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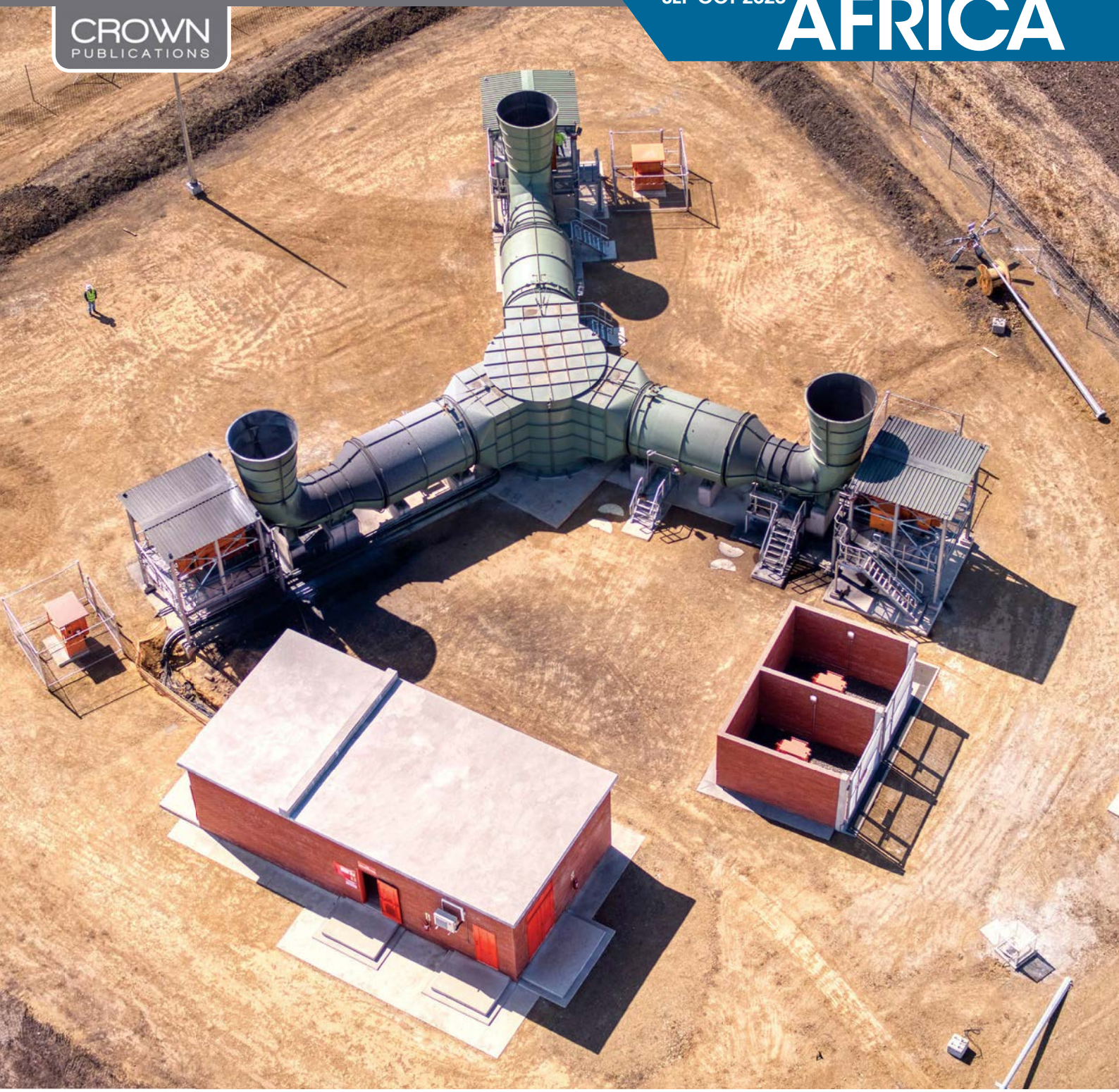

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Editor: Peter Middleton
e-mail: peterm@crown.co.za
Advertising: Elmarie Stonell
e-mail: mechchemafrica@crown.co.za
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Email: mining@chartindustries.com
Website: www.chartindustries.com

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COMMENT

Positive tipping points: our best hope for environmental sustainability

Peter Middleton

I recently attended a talk by Tim Lenton, founder of the Global Systems Institute at the University of Exeter in the UK, on the topic of tipping points: the positive ones that can accelerate decarbonisation towards meeting net-zero emission targets.

What's important about tipping points, Lenton explains, is that if breached, they cause abrupt changes that are much harder to reverse. "I spent a lot of the past 20 years mapping out the bad tipping points in the climate system that we don't want to cross if we can avoid them," he says.

These critical climate tipping points are often coupled in a way that makes each one likely to trigger the tipping of others, he explains. A loss of major ice sheets, for example, causes a significant amount of sea level rise, resulting in the reorganisation of ocean and atmospheric circulation, which changes weather patterns worldwide and leads to the loss of substantial parts of the biosphere.

Which is why we need to act decisively to decarbonise the global economy and limit global warming. And while this is happening, we are accelerating much too slowly. "That's why I want to talk about positive tipping points as our best hope of achieving the acceleration in change we need," Lenton says.

Going back into history, he recounts the story about one of his distant relatives, Lillian Lenton, a suffragette who was imprisoned while fighting for women's voting rights. She was arrested for burning down the tea house in Kew Gardens in London. While on a hunger strike, she was force fed, and unfortunately, they put the feeding tube into her lungs and nearly drowned her.

She was rushed to a hospital, with the UK Government of the time trying to cover up what had happened. It was quickly realised that they were lying, though, which ultimately led to a profound social tipping point in public opinion against the then government and in favour of votes for women, Tim Lenton relates.

He goes on to cite the brave actions of Greta Thunberg, who, by deciding to skip school and protest outside the Swedish parliament, made it easier for more and more youngsters to defy their parents, governments and schools, and join the movement for more decisive climate action. Around the world, millions of people of all ages are now climate activists, marking a tipping point in public opinion. However, as Greta Thunberg would remind us, this only matters if we actually act in a way that changes our behaviours or the technologies responsible for greenhouse gas emissions so that we eventually eliminate them.

In terms of technological tipping points, Lenton displays a photograph of the Easter Parade on Fifth Avenue, New York City, in 1900, which depicts rows of horse-drawn carriages alongside a single early automobile. A second photograph, taken on the same day and the same street just 13 years later, shows the exact opposite; there is just one last person left in a carriage, while everybody else is in an automobile. "This shows a fundamental change in how people moved around in our cities, and it unfolded within a decade across US cities and continued to spread rapidly around the world," he points out.

Through that transition, even a century ago, some 30% of these automobiles were battery electric. But the combustion engine prevailed, with the electric vehicle relegated to an inconvenient alternative. This is rapidly changing. Electric vehicles on Norway's roads now outnumber those with combustion engines. This is primarily thanks to a few social activists and the pop band A-ha, who imported a converted electric Fiat Panda, which was used to publicise demands to the Norwegian government to incentivise the switch to clean electric transport. Within seven or eight years, the enabling conditions and attitudes that would lead to a tipping point were breached. Today, battery electric vehicles have entirely taken over the market in Norway, with over 95% of all new vehicle sales in 2025 being electric.

More electric vehicles mean more batteries are needed, and the costs decrease. This is a knock-on enabler of storage solutions for renewable energy generation, he explains. "We are entering an extraordinary future, where electricity will be cheaper than it's ever been, incentivising its use for other things, such as using excess renewable energy to heat or cool our homes or to make new fuels, such as green hydrogen.

Most importantly, we all have some agency in creating and reinforcing positive tipping point changes. As consumers, we can choose to purchase or adopt different technologies, buy more energy-efficient appliances, change our eating habits, decrease the amount of single-use plastic we buy and recycle as much of our waste as possible. In industry, we can double down on energy efficiency initiatives, invest in renewable energy solutions to minimise fossil-based demand from the grid, adopt more circular and resource-efficient processes, and encourage others to follow suit.

Much of this is already underway. We need to be bolder, though, not only because it's necessary, but also because the results are overwhelmingly positive.

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communication@fuelsindustry.org.za

Mine cooling, ice systems, and the Mponeng ice plant expansion

Theuns Wasserman, the General Manager for Mine Cooling and Compressors at Howden, a Chart Industries Company, describes the range of mine cooling systems for different areas of a mine, and the ongoing expansion of Howden's hard ice solution at the ultra-deep Mponeng Gold mine.

"Mine cooling installations must supply either chilled water or cool air to the mining zones, and several mine cooling systems can be used, depending on the mine's location, depth and configuration," begins Theuns Wasserman, the General Manager for mine cooling and compressors at the Johannesburg-based Chart Industries company, Howden.

Most deep-level mines, he continues, incorporate a combination of systems that are installed in stages as the mine develops. Key factors to consider when selecting a mine cooling system include:

- The mining depth.
- The underground heat loads and sources.
- The distance from the mining zone to the ventilation shaft.
- The available real estate and size constraints, on the surface and underground.
- The cost of power and the availability of water.
- The seasonal and daily ambient temperatures on the surface.
- The available air supply from the surface and in underground airways.
- The ease and cost of maintenance.

Where ice fits into mine cooling

Presenting an overview of the types of mine cooling systems, Wasserman lists the following: hard ice solutions, where ice is produced on the surface and sent to underground dams; surface bulk air cooling; spot cooling systems; underground refrigeration systems; and surface chilled water systems.

To get an idea of where ice fits in, he says the distribution of refrigeration must provide cooling to the mining areas as economically as possible. Subsequently, the thermal losses in transporting the cooling medium must be minimised. So the magnitude and sources of the heat loads will have a bearing on the type of refrigeration and distribution strategy employed, he says.

There are three commonly used fluids to cool underground mining zones. Chilled air, either generated on the surface or from underground Bulk Air Coolers; chilled water, which can be pumped to the mining zone and through air handling units to cool the air in the area being mined; and ice, which can be dropped deep into a mine dam to cool water before being pumped through air handling units.

Cooling air on the surface is usually relatively simple and generally the least expensive option. The air can be chilled down to 6.0 or 5.0 °C, with the amount of cooling stored in the air being limited by the available air flow and the ambient starting temperature. The dehumidification of the air, which is done on the surface, also helps to improve underground conditions.

"Generally, however, the efficiency of surface bulk air cooling is limited in deeper mines due to the effects of autocompression and strata headloads," he explains.

Going deeper, chilled water has to be sent from the surface into the underground mine. "Water systems are expensive, though, because the water has to be pumped into and back out of the mine, with pumping costs often being far more expensive than the costs of running the refrigeration system itself," says Wassermann.

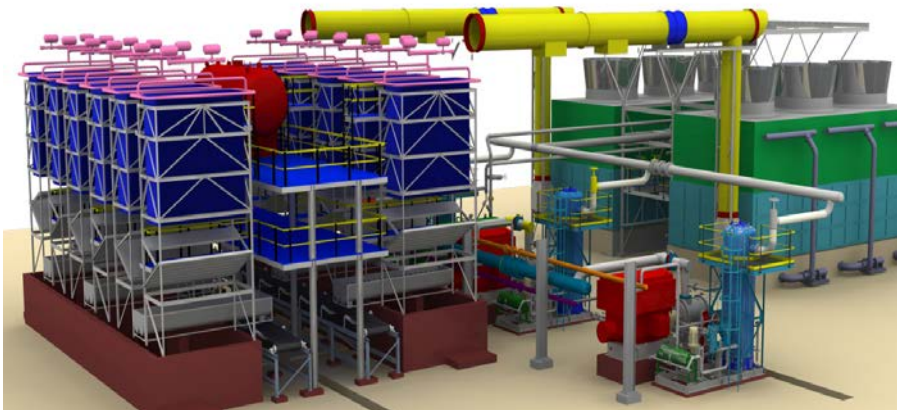
Typically, about 9.0 MW of refrigeration can be provided for every 100 kg/s of water flow. For every 1 000 m change in depth, there is a 100 bar pressure head that has to be overcome to pump the water back to the surface. "The combination of pumping energy, due to the higher pressure, and size of water columns becomes a limiting factor for mines at extended depths," he adds.

In addition, the deployment of underground refrigeration plants offers a viable option for deep-level cooling. However, their effectiveness is inherently constrained by heat rejection, which typically relies on discharge into the return airways. This introduces a critical limitation, where the total cooling capacity that can be installed underground is directly governed by the air volume of available return airflow.

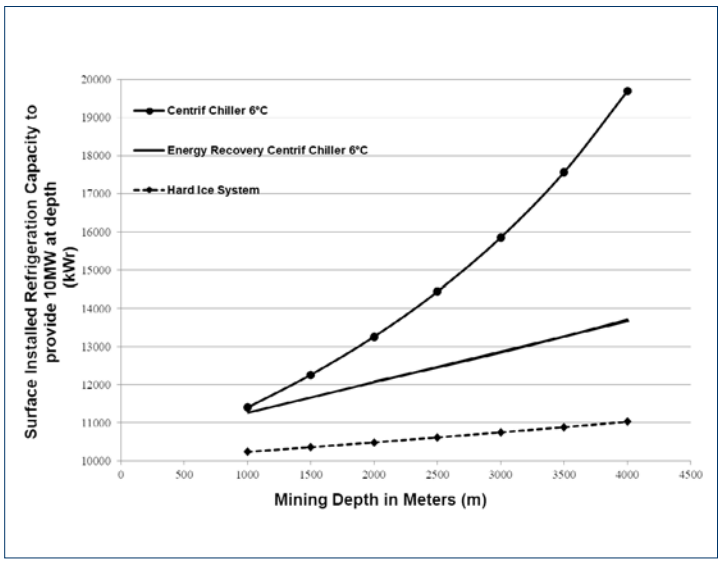
The cooling energy in ice is stored and released because of the ice-to-water phase change. This is why ice is an effective medium for cooling ultra-deep mines. Typically, 100 kg of ice can store 39 MW of cooling, compared to 9.0 MW for the same mass of water. One kilogram of ice is equivalent to approximately four and a half kilograms of chilled water.

