our corporate social responsibility. And it goes without saying that we have an interest in attracting new talent for Endress+Hauser," says Jörg Stegert, the Group's chief human resources officer.

International exchange

During their time at the company, the young people have the opportunity to acquire a wide range of experience, including internationally through partner companies and other Endress+Hauser entities, language courses or competitions. "For us it's important that our apprentices become familiar with other work approaches, cultures and languages," says Jens Kröger, head of personnel development at Maulburg. The apprentices work within various departments at their location. In some of the professions the fundamentals are taught in an apprenticeship workshop.

Secure career start

After completing the programme, the apprentices are generally offered a regular employment contract. "Our goal is to employ as many apprentices as possible for at least one year," explains Céline Ritter, who heads up the training and development department at Reinach. Many apprentices take a second step towards a university entrance diploma or they begin a course of study at a university. "We offer a support programme to help them on their further career paths and thus tie them to the company on a long-term basis," says Jens Kröger.

Close cooperation with schools

Endress+Hauser attracts most of its apprentices through close cooperation with schools in the region, including educational partnerships, class visits by trainees and cooperation in electronics and technology courses. The students also have the chance



58 young people are kicking off an apprenticeship at Endress+Hauser in the tri-country region this year.



Open learning atmosphere: the training and education facilities at Endress+Hauser Maulburg stimulate learning and interaction.

to become familiar with various professions on-site. "Every year we offer more than 100 five-day trial internships," says Jens Kröger. Interested students can also use WhatsApp for their questions about training opportunities and application details.

Skilled workforce for the future

This coming year, an apprenticeship in logistics will be offered at Reinach for the first time. In light of digitalisation and the rise of automa-

tion in production, Maulburg is increasingly looking for prospective mechatronic and IT specialists. And at Endress+Hauser Germany, located in Weil am Rhein, the plan is to further increase the number of apprenticeship slots.

"Training and education is an investment in our own future and the future of the region. For this reason – and also because we are a family company – we always plan for the long term," says Céline Ritter.

www.endress.com

TS2 transfer system brings ergonomic assembly to life

A Bosch Rexroth TS 2 transfer system supplied by Tectra Automation and engineered by Petrichor Concepts has been chosen for a recent upgrade at ASSA ABLOY South Africa, the local manufacturer of security products and systems. Trevor Bruce, engineering manager for Petrichor Concepts, outlines the benefits.

Leading local lock, door and secure access solutions manufacturer, ASSA ABLOY South Africa, recently upgraded its assembly line to a semi-autonomous production system engineered by Petrichor Concepts, a lately acquired and wholly owned subsidiary of FLSmidth South Africa.

Accurately moving components to each workstation across the assembly line is achieved using a Bosch Rexroth TS 2 transfer system supplied by Tectra Automation.

Aiming to increase its production output of a variety of different lock types and configurations, the new assembly line integrates a combination of automated and manually operated workstations connected via the 29 m TS 2 conveyor.

"Simpler assembly tasks are now achieved with high-tech robotics, while jobs requiring more dexterity are achieved manually," explains Trevor Bruce, engineering manager for Petrichor Concepts. "Bringing this lean production concept to life required a transfer system providing full 360° pallet movement,

including lift stations with ultra-precise levels of control." With the TS 2 transfer system, components are moved to their required positions within a 0.01 mm tolerance.

Enabling this precise handling control across the system are pneumatic technologies from Aventics, including the AV05 control bank with Profibus connection, which has 96 digital inputs and 48 outputs connected to Petrichor's engineered control system architecture.

"In addition, the modular, fully customisable nature of the Bosch Rexroth TS 2 system enabled us to build a bespoke line with simplified engineering and installation requirements with full technology support from Tectra Automation," says Bruce.

This modern, ergonomic semi-autonomous assembly line now enables ASSA ABLOY to produce more locks per operator than before. In addition, enhanced quality monitoring across the assembly process and reduced wastage of materials and consumables helps further reduce production costs and time.

TS 2: versatile, robust, adaptable



The Bosch Rexroth TS 2 Transfer System moves inventory across ASSA ABLOY's assembly line, rapidly and precisely.

Comprised from standardised modular units that can be combined in many ways to create a single system, the Bosch Rexroth transfer system is designed for transport of workpiece pallets of up to 240 kg, with several types of combinable conveyor media.

"The TS 2 is a system solution that can be scaled quickly and easily for any requirement," explains Cobus Snyman of Tectra Automation. "The adaptable, modular design allows factories to realise a vast array of system layouts with quick implementation. The system is ideal for any assembly application, from the automotive industry to electronics and electrical technology, medical technology and the optical industry." Tectra Automation is a member of the Bosch Rexroth South Africa Group of Companies.

www.hytecgroup.co.za

Higher-range synchronous servo motors

With twelve new variants of the synchronous servo motor MS2N, Bosch Rexroth is expanding the performance range of the engine series at the high end. With up to 692 Nm, the maximum torque is almost doubled. These new, compact motors offer high continuous power and an extended speed range to manufacturers.

Bosch Rexroth has increased the continuous power within the small installation space through optimised electromagnetic design and use of the reluctance effect to create torque. The new frame size MS2N13 comprises four compact lengths in three cooling variants each: self-cooling, force-ventilated or water cooling. With a continuous torque of up to 345 Nm and maximum speeds of up to 3 600 rpm, they are particularly suited for powerful applications in plastics processing machines, in forming technology or in heavy-duty machining.

The MS2N motor series is a true all-rounder for all applications in automation and combines dynamics with compact dimensions and maximum energy efficiency. The motors can be configured flexibly, with a wide range of shafts, encoders and holding brakes to choose from.

Designers can select them in line with their respective requirements. The integrated SafeMotion encoders with the high performance class SIL3/PLe make additional safety components in the machine redundant. The encoders interact with drive controllers as sensors to collect the operational data of the axis. This way, the

motors are integrated in the increasingly networked field level of the future.

MS2N also plays an integral part in maximising productivity in the new Bosch Rexroth Automation world, ctrlX AUTOMATION.

These motors are available in sub-Saharan Africa through Tectra Automation, a Bosch Rexroth South Africa Group Company.

www.boschrexroth.africa/company/tectra-automation

Twice as strong but still compact, the new MS2N13 synchronous servo motor from Bosch Rexroth makes the MS2N series motors even better for applications in automation that require dynamics, compact dimensions and maximum energy efficiency.



Netilion, IIoT Ecosystem

From sensors to digital services



Key facts

- Netilion, Endress+Hauser's IIoT Ecosystem allows intelligent and networked applications to be realized around the Industrial Internet of Things
- We currently have four Netilion Services available with Analytics, Health, Library and Value as well as two Netilion Smart Systems with Surface Water and Aquaculture
- Data security is ensured by using the most modern standards and through audition by independent third-party certification bodies

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Networked beer tanks from Keller

The Internet of Things (IoT) always starts with a sensor. After all, things cannot capture states or carry out actions unless they are fitted with sensors. These two activities and a connection to the web are what make these objects 'intelligent' without the help of humans. This article describes how connected pressure sensors from Keller are being used to the delight of landlords and breweries.

The Internet of Things (IoT) offers smart solutions that help make life easier and more convenient. It can improve and streamline processes by receiving information in good time that was previously unavailable or difficult to acquire. Smart solutions are highly personalised but always begin with an object and a sensor

A level measurement with a remote transmitter is not just highly practical for detecting hazards but also for other level and fill level applications. Take pubs, for instance, where an emptying beer tank could be equally dangerous.

In this application, two Keller pressure sensors work at the heart of the solution to measure the level of liquid in the tank and to send a warning message to the brewery by e-mail using an ARC 1 remote transmitter connected to the mobile phone network and the Internet. The brewery sends an automatic

order proposal to the landlord, who simply has to confirm the order.

This automated, smart machine-to-machine (M2M) solution reduces stress for landlords and saves brewery drivers from profitless emergency weekend deliveries. Inaccurate order entries are now a thing of the past, shipping can be optimised and landlords have a continuous supply of fresh beer.

Crisis averted.

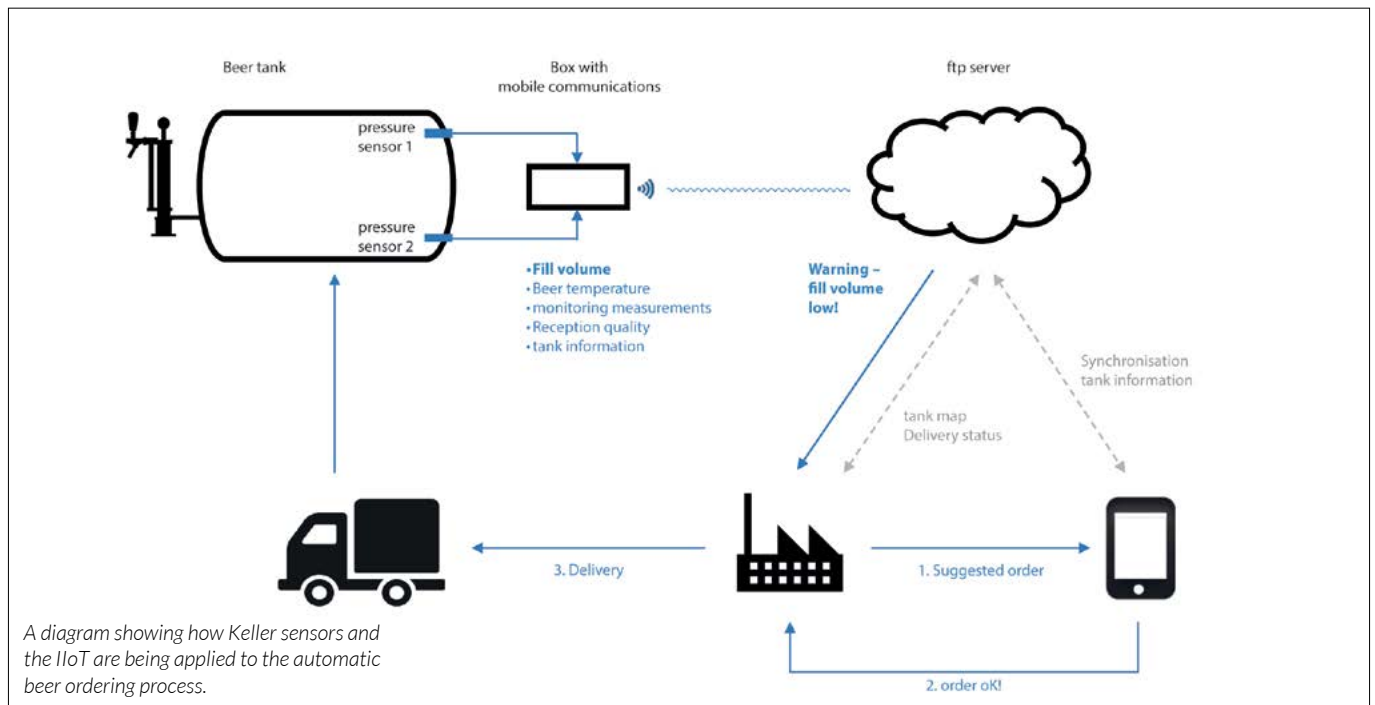
KELLER is Europe's leading manufacturer of pressure sensors, making it a key

partner when it comes to implementing IoT solutions. In South Africa, Keller is proudly represented by Instrotech.

www.instrotech.co.za



Two Keller pressure sensors measure the level of liquid in the beer tanks and send a warning message to the brewery by e-mail.



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Securing SA's energy supply: the multi-faceted approach

MechChem Africa talks to Tygue Theron, Commercial Head of Energy Partners Intelligence, about the company's holistic energy offering, from simple behaviour-based 'war on waste' efficiency drives to integrated and financed solar generation, refrigeration and energy management services funded via power purchase or shared savings agreements.

Energy Partners (EP), which was founded in 2008 while the world was experiencing a financial crisis, is today a leading energy service provider, offering energy intelligence solutions; renewable solar and storage systems; heating and cooling as a service; and turnkey plants that come with co-owned and fully outsourced financial service options.

Being part of the PSG Group – which has a market capitalisation in excess of R40-billion and a 30.7% interest in Capitec – Energy Partners is an active investor in the solutions it develops, often eliminating the need for clients to find up-front capital to upgrade and secure their energy futures.

Fundamental to EP's success is energy optimisation in order to deliver lowest possible consumption, best energy efficiencies and significantly reduced energy costs. The multi-faceted approach used to achieve this includes sourcing and funding the investment capital, implementing solutions and then collecting and monitoring usage and performance on an ongoing basis to ensure that investments remain cash positive from day one to end-of-life.

The role of EP Intelligence

Citing the recent announcement by Gwede Mantashe, South Africa's Minister of Mineral Resources and Energy, of plans to tender for up to 16.8 GW of 'emergency capacity' to fill 'desperate' current needs, Tygue Theron of EP Intelligence suggests that, for the time these projects are being completed, the country will still face undersupply. "This is where energy reduction can play a vital role," he argues.

"We act as a supporting partner for our other EP divisions and, for most projects, we will arrive on site first: to do a comprehensive set of measurements to see where energy is needed, how much is being consumed and where we may be able to make a difference. Initially, we set the baseline and identify opportunities. Only then do we get our other divisions involved," explains Theron.

"We don't stop there, though. We run ongoing energy management programmes, monitoring the site and making sure that any energy investments are delivering as they should. It's all about measuring how well everything and everyone is working together," he adds.

Energy Partner's client base sits mostly



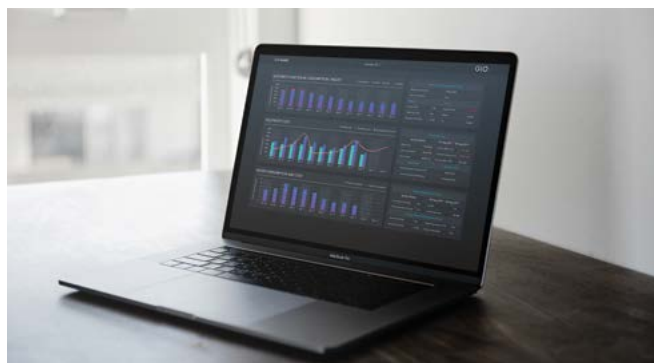
in the commercial sector, Theron continues: "While we don't impose any limits in terms of clients or technologies, we tend to find that lighting, refrigeration, air conditioning, storage and ventilation are key areas where energy use can be reduced. Sometimes it's as simple as topping up the refrigerant in a chiller, and sometimes we can replace the whole refrigeration circuit with an ammonium-based system, which can often halve the power draw compared to traditional plants," he says.

"We at EP Intelligence will identify the opportunity and then pass on our findings – to EP Refrigeration for an ammonium plant, for example, which will take on an upgrade project, secure the capital and then sell on the refrigeration as a service," Theron explains.

He describes a 10-year ongoing project with one of South Africa's largest food retailers. "Not only has energy expenditure been reduced over the years, but demand from the national grid has been reduced by enough to power 800 000 homes



A 2.4 MWp PV system at Pick n Pay's Longmeadow Distribution Centre: "South Africa has among the highest solar yield in the world, along with very favourable temperature profiles, so solar is an ideal technology for us," says Theron.



Left: EP Intelligence collects data to build reports with energy reduction targets. Above-target energy is identified as waste and site employees are all urged to implement a war on waste. **Right:** Modern high-efficiency refrigeration technologies are estimated to be able to deliver a further 20% in energy savings to retail.

for a year,” he tells *MechChem Africa*.

Operating on multiple sites, this was a favourable client for Energy Partners, with relatively few areas of energy consumption: lighting, refrigeration, air conditioning and back-of-house cold rooms and dry shelving areas. “Knowing that every one of this company’s facilities is dealing with the same things enables us to manage all their sites centrally,” he notes.

He explains that as soon as data begins to be collected and used to produce load profiles, it becomes immediately apparent when power is needed, how much is being used and where it is being wasted. “We also incorporate other known factors such as when stores are open, when the shelves are being stocked and when there is a night shift. By starting to suggest changes, such as turning off half of the lights when employees are stacking shelves, significant savings become apparent. This is easy, we simply install key switches, one for use when stacking shelves and another to switch all the lights on when the store opens for customers,” he tells *MechChem Africa*.

Across all of this retailer’s sites, EP Intelligence was able to use collected data to build reports with reduction targets. These identified all above-target energy use as waste, and urged every site to implement a war on waste. “This, along with simple behaviour measures adopted by site staff – never leaving fridge or cold room doors open, for example, or never blocking the air ducts of chiller cabinets with over-stacked product – resulted in 37.5% energy savings. Over the 10 years we have been managing energy in this way, we estimate that R2.7-billion has been saved,” Theron says.

Other interventions include replacing dry and brittle seals on cold room doors, installing night blinds over the refrigerated cabinets to better contain the cold air overnight, and many more. “Most are low cost interventions that, combined, contribute to ongoing savings across multiple sites,” he adds.