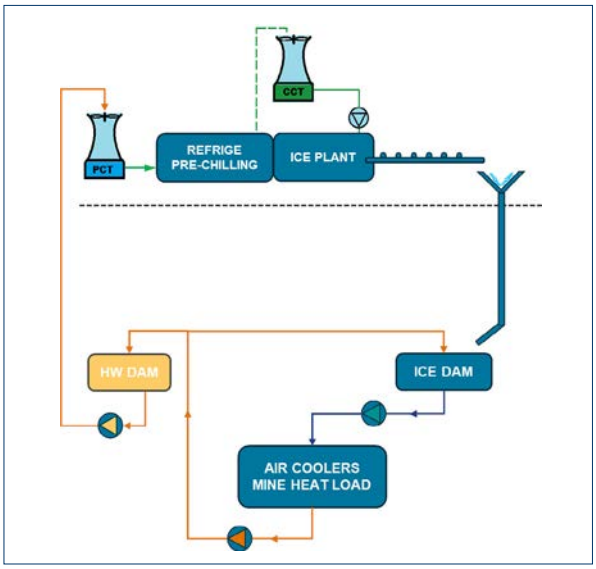
In a deep mine, where pumping is a significant energy consumer, using ice results in 23 kg/s of ice providing the same cooling as 100 kg/s of chilled water flow. Ice, therefore, reduces the pumping flow requirement by 77%, making a significant impact on the cost effectiveness of a hard ice plant.

Highlighting the results of a study that looked at how efficiently 10 MW of refrigeration could be delivered to a mine at



A CAE model of the hard ice plant expansion project installed by Howden at the Mponeng mine in Carletonville.





Left: Figure 1: A summary graph highlighting the refrigeration capacity needed to achieve 10 MW of cooling using different technologies at increasing depths. Right; The general layout of a hard ice cooling system.

different depths

Wassermann points out that, between depths of 3 000 and 4 000 m, a significant amount of cooling capacity on the surface must be added if using water as the transfer fluid (Figure 1). With ice, the capacity increment is relatively linear with increasing depth. "To get 10 MW of refrigeration to a mining zone that is 3 500 m below the surface, for example, almost 70% more surface capacity is needed if using a conventional water-based system – the top line of this graph – compared to adopting a hard ice solution – the bottom line," he points out.

It is essential to note, he says, that a combination of fluid configurations and equipment technologies can be employed in a mine's refrigeration strategy, which typically evolves in different stages over the life of a mine.

A typical hard ice plant:

Pointing to a system diagram, he says that Howden's hard ice solution starts on the surface, where large quantities of ice are produced.

The ice is conveyed to the mine shaft through vertical pipe chutes. It then falls into an ice dam, where it is stored as a combination of ice and chilled water at between 2.0 and 5.0°C. From the dam, the chilled water is sent to various air coolers at mining zones.

The chilled water from the ice dam is utilised in the air handling units, and the majority of the hot water is returned to the ice dam; only the water equivalent to the ice flow is pumped back up to the surface to be refrozen. "Consequently, the total chilled flow to the mining zones far exceeds the ice flow, which results in a significant reduction in the total water being pumped back to the surface.

Howden installations and ice technology

Howden has been involved in pioneering mine cooling systems since the 1960s, when surface chillers operating on R11 and R12 refrigerants (also known as Freon) were used for medium to deep mines for bulk air cooling (BAC). Chilled water systems soon followed, enabling chilled service water to be sent underground. "But as the underground workings went deeper, water flow rates became excessive, resulting in increasing pumping costs and maintenance issues."

Following research in the late 1970s and early 1980s, Howden-engineered ice plants were installed at the ERPM Mines in 1986 and at Mponeng in 2014. These hard ice systems use mechanical refrigeration with an ammonia refrigerant and plate ice technology: The ice is formed on vertical plates. When the required ice thickness is reached, the refrigeration cycle is reversed, causing hot gas to be passed through the plate, which defrosts the ice in contact with the surface. The sheet then slides off the plate and is broken up, ready for conveying.

Another ice technology that has been employed, although not by Howden, is soft or slurry ice, which is produced under a vacuum, where the pressure in the vessel is reduced to the triple point of water, where all three phases of water, i.e. vapour, liquid and solid, exist in an equilibrium. Large Mechanical Vapour Recompression (MVR) compressors are used, and a saline solution is required to form ice crystals in a 15% ice slurry. An ice concentrator is then used to separate the ice slurry from the brine mixture.

The primary difference between hard ice and soft ice is their ice mass fraction (IMF), which is the ratio of solid ice to water. "Ultimately, we aim for an ice system with the least amount of liquid. Hard ice has an ice mass fraction of between 93 and 98, which means there is between 7.0% and 2.0% liquid in that ice. Soft ice slurries typically produce ice with a 70% IMF, so for the same cooling effect, 30% more water must be pumped back," says Wasserman.

The Mponeng Ice Plant expansion

Howden has recently completed a hard ice plant expansion project at the Mponeng mine in Carletonville, which, at 4.0 km underground, is the deepest mine in the world. This expansion will increase the nameplate ice production capacity to 200 t/h.

"Mponeng employs all types of large refrigeration systems, including ice, hard ice and soft ice. In 2014, we completed the first hard ice plant there, with an initial production capacity of 100 t/h. Then in 2023, we were contracted to expand the plant to double its capacity, which has just been completed," says Wasserman.

At the heart of the refrigeration system is Howden's range of WRV Screw Compressors. The expanded plant will incorporate four of these compressor packages, potentially to provide a total installed refrigeration capacity of 24 MW. Heat rejection is being achieved via custom-engineered evaporative condensers, with four banks of 12 coils each.

Howden has supplied ventilation equipment to every major mining company in the world, from frozen sites in the Arctic to the hottest nations in Africa. A wide and quality portfolio of cooling systems is available, from surface bulk air coolers to hard ice plants.

"For the deep mines we have here in South Africa, hard ice solutions are becoming increasingly important, and we have the experience and the expertise to effectively deliver cost-effective plant cooling to enable safe mining at these ultradeep levels," concludes Theuns Wasserman.

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Anthony Artin, Director, Multotec Brazil.

Jaco Erasmus, Multotec Manager for Linings.

Driving sustainable lithium production in Brazil

Multotec is leveraging its custom wear solutions and global technical expertise to maximise uptime for a leading Brazilian lithium producer.

A Brazilian lithium producer has turned to Multotec Brazil for a durable, sustainable wear-lining solution after facing relentless abrasion on its rubber-lined chutes, which led to frequent, unplanned shutdowns. To address this critical uptime risk, Multotec engineered a custom solution to restore operational reliability.

Located in the state of Minas Gerais, Brazil, the client is a prominent hard-rock lithium producer, supplying high-purity lithium concentrate essential for supporting the global shift toward a low-carbon future.

The Brazilian producer was experiencing frequent production stoppages due to excessive wear on the rubber-lined chutes within its mineral processing plant. The operation uses Dense Media Separation (DMS) to separate lithium minerals from hard-rock ores, producing a lithium concentrate. However, the highly abrasive nature of the coarse material being transported from one process step to another proved too harsh for the conventional rubber-lined chutes to withstand. As a result, the rubber-lined chutes had a wear life of between two and three months before requiring refurbishment or replacement. This led to costly maintenance and regular production stoppages to refurbish or replace the chute linings.

A custom-engineered wear lining solution

In search of a more durable and sustainable wear lining solution, the lithium producer partnered with Multotec Brazil, which recommended switching to ceramic-lined chutes. These wear-resistant ceramic tiles offer exceptional abrasion and impact resistance, while their smooth surface reduces friction, improving material flow at transfer points throughout the plant.

Drawing on its global expertise, Multotec Brazil collaborated with wear-lining experts from Multotec South Africa to custom-design and install wear-resistant ceramic-lined chutes, significantly extending wear life and restoring operational reliability for the client. The project involved lining 23 chutes with high-grade ceramic alumina tiles manufactured at Multotec's wear linings factory in Pretoria, South Africa.

A team of four experienced South African tilers spent three months in Brazil, completing the project while working alongside their Brazilian counterparts. The teams exchanged best practices, conducted training, and transferred valuable operational insights to ensure local skills development

Multotec teams from South Africa and Brazil collaborated, exchanged best practices, did training and transferred valuable operational insights to ensure local skills development and project sustainability.

and project sustainability.

"This collaboration between Multotec Brazil and Multotec South Africa not only ensured the seamless installation of the ceramic-lined chutes but also equipped the local team with the skills and expertise needed to maintain the chutes," says Anthony Artin, Director at Multotec Brazil.

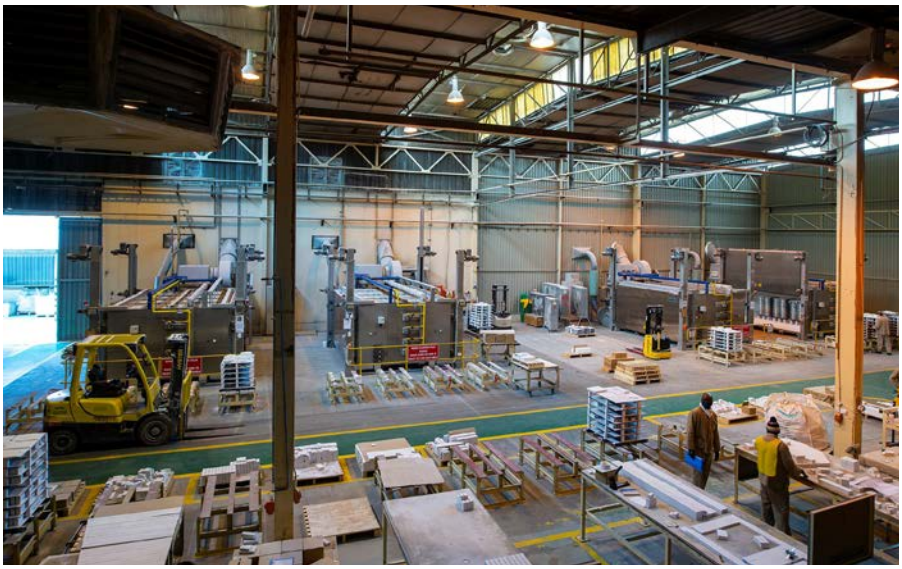
Substantial operational gains

The impact of the ceramic-lined chutes was substantial. The plant experienced increased uptime, improved operational efficiency, and reduced maintenance costs due to the improved wear rate of the ceramic linings. Whereas the previous rubber-lined chutes lasted just two to three months, the new ceramic-lined chutes now deliver a wear life of 12 to 18 months, a four to sixfold improvement.

To maintain these performance gains, Multotec continues to provide after-sales support, which includes monthly inspections, operator training on field-cutting ceramic tiles, and comprehensive wear audits. This approach ensures the ongoing efficiency of the ceramic linings and proactive maintenance when necessary.

Building on the success of this project, Multotec Brazil is also in discussions with the lithium producer to establish a maintenance contract. This agreement would streamline the ongoing maintenance of the ceramic linings and cover several other Multotec technologies in operation at the plant, including DMS cyclones, magnetic separators, demagnetising coils and screening media.

Additionally, the partnership could pave the way for a dedicated local workshop, further enhancing service support in the Minas Gerais region.



Multotec's wear linings factory in Pretoria, South Africa, produces 60 to 200 tonnes of standard and bespoke engineered ceramics.

"Multotec's Wear Linings factory in Pretoria, South Africa, produces between 60 and 200 tonnes per month of standard and bespoke engineered ceramics, 80% of which are engineered to specific client specifications," says Jaco Erasmus, Manager: Linings at Multotec.

Smarter chute design and expanded collaboration

Looking ahead, Multotec Brazil will also provide support for the redesign and modification of all new steel chutes, using insights from current wear patterns to improve wear resistance before installing the linings. Beyond its commitment to delivering tailored wear solutions, the company recognises that proper chute design is critical, no matter the lining quality, as poorly designed chutes will still suffer from premature wear.

This next step in collaboration with the lithium producer underscores Multotec's global reach and innovative approach to delivering sustainable wear solutions that are engineered for abrasive environments, built to last, and focused on improving uptime, plant efficiency and the economic processing of lithium.

Multotec's solutions ultimately help bring more sustainable lithium concentrate to market, supporting the green energy and green mobility transition.

www.multotec.com

Left: ***Multotec lined 23 chutes in Brazil and will redesign and line new chutes using insights from current wear patterns to improve wear resistance.*** *Right:* ***A lithium producer in Brazil upgraded its chutes from rubber lining to Multotec's custom ceramic lining, achieving a significant improvement in wear life.***

VEGABAR sensors and SA's paper industry

Pulp and paper manufacturing is an intricate, multi-stage process that depends on consistent monitoring and control of pressure at every stage. This article highlights the role of the VEGABAR range of sensors in monitoring and controlling pressure during the papermaking process.

Above: The VEGABAR 81 differential pressure transmitter is particularly effective for monitoring pressure drops in filtration systems.

The VEGABAR 82 and VEGABAR 83 deliver precise, real-time pressure measurements, allowing paper mill operators to optimise their production processes.

In chemical pulping, where wood chips are cooked in large digesters with chemicals such as sodium hydroxide and sodium sulphide, precise pressure control is crucial. Pressure inconsistencies can lead to poor-quality pulp or process interruptions, resulting in wasted energy and raw materials. Additionally, the corrosive chemicals and extreme temperatures place immense demands on pressure sensors.

Other challenges lie in the pressing and drying stages. During pressing, water is mechanically removed from the pulp sheets, while the drying phase requires precise management of steam pressure to ensure uniform drying. Any pressure fluctuations can cause product defects and inefficiencies.

South Africa's pulp and paper mills also face significant challenges in wastewater treatment. Pressure monitoring in settling tanks, filtration systems, and pipelines is critical for ensuring compliance with environmental standards, particularly in regions such as KwaZulu-Natal and Mpumalanga, where mills operate near sensitive water sources. Inaccurate pressure readings can lead to leaks, overflows or suboptimal treatment, resulting in environmental damage and regulatory fines.

Vega's instruments

VEGABAR pressure transmitters are designed to address the unique challenges faced by the pulp and paper industry. Built for durability and precision, the VEGABAR range ensures reliable pressure monitoring in aggressive, high-temperature and high-pressure environments, making it ideal for critical pulp and paper applications.

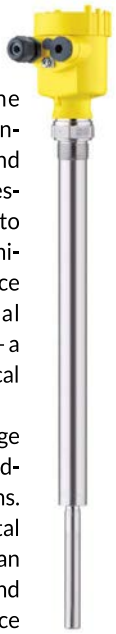
One of the standout products is the VEGABAR 82 pressure transmitter. Equipped with a ceramic-capacitive measuring cell, the VEGABAR 82 is particularly well suited to the harsh environments of pulp digesters and chemical processing tanks. Its ceramic sensor offers excellent resistance to corrosion and abrasion, essential for withstanding the aggressive chemicals used in kraft/sulphate pulping processes.For South African mills operating in high-humidity and high-temperature conditions, the VEGABAR 82's stability and durability ensure long-term reliability, reducing maintenance needs and operational disruptions. The sensor also provides high accuracy, which is critical for maintaining optimal cooking pressure in digesters. This improves the quality of pulp while reducing chemical and energy consumption, helping mills optimise production costs.

In the pressing and drying stages of paper production, where steam pressure control is crucial, the VEGABAR 83 provides an ideal solution. Featuring a robust metal measuring cell, the VEGABAR 83 withstands extreme temperatures and pressures commonly encountered in steam pipelines and drying cylinders. Its high-temperature resistance, coupled with accurate measurements, allows operators to maintain consistent steam pressures, ensuring uniform paper drying.

For mills in KwaZulu-Natal, where energy costs can account for up to 20-30% of production expenses, efficient steam management enabled by VEGABAR 83 can significantly reduce energy consumption. By preventing steam pressure fluctuations, mills also minimise defects and increase throughput, improving overall productivity and profitability.

Wastewater treatment is a critical process in pulp and paper production, particularly in the South African context, where water scarcity demands efficient resource management. Pressure measurement in wastewater treatment systems ensures optimal operation of pumps, filtration units, and settling tanks. The VEGABAR 81 differential pressure transmitter is particularly effective for monitoring pressure drops in filtration systems, enabling operators to detect blockages or performance issues in real-time.

The VEGABAR 81's chemical-resistant materials make it suitable for handling treated and untreated wastewater, ensuring long-term performance in harsh conditions. By improving pressure monitoring in wastewater processes, South African mills can reduce water losses, optimise treatment efficiency, and comply with strict environmental regulations.



Improving efficiency and process optimisation

One of the primary advantages of the VEGABAR range is improved process control and efficiency. The VEGABAR 82 and VEGABAR 83 deliver precise, real-time pressure measurements that allow operators to optimise production processes, from chemical pulping to steam drying. This can reduce energy consumption, minimise material waste, and enhance overall product quality – a crucial factor for mills competing in both local and export markets.

The robust design of the VEGABAR range ensures reliable performance in the demanding conditions of pulp and paper operations. With corrosion-resistant ceramic and metal measuring cells, VEGABAR transmitters can withstand high pressures, temperatures and aggressive chemicals, reducing maintenance costs and downtime. This is particularly valuable in South Africa, where mills operate under tight production schedules and cannot afford frequent disruptions.

By enabling accurate pressure monitoring in wastewater treatment processes, VEGABAR transmitters help mills optimise water usage and comply with environmental regulations. This is essential for mills operating in water-stressed regions, where responsible water management is a top priority.

VEGA instrumentation integrates seamlessly with digital control systems, enabling mills to implement smart process monitoring and predictive maintenance strategies. This enhances operational visibility, allowing mills to identify and address potential issues before they impact production.

By improving pressure monitoring in chemical pulping, steam drying and wastewater treatment, the VEGABAR range enables South African mills to enhance process efficiency, reduce operational costs, and achieve environmental compliance. As the industry continues to grow and modernise, VEGA's instrumentation will play a crucial role in supporting sustainable and efficient pulp and paper production in South Africa.

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WEIR

Mining technology for a sustainable future

Weir's intelligent path to optimised mining

Building on over 150 years of engineering expertise, Weir is driving greater customer value through its three NEXT Intelligent Solutions packages: Insight, Uptime and Production. These packages reflect Weir's customer-focused approach, enabling operations to harness real-time data, advanced automation, and improved efficiency.

Delivering highly engineered solutions for over 150 years, Weir is unlocking even more potential with three focused value packages in its NEXT Intelligent Solutions packages.

"We maintain a close connection with our customers to ensure our solutions evolve with their changing needs and deliver real value to their operations," says Marina Eskola, Director of Digital Solutions Management at Weir. "This customer-centric approach also guides how we digitally enhance our equipment and systems and is clearly reflected in the value-driven packages within our NEXT Intelligent Solutions."

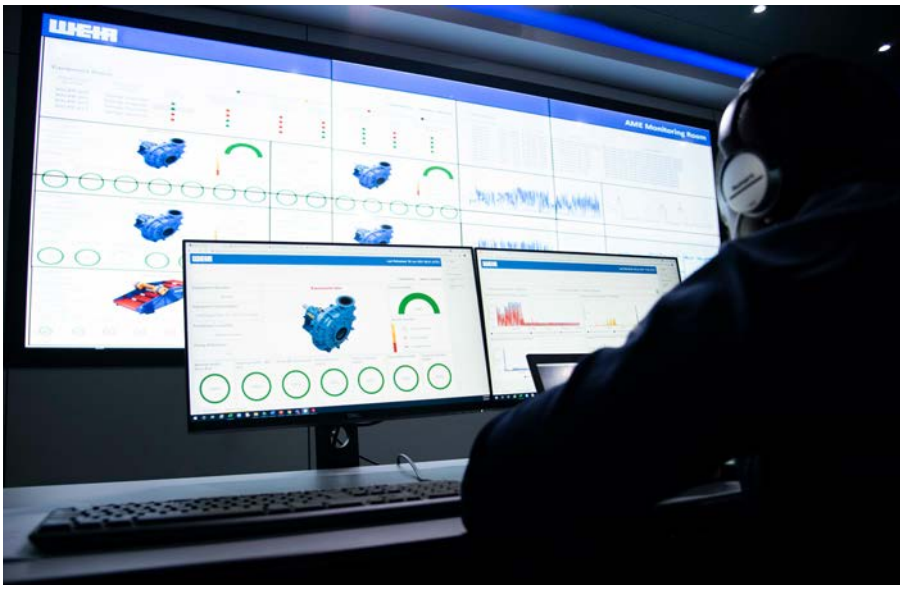
The NEXT packages – Insight, Uptime and Production – align with the journey that customers can take in partnership with Weir to leverage real-time data in making informed decisions, applying cutting-edge sensing technologies and boosting operational efficiency.

"The three packages highlight the focus at each key step of this journey, allowing the customer to steadily gain more value from this intelligent technology as they progress through the stages of implementation," she says. "At the foundation is our Insight package, which, through a web interface, gives the customer access to a dashboard of vital information about the performance and condition of their equipment in real time."

With Weir's in-depth technical understanding of all its equipment, supported by extensive data on historical trends and parameters, NEXT Insight also includes key performance indicators and algorithms as part of this application to assist in the decision-making process.

"An important differentiator between NEXT and other condition monitoring systems is that we go beyond just alerting the user to any potential issue," she adds. "We are also able to recommend a course of action for the customer to follow to address the issue being flagged."

This leads her to the following package in the customer journey: Uptime. While the goal of the Insight package is to provide visibility across the operation, she explains, the Uptime package aims to extend the operational lifetime of the equipment itself. "This is where we add predictive capabilities so that we can forecast the remaining useful lifetime of the critical components," she says. "This in turn allows the customer to run the components for longer – until their actual condition demands replacement."



Weir uses various AI tools to predict the useful lifetime of equipment and the probability of mechanical failure.

Weir's detailed technical knowledge and historical data can be applied to necessary adjustments on physical equipment.

This is a significant improvement on using a time-based replacement schedule, which is often the norm when there is no visibility of the components' wear. By extending the life of components, customers can also reduce the equipment's total cost of ownership while mitigating the risk of downtime.

"Another solution in the Uptime package is automated adjustment, allowing certain parameters on our equipment to be adjusted quickly and without the manual intervention of any operators," she says. "On a slurry pump, for example, the gap between the throatbush and the impeller can be adjusted automatically, reducing wear on critical components while improving hydraulic efficiency."

This extends the life of this component, with the added benefit of improving on-site safety by removing personnel from

Left: ***The NEXT system can recommend a course of action for the customer to address an issue that has been flagged.*** *Right:* ***Weir has detailed knowledge of how their equipment operates and performs over decades, allowing them to build predictive models.***

the proximity of the pump.

The third element in NEXT Intelligent Solutions is the Production package, according to Mauricio Vega, Head of Process Optimisation Technology at Weir. This allows customers to maximise their process efficiency with AI-powered optimisation.

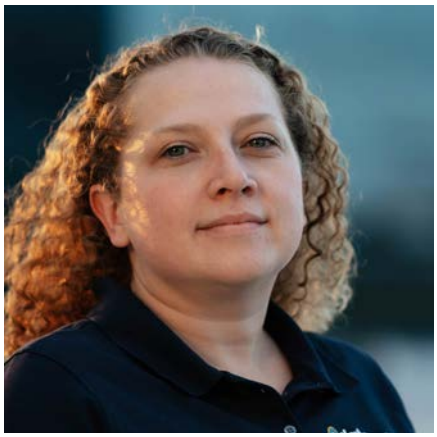
"The NEXT Production package includes an intelligent assistant that we are rolling out this year," says Vega. "This takes all the data gathered through the Insight and Uptime packages, and gives recommendations to metallurgists, process engineers and operators based on their operational priorities."

Every mine has its particular targets and imperatives, he notes, so this package helps to guide decisions to achieve those goals, such as a production target or a desired product size for the classification circuit. The intelligent assistant does this by combining Weir's depth of historical data from equipment operating globally with the site data from the customer's control room.

"We also recognise the customer's constraints, such as energy usage limits, which the intelligent system can take into account," he says. "This helps pave the way to smart and efficient mining, which is very much the focus of the mining industry today," Vega concludes.

www.global.weir

Weir's NEXT Intelligent solutions leverage an in-depth understanding to inform predictive maintenance.



CHEMCAD: meeting the expanding needs of chemical engineers

MCA talks to Noelle Garza, a chemical engineer and Technical Specialist for CHEMCAD – distributed and supported in South Africa by Chempute Software – about CHEMCAD NXT, an advanced chemical process simulation software suite for process design, optimisation and reporting.

CHEMCAD was initially developed in the 1960s at the University of Houston, as part of a US government-sponsored project to develop process simulation software for synthetic fuels. It was commercialised in 1988 and has since become a flagship product in the Datacor Engineering Software Suite.

Over the years, CHEMCAD has continually evolved into the comprehensive simulation suite it is today. Batch process simulation and detailed heat exchanger design were added in 1992, followed by full integration of dynamic simulation by 2000. "With the unveiling of CHEMCAD NXT in 2021, which has a modern interface and advanced tools such as parallelisation and multi-objective optimisation, we have continued to prioritise the user experience," begins CHEMCAD Technical Specialist, Noelle Garza, adding that joining Datacor has enhanced the available resources and strategic alignment, allowing more ambitious development goals for CHEMCAD.

Datacor is a leading global provider of software solutions for process manufacturers and chemical distributors. Datacor solutions support over 15 diverse sectors, including oil & gas, mining, food & beverage, nutrition, packaged gas, pet food and pharmaceuticals. Together, Datacor and CHEMCAD support engineers with tools that enhance productivity, data-driven decision-making and promote smarter business growth.

Noelle Garza: engineer, data analyst and marketing specialist

Noelle Garza found her way into chemical engineering through science, mathematics, a love for problem-solving and a deep curiosity about how the world works. "What resonates with me is the idea that chemical engineers make sense of complex systems to help drive meaningful progress.

"Our CHEMCAD team likes to use the phrase 'ChEs are Heroes' because it reflects how the work of chemical engineers can improve lives, support innovation and solve some of society's biggest challenges. Our customers engineer products that bring food, energy, medicine and clean drinking water to people, among many other living essentials," she says.

Chempute's journey with Datacor

Chempute has a long history as a partner of Datacor in both Chemical Process and Pipe Flow, having first introduced CHEMCAD into South Africa in 1986, making it one of the earliest international dealers to purchase and distribute the software. Some of the company's first clients included leading South African manufacturers, engineering firms and chemical producers who adopted CHEMCAD to modernise their process design and optimise plant performance. Over the years, Chempute has steadily grown its customer base, supporting organisations across a wide range of industries – from petrochemicals and mining to food processing and pharmaceuticals.