“On the level above, we have developed procedures to optimise the way cold rooms are packed, so that, wherever possible, they

run at full load and best efficiency. We also implemented a general refrigeration maintenance programme. On average, refrigeration units consume 50% of this retailer’s total energy consumption, so keeping units at their best possible efficiency presents an obvious savings opportunity,” he says.

Theron says the behaviour of store managers was, undoubtedly, the lowest hanging fruit for this project. “But we are not done yet. The next step will be to look at changing to modern high-efficiency refrigeration technologies, which we estimate could deliver a further 20% in energy savings,” he continues.

Rolling out solar energy across the chain is another huge opportunity, which Theron suggests can feasibly contribute between 5.0 and 50% of ongoing energy needs in typical commercial and industrial enterprises, depending on the roof size and the location of the facility. PV-solar systems directly reduce grid-based demand and costs, while also contributing to reducing grid dependence and associated tariff uncertainty.

“Tariff optimisation is another key and often missed issue with respect to energy optimisation,” Theron continues. “Of all the clients I see, I find 30% of them are on the wrong tariff, which means they have tariff switching options available to them that will immediately reduce their monthly bills.

“Many commercial and industrial users are on demand-based tariffs, where a single rate is applied depending on the maximum demand. The alternative is a time-of-use tariff, which is almost always better, typically reducing monthly bills based on the identical consumption profile by 10% to 15%.

“Because our national grid problem is related to peak demand, it makes sense, for everyone, to encourage people to shift their time-of-use to lower demand and lower cost time periods – the City of Cape Town has already begun to shift all users onto time-of-use tariffs. When paying three to four times more for energy at peak times, it becomes easy to persuade companies to find ways of rescheduling consumption to lower cost periods,” he explains.

Renewable energy and PPAs

Theron notes that there is now “huge value from multiple perspectives” of adopting renewable energy solutions such as solar power. The benefits are far larger than simply costs. One of our healthcare clients, for example, is achieving an additional 30% in cost savings, simply because the solar system has reduced the peak demand charges on the utility bill.

“Through EP Solar, we can deliver client-funded turnkey energy plants, but in current leaner times, it is more common for us to set up a power purchase agreement (PPA) for a period of 25-years to attract an investor,” he says, adding that PPA tariffs are typically 30%-40% below the grid rate.

“When coupled with other energy management and efficiency initiatives, multiple benefits accrue: for users, investors and for the national grid, which will be better off in the long term if demand is reduced to better match its generation capacity,” Theron argues.

“We in South Africa have among the highest solar yield in the world, along with very favourable temperature profiles, so solar is an ideal technology for us. But it still needs to be coupled with storage if we are to help solve current network problems of peak loading in the morning and early evening. We estimate that by 2023, payback periods on a battery-based storage solutions will drop to as little as five years,” he says.

Turning attention back to the current national grid crisis, Theron argues that South Africa cannot continue to increase capacity in order to “fix a broken system”. “We can’t simply carry on adding capacity and running it inefficiently.

“Currently, 26 of South Africa’s largest companies consume roughly 40% of the country’s energy. Reducing these companies’ energy consumption by focusing on solutions such as energy storage, renewable energy, process optimisation, power quality and general energy efficiency, can not only enable them to lessen the strain they place on the grid, but it will also significantly reduce their operational costs,” Theron concludes. □

Smart engineering with digital twin technology

Indrian Govender, manager for R&D at Babcock Ntuthuko Engineering, talks about the advantages of using digital twin technology in the power industry.

The smart use of data is becoming increasingly pivotal to Babcock's Ntuthuko Engineering business, coupled with deep engineering knowledge and technical expertise to support complex projects. A large part of finding solutions to Babcock's customers' challenges relies on developing a digital twin to improve operations, increase efficiency and provide predictive maintenance alerts before problems occur in real time.

By creating a digital twin, Babcock is able to gain instant insight into how to troubleshoot problems before they arise, using knowledge obtained from a simulated digital model. Solutions can then safely be implemented in real-life systems, while simultaneously reducing risk and improving efficiencies.

Govender says the technology associated with a digital twin enables engineers to make faster, better informed, decisions while ensuring sound asset management and integrity.

It also opens clear lines of communica-

tion and facilitates collaboration between stakeholders by sharing the data on platforms that can be easily accessed by the customer. "Digital twins bring us closer to our customers as we share our technologically gained input and enable them to make informed decisions," he says.

Govender explains that this is particularly true in the power industry where data is not often fully available or at the necessary quality. Digital models fill the gaps by creating a simulated twin of a physical asset that is continually updated using real-time data. "Using our deep system engineering understanding of the assets we manage, we are able to extract the precise data to create a digital twin model," says Govender.

While digital solutions are increasingly part of Babcock's projects, Govender highlights the ongoing need for skilled engineers who are capable of using digital technology to make the right decisions. To this end, Babcock trains existing engineers in specialised digital technology skills, supported by a research and development division that develops digital twin technologies. "We leverage Babcock's engineering expertise for specialised capabilities as we all have a deep system engineering understanding of the assets we manage," notes Govender.

Babcock has already successfully utilised digital twinning on a number of critical projects. Most recently, the company relied on 3D scanning and digital twin modelling to implement one of the first nitrogen oxide (NOx) abatement projects in the country. The complex project required a modern approach to engineering that integrated various engineering disciplines. Babcock used its in-house 3D scanning and modelling capabilities to facilitate and optimise the design phase, while all stakeholders, from the cus-

tomers and engineers through to operators and safety officers, were able to review the process safely, often without requiring on-site presence.

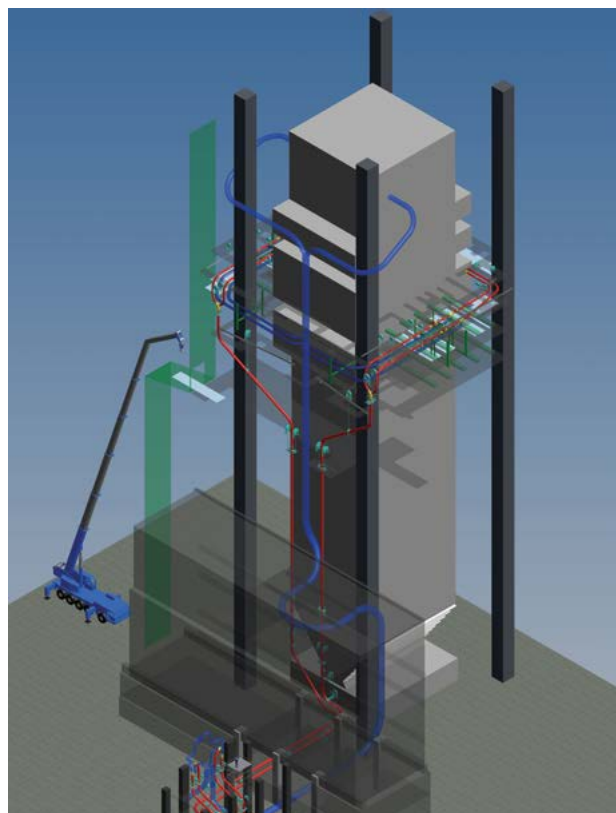
Earlier this year, Babcock applied digital twinning to repair a ruptured mainstream piping system at a major power station. 3D scanning was used to assess the extent of the damage to the piping and associated structure, as well as to determine how to safely synchronise it back into the power grid. On this project, time was of the essence and, by using specialised software, Babcock was able to digitise the real-world architecture by capturing existing plant conditions and complex geometry, quickly identifying large sections of pipework and structures, which had been displaced during the rupture.

Another previous project that drew on digital twin technology was the replacement of a vital 1 100 kPa desuperheater at a steam plant, again under intense time constraints. Two previous attempts by other organisations had been unsuccessful, and Babcock was tasked with completing the project within five months. Installation had to be completed within 11 days. Babcock attributes much of its fast turn-around time to the system design, aided by its in-house 3D scanning and modelling capacity, to deliver accurate results.

Babcock's sophisticated digital twin models provide unique opportunities for re-assessing original designs using state-of-the-art engineering methods. Any measurable form of data can be extracted and combined with Babcock's 3D scanning technologies, engineering analysis and design software, and electronic, control and instrumentation components to develop a digital twin model. These provide predictive and innovative maintenance solutions leading to improvements in efficiency and maintainability of plant assets, and ultimately, to improved availability and cost of the assets for the client.

Babcock's Ntuthuko Engineering business has multidisciplinary capability comprising process, mechanical, piping, EC&I, welding and R&D disciplines, supported by project and system engineering, data management and drawing office departments. These operate individually or as an engineering design group, covering simple and complex projects

www.babcock.co.za



Babcock's specialised capabilities and its deep system engineering understanding are an ideal platform for developing digital twins of the assets it manages.