Early global successes for CHEMCAD included its adoption by engineering firms, operators, and OEMs looking for a flexible, user-friendly simulation tool that could support all stages of chemical process design. Notable global users include companies such as BASF, Chevron, and Pfizer, who have utilised CHEMCAD for process design and optimisation.

Key features and uses

CHEMCAD helps chemical engineers simulate complex processes through steady-state and dynamic modelling, equipment sizing, thermodynamic analysis, sensitivity studies and optimisation tools.

"CHEMCAD helps engineers to save time and money by enabling them to test ideas virtually before making costly real-world changes. It supports innovation, reduces trial-and-error, shortens design cycles, improves process reliability and supports better decision-making. Ultimately, this leads to higher product yields, lower energy use and fewer operational surprises," says Garza.

"One everyday use for our software is evaluating the performance of piping or equipment. Consider a liquid-liquid absorber column used to recover acetone from a mixture with benzene, for example, a scenario typical of a mixed solvent waste stream from a speciality chemical plant, or a byproduct separation in a petrochemical facility," she says.

In this setup, as shown in Figure 1, acetone and benzene enter the extractor from the bottom, while water enters from the top. "Because acetone is partially miscible with water, it selectively transfers into the aqueous phase, while benzene remains in the organic phase. This simulation is used to determine

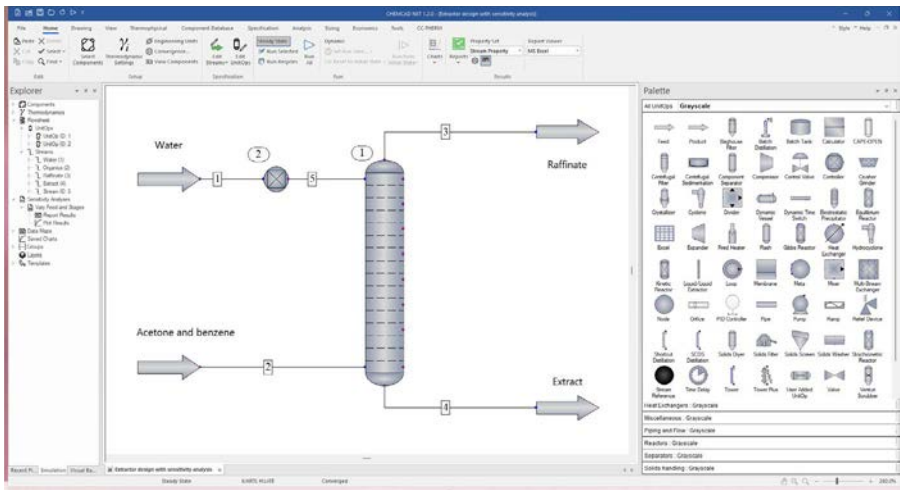


Figure 1: CHEMCAD allows engineers to go beyond static modelling by analysing what-if scenarios using steady-state or dynamic simulation. In this case, a sensitivity analysis is used to test multiple scenarios with varying numbers of stages, ranging from 2 to 7, and water flow rates from 5 to 95 kmol/h, to simulate the mole rate of acetone in the extract stream [4].

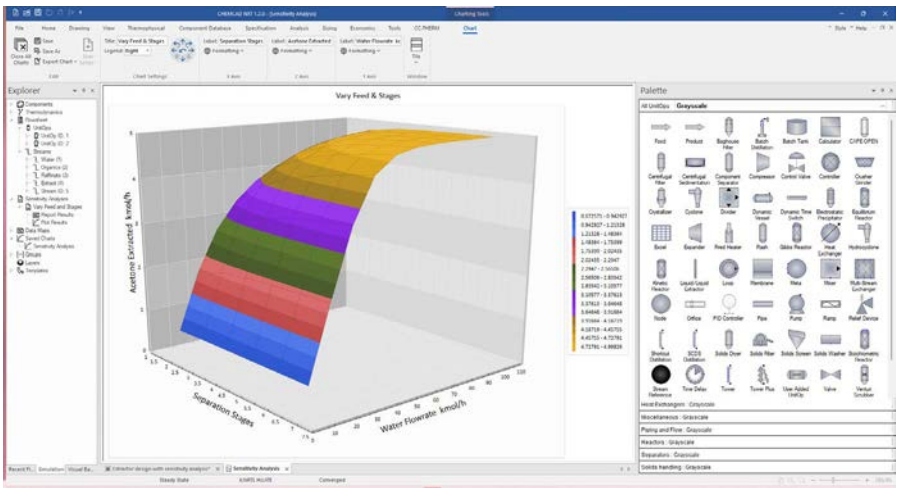


Figure 2: Sensitivity study simulation results for the scenario shown in Figure 1, which shows how the mole rate of acetone in the extract stream [4] varies with the number of stages and the water flow rate (5 to 95 kmol/h).

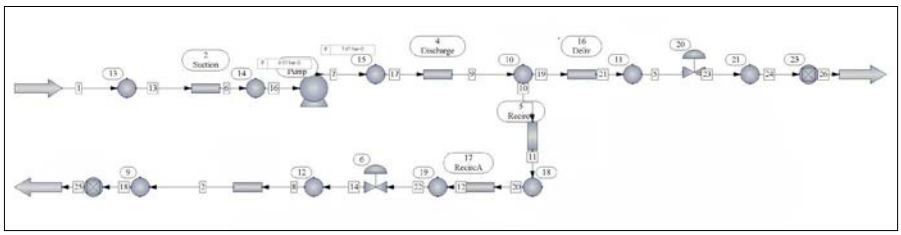


Figure 3: For a fuel blending system upgrade, CHEMCAD was used to evaluate whether an existing ethanol-gasoline blending system could handle increased ethanol content. This flowsheet was built using piping layouts from isometric drawings and pump performance was modelled from manufacturer curves to verify capacity.

the optimal conditions for a 99.96% recovery of acetone in the extract," Garza explains. The results from a sensitivity study simulation are shown in Figure 2.

This example also shows how CHEMCAD can enable engineers to go beyond static modelling by analysing 'what-if' scenarios using steady-state or dynamic simulation models.

"This may be for a new design or to help troubleshoot existing equipment, especially when issues arise in the plant. Engineers can use CHEMCAD as a virtual twin of the equipment or process being assessed, to determine whether the facility can handle anticipated operational conditions or process changes before making any physical modifications," she explains.

A great example comes from Fluid Quip Technologies (FQT), a leader in biotech engineering. "FQT used CHEMCAD to optimise a biofuel production facility. Starting with process data and equipment drawings, FQT built a steady-state simulation in CHEMCAD to evaluate performance, identify bottlenecks and improve energy efficiency. They used CHEMCAD's distillation modelling tools to test tray configurations and match site specifications. CHEMCAD's advanced heat exchanger modelling tools were used to size exchangers for better heat integration.

"This optimisation resulted in significant energy savings without requiring additional capital investment. This project shows how CHEMCAD can be used to improve performance, reduce operating costs, and support sustainability goals in large, complex processes," Garza notes.

CHEMCAD is especially useful for smaller-scale projects where engineers need to make decisions quickly. Noelle Garza cites a fuel blending system upgrade in the UK, where engineering firm P&I Design used CHEMCAD to evaluate whether an existing ethanol-gasoline blending system could handle increased ethanol content [Figure 3]. "Using steady-state and dynamic modelling, P&I identified limitations in the current infrastructure and developed a cost-effective strategy to meet the new blending requirements.

"Here, CHEMCAD was used to simulate control responses, pressure behaviour, and to test short-term fixes before implementing long-term upgrades. This is a perfect example of how CHEMCAD supports troubleshooting and incremental improvements while saving time, reducing risk and avoiding unnecessary spending, all without disrupting ongoing operations," she tells *MCA*.

CHEMCAD is also making it easier for engineers to run cleaner, more efficient processes. "Whether they are designing alternative energy systems, carbon capture solutions or optimising traditional hydrocarbon and chemical processes to meet sustainability and energy reduction goals, engineers are using CHEMCAD to find energy-saving opportunities.

"Many companies have used CHEMCAD to improve energy usage and incorporate heat integration to cut utility costs and reduce waste. It's a powerful tool for developing control strategies that reduce or prevent emissions at source. If emissions do occur, however, CHEMCAD can also help quantify their composition and volumes," says Garza.

On the cost-effectiveness of its use, she says CHEMCAD delivers a strong ROI by helping engineers make smarter decisions when simulating process changes, testing breaking points, and evaluating operating conditions. "Unexpected shutdowns can cost thousands per hour, and CHEMCAD reduces that risk by allowing engineers to explore 'what-if' scenarios, such as feedstock changes or equipment swaps, before real-world testing. This saves time, energy, avoids wasted materials and improves reliability.

"By optimising reaction conditions, separation efficiency and energy use, CHEMCAD boosts product yields and helps engineers get more out of existing assets. That means lower operating costs (OPEX) and more informed capital investment decisions (CAPEX), especially in resource-constrained environments," concludes Noelle Garza.

www.chempute.com/chemcad

MEPS: the opportunity and impact

A media roundtable event held at WEG Africa earlier this year brought together energy efficiency specialists to highlight the impact and opportunities associated with South Africa's Minimum Energy Performance Standards (MEPS) for electric motors, which took effect on June 4, 2025.

Following international trends, IE3 premium efficiency motors are now the minimum allowable import standard for three-phase, low-voltage electric motors with rated power outputs ranging from 0.75 kW to 375 kW. The new South African regulation, the Minimum Energy Performance Standards (MEPS), now prevents South African suppliers from importing lower-efficiency IE1 and IE2 motors. This switch brings efficiency and cost benefits to businesses, suppliers and original equipment manufacturers (OEMs).

Leading industrial and energy component manufacturer WEG Africa hosted a media briefing on June 5, 2025, at its training centre in Longlake, Johannesburg, to discuss the motivations, benefits, and requirements for MEPS.

WEG Africa invited three speakers to address the media at the roundtable event: Harvest-Time Obadire, the Power and Energy Transition analyst for Fitch Solutions Company, BMI; Zadok Olinga, an energy measurement and verification consultant focused on energy-related tax incentives and grants; and Fanie Steyn, LV and HV Executive for the Electric Motor division at WEG Africa.

For IE3 motors, WEG Africa has opened a local assembly facility.

Meeting the demand deficit: Harvest-Time Obadire

Obadire opened with a chart showing expectations for global growth in energy consumption, which BMI predicts will continue to increase over the next decade. Markets are targeting a net-zero energy transition, and the IEA's net-zero-based emissions forecast expects an 8% decline in energy use by 2050. "But we are expecting energy consumption to increase by over 10% by 2030, which means that the energy consumption in the near term will still be significantly more than what is needed to meet net zero targets by 2050," he says.

Obadire points out that, while Africa consumes only 2% of global energy, South Africa accounts for over 60% of that consumption. "In South Africa, we play a significant role in terms of energy consumption, compared to both Africa and globally," he says.

In the past and to date, he says, South Africa has been a net energy producer, but by the end of the decade, BMI expects our energy market to enter a deficit. "Production of energy is not going to be able to meet the demand we expect, and this is where improved electrification and energy efficiency are recommended," he predicts.

In the industrial sector, particularly in manufacturing, a significant portion of South Africa's energy is consumed by electric motors, so the efficiency of these motors plays a crucial role in helping to reduce the country's energy deficit. Across the board, he says energy prices are increasing at rates above inflation, placing significant pressure on consumers and industries. Energy-efficient measures will therefore become increasingly important.

Energy-efficiency incentives: Zadok Olinga

Opening his presentation, Zadok Olinga of the energy-efficiency consultancy Ölinga, says that energy efficiency is seen by the International Energy Agency (IEA) as the 'first fuel of the energy transition'.

In South Africa, he says, we have established a culture of energy efficiency through various policies such as Eskom's Demand Side Management (DSM) programme, where the government subsidised companies to implement measures to lower their demand and improve their energy efficiency. "This is a positive story for South Africa, and from this, other programmes have been established.

Most companies implement energy efficiency to improve their productivity, lower their energy costs, and reduce their carbon emissions, he says. Because of the environmental crisis, South Africa has now implemented the 12L tax incentive for industrial consumers. This tax incentive offers energy users direct rewards of 95 cents per kWh of energy saved across all types of energy used within a company, including electricity, coal, heavy fuel oil, and others, Olinga advises.

The incentive applies to all energy-equivalent savings, "so if you implement process improvements, and those process improvements lead to a reduction in compressed-air usage, for example, that qualifies," he advises.

Administered through SANEDI, the South African National Energy Development Institute, and paid out from the National Treasury based on the company's SARS tax return, the incentive is available for any technological changes, upgrades to processes and existing equipment, retrofits, Greenfield projects, and energy recovery initiatives such as waste heat recycling.

"It is the only tax incentive that is retrospectively payable, going back to 2013," he says, adding that claimants must be willing to open up their tax returns and go through a measurement and verification process to quantify savings and validate each claim.

In addition, Eskom is offering an energy rebate programme that can be worth more than the R12 000 tax incentive. This rebate is 41 cents per kWh of electricity saved between 6:00 am and 8:00 pm. Investment in upgrading the efficiency of electric motors, by replacing IE1 and IE2 motors with IE3 or IE4 motors, can therefore be further subsidised using these two government-backed initiatives.

ESG, jobs and local content: Fanie Steyn

MEPS, begins Steyn, is a massive milestone for our country. "In terms of the energy efficiency

level of electric motors, MEPS will dictate the type of motor that we can bring into our country or sell into our industries," he says.

During ESKOM's DSM programme, IE2 high-efficiency motors were on everyone's lips as a replacement for IE1 standard efficiency motors. Nowadays, we have premium-efficiency IE3 motors, and super-premium efficiency IE4 motors, which offer even higher levels of energy efficiency.

Motors, he says, use a high percentage of the energy consumed by industry in our energy-hungry country. "We continue to experience an energy crisis and energy poverty. So we must either build more power stations or buy more power from elsewhere. Solar or wind farms are an option, but these projects involve a significant capital outlay, and it takes a long time to secure the investment and complete the installations before they can contribute.

"The quickest and easiest way to alleviate power shortages is to increase the efficiency of the industrial processes and equipment that consume the energy," he notes.

"South Africa has done a phenomenal job over the years, with energy-efficient TVs and washing machines, and compact fluorescent and LED lighting, for example, but now we are including the big energy users, the electric motors. Just by increasing the efficiency from IE1 level to IE3, typical savings of between 4% and 10% can be achieved, depending on the motor size. Since electric motors consume approximately 60% of the electricity in industry, imagine if all the motors we use were replaced with IE3 motors, we would be using between 2.4% and 6.0% less energy.

"That would make our net-zero curve look much better over the next few years," Steyn suggests.

The new IE3 efficiency standard, officially known as the Compulsory Specification VC 9113, became mandatory on June 4, 2025. The specification applies to a broad range of three-phase, low-voltage electric motors, specifically those with two, four, six, or eight poles, and a rated power output ranging from 0.75 kW to 375 kW.

This includes motors with non-standard mechanical dimensions and geared motors. Excluded are specific special categories, such as single-speed motors with ten or more poles, multi-speed motors, motors that use mechanical commutators, and submersible motors designed to operate entirely while immersed in a liquid. Businesses are permitted to continue operating IE1 and IE2 motors, replacing them upon failure with IE3 equivalents.

In most cases, OEMs and equipment suppliers must obtain approval to supply their motors. End-user businesses should request to see a supplier's Letter of Authority for the motors, issued by the National Regulator for Compulsory Specifications (NRCS).

Investment returns

Some electric motors can consume the energy equivalent of their acquisition costs in the first few weeks of operation, making switching a quick-win decision. When comparing cumulative running costs, IE3 savings typically return investments within one to five years, and well-chosen premium IE3 motors that run continuously can recoup their costs from energy savings within months.

The use of IE3 motors also radically improves a company's environmental impact and market competitiveness, as well as offsetting rising energy costs.

In maximising the benefits, Steyn suggests systematic preparation:

- Conduct a thorough electric motor inventory audit to accurately identify all motors that fall within the scope of the MEPS regulations.
- Talk to equipment suppliers to understand the impact on equipment used in operations and how the supplier will address MEPS requirements.
- Develop a comprehensive, long-term strategy for replacing older motors, prioritising those that operate for extended periods to maximise potential energy savings.
- Update procurement policies and technical specifications to explicitly mandate that all applicable new electric motor purchases must meet the IE3 efficiency standard.
- Train relevant staff members – including procurement, maintenance, and operations teams – on the new MEPS regulations and compliance.
- Undertake a cost-benefit analysis for replacing older, less efficient motors even before they fail, taking into account the potential for significant energy savings and the projected increases in the cost of electricity.

Equipment suppliers and end-user businesses can also engage with WEG Africa to learn more about the new regulation.

"The new MEPS standard will bring considerable savings to customers and relief for the national grid, and we at WEG Africa are fully behind the government with this initiative. We already bring IE4 motors into South Africa, and for IE3 motors, we have opened a local assembly facility.

"For us, motor efficiency is not just part of our ESG initiative; it also creates jobs and increases local content, empowering our country to move forward in several positive ways," concludes Fanie Steyn.

www.weg.net

John Thompson and BECS to deliver biomass energy solutions

John Thompson, a division of ACTOM (Pty) Ltd and South Africa's leading provider of industrial energy solutions, has announced a strategic partnership with Berkeley Energy Corporate Solutions (BECS), a specialist developer and supplier of biomass energy projects.

Nicholas Tatrallyay, Managing Director at BECS and Jaco Grobbelaar, CEO of John Thompson Industrial, sign a strategic partnership to accelerate the deployment of reliable, renewable steam solutions.

Together, ACTOM's John Thompson and Berkeley Energy Corporate Solutions (BECS) aim to accelerate the deployment of reliable, renewable steam solutions to industrial customers in South Africa and across Africa. This collaboration brings together John Thompson's deep engineering expertise and manufacturing capability with BECS' innovative approach to sourcing, securing and supplying sustainable biomass fuel.

The alliance is a powerful partnership geared towards helping businesses decarbonise their operations, reduce reliance on fossil fuels, and meet growing demands for cost-effective, renewable energy.

As a non-exclusive partnership, BECS will continue to pursue other energy projects independently, while John Thompson will engage BECS in suitable projects for customers that require funding, development support, and scalable energy-as-a-service delivery.

Decarbonising with confidence

With industrial sectors under growing pressure to transition to low-carbon operations, this partnership is perfectly timed. The industrial sector is a significant energy consumer and carbon emitter, particularly in industries that rely on high-temperature process heat, such as food and beverage, pulp and paper, chemicals, textiles and mining.

Switching to cleaner fuels is more than just a regulatory imperative; it is a business necessity, which is where the John Thompson-BECS model comes in. The partnership offers a low-carbon steam solution based on sustainable biomass feedstock. Under a long-term heat offtake agreement, the system is designed, funded, built and operated on behalf of the client, who pays only for the steam consumed.

"This approach helps businesses overcome the two biggest barriers to decarbonisation: the high upfront cost and technical complexity of energy system upgrades," says Jaco Grobbelaar, Industrial CEO at John Thompson. "Our clients do not need to become energy experts or infrastructure owners, because we take on the risk, the capex and the performance accountability."

A unique approach to biomass supply

What sets this partnership apart is BECS's strategic approach to biomass sourcing. BECS goes beyond simple fuel supply, working directly with large-scale agricultural and forestry producers and processors to secure long-term feedstock contracts that are sustainable, traceable and cost-effective. This ensures a reliable fuel supply chain tailored to the client's specific needs, something many energy developers cannot offer.

"In a market where supply risks and quality inconsistencies can stall biomass adoption, we provide stability," explains Jonathan Probert, Business Development Manager for Southern Africa at BECS. "We align our supply chains to specific project locations and customer volumes, ensuring security of supply while maintaining competitive pricing." Unlike other players in the African energy sector, BECS is focused solely on renewable energy and energy efficiency solutions, including the use of sustainable biomass to generate steam and/or power. This singular commitment differentiates the company from other providers in the market, who typically generate energy from predominantly fossil fuels.

"This partnership enables us to deliver bankable, long-term energy solutions that meet the real-world needs of industrial clients," says Nicholas Tatrallyay, Managing Director at BECS. "Together with John Thompson, we are addressing the cost, complexity and carbon intensity of steam generation, helping businesses achieve sustainability and growth."

Expanding across Africa

Initial deployments are already underway in South Africa, with the model now being introduced to industrial clients in Zambia, Kenya, Mozambique and Ghana, where energy resilience and sustainability are key enablers of growth. This solution is particularly attractive to companies looking to reduce carbon emissions and operational risk while securing predictable long-term energy pricing.

The partnership is already progressing on a range of biomass boiler projects across South Africa, with potential expansion into other African markets where John Thompson has an existing footprint. Each solution is designed to be scalable, bankable and tailored to the operational realities of industrial users.

By integrating BECS' biomass fuel solutions into John Thompson's proven boiler systems and operational models, clients can expect a seamless transition to renewable energy without sacrificing performance or uptime.

Designed for delivery and long-term impact

"This is not just about replacing a fuel source. It is about delivering an end-to-end renewable energy solution that works," concludes Grobbelaar. "Together with BECS, we are giving African industry the tools to achieve sustainability, profitability and resilience."

www.johnthompson.co.za

Axel Scholle, co-founder and Business Developer at SPS.

Seychelles' journey towards renewable energy

Axel Scholle, Co-founder and Business Developer at Sustainable Power Solutions (SPS), describes how the Seychelles is overcoming logistical and land challenges on the path towards replacing its dependence on heavy fuel oil and diesel with renewable energy solutions.

Seychelles has long faced challenges in its journey towards renewable energy, primarily due to limited land availability, suboptimal wind resources, and its reliance on Heavy Fuel Oil and diesel. This dependency has led to some of the highest electricity tariffs in the world, placing a strain on both the economy and its citizens.

Yet, despite these constraints, Seychelles remains committed to its ambitious goal of achieving net-zero carbon emissions by 2050. While the road ahead is not without obstacles, recent technological advancements and strategic planning are steadily paving the way for a more sustainable future.

Meaningful progress through solar and battery solutions

To date, affordable and effective solar and battery storage systems have opened up new possibilities for the archipelago, particularly in its high-end tourism sector. Recent solar and battery storage projects have helped some of Seychelles' outer islands reduce their reliance on diesel from 100% to around 20%, which is a significant milestone for a nation with such unique geographical limitations.

The progress made with solar installations on the outer islands of Seychelles is substantial. The combined efforts of private companies, with Sustainable Power Solutions (SPS) being the most significant private investor in the Seychelles' energy sector, are notable in supporting the country's carbon emission reduction goals.

Navigating complex logistics

A key challenge in rolling out renewable energy infrastructure lies in Seychelles' geography. Of its 115 islands, only about 20 are inhabited, many of which are remote and require access to reliable power. Transporting equipment, fuel and personnel require lengthy journeys over water, often in unpredictable conditions.

Despite these hurdles, the country's energy systems demonstrate notable resilience. Local expertise has been developed to manage and maintain off-grid energy installations, while remote monitoring technology ensures that system performance can be assessed and optimised in real-time, reducing the need for constant on-site intervention.

Creative solutions for land constraints

Another limitation is the lack of available land for large-scale solar projects, particularly on the larger inner islands. Floating solar projects can be an innovative solution to this issue; however, they also come with their own challenges. While still in development, these projects offer promising opportunities to increase renewable capacity without competing for scarce land resources.

Given the relatively small size of Seychelles' energy market and its demands, targeting high-consumption sectors like tourism, a significant contributor to the economy, makes strategic sense. Successful solar and storage projects on multiple islands have demonstrated the potential for further expansion and impact.

For example, powering a high-end resort with a few megawatts of solar power and maintaining consistent performance with minimal interruptions is a testament to the significant advancements in renewable technology, and it is reassuring to see such successful implementations.

The Islands Development Company's (IDC) efforts in transforming the outer islands into high-end destinations have indeed been remarkable. The IDC's vision and management have driven development, including the integration of solar energy into new projects. This not only supports Seychelles' carbon reduction goals but also enhances the green credentials of these resorts, making them more attractive to environmentally conscious tourists.

Renewable energy as a tourism asset

Globally, integrating renewable energy into the tourism experience has become a growing trend, and the Seychelles is well-positioned to capitalise on this. Resorts powered by solar and battery systems not only reduce operational costs and emissions but also appeal to environmentally conscious travellers.

Examples from destinations such as Kenya demonstrate how solar systems can become an integral part of the tourist experience, offering visitors firsthand insight into sustainable living. This approach not only raises awareness but also underscores the tangible benefits of renewable energy in everyday comforts, such as staying cool at night and having access to warm water.

A clear path forward

While challenges remain regarding logistics and land, the Seychelles is making meaningful headway in reducing its dependence on fossil fuels. A key enabler behind this progress is SPS, the largest private investor in the Seychelles energy sector. Through its investments in solar and battery storage projects across multiple islands, SPS continues to play a pivotal role in supporting the nation's sustainability journey and reducing its reliance on imported diesel.

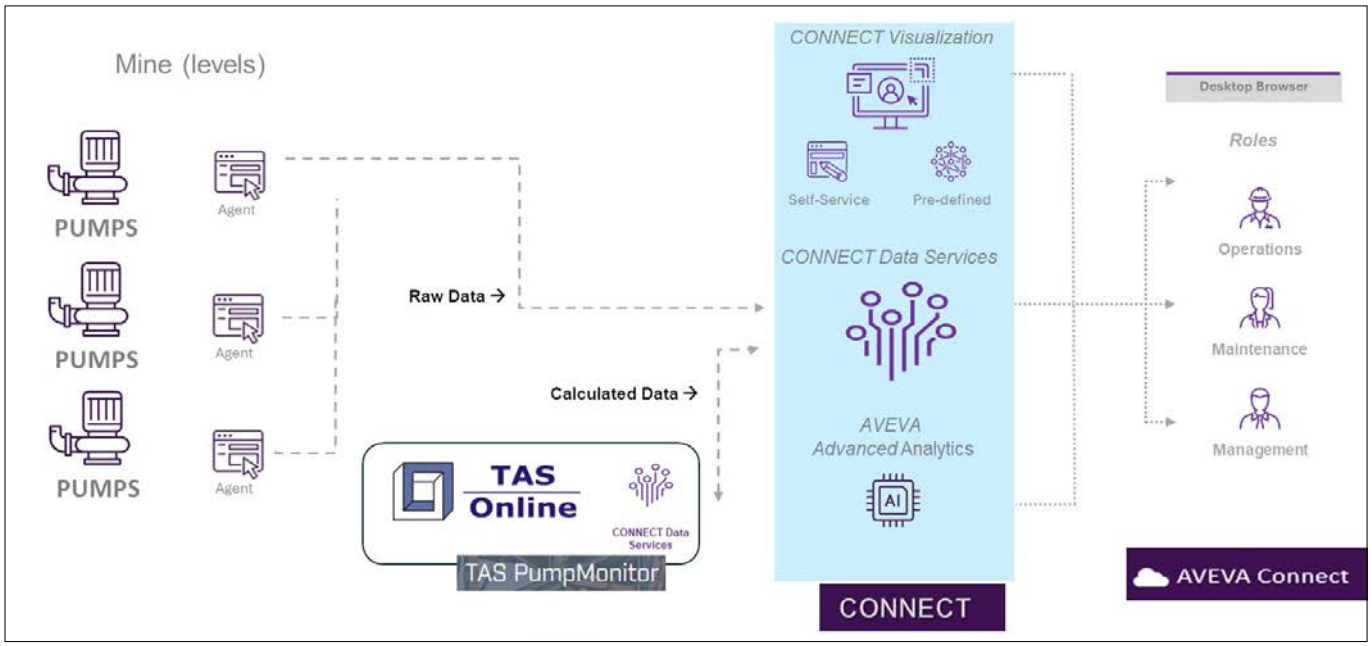
Through collaboration, innovation and smart prioritisation of sectors like tourism, Seychelles continues to demonstrate how even geographically isolated nations can chart a viable path to sustainability.

https://sps.africa

Through investments in solar and battery storage projects across multiple islands, SPS plays a pivotal role in supporting Seychelles' sustainability journey.