Large customised genset for platinum mine

Zest WEG, one of the few local OEMs capable of undertaking a large customised genset project, is constructing a 2 500 kVA diesel powered generator set that will be delivered later this year to a South African platinum mining customer.

To accommodate the space constraints of a South African platinum mining customer, Zest WEG is constructing a large diesel-powered generator set to be delivered later this year.

The 2 500 kVA genset will be the largest unit yet to be fully load-tested at the company's genset manufacturing facility in Cape Town, according to Craig Bouwer, projects and product manager at Zest WEG.

"In addition to functional testing, we will be equipping ourselves to conduct load testing to 11 kV on this unit," says Bouwer. "With load-banks in-house, we will be stepping the voltage down to 400 V during the testing, and drawing on MV specialists to ensure a safe and reliable process."

The genset is a highly technical solution to match the customer's specific needs, he says.

Based on the available space, it is housed within a 12-metre ISO shipping container with the electrically-driven radiator

mounted on the roof.

Prime-rated at 11 kV and powered by an MTU diesel engine, the genset has been designed in close consultation with the customer over a number of months. Having concluded the engineering design, construction is currently underway in Cape Town.

Bouwer highlights the detailed and time consuming nature of engineering design for a project of this magnitude and complexity. "Stringent technical requirements demanded lengthy and ongoing collaboration not only with the customer, but between our engineering team and production operations," he says. "The customer was particularly pleased with our flexibility and the extra effort we applied to ensure optimal technical returnables for the project."

One of few original equipment manufacturers (OEMs) capable of undertaking a customised genset of this capacity in-house, Zest WEG will also be supplying the control



Craig Bouwer.

and protection panel from its extensive range of electrical equipment and products.

"To enhance safety and ergonomics, the control panel is in its own compartment within the ISO container," he says. "A 1 000 l bunded day tank has also been installed inside a separate compartment within the container, which includes a fuel cooler and filtration system."

The COVID-19 lockdown had minimal impact on the work schedule, he notes, as planning and communication with the customer to deal with various technical clarifications could continue remotely. To facilitate the transportation of this large unit to site, it will be shipped as three separate components: the genset, radiator and exhaust system. Once installation is complete – a process that Zest WEG specialists will supervise – its experts will conduct the cold and hot commissioning, and hand over to the customer.

www.zestweg.com



Zest WEG is constructing a 2 500 kVA diesel powered generator set that will be the largest unit yet to be fully load-tested at the company's genset manufacturing facility in Cape Town.

Zutari: Africa's renewable energy pioneer

MechChem Africa talks to Paul Nel, Energy leader for Zutari, who tells of the company's renewable energy journey and shares his excitement at being back home to service the South and continental African markets.

“We have been exceptionally successful in building a renewable energy business within the engineering consultancy space, not only in South Africa but across the African continent,” begins Nel. “We have done projects all over all over Africa, in Ghana, Nigeria, Burundi Uganda, Tanzania, Madagascar and many others.

“In South Africa, we have been involved in around 70% of all of the REIPPPP projects completed to date, starting from the very first bidding round some seven years ago. We understand the African and South African energy markets, so we are very strong and comfortable here,” he tells *MechChem Africa*.

“As a company, we were born and raised in Africa, so it feels good to have returned to our roots. Our collaboration with the global Aurecon Group enabled us to learn so much, but we have always been proudly African and

I feel that it's a real privilege to be involved in developing solutions for this continent,” he adds.

Nel says that, throughout its energy business, Zutari has world-class technical ability. “We have the ability to go deep when it comes to technical expertise. On the solar PV, side for example, a lot of companies will fulfil technical advisory or owners engineers roles in these projects. So can we, but in addition we can also offer the engineering design detail, so we can carry a project all the way from due diligences and feasibility, looking at the potential of an asset in terms of the capital investment required and, based on available energy forecasts, the expected electrical energy yields and financials returns,” he says.

Paul Nel believes that, on the African continent, Zutari is the best engineering house in the energy space, citing the company's hydro abilities as evidence. “We believe we are the leading local hydro consultant in Africa. We



Zutari Energy Leader - Paul Nel

are currently involved with a 40 MW hydro plant in Nigeria, two in Burundi and a further two smaller plants in the Northern Cape and Free State Provinces of South Africa. We are also assisting with a hydro refurbishment and engineering for a Greenfields project in Uganda, along with a large transaction in Tanzania that involves a combination of Hydro and wind.

“Hydro projects require an exceptional skills set and we can offer the hydro-mechanical, hydro-electrical and civil/structural aspects of these plants, large or small,” he reveals.

“We really are a one stop shop,” he continues. “We do not simply do electrical plants, we can do roads, grid connection studies, detailed



Having provided engineering, design, construction supervision and commissioning services for the 4.2 MW Stortemelk hydropower scheme on the Ash River in South Africa, Zutari is a leading local hydro consultant in Africa.



Zutari has been extensively involved with the Kathu Solar Farm in the Northern Cape, which comprises 384 000 solar panels with single axis tracking to produce 100 MWp. Paul Nel predicts that solar energy will “definitely be” the energy of the future.

design, structural design and environmental impact studies,” he says.

“While with Aurecon, one of the things I really enjoyed was doing all the design work for the large Australian Solar PV plants out of our office in Cape Town. And even though we are now separated from the global group, we remain a key design resource for our Australian colleagues,” he says.

The energy mix of the future

With regard to the future, Nel believes the energy landscape is changing at rapid rate. “I am feeling positive about the reaction of the government and Eskom over past three years. Their narrative is much more pro renewables, which is very encouraging. We will have to live with load shedding for a while yet, which doesn’t mean that Eskom is not on the right path. It simply shows it’s a big ship that is inherently slow to turn around,” he suggests.

The current energy crisis, he believes, is driving positive change and our energy mix is going to look different and better in the future. Eskom has already announced its intention to decommission three of the older coal-fired power stations, Komatie, Grootvlei and Camden. “In terms of replacements, the answer has to be renewables, with a healthy dose of gas in the medium term to provide on-demand dispatchable power,” he says.

While renewables are not yet dispatchable, Nel says this is changing, with battery storage becoming far more available and affordable. Eskom itself is tendering for 1.4 gigawatt-hours of battery storage for installation by December 2021. “Storage will make renewables dispatchable, and that is the point we have to get to. While the costs of battery storage are not yet comfortably viable, it can already be justified for many projects: when distance makes a grid connection too costly or

when the grid stability is poor, for example,” he explains.

In a project in Madagascar, for example, Zutari is looking at a hybrid solution that combines solar PV with battery storage and HFO (heavy fuel oil) generators. “We expect to see more and more of these hybrid solutions on the African continent, driven by customers’ immediate needs,” he tells *MechChem Africa*.

Hybrid solutions, Nel argues, are interesting in that the sizes of the different components are constantly changing. As battery storage becomes more accessible with better energy density and efficiency, it can take on a larger and larger share of the power shortfall, allowing the HFO generation side to be decreased. Such systems are already being installed in a modular way so that PV generation and storage can be systematically expanded to minimise the use of the CO₂-producing backup generator.

“These systems can also be installed close to where the power is needed. With coal, gas or hydro, the generation usually has to be close the fuel source, which makes the transmission losses much more significant. In South Africa, this is not a huge issue because we have a comprehensive distribution network, but in many countries in Africa, the infrastructure is weak so hybrid distributed solutions are likely to grow,” Nel predicts.

In South Africa, Zutari is increasingly dealing with larger mining resource companies, which are looking to pivot their business model into the energy space. Nel says Zutari is able to assist such companies to become direct suppliers of energy, via connections to a local or the national grid. “There is definitely a market for selling privately produced power through a transmission grid. These are mostly solar based, which is suited to most places in Southern Africa. Wind is trickier and mostly

limited to coastal regions,” he says.

He predicts that solar energy will “definitely be” the energy of the future, for many reasons. It is the only energy resource that is off-planet; it is easy to install; few moving parts – none if not coupled to single or dual-axis tracking systems; it is stationary; and, compared to boilers and turbines, low temperature.

“Prices are going down and lots of research investment is going into efficiency improvements of solar panels and battery storage systems. 50 years from now, I believe solar could well be our dominant generation technology,” Nel says.

“For close to a decade now, we have been associated with some of the biggest renewable projects in Africa, and we are still involved in maintenance and advanced data analytics projects to optimise the performance of some of our first round REIPPPP projects.

“We have also begun to automate our PV design process, reducing the amount of repetitive design work by using computational techniques. Renewable technology is constantly being disrupted and we are part of that, which is very exciting.