TAS PumpMonitor for real-time pump performance optimisation

TAS Online has launched a new TAS PumpMonitor that transforms access to real-time pump performance data, significantly enhancing the ability to keep pumps operating within their optimum efficiency zones. Harry Rosen explains.



AVEVA CONNECT Data Services is an easily scalable cloud-based interface and data management service that makes sharing industrial data simple and secure.

"Our latest version of TAS PumpMonitor enables raw engineering data from a client's pumps to be accessed directly for analysis by PumpMonitor, and the results to be relayed back to the client's control centre within seconds," begins TAS Online MD. Harry Rosen.

"As an 'outsider' to a client network, we used to have a separate onsite server to extract data from the pumps onsite, before sending it on for analysis at TAS Online. It was difficult to extract the data and even more difficult to act speedily on the results," he tells *MCA*.

"Consultants working for mining clients can't have direct access to their network, but for the best results, we needed to be able to react rapidly to issues detected by our performance monitoring service. This is now possible through AVEVA CONNECT Data Services, an easily scalable cloud-based interface and data management service that makes sharing industrial data simple and secure," Rosen explains.

A goldmining success

TAS Online has been monitoring pump stations for a deep gold mine near Carltonville since 2008, collecting pump process data from its underground dewatering pump stations. Rosen says that the mine operates in some deep mines that must be continuously dewatered. Natural surface water enters, refrigerated water is introduced, and some equipment still uses water for hydraulics. So all this water must be pumped out again to keep key parts of the mine from flooding.

"We have now installed our new cloud-based PumpMonitor system at this mine. With a depth of over 4 000 m, this is the deepest underground mine in the world and one of the highest pumping shafts in terms of volume, so it's a perfect application to test our latest PumpMonitor innovation," he notes.

To dewater the mine, 10- to 12-stage multi-stage pumps from OEMs such as Scamont and Sulzer are being used. These pumps draw water from several pump stations at different levels into a series of underground dams and ultimately to a surface dam. Each pump station typically has two sets of two pumps, connected in parallel. The two inner pumps are connected into a single column, and the two outer pumps are connected into a second column.

"Each pump in the system is typically driven by a 4 000 kW motor, so the dewatering operation can consume 12 MW of electrical power at every level. Should the pumps run inefficiently, due to wear or being operated outside of best efficiency, massive unnecessary consumption and expenses can accrue," explains Harry Rosen.

The key reason for monitoring pumps like these is to maximise efficiency, he continues. "In the past, we monitored and calculated their efficiency every month. Pumps were manually tested every 2-3 months, and when any pump dropped below a specific efficiency level, we would recommend refurbishing it. However, the pump test only measured the efficiency of each pump when running independently of the others.

When running pumps in parallel, as soon as one pump's efficiency drops, due to wear or damage, for example, the more efficient pump will dominate, pushing the weaker one further away from its most efficient operating zone. Our previous pump monitoring system, based on periodic testing, could not track exactly where a pump was operating on its curve in real time, and we found that the actual pump efficiency during that period was significantly lower than the one-off test results. This prevented us from alerting the mine promptly to pump performance and efficiency issues, which can totally change the decision as to when to refurbish the pump," Rosen suggests.

Pumping in parallel offers significant energy savings opportunities, he continues, because it is not just about squeezing three or four percent better efficiency from a

pump. The wasted energy when parallel pumping with one strong pump and one weaker one is typically in the 15-20% range. For two mismatched 4 000 kW pumps connected in parallel, continuous and unnecessary power losses of between 600 and 800 kW may occur. For a 24/7 operation on an industrial tariff of, say, R1.50/kWh, losses in the order of R1-million per month could accrue.

"This makes the rapid intervention to restore the failing pump very cost-effective," Rosen points out.

The AVEVA World presentation

At the AVEVA World Annual Congress 2025 in April of this year, TAS Online and AVEVA delivered a joint presentation on the successful combination of PumpMonitor with AVEVA CONNECT, which helped the South African gold mine minimise its pump losses. Held in San Francisco earlier this year, this is a big annual event for AVEVA end-users and their partners, which attracts over 3 000 people, says Rosen.

The TAS PumpMonitor presentation highlighted how raw data from the pumps, normally collected for the mines' digital control centre, was also made available to TAS Online in real time via AVEVA's Connect Data services.

"Data from pumps, including suction and discharge pressures, flow rates and power consumption, don't mean anything on their own. It's only when you relate these to the specific pump's performance curve that you can gain a clear idea of how well or how poorly a pump is performing. This is what TAS Online has been doing for years, but this is the first time we have been able to plot and track a pump's performance on a pump curve in real time.

"We are now able to accurately track and compare the operating efficiency of each pump to determine whether it is good or bad, by plotting the data onto each individual pump's performance and efficiency curves. This makes even the smallest deviation away from the ideal efficiency zone of every dewatering pump transparent, enabling in-time targeted action to be taken to minimise losses and maximise the specific energy efficiency of each pump," Rosen explains.

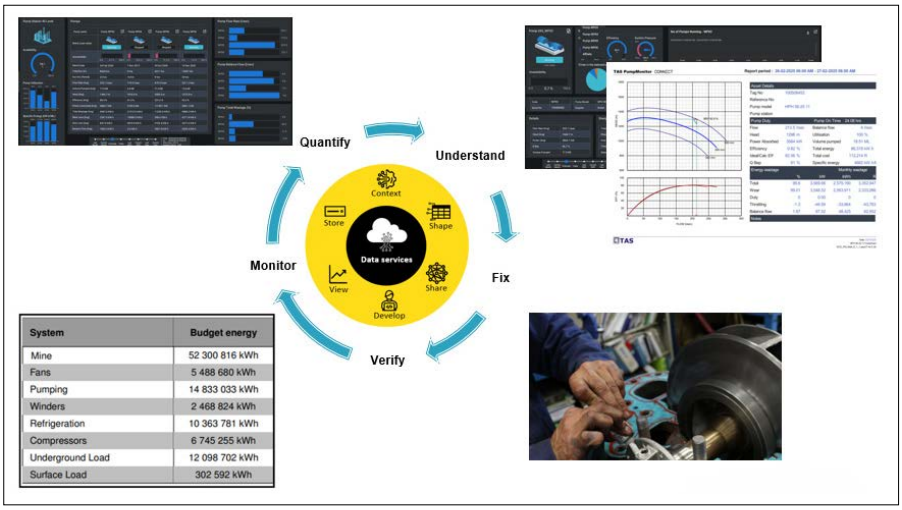
There are also times when the mine only needs to run one of the two parallel pumps, which enables the system to recalibrate itself, resulting in more accurate performance tracking. "Because there is only one flowmeter per riser column, we can accurately measure the flow rate of an individual pump without having to calculate how the flow is shared, which requires the use of other data like the motor power," he adds.

Having data in the CONNECT cloud means that all South African mines can now access near-real-time performance monitoring, without impacting local network infrastructure. It also enables pump maintenance teams to have 24/7 access to accurate performance data from anywhere. "The value of this cannot be overstated," said Rosen at AVEVA World. "Power costs amount to 90% of the total life-cycle cost of a typical water pump; pumping systems use 40% of electric motor consumption in industrialised countries; the average energy wastage in pumping systems is in the 15-40% range, and, based on UNIDO pump system audits, energy savings in the order 10-20% have routinely been demonstrated by returning performance to best possible efficiency," he argues.

"Pump performance is also a very reliable indicator of pump condition. Operating pumps at best efficiency improves pump reliability and the wear life of all components, including bearings and seals," concludes Rosen, adding that this is worth unpacking in a future article.

www.tasonline.co.za

The latest version of TAS PumpMonitor enables direct access to raw engineering data from a client's pumps for analysis by PumpMonitor, with results relayed back to the client's control centre within seconds.



The new TAS Online PumpMonitor with AVEVA CONNECT offers a holistic approach to pump system management by tracking the performance of every pump against its corresponding performance curve. Collecting, monitoring and analysing the data helps operators quantify each pump's performance, understand the required demand, address operational and maintenance issues, and verify and optimise pump efficiency.

Relaying PumpMonitor results back to an AVEVA Dashboard connected to the mine's SCADA system enables pumping efficiency to be optimised in real-time.

Key innovations shaping wastewater treatment systems

As the world faces mounting water scarcity and increasingly stringent environmental regulations, wastewater treatment systems are undergoing a significant transformation. At the forefront of this change is globally trusted infrastructure firm AECOM.



Left: ***Terisha Naicker, a water and wastewater process engineer at AECOM.*** *Middle:* ***Nyiko Khosa, an Associate Process Engineer at AECOM.*** *Right:* ***Mohamed Abdelmegeed, AECOM's Technical Director for Water.***

AECOM is pioneering cutting-edge solutions to improve efficiency, sustainability and regulatory compliance. "New technologies are helping us treat wastewater more effectively while recovering valuable resources," says Terisha Naicker, a process engineer at AECOM who specialises in water and wastewater treatment.

Key innovations focus on advanced biological treatment methods. These include compact Membrane Bioreactors (MBRs) to produce high-quality effluent and Moving Bed Biofilm Reactors (MBBRs). Energy and resource recovery are also key focuses. Here, anaerobic digestion systems convert sludge into biogas.

Combined Heat and Power (CHP) systems use the biogas to generate both electricity and heat. In addition, nutrient recovery technologies such as struvite precipitation enable the reclamation of phosphorus and ammonia for use as fertiliser. "With deep technical expertise and a future-focused approach, AECOM continues to lead the way in developing sustainable wastewater solutions that meet global challenges head-on," notes Naicker.

Digital and smart technologies are also playing a transformative role. These include real-time monitoring and control through IoT sensors, telemetry and SCADA systems with advanced analytics. Such tools promote water reuse and principles of the circular economy. They enable Direct and Indirect Potable Reuse (DPR and IPR) in water-scarce areas, greywater recycling in buildings for flushing or irrigation, and the integration of Zero Liquid Discharge (ZLD) technologies.

Pumping systems and efficiency

Pumping can account for 4% to 30% of the energy consumption in municipal wastewater treatment plants, highlights Nyiko Khosa, an Associate Process Engineer with over 19 years' experience. "To address this, the industry initially focused on improving the efficiency of electric motors and reducing energy usage."

Historically, IE2 and IE3 motors were the standard for pumps under IEC 60034-30-1. "Now, there is a shift towards IE4 motors, recently introduced to the market," adds Khosa. These super-premium efficiency motors can be retrofitted to older pumps, enhancing energy performance with minimal disruption.

"Pumping systems are the backbone of modern wastewater management, and their evolution is critical to meeting the increasingly complex characteristics of contemporary wastewater," adds Mohamed Abdelmegeed, AECOM's Technical Director for Water, who has over 27 years' experience in this area. As urbanisation and industrial discharges increase, conventional pumps are being replaced by intelligent, resilient systems engineered to operate under challenging and variable conditions.

One significant advancement is the integration of variable speed drives (VSDs) to run pump motors. These allow pumps to adjust their speed based on real-time demand rather than operating at full capacity continuously. During low-flow periods such as dry weather or off-peak hours, VSDs reduce pump speed. It can result in energy savings of up to 40% while maintaining hydraulic performance.

Evolving wastewater composition, including higher concentrations of solids, rags and non-flushable materials, poses significant clogging risks. In response, manufacturers have developed non-clogging impeller designs and self-cleaning mechanisms to enhance reliability and reduce maintenance. Material selection is also key to long-term performance, particularly in corrosive environments caused by hydrogen sulphide, industrial chemicals or saline intrusion.

Extending equipment life

Modern pump systems increasingly utilise materials such as AISI 316, duplex stainless steel and high-performance polymers for superior chemical and mechanical resistance. In coastal installations, for example, stainless steel is preferred to withstand saltwater intrusion. In industrial zones, ceramic and rubber linings, epoxy coatings, or thermal spray metallising are employed to resist corrosion. These improvements extend equipment life, reduce failure rates and lower lifecycle costs.

Digitalisation is further redefining pump management. IoT-enabled sensors now monitor vibration, temperature, energy use and hydraulic efficiency in real-time. This data feeds into predictive maintenance platforms, enabling early detection of faults and reducing costly downtime.

Operational challenges

"One of the major operational challenges is a shortage of skilled personnel to operate advanced biological treatment processes," Naicker points out. Other ongoing issues include influent variability, which affects treatment performance; sludge handling and disposal, where volume reduction and dewatering remain problematic; and persistent concerns around odour and vector attraction.

Most existing plants still rely on the conventional activated sludge process, which is energy-intensive, adds Khosa. "The adoption of advanced biological processes could significantly reduce energy consumption." Abdelmegeed concurs, noting that wastewater management is now challenged by a complex web of environmental pressures, ageing infrastructure, regulatory demands and heightened public expectations. These challenges are interconnected and demand integrated, innovative solutions.

A particularly pressing concern is the increasingly hazardous composition of in-

fluent. Unpredictable industrial discharges, household chemicals, pharmaceutical residues, microplastics and even illicit substances complicate biological treatment and increase the risk of toxic shock events.

In addition, high concentrations of fats, oils, and greases (FOG) and non-biodegradable materials, such as wet wipes and plastics, cause frequent clogging, equipment wear, and costly maintenance. These contaminants also contribute to the formation of 'fatbergs', large solid masses that obstruct pipelines and cause overflows, posing environmental and public health risks.

In many developed countries, wastewater infrastructure is decades old and showing significant signs of deterioration. Ageing pumping stations, cracked pipes and undersized treatment plants are struggling to keep pace with growing populations and rising water usage. The result is frequent leakage, groundwater infiltration and combined sewer overflows (CSOs) during heavy rainfall.

Wastewater treatment is one of the most energy-intensive municipal operations, sometimes accounting for up to 35% of a city's total electricity use. Aeration, sludge digestion and pumping require a substantial energy input, driving operational costs and carbon emissions. Utilities are under pressure to reduce energy consumption while maintaining performance; yet, many still rely on inefficient legacy systems with outdated controls.

Regulations are also tightening in response to concerns around nutrient pollution, water quality and emerging contaminants. New standards, particularly for nitrogen, phosphorus and micropollutants, are compelling utilities to upgrade their treatment processes.

Climate change is exacerbating the situation. Extreme weather events, such as flooding, droughts and heavy rainfall, are becoming more frequent and severe. Flooding can overwhelm systems and lead to sanitary sewer overflows (SSOs), while drought reduces dilution capacity in receiving waters, complicating compliance with discharge standards.

Future-ready infrastructure must now be designed with climate resilience in mind, using adaptive strategies such as green infrastructure, overflow storage and decentralised treatment systems.

Skills shortages

Despite technological advancements, the wastewater sector continues to face pronounced skills shortages. An ageing workforce and declining interest in technical careers have created a gap that threatens operational continuity and innovation.

Wastewater treatment plants are critical in managing sewage and-industrial effluents.

Moreover, digital systems such as SCADA, AI analytics and predictive maintenance require new technical competencies that many utilities are still developing. Without targeted recruitment and training, the effective operation of advanced systems will continue to be a challenge.

Naicker highlights that system monitoring and predictive maintenance are key to optimising plant performance by enabling proactive management, minimising downtime and improving overall efficiency. Real-time monitoring allows operators to track key parameters and receive alerts when values exceed acceptable thresholds. This supports better process control, stability and reduced reliance on manual intervention.

"In today's increasingly complex and regulated environment, monitoring and predictive maintenance are essential for ensuring operational reliability, efficiency and compliance," says Abdelmegeed. These technologies shift maintenance strategies from reactive to proactive and even strategic, supporting long-term sustainability and cost-effectiveness.

Advanced monitoring, typically implemented through SCADA and IoT sensors, provides real-time insights into parameters such as flow rates, pressure, dissolved oxygen levels, chemical dosing and equipment status. This constant visibility enables immediate corrective action, helping to maintain treatment quality within regulatory thresholds.

In large or remote facilities, cloud-based platforms enhance accessibility by enabling remote diagnostics and monitoring. This reduces the need for site visits and allows for centralised oversight of decentralised systems, a growing necessity for many operators.

Predictive maintenance technologies utilise both historical and real-time data, often powered by machine learning algorithms, to identify patterns that indicate impending equipment issues. They can forecast problems such as bearing failures, leaks, clogging or membrane fouling before they cause operational disruptions.

This proactive approach helps prevent unplanned outages, reduces emergency repair costs and protects process continuity. Industry data suggests utilities can lower operating expenses by up to 30% by transitioning from reactive to predictive maintenance.

One of the key benefits of predictive maintenance is extending the equipment's lifespan. Pumps, blowers, and mixers that are monitored proactively are subject to fewer mechanical stresses and are more likely to operate within their design limits. This results in more stable operations, reduced wear and deferred capital replacements. In addition, intelligent monitoring enhances energy efficiency by identifying underperforming assets and optimising operational efficiency – for example, by detecting oversized pumps that run inefficiently during low-demand periods – thus reducing both operating costs and carbon emissions.

"With regulatory scrutiny increasing, continuous monitoring also ensures better compliance. Automated alerts and reporting support timely corrective action, reduce the risk of violations and improve transparency through streamlined auditing," concludes Naicker.

www.aecom.com

New wastewater pump for local municipalities and industries

The latest wastewater pump from KSB Pumps and Valves is making waves in the industry due to a host of new features that provide users with an ultra-durable, long-service, blockage-resistant pump with lower maintenance requirements than traditional wastewater pumps.

The new Amarex Pro from KSB is built for reliability and ease of use, featuring technologically advanced hydraulic design and advanced smart capabilities for improved pump management.

At a challenging time for municipalities and industrial pump users, as ageing infrastructure fails and maintenance requirements for older pumps become increasingly demanding, the KSB Amarex Pro submersible pump provides solutions to address many of the challenges now and in the future.

According to KSB Pumps and Valves' waste water market area manager, Hugo du Plessis, the new series is "a game changer for municipal and industrial pump stations alike". They are built for reliability and ease of use, featuring technologically advanced hydraulic design and advanced smart capabilities for improved management.

"At the core of KSB's Amarex innovations is the open dual vane D max impeller for improved hydraulic efficiency and unsurpassed energy savings, particularly in heavy-duty abrasive or aggressive waste water environments.

"The pumps are coupled to IE5 class motors to improve efficiency further, and a range of smart features allows users to run the pump correctly for different conditions. It monitors its condition in real-time, automatically detecting blockages, engaging in de-ragging routines, and adjusting its operating point to match system demands, a feature that significantly reduces wear and the need for unscheduled maintenance.

"With the Amarex Pro, clients can expect far fewer breakdowns. Its automatic clog detection and soft start technology reduce stress on the system, and integrated motor and vibration protection give operators full confidence in continuous operations."

Du Plessis adds that one of the pump's best features is its plug-and-play simplicity. Each unit is pre set to the client's specified duty point, requiring little more than connection to KSB's free ServiceTool to fine-tune performance. The customer interface is very intuitive, making commissioning and configuration straightforward even in remote sites.

The range is also designed to fulfil multiple roles with its 'adaptive operating point' flexibility, which covers two to three duty sizes with a single pump. This translates to fewer product variants and reduces spare parts stock in the field. Its toughness and low-maintenance design are also impressive, with each pump supplied with a hard iron (G2) impeller and a choice of mechanical seals tailored to cope with abrasive sludges and aggressive waste water. A range of adapter claws and the easy-to-navigate GoToAmarex app also ensure upgrades to existing installations are seamless and fast.

"KSB's mission is to deliver solutions that save both energy and operational hassle. Being smart, efficient and reliable, the Amarex Pro is a great example of this. It's precisely what South Africa's pump station operators need," Hugo du Plessis concludes.

www.ksb.com/en-za

KSB Academy for next-generation experts

Craig Hawkins presents at KSB's SupremeServ Academy.

KSB Pumps and Valves has invested in a specialised training centre designed to equip internal and branch staff, as well as certified partners, with in-depth knowledge of KSB products and systems. Clients are also catered to through 1st line maintenance and operator training.

According to Craig Hawkins, who heads KSB's SupremeServ Academy, the initiative was launched due to the growing need for skills development across KSB's service value chain, particularly in support of the company's extensive pump portfolio.

"Our academy is designed to arm our people and partners with the knowledge and skills needed to successfully repair, maintain, install and fault-find KSB products and related equipment. It also aims to ensure that end-users are educated in how to operate our pumps efficiently and reliably," says Hawkins.

The training offered at the SupremeServ Academy is designed to cater to a diverse audience, including artisans, technicians, engineers, sales teams, certified service partners, and clients. It encompasses over 280 training modules, covering everything from basic pump theory and pump selection to industry-specific applications, model-specific maintenance, value-added products such as Pump-Guard, and even site installation and setup simulation training.

These modules vary in duration, ranging from one-day to week-long courses, and offer a blend of theoretical and interactive content depending on the needs of participants. While the Academy is currently not-for-profit generating centre, course costs are structured to cover facilitator fees, training materials and related travel or accommodation expenses, particularly when sessions are delivered off-site.

"Knowledge is power, and by completing our courses, our staff improve their skillsets and meet personal development goals. Certification also assures our clients that qualified professionals are carrying out our work," Hawkins adds.

Training is mainly held at the KSB's Jet Park facility, where a well-equipped lecture room accommodates up to 16 participants. The room features a Clevertouch screen, individual workstations, and display models of pumps and components.

Although still in its early stages, the academy has already hosted several successful courses, including SAPMA's advanced pump training and API standards overview. Upcoming sessions, designed for specific industry personnel, such as those involved in boiler water circulating pumps for our energy partners, are already scheduled.

Phase two of the Academy, which is currently underway, will include a dedicated practical workshop, allowing for hands-on training and product familiarisation.

www.ksb.com

IPR differentiates itself through strategic dewatering partnerships

IPR sets itself apart by partnering closely with mining customers to deliver tailored dewatering solutions based on in-depth site assessments and operational needs.

IPR maintains a robust and versatile rental fleet by upholding technical excellence and fostering a strong partnership mindset.

IPR's supply of Atlas Copco submersible pumps continues to raise the bar for quality, offering highly efficient performance across demanding drainage, sludge and slurry applications.

In the demanding conditions of Southern African mining, dewatering is not just a support function - it is mission-critical. IPR, Integrated Pump Rental, part of Atlas Copco's Specialty Rental Division, has built its reputation on recognising this reality, setting itself apart from conventional pump rental providers by forming close partnerships with its customers and offering technically sound application-specific solutions backed by responsive service and support.

According to Steve du Toit, Sales Manager at IPR, the company's focus has always been on collaboration. "We don't just rent out pumps. We engage with our customers at every step to understand the actual challenge they are facing. We visit the site, analyse the water conditions, the solids content, and the infrastructure limitations, and then develop a tailored solution. It is a process that is as much about engineering expertise as it is about service."

He emphasises that the first and most critical step in solving any dewatering problem is conducting a detailed on-site assessment. "Without that, it's guesswork. The wrong pump, whether under- or over-specified, can cause inefficiencies, higher operating costs or outright failure.

"We often encounter sites where legacy equipment is simply no longer suited to the job, but no one has reassessed the requirements in years. We recently helped a mine overcome exactly that challenge. They were using an outdated and oversized pump setup. Our assessment allowed us to replace it with a new, correctly sized unit, which delivered the same performance with far less energy consumption and downtime."

IPR also plays a key advisory role in helping mining customers decide whether to rent or purchase dewatering equipment. "We look at where the mine is in its lifecycle and the nature of the dewatering requirement," says du Toit. "If it is a permanent and consistent need, a purchase might make more sense. But if the operation is still developing or if the requirement is short-term or fluctuates seasonally, then renting a dewatering pump offers a more flexible and cost-effective solution."

Where IPR continues to differentiate itself is in the level of after-sales and rental support it offers, which is particularly important when dealing with remote or high-risk sites. "Once the pump is delivered, our job isn't done," says du Toit. "We stay involved, conduct regular site visits and make sure our team is available for any technical support needed. Our rental customers often comment on how proactive we are, checking in before there is a problem rather than waiting for a breakdown."

Pump-based dewatering remains a niche discipline, requiring more than just an understanding of flow rates and pump curves. IPR brings a deep understanding of the challenges that Southern African mines face, whether it is silt-heavy water, unpredictable rainfall, or the logistical complexities of operating in remote locations. This knowledge informs every recommendation the team makes.

To meet this wide range of challenges, IPR maintains a robust and versatile rental fleet that includes Atlas Copco diesel-driven pump sets and submersible pumps, Toyo heavy-duty slurry pumps for demanding solids-handling applications and the company's own SlurrySucker dredging units for desilting dams and water storage facilities.

As mines expand, change layout or encounter new geological conditions, IPR adapts its solution accordingly. "The dewatering system that works today might not be the right one in six months," explains du Toit. "We keep pace with the mine's evolution and our flexibility, whether in equipment, configuration or service, is a big part of the value we offer."

Through technical excellence, tailored support and a partnership mindset, IPR continues to raise the bar for dewatering solutions across the continent, ensuring its customers are not only equipped for today but prepared for whatever tomorrow brings.

www.pumprental.co.za

Runxin F135 duplex valve improves continuous production

In a recent installation at a Gauteng-based manufacturer of household and personal care products, Allmech provided a tailored water treatment solution to ensure a consistent supply of soft water for steam generation – an essential element in the client's 24/7 production cycle. Lukas Makgopa, one of Allmech's water treatment technicians, explains.

A household and personal care manufacturer based in Wadeville, Germiston, has chosen to use a single Allmech F135 duplex valve solution to manage its water softening system. According to Lukas Makgopa, an Allmech water treatment technician, this manufacturer uses steam in various processes, including drying semi-liquid soap mixtures, setting packaging components and extracting active ingredients from silica-rich plants.

To support the steam supply quality, Allmech has installed a water softener system capable of processing up to 10 000 litres of water per hour, powered by a Runxin F135 duplex valve.