“Greater energy availability will drive development and we expect to see the energy industry in Africa leap frog the prerequisite for large distribution and transmission networks. Instead, local and smaller distributed generation systems can be interlinked to form islanded solutions like the ‘cells’ of a cellular telephone network. This will create industry across Africa, I am sure of it.

“We at Zutari are passionate about who we are and what we do. We belong here. It is where we feel most comfortable and we are very proud to be part of driving the growth of our continent,” Nel concludes. □

Hand drying with paper towels: the best option for hygiene

In response to the 'celebration' of Global Handwashing Day last month, this article from the Paper Manufacturers Association of South Africa (PMASA) talks about why hand drying is just as important as hand washing and why using a paper towel is better than using a jet dryers to dry hands.

'Singing or hum Happy Birthday twice when washing your hands' has been 2020's mantra. But it's not the whole story. Thankfully, no more singing is involved, but it turns out that hand drying is just as important as hand washing to reduce the transmission of germs [1]. Not only does hand drying remove moisture from our hands, it also causes friction. This friction further reduces the microbial load and the transfer of germs. According to a study by Auckland University, wet skin is more likely to transmit microbes than dry skin. [2]

Does it matter what we use to dry our hands? Yes it does, according to researchers at Swansea University [3]. Disposable paper towels – a form of tissue product – have been shown to be the most hygienic, especially when compared to jet air dryers and fabric towels.

Warm air and jet air dryers are not recommended for use in hospitals and clinics for hygiene reasons, as they can disperse the bacteria from the hands and deposit it on surfaces, including recently washed hands

[4]. In fact, COVID-19 workplace regulations gazetted on 29 April 2020 by the Department of Labour stipulated that only paper towels be made available in bathrooms for hand drying.

Environmental impact of disposable paper towels

Many people worry about the impact of single-use or disposable paper towel. "Paper towel and tissue products are made from a renewable resource," assures Jane Molony, executive director of the Paper Manufacturers Association of South Africa (PMASA).

"Many tissue mills use recycled fibre from used office paper as well as sustainably sourced virgin wood fibre, depending on the type of product." PAMSA's tissue manufacturing members also subscribe to the Forest Stewardship Council chain of custody for their products.

How to dispose of tissue and towelling products

While tissue products are not recyclable themselves, they are biodegradable. If you've

ever tried to use toilet paper to mop up a spill, for example, you will know that it is made to disintegrate when in contact with water – and paper towelling is also manufactured to be fit for purpose, but still able to break down.

Paper towelling – such as kitchen paper or hand towel – is treated with wet-strength additives, so it can hold its structure for a bit longer. This should not be flushed down a toilet, but rather discarded in a closed bin to reduce viral transmission.

The Paper Manufacturers Association of South Africa (PAMSA) promotes the renewability and recyclability of everyday paper products. PAMSA represents 90% of South African pulp, paper, paper packaging and tissue manufacturers and also manages RecyclePaperZA, the paper recycling association of South Africa, which represents processors of recycled paper fibre.

PAMSA provides a platform to the sector on pre-competitive issues such as research, energy, water and environmental matters as well as education, training and development.

www.thepaperstory.co.za



Disposable paper towels have shown to be the most hygienic way of hand drying, especially when compared to jet air dryers and fabric towels.

Scan to see how
use paper towel to
dry hands.



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MoPo: Recycling polystyrene into raw-materials

VTT has secured funding and established partnership for its multi-technological recycling for polystyrene (MoPo) project that aims to develop collection, handling, mechanical and chemical processing techniques to recirculate waste polystyrene, including expanded polystyrene, into pure polystyrene or styrene monomers.

The bulk of collected expanded polystyrene (EPS) and other polystyrene waste still ends up incinerated. In its two-year MoPo project, VTT with its partners will, therefore, explore how recycling of polystyrene could be substantially increased by reshaping its collection and handling. The goal is to convert waste into pure polystyrene or styrene monomers used in other plastics and chemicals.

The global polystyrene market was worth some €36-billion last year, and the market is expected to grow by 10% per year over the next few years. At the same time, there's a need to reduce the use of fossil raw materials, such as crude oil. This is why recycling of crude-oil-based polystyrene will inevitably become increasingly important.

Polystyrene is typically used in its hard form in containers, such as yogurt pots, and as a foam, known as expandable polystyrene (EPS) when insulating or damping properties are needed. Both types can be mechanically recycled, which means they can be moulded into new polystyrene products by melting the material. The amount of collected polystyrene waste is, however, quite small in Finland, so it usually ends up incinerated. The collection of EPS is especially challenging, as EPS takes up a lot of space for its weight and crumbles and stains easily.

"In the new MoPo project, our target is to offer a technically and economically feasible solution to the recycling of polystyrene waste in Europe. We will explore the state of polystyrene production, consumption and recycling in Finland and in selected European countries. We will also develop a logistics model for col-



The collection of EPS is especially challenging, as EPS takes up a lot of space for its weight and crumbles and stains easily.

lecting polystyrene waste and methods for its mechanical and chemical recycling," says Muhammad Saad Qureshi, senior scientist at VTT and leader of the MoPo project.

Turning polystyrene into styrene

As not all polystyrene waste is suited for mechanical recycling, thermochemical recycling methods will be developed in the MoPo project as well. In thermochemical recycling polystyrene is pyrolysed, that is, heated in the absence of oxygen, which causes it to disintegrate into shorter polymer chains and, ultimately, into styrene monomers. The resulting pyrolysis oil, upon purification, can replace oil fractions when producing, for example, aromatics, latex, polystyrene and carbon black. A method will also be developed to allow safe utilisation of polystyrene waste containing flame retardants and other hazardous components.

The MoPo project led by VTT has a total budget of EUR €964 000, which will be covered by Business Finland, VTT and research and business partners: Aalto University, L&T, HSY, Finnfoam, PS Processing, CH-Polymers, Pohjanmaan Hyötyjätekuljetus and Suomen Uusiomuovi.

"Together with our partners we can develop the whole value chain involved in polystyrene recycling. We expect that the project will substantially increase recycling opportunities and create new businesses. Our goal is to lead the way in polystyrene recycling across Europe," Qureshi says.

During the project, participants will demonstrate various processes such as separate collection of polystyrene waste, handling of polystyrene waste with a new kind of extruder developed at VTT, and mechanical and chemical recycling of polystyrene waste.

www.vttresearch.com

VTT's approach to plastic in the circular economy

VTT offers solutions for the whole value chain in a circular economy of plastics. VTT helps plastics producers to redesign their materials to enable circularity, recyclers to develop their technologies to increase recycling rates and improve recycle quality, and brand owners to provide new and sustainable offerings.

The cornerstones of VTT's multi-tech-

nology approach include:

- **Ecodesign:** Developing reuse opportunities for plastics applications and redesigning or replacing plastics that are difficult to recycle.
- **Sorting and mechanical recycling:** Improving recycle quality and increasing recycle rates with intelligent sorting and recycling systems.
- **Reduce fossil feedstock:** Developing renewable bio- and CO₂-based polymers without competing with the food manufacturing chain.
- **Chemical recycling:** Developing robust thermochemical recycling and depolymerisation technologies towards producing monomers and oligomers. □

Internal inspection via SKF Endoscope

The TKES 10 Endoscope Series from SKF is designed for fast, easy internal inspection of machinery with minimal need for machine disassembly, delivering significant savings in terms of time and money to customers and end-users.

“By helping to minimise the need for laborious and time consuming disassembly of machinery prior to inspection, this compact, user-friendly first-line inspection tool optimises machine availability and maximises uptime and productivity,” says Eddie Martens, SKF product manager, MaPro.

The TKES 10 Series is available in three different models and has been specially developed by SKF to cater to a

wide range of applications and customer requirements. The tool is packed with several advanced and value adding features, including a high resolution miniature camera with 2× digital zoom capabilities that delivers a clear and sharp full screen image easily visible on the 3.5" backlit display. Up to 50 000 images and 120 minutes of video footage can be saved or stored on the SD memory card.

The 1.0 m insertion tube, which is supplied in three different variants – flexible, semi-rigid or with an articulating tip – features a small 5.8 mm tip diameter and a wide field of view to facilitate access as well as visibility inside machines, including even narrow, difficult-to-reach

areas. Martens adds that the side view adapter makes it possible to use the SKF Endoscope to inspect applications such as pipe walls, while powerful variable LED lighting allows for inspections in dark locations.

There are also other options with varying lengths for both the flexible and semi-rigid insertion tubes. These are available on request, up to a maximum length of 5.0 m.