"We chose the F135 because it's a true duplex system that uses a single valve to control both of the softening supply vessels," explains Makgopa. "That means when one vessel is in service, the other is on standby, ready to take over automatically when regeneration is needed. There is no need to switch two separate valves manually."

Makgopa says that compared to installing two Runxin F74 valves in parallel, the F135 offers a simplified, space-saving design and faster installation, with fewer components and no need for interlocking signal wiring. It also provides seamless, automatic switching between vessels, ensuring no downtime during regeneration, which is crucial for manufacturers who can't afford interruptions.

"This client uses a lot of water, and their boiler system needs soft water at all times," he notes. "If calcium or magnesium enters the boiler, it can form scale on the tubes. That's like cement building up. It makes heat transfer inefficient, increases fuel consumption and reduces steam output."

By ensuring a consistent supply of soft water, the Runxin F135 protects the client's boilers from scaling and reduces the need for reactive maintenance. The unit's larger internal components also enable it to handle variable water pressures – an issue Makgopa says this site frequently faces, with pressure sometimes spiking from 200 to 600 kPa.

"The F135 can manage those pressure fluctuations, which is why it works better here than smaller valves," he says. "It's a durable system and it's been performing very well since we installed it."

Simpler system for consistently soft water

In the past, the client's smaller vessels needed to be regenerated multiple times a day, but the F135 setup now typically requires regeneration just once every 24 hours. This allows time for proper brine saturation, an essential factor in achieving effective resin regeneration. Poor brining had previously led to morning samples testing positive for hard water, affecting steam quality and production efficiency.

"Since implementing the new system, hard water issues are no longer a concern on site," Makgopa adds. "We used to get calls often about this. Now the water quality is consistent, and the team on-site only needs to monitor it once or twice a day.

"Compared to setting up two separate valves and synchronising them, this was much simpler in the long run. Maintenance is also easier. We've even set up a WhatsApp group with the client to resolve any issues that pop up quickly, so it's a very collaborative relationship."

With a customer base stretching from its head office in Benoni, Johannesburg, throughout Southern Africa and beyond, Allmech has become recognised as an experienced end-to-end provider for clients requiring boiler plants, steam supply of all types, cooling towers, water treatment equipment and associated chemical programmes. Aside from sales to direct and distributor clients, the company's services include technical support, repairs and maintenance, and the sale of spares.

Allmech is also the only authorised South African agent for Runxin valves, produced by the global Wenzhou Runxin Manufacturing Machine Company, headquartered in China.

www.allmech.co.za

"We chose the F135 because it's a true duplex system that uses a single valve to control both of the softening supply vessels," explains Lucas Makgopa, one of Allmech's water treatment technicians.

Grindex Mega improves long-term reliability

Integrated Pump Technology, in partnership with local distributor IES, supplied a Grindex Mega INOX dewatering pump to a major Copperbelt mine in Zambia, where it has been operating successfully for nearly a year, reinforcing growing demand for Grindex solutions in the region's challenging mining environments.

Left: ***Integrated Pump Technology's Grindex Mega INOX pump in action at a Zambian mining site, delivering reliable dewatering from the tailings dam to the process plant.*** *Right:* ***The 85 kW Grindex Mega INOX pump has operated continuously for nearly a year, meeting the mine's high head and flow requirements with ease.***

Integrated Pump Technology, in collaboration with its local distributor IES, stepped in to provide a reliable dewatering solution at a major mining operation on Zambia's Copperbelt. Almost a year later, the 85 kW Grindex Mega INOX stainless steel dewatering pump continues to operate successfully, transferring water from the tailings dam back to the process plant, says Alfred Kelsey, Sales Manager at Integrated Pump Technology.

"This was the first unit of its kind to be installed at the site, and the customer was extremely pleased with its performance during the three-month trial," says Kelsey. "They valued the confidence we had in the pump, which allowed us to offer a 12-month warranty. Equally important was the fact that we could provide local support through our distribution partner, IES, not something all pump suppliers in the region can offer."

Thanks to the strong partnership between Integrated Pump Technology and IES, strategic stockholding in Zambia ensured that the Grindex Mega INOX pump was available ex-stock and could be deployed without delay, he adds. The unit is tasked with pumping water at a rate of 60 l/s at a head of approximately 80 m.

Kelsey notes that the Copperbelt region hosts some of the wettest mines globally, and with mining activity on the rise, the demand for Grindex dewatering pumps is gaining solid momentum.

"In particular, our units in the power range of 10 kW, 18 kW, 37 kW and 90 kW are especially popular," he explains. "These models offer a combination of high performance, robust design and long service life, making them ideal for demanding mining applications."

He highlights that Grindex pumps are engineered for high-head and high-flow applications and are built with features that set them apart in harsh conditions. These include durable stainless steel or cast iron construction, advanced motor protection and built-in air valves that allow the pumps to run dry without damage.

The pumps also incorporate smart cooling designs and heavy-duty mechanical seals to ensure reliability in highly abrasive and corrosive environments, such as open-pit mining, underground dewatering and tailings management.

"The Mega INOX, for example, can handle aggressive water with high chloride content, which is common in tailings dams," says Kelsey. "It is equipped with a high-efficiency motor and hydraulics to ensure minimal energy consumption while delivering high performance."

Another advantage is the ease of serviceability. "Grindex pumps are designed for quick maintenance with minimal downtime, and many components are interchangeable across models, which simplifies logistics for mines," he adds.

Combined with the local technical expertise and readily available spares and units through IES in Zambia, customers are assured of fast turnaround times and minimal disruption to operations. "This holistic support structure is key to maintaining uptime in environments where every minute counts," Kelsey concludes.

www.pump-technology.com

Paving the way for a carbon-neutral future in SA

Veron Maharaj, Marketing Specialist for the Smart Buildings Division at ABB Electrification, describes how ABB is enabling the transformation of infrastructure in South Africa and across the continent.

Through its Ability™ platform, ABB integrates technologies such as edge computing, cloud connectivi-ty, analytics, artificial intelligence and cybersecurity to deliver infrastructure management solutions.

Wherever there are people, there is infrastructure. From the electricity that powers our vibrant cities to the clean water that nourishes our communities, infrastructure is the unseen force that shapes our daily lives and determines our quality of life. Yet, much like the air we breathe, it's often only noticed when something goes wrong. With South Africa grappling with challenges such as rapid urbanisation, climate change and resource scarcity, it is clear that our infrastructure must evolve to become smarter, more resilient and sustainable, ensuring it can meet the needs of today and tomorrow.

At ABB Electrification, we believe the infrastructure of the future must do more than support daily operations; it must anticipate them. We are reimagining how airports operate, how ports manage energy, how cities move people, and how utilities deliver critical services, utilising digital technologies to enhance efficiency, reliability and sustainability.

The world is amid a global transition. To meet the climate targets outlined in the Paris Agreement, a staggering US$13.5-trillion must be invested in energy efficiency and low-carbon technologies by 2030. This shift requires not just investment, but innovation. ABB is at the forefront of this transformation, delivering innovative, connected solutions that reduce environmental impact while enhancing performance.

Our work spans critical sectors where infrastructure challenges are complex and growing, particularly in South Africa. In the aviation sector, we support local airports in enhancing safety, improving passenger experiences, and mitigating the environmental impact of the industry, which accounts for approximately 2% of global CO_2 emissions.

In water management, we support utilities grappling with the pressures of rising urban demand and significant water losses, with some areas losing up to 30% of water through leakage. ABB's advanced solutions are integral in addressing the ongoing challenges posed by South Africa's water scarcity and ageing infrastructure.

In land transportation, we enable mobility solutions that strike a balance between traffic safety, energy efficiency and environmental impact. In the ports sector, we provide the technologies needed to increase throughput and automate container handling, all while reducing carbon emissions from 90% of the world's global trade.

In the telecommunications industry, customer expectations are at an all-time high, and the need for resilient, scalable infrastructure has never been greater. ABB is enabling telecom operators to deploy robust digital solutions that keep people connected, regardless of their location. We aim to be at the forefront of the digital migration taking place in South Africa and across the continent.

A key differentiator of ABB lies in our ability to combine global expertise with local delivery, particularly in South Africa. Our team of 53 000 professionals, working across 200 manufacturing sites globally, brings deep local knowledge and expertise to every project, ensuring that our solutions are customised to meet South Africa's specific needs while adhering to global best practices.

Through our ABB Ability™ platform, we integrate technologies such as edge computing, cloud connectivity, analytics, artificial intelligence and cybersecurity to deliver infrastructure management solutions. These innovations offer real-time insights and predictive capabilities, driving efficiency and sustainability while contributing to South Africa's ongoing digital transformation.

In the smart buildings space, we deliver energy and asset management solutions that enable owners, operators and governments to reduce operating costs, enhance sustainability and improve occupant comfort. With embedded software and intelligent devices, our systems continuously monitor and adapt to usage patterns, ensuring optimal performance while minimising waste.

With road transport responsible for more than 75% of transport-related CO_2 emissions globally, and passenger cars alone accounting for 60%, electric mobility is a cornerstone of the net-zero transition. At ABB, we are powering this shift with charging solutions for every application, from residential EV chargers to high-power highway stations and fleet-scale electrification for buses and trucks.

Electrified transportation, when combined with renewable energy, has the potential to significantly reduce emissions and improve air quality in many South African cities. This transition is not just a technological imperative, but a societal one. Cleaner transport means healthier cities, reduced noise pollution, and more liveable communities, especially in urban centres like Johannesburg and Cape Town, where pollution levels are a growing concern.

Ultimately, the future of infrastructure in South Africa is one where systems are seamlessly integrated, intelligently managed and environmentally responsible. It is a future where connectivity drives efficiency in sectors such as energy, transportation and water, where digital tools enable predictive maintenance to avoid system failures, and where electrification paves the way for a carbon-neutral South Africa, contributing to the country's climate goals and sustainable development.

At ABB Electrification, we are proud to be shaping this future. Through our partnerships, technology, and passion for progress, we are helping businesses, industries, and governments design and deliver infrastructure that meets today's demands while safeguarding the possibilities of tomorrow.

go.abb/electrification

The world of portable compressed air

With over a decade of hands-on experience in compressed air technology and pneumatic equipment solutions, Johnathan Cassell, an accomplished Portable Air Sales Engineer for Atlas Copco's Power Technique business area, offers an expert's insight into the ever-evolving world of compressed air.

Jonathan Cassell began his journey at Atlas Copco Power Technique in April 2018, bringing five years of experience from one of the company's distributors. In the position of Sales Representative, he honed his skills, laying a solid foundation of knowledge in air compressors and pneumatic tools.

"While the first air compressor, which was also the first mobile air compressor, introduced by Atlas Copco back in 1905, was considered advanced for its time, it understandably can't compare to what our latest models deliver today in terms of efficiency and performance. Thanks to major advances in compressor technology, materials and energy management, new compressors typically offer more reliable air delivery, often with enhanced control systems that can maintain stable pressure while reducing energy consumption by adjusting the compressor's operations in real-time."

Atlas Copco has also made significant strides in environmental innovation, with its latest compressors engineered to meet eco-friendly standards, equipped with enhanced features and leading-edge technologies that reduce emissions and noise. "Some of our newer models are compliant with the most stringent global standards, including Stage V, Tier 4 Final, and EPA regulations," adds Cassell.

Unpacking Power Technique's portable compressor line-up, he describes the range of small, medium and large machines as vast. "We have compressed air solutions fit for portable diesel and electric applications, depending on the customers' requirements."

"Our competitive edge lies in the interaction between innovation, product versatility, global support and a strong focus on sustainability," asserts Cassell. "While competitors may offer comparable products, Atlas Copco stands head and shoulders above in the delivery of a truly holistic and sustainable advantage through the seamless integration of advanced technology and dedicated service, coupled with environmental responsibility.

"Our mandate is to support customers in meeting both their economic and environmental sustainability goals. We continuously evolve our product range by integrating innovative designs, advanced features, cutting-edge digital technologies and smart connectivity into our portable air compressor range. We aim to boost performance, efficiency and reliability, ultimately enhancing the user experience. Alongside industry-leading fuel efficiency and emissions compliance, we prioritise machine durability and extended lifecycles, which are key factors in reducing operational and total ownership costs."

Key innovations enable customers and customer centres to monitor various parameters, including pressure, temperature, operating modes, running hours and locations, he continues. "Power Connect is one of several easy-to-use apps specially designed for customers who require data from a specific machine anywhere, anytime.

With features such as corrosion-resistant canopies, heavy-duty frames and water-resistant electronics, Atlas Copco compressors are built to withstand the harshest conditions, operating in temperatures ranging from -25°C to +50°C, and remarkably, even hotter if fitted with a tropical kit.

"Advanced technologies such as VSDs (Variable Speed Drives) and PACE (Pressure Adjustment through Cognitive Electronics) add both energy efficiency and operational flexibility to the value chain. A VSD intelligently regulates the compressor's motor speed to align air output with real-time demand, reducing energy consumption and wear. PACE allows precise pressure control within a customisable range, enabling one machine to handle multiple applications with ease," he explains, adding that features like eco-mode and load/unload control, which are integrated into Atlas Copco compressors, provide significant gains in operational efficiency.

Shifting his focus to portable electric air compressors, Jonathan Cassell highlights the advanced capabilities of the innovative E-Air range, which is ideal for applications requiring consistent airflow and pressure. Engineered for durability, these units operate efficiently in even the harshest conditions and toughest environments, requiring no variable speed adjustment, and delivering long-term reliability and sustainable productivity for customers.

The mining, oil & gas, and construction rental sectors are driving a significant surge in demand for portable air solutions. He says that Atlas Copco products are specifically engineered to meet the rigorous demands of these industries, delivering reliability, efficiency and versatility where they're needed most. "Our