Thanks to powerful magnets and a tripod-mount on the back of the display unit, the tool can be conveniently used hands-free. The Endoscope is supplied in a sturdy carrying case complete with all necessary cables, a universal mains charger and a cleaning kit.

www.skf.com/africa/en

WearCheck awarded SPM dealership rights



WearCheck's reliability solutions manager, Philip Schutte (second from left) and RS senior sales technician, Annemie Willer (fourth from left), visit SPM's head office in Sweden to seal the deal between the two companies.

South African condition monitoring specialist, WearCheck, has announced a partnership with Swedish condition monitoring instrument manufacturers, SPM, allowing WearCheck to sell and support these world-class products.

SPM produces portable condition

monitoring products, online systems, maintenance tools, technologies and expertise to help customers to achieve the highest possible uptime of critical assets, an approach that dovetails perfectly with WearCheck's.

WearCheck technicians are trained to use, apply and install SPM systems, which perform many reliability solutions techniques, including vibration measurement and analysis, balancing, orbit analysis and laser shaft alignment, bearing and pulse checking, lubrication assessment and root cause analysis.

WearCheck's reliability solutions manager, Philip Schutte, believes the partnership is set to yield many benefits, and that it enhances the two companies' shared vision of maximising the planning horizon for maintenance and repairs.

Says Schutte, “This partnership supports WearCheck's mission to be a global leader in transforming condition monitoring into an ever-evolving market of the Industrial Internet of Things (IIOT) and

artificial intelligence. We are pleased to have the SPM brand join us as the leaders on the African continent in innovation within the reliability solutions arena.”

Rikard Svärd, SPM Instrument's global sales manager agrees. “We are confident that WearCheck's competence, as well as its industry, customer, and sales focus, are an excellent match for our strong portfolio of condition monitoring solutions. We are delighted to partner with WearCheck and look forward to a long and fruitful business relationship that will further strengthen our position in the African market.”

Coupled with WearCheck's comprehensive condition monitoring programme, the SPM tools provide the expert knowledge needed to evaluate machine condition: a complete bearing catalogue, lubricant data, bearing life calculation, traffic light 'green-yellow-red' condition evaluation, ISO limit values, spectrum and time domain analysis, fault symptom detection, and more.

www.wearcheck.co.za

New GEMÜ pneumatic actuators for quarter turn valves

Valve specialist GEMÜ is expanding its range of pneumatic actuators for butterfly and ball valves, and will also offer versions with simple GEMÜ GDR or GSR basic actuators in the future.

The GEMÜ GDR and GSR basic actuators are available for pneumatically operating butterfly valves and ball valves. The single acting design of GEMÜ GSR and the double acting design of GEMÜ GDR are suited to simple open/close applications in non-corrosive environments. The setting accuracy range for the end positions is within $\pm 5^\circ$. The actuators can be operated with a control pressure of 2.5 bar minimum and 8.0 bar maximum and are suited to low to medium cycle duties. The optical

position is indicated via a trigger cam with a scale ring, allowing the position of the butterfly disc in the piping to be determined quickly and easily.

Standardised flanged connections according to DIN EN ISO 5211 from F03 to F14 enable quick and easy fitting onto GEMÜ quarter turn valves with nominal sizes of up to DN 350. The actuators also feature an interface according to VDI/VDE3845 for position indicators, pilot valves and other accessories.

Because of the aluminium housing and the epoxy-coated cover, actuators are also protected against corrosion.

www.gemu-group.com



Trash pumps for water with large solids

Dewatering activities on large construction and infrastructure project sites is not always a simple task. In fact, pumping dirty water containing large amounts of debris calls for a 'trash pump', according to Henru Strydom, operations manager at Integrated Pump Rental.

"Contractors often find themselves having to pump water that contains hard and soft solids such as trash, gravel, stones, leaves and twigs," Strydom says. "In many instances, the construction site needs dewatering to be done at a consistent rate, while reducing the chance of the pump clogging from this kind of material. This is why a trash pump is a popular and reliable option, and it offers versatility in terms of its configuration."

Integrated Pump Rental, with its capacity to design and assemble pump sets in-house, can customise these for users' specific site conditions. "Our comprehensive pump rental fleet has included trash

pumps for some time, and more recently we have been tailor making trash pump sets for customers on request," Strydom says. "By configuring the pump set to end-user specifications we can ensure the pump dewatering solution is fit-for-purpose," he explains.

IPR's trash pump sets are usually trailer-mounted with a diesel engine for optimal mobility, but Strydom says these can also be static units driven by electric motors.

Ensuring proper pump selection means understanding basic requirements such as the head height to be pumped, the quantity and flow rate required, and the distance over which the water will be transferred. Trash pumps can typically handle solids of up to 76 mm with flow rates of about 110 l/s, and a maximum head of 32 m.

"Our self-priming, tried-and-tested trash pumps are often considered the real workhorses of the construction pump



Trash pumps from Integrated Pump Rental can typically handle solids up to 76 mm in size with flow rates of up to 110 l per second, at a maximum head of 32 m.

market," Strydom notes. "Apart from dewatering sites, these can also be easily moved into place where large pipelines have to be temporarily bypassed, for instance, moving large volumes of water quickly and dependably," he says.

www.pumprental.co.za

Need to fill the tank and still measure the level accurately?

Senix ToughSonic ultrasonic transmitters perform distance and level measurements with non-contact technology, requiring a minimum working distance to the liquid. Elevating the sensor has been one solution, but now there is a better way.

When used with the new Senix 90° adaptor, users can achieve the minimal working distance without raising the sensor for a more compact installation. The ultrasonic dead band is essentially inside the adaptor, so filling a container won't interfere with measurement and the sensor's maximum range is unaffected. This stainless steel adaptor is now available for all one-inch NPT threaded ToughSonic 3, ToughSonic 12, and ToughSonic 14 sensors.

Senix ToughSonic sensors measure the liquid or other surface from above. They're tough and used in some of the harshest factory environments anywhere. Senix makes them smart too. They come with Senix's new Reference Target Temperature Compensation technology to eliminate drifting from diurnal effects such

as rapid temperature shifts. They are widely used in closed tanks and stilling tubes, in open-air monitoring for irrigation, stream monitoring, flood and tsunami warnings and sea level monitoring. They are also installed in heavy construction and farm equipment. ToughSonic ultrasonic sensors are exceptional for accurate object detection in a variety of applications.

Easily connected to users' equipment, Senix sensors have built-in switches that

can control relays, light alarms, motors, and more.

Steady, repeatable, accurate, easy to use and extremely rugged, thousands are installed throughout the world. Where a tank level requires a rugged, compact ultrasonic installation, there is an equally rugged Senix adaptor available.

Senix sensors and adaptors are available in South Africa through Instrotech.

www.instrotech.co.za



When used with the new Senix 90° adaptor, users can achieve minimal working distances without raising the ToughSonic ultrasonic transmitter for a more compact installation.



Condition monitoring specialists



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Multotec opens screen panel plant in China

Bucking global economic trends, mineral processing equipment specialist Multotec has opened a new, larger manufacturing facility in China to meet growing demand.

The 3 200 m² factory in the busy port city of Tianjin south-east of Beijing, is over double the size of the previous premises, according to Ken Tuckey, one of the directors of Multotec Screening Systems (Tianjin) Ltd. It focuses on producing the company's polyurethane screen panels, including specialised panels for fines dewatering and classification.

"The expanded facility was necessary to increase production capacity, as sales have grown rapidly since Multotec became directly involved in this business in 2017," says Tuckey. "The investment in China is also an important part of Multotec's global strategy to get manufacturing operations closer to end-customers wherever possible."

Multotec took over the business from Tema Screening Systems, which had started up in 2006 and focused mainly on the aggregate and quarry sectors. Multotec's sales have expanded mainly into China's mining industry, but the factory's increased capacity is also allowing it to produce for other parts of the world.

Running the operation on the ground since

2018 is general manager He Pu, a local expert with 20 years' experience in mineral processing. "The new factory has taken careful planning over the past year, and had to obtain a range of strict government approvals," he says. "Even though the COVID-19 pandemic did present some challenges to our schedule, we were still able to move into the new plant in May this year."

He Pu highlights the importance of innovation as a key ingredient for any company to break into the Chinese market. This was vital to the early success of Multotec, which has proven a range of product advances around Africa and other markets. He says that recent improvements in China's manufacturing sector have also underpinned the success of the local business.

"Focus on the mining sector in China has shifted towards increased efficiencies and improved quality," He Pu says. "Multotec is now well positioned to take advantage of this, especially with the innovative screen panel technology it can offer the market. This



Multotec's new larger manufacturing facility in China focuses on producing polyurethane screen panels including specialised panels for fines dewatering and classification.

is underpinned by our quality manufacturing processes as well as our excellent local supply chain."

Multotec's Chinese company is ISO-accredited with strong in-house quality control expertise, he says. Latest technology, combined with Multotec's experience and ongoing in-factory training, ensure a consistently world class quality of polyurethane panels.

www.multotec.com

New Fenner Quattro Plus wedge belts

New to BMG's extensive range of Fenner power transmission components are Fenner Quattro Plus Twin Wrap (TW) wedge belts, that transmit 30% more power than conventional belts.

"These maintenance-free wedge belts, with a wrapped chloroprene rubber construction, have a two-ply higher modulus polyester cord outer jacket to reduce belt elongation and improve stability in tough operating conditions," says Carlo Beukes, business unit manager for the Power Transmission division at BMG. "Fenner Quattro Plus TW wedge belts cope extremely

well in harsh African conditions and the maintenance-free feature of this series is a major advantage where there is a shortage of skilled labour.

"It is common for us to see belts prone to downtime and requiring maintenance, simply because they are unable to withstand demanding operating conditions. Conventional belts installed in dusty environments tend to stretch unevenly, slip and jump out of pulley grooves. Belts can even melt if they are unable to cope with extreme temperatures.

"With the installation of appropriate belts, designed to adapt to the specific application and environmental conditions, maintenance staff are able to spend more time on preventative maintenance, rather than having to

regularly repair their drive systems.

The asymmetric weave double jacket of Fenner Quattro Plus TW belts is heat and oil resistant, offering increased durability and improved abrasion resistance in harsh conditions. Other important features include high performance, maximum drive efficiency and extended service life. These flexible belts, which offer up to 96% energy efficiency at optimum performance, have been designed for easy installation as a permanent replacement, with minimal downtime. No dismantling of equipment is necessary.

BMG's Fenner Quattro Plus TW belts, which are suitable for counter-bending, back-tensioners and clutches, can withstand an extended temperature range of between -30°C and 80°C. The range conforms with all international standards, including BS 3790, ISO 4184, DIN 7753 and American Petroleum Institute specifications. Fenner Quattro Plus belts also meet the highest standards for static conductivity (ISO 1813 standards). They are particularly well-suited for heavy industrial applications, including crushers, heavy duty conveyors, waste compactors and pumps.

www.bmgworld.net



BMG's Fenner Quattro Plus TW heavy-duty wedge belts offer high performance, maximum drive efficiency and extended service life in tough conditions.

Rapid new product introductions from Mouser Electronics

Mouser Electronics, a Berkshire Hathaway company, is an award-winning, authorised semiconductor and electronic component distributor focused on rapid New Product Introductions from its manufacturing partners for electronic design engineers and buyers. The global distributor's website, Mouser.com, is available in multiple languages and currencies and features more than five million products from

over 800 manufacturers. Mouser offers 27 support locations around the world to provide best-in-class customer service and ships globally to over 630 000 customers in more than 223 countries/territories from its 70 000 m² state-of-the-art facility, south of Dallas in Texas.

With its broad product line and unsurpassed customer service, Mouser strives to empower innovation among design en-

gineers and buyers by delivering advanced technologies. The company stocks the world's widest selection of the latest semiconductors and electronic components for the newest design projects.

Mouser Electronics' website is continually updated and offers advanced search methods to help customers quickly locate inventory. Mouser.com also houses data sheets, supplier-specific reference designs, application notes, technical design information, and engineering tools.

Mouser.com

Maintenance and remanufacture now key to survival

Facing the toughest economic conditions in living memory, South African businesses using diesel engines must refocus on preventative maintenance and quality remanufacturing. "Catastrophic failure of a diesel engine in these tough times can be fatal for the profitability of a project or even a company," says Andrew Yorke, operations director at Germiston-based Metric Automotive Engineering. "More than ever, reliable and economical engine operation is key to survival."

He warns that cutting corners on maintenance programmes – which he has witnessed among many fleet operators – would inevitably lead to failures and costly unplanned downtime. An important aspect of preventative maintenance is regular oil sampling, for instance, which helps to iden-

tify issues such as coolant contamination and other factors that lead to high wear on engines and components.

"Companies need to empower their technical departments to ensure that best practices in fleet maintenance are applied," he says. "This is not a function that can be devolved to a purchasing department."

With the early warning that preventative maintenance provides, diesel engine users can plan ahead for timeous and cost effective repair or remanufacturing of large diesel engine components at experienced and well-equipped facilities like Metric Automotive Engineering. This world class service is particularly relevant with the Rand exchange rate contributing further to the high cost of importing new engines and components.

With 50 years of experience, this South African company refurbishes large diesel engine components and offers services such as cylinder head remanufacture, cylinder block line boring, milling, honing and boring. It also grinds camshaft and crankshafts, assembles engines and conducts dynamometer testing.

"Staying abreast of the latest technology means we are one of Africa's leading crankshaft grinding facilities, with capability to grind shafts up to 4.7 m long and up to two tonnes in weight," says Yorke.

Diagnosis and fault analysis on fuel injection systems is another benefit Metric Automotive Engineering offers its customers – through its sister company Reef Fuel Injection Services. This includes the remanufacturing of the latest generation of fuel systems, saving companies substantial costs on new components.

www.metricauto.co.za

FILTECH 2021: Efficient separation for sustainable stone products

Over the past 20 years, global demand for sand and gravel has tripled. In Europe alone, there are almost 14 000 companies that extract aggregates such as sand, gravel, and natural stone. While natural sand is gradually becoming scarcer and more expensive, higher quality is becoming an increasingly important factor.

The aggregate plays a decisive role in this respect. It is an essential parameter for achieving the desired quality of the end product and thus ensuring that the material has the required properties for its intended use. Efficient plants and workflows are therefore needed for the efficient extraction and processing of mineral products – in the quarry, during transportation, classification, storage, and loading.

State-of-the-art screening plants are a key element for ensuring both efficiency

and quality in stone processing. However, finding the right machinery for the desired application is not always straightforward, even for experienced plant operators. Ultimately, it is not just about matching the specifications to the extracted rock and the desired quality; aspects such as wear resistance, throughput, and service offerings also need to be considered.

Industry representatives will find and present answers to questions about screening, sifting, and classifying at FILTECH, which takes place every eighteen months. Again in 2021, a large number of exhibitors will be presenting their products and services. FILTECH, the most important platform for filtration and separation technologies worldwide for solid, liquid, and gaseous media, reports over 340 registered exhibitors.

Processing technology is an impor-

tant topic in both the exhibition and the presentation area of FILTECH. Exhibitors such as Haver & Boecker, Siperma, and Paco Filter will be presenting the latest trends and innovations in screening, machinery, and systems.

The exhibitors' solutions are all designed to enable efficient screening, washing, and pelletizing as well as reliable particle analysis and characterisation. The products and services of exhibitors at the FILTECH are also capable of meeting special requirements, for example, in terms of degassing, capillary transport, or sound insulation.

With the latest ventilation technology, the modern Halls 7 and 8 of Koelnmesse have been chosen to support the safety and hygiene concept for the event, which includes a safe hall layout, availability of disinfectant at all essential points and masks to wear when not seated.

FILTECH takes place in Cologne from February 23 to 25, 2021.

filtech.de

Modern safety chamber technology

MechChem Africa talks to MineARC Systems' Jason van Niekerk, sales manager for Africa, and Alex Farquhar, business development manager for the global petrochemical industry, about the company's innovative chamber technologies for protecting lives on sites that are subject to potentially deadly and very expensive safety risks.

MineARC Systems officially opened in South Africa in 2013 to cater for the need for emergency safe refuge chambers for underground mines. "Our first clients were Anglo American Coal and Sibanye Gold Mine," Van Niekerk tells *MechChem Africa*.

"The African business grew from there. We started to manufacture chambers in North Riding in Johannesburg and to supply and install our solutions in key countries around Africa where underground mines are prevalent," he adds.

"We have now also started to supply the African chemical industry with shelters. So far, we have commissioned two – one in Namibia on a uranium processing plant and another in Morocco for a fertiliser plant, both to mitigate against the risk of an ammonia release," he says.

Farquhar notes that the safe refuge technology originated in Australia back in 1999 and quickly became well established in hard rock mining. "We are celebrating our 21st this year, and we have grown to have manufacturing facilities in Perth, Australia; Dallas, Texas and in Johannesburg. We are now supplying to over 60 countries globally," he says.

"When it comes to the petrochemical mar-

ket, chambers, safe havens or refuges are not established products anywhere in world – so much so that there is not even a common set of terms for them. In the petrochemical industry in the US, they are called 'safe havens', here in Australia, they are called 'shelters' or 'refuges', and the mining industry prefers the term 'refuge chambers'. Acceptance of the need for the technology is growing, though. It is something everyone facing potential risks to life should be looking at," says Farquhar.

Describing the technologies currently embedded in chambers, Farquhar first points out that every shelter is designed to protect the lives of people at risk. This means that MineARC's solutions are customised to suit a specific site and the particular risks faced by those working there.

"For an underground mine safety chamber, the risk generally involves loss of respirable atmosphere from underground fires. Rescuing the miners may take several days, so the chamber needs to sustain life for anywhere from 36 to 96 hours, depending on the depth, complexity and type of mine.

"Our ChemSAFE chambers, on the other hand, seldom need to isolate people for much longer than 12 hours. Chemical incidents are generally immediately catastrophic, but fires

and explosions tend to burn-out relatively quickly, and gas releases will usually dissipate within 12-hours or so. I have chambers built for as little as two hours," he explains.

Each refuge chamber has its own backup power and redundant systems to enable self-contained operation, so even if there is catastrophic plant loss, these systems will continue to operate. "Grid power is connected to each chamber, which trickle charges a battery bank. We assume that power may be lost, however, so the battery bank is designed to power the chamber for the full containment time," he adds.

"We provide supplemental oxygen, we offset the humidity and heat, and we scrub out the CO₂ from the breath of each person being protected. The idea is to sustain a comfortable and life-sustaining environment in the chamber for the full extent of a potential incident," Farquhar explains.

A critical component of these systems is communication. "Underground, mines are moving towards fibre and LTE Wi-Fi," notes Van Niekerk, "but many are still running on hardwired solutions. Our systems come with a comms port and aerial connection, so we can easily connect to any mine's local network.

"A key innovative feature of our chambers



MineARC's underground mine safety chamber can sustain life for anywhere from 36 to 96 hours, depending on the depth, complexity and type of the mine.

is the inclusion of our GuardIAN Network Intelligence suite, which uses the network to access two-way video and voice technologies to maximise the connectivity between the trapped personnel and the outside world. It was initially designed for communication to and from the chamber, but we have been adding supplementary products around that, such as environmental gas monitoring, tracking and lighting," he informs *MechChem Africa*.

Farquhar explains: "Modern connected gas monitors are used to continuously track the gas levels in areas surrounding the shelter. This helps rescuers efficiently and safely re-enter the area following an emergency. We also now use tracking technologies in high-risk petrochemical systems to identify where everyone is at any point in time. We have cameras in control rooms that can do remote monitoring via dashboards and we can install navigational lighting systems as part of a solution to help get people into the chambers as quickly as possible, which is critical following any incident," he says.

Safety procedures alone cannot save people when there is an incident. Purpose built technologies can. "We have saved lives on sites that have adopted our solutions, which has made these companies acutely aware of the value of these systems. It's a matter of education and advocacy to others that are currently taking risks," he notes.

As well as self-contained purpose-built toxic gas shelters, MineARC has also become a specialist in blast resistant buildings and shelter-in-place solutions. Largely targeting the chemical and petrochemical industries, these are conversions to existing buildings designed to shelter people in-situ.

"If a petrochemical facility has offices onsite, it seldom makes sense for people to be sent outside to find the shelter, so we identify a room or some space inside the building and we upgrade sealing performance and equip the area with the everything needed to control the air quality and climate, to keep people alive and comfortable until they can be safely evacuated.

"We are trying to get more of the petrochemical plant operators to see the benefits of technologies such as these," continues Van Niekerk. Even this year, we saw a fatal incident at a refinery in Cape Town.

"Plants in South Africa tend to have an escape gas room and, having seen many of these, they are often little more than a room with standard doors and taped up windows. This is totally inadequate for protecting people in the event of any serious gas release. We are trying to educate operators at plants such as these as to what is truly required to sustain employees until they can be safely rescued," he says.

"The shelter-in-place option is also ideal



Safe Haven chambers provide supplemental oxygen, offset the humidity and heat, and scrub out the CO₂. The idea is to sustain a comfortable and life-sustaining environment in the chamber for the full extent of a potential incident.

for control rooms, where people will often have to stay at their stations, regardless of what is happening outside. We can go to site, do visual and leak testing and identify the potential for improving the isolation capability. If too difficult, we also have 'room in a room' solutions, where we install a sealed room inside the control room to ensure employees can safely remain in place," says Farquhar.

He cites a growing need for shelters as a result of the emerging use of hydrogen fuel in the Australian shipping industry. "Hydrogen poses challenges in terms of its use and storage. One solution involves the use of ammonia as the source of hydrogen, so we hope to see

more widespread use of our technology to mitigate against ammonia hazards.

"Safety solutions should be seen as another essential tool in a plant's emergency response plan. In mitigating against real and potentially very expensive risks of disaster, what better way is there than adopting the best possible tools on the market? All employers need to make sure there is no question about whether people are safe while working down a mine or on a plant," he notes.

"We should all be thinking about doing everything we can to keep our people safe, rather than simply meeting minimum safety requirements," Van Niekerk concludes. □



ChemSAFE chambers protect against immediately catastrophic incidents that dissipate relatively quickly, usually within 12-hours or so.

Intelligent water boosting systems for energy savings



Grundfos MPC, Nick Pluck.

“Ensuring the right pressure and volume of water in a building today calls not just for a reliable system, but one that is also energy efficient,” says Grundfos’ external sales representative, Nick Pluck. “Electricity costs are an increasing concern for owners and managers of buildings, and this is from residential and business blocks to hotels and

Electricity costs are an increasing concern for owners and managers of buildings, and ensuring the right pressure and volume of water calls, not just for a reliable system, but for one that is energy efficient as well. External sales representative for Grundfos, Nick Pluck, explains how this can be achieved.

industrial facilities,” he adds. “This is where the Grundfos MPC booster systems offer enhanced value.”

Known for their high performance and reliability, the Grundfos Hydro MPC booster systems also offer an advanced, intelligent cascade controller to further improve energy efficiency and ease of operation.

“Over time, the CU 352 smart controller develops its own patterns based on its understanding of a building’s daily requirements,” he explains. “It will register and remember how the water demand changes over the course of a day and ensure the pumps meet that demand without running unnecessarily when demand is low.”

Equipped with this controller, the Grundfos Control MPC can monitor up to six connected identical pumps, each driven by motors with variable speed drives (VSDs). “We incorporate the VSD so that the controller and MPC can

change the speed of each individual motor based on the demand requirements,” he says. “A four-pump system, therefore, could have three pumps running at full capacity while the fourth runs at just 60%, saving energy while still meeting demand.”

As the system’s algorithms calculate patterns, it can trim off waste energy consumption when less pumping is required. The controller can also alternate the starting sequence of the pumps, resulting in more even running time, and less wear and tear across the pumps. This allows more accurate and economical service planning and scheduling.

High-efficiency IE3 motors further enhance the Grundfos Hydro MPC’s energy efficiency while maintaining a constant pressure during changing flow demands. With a user-friendly interface, the systems offer ease of installation and commissioning, along with long-term value for money. □



Left: The Grundfos Hydro MPB booster system offers an advanced intelligent cascade controller to improve energy efficiency. **Right:** The Grundfos Control MPC can monitor up to six connected identical pumps.

ChemSAFE Toxic Gas Shelters



MineARC's ChemSAFE range of toxic gas shelters are designed to provide emergency refuge for personnel in the petrochemical industry, when evacuation is not an option.

Features:



chemSAFE

- ✓ Up to 12psi blast rating for 200ms
- ✓ Up to 100% air integrity (zero ACH)
- ✓ Vestibule with positive pressure flushing system
- ✓ Breathable oxygen supply
- ✓ CO₂ & CO scrubbing
- ✓ Digital fixed gas monitoring
- ✓ Air-conditioning & dehumidifying
- ✓ Communications connection & external monitoring/diagnostics
- ✓ 12hr minimum backup power supply
- ✓ Portable, permanent & custom designs





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FLEXICON® Flexible Screw Conveyors move free-flowing and non-free-flowing materials, from sub-micron powders to large pellets, including products that pack, cake, seize, fluidise, abrade or smear, with no separation of blends.

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You can route the flexible conveyor vertically, horizontally or at any angle, over or under obstructions, through small holes in walls or ceilings. Mobile units serve multiple functions and require minimal floor space.

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6 Enjoy the Fastest Payback


The combination of top performance, low initial cost and low operational cost maximises your return on investment and profitability.



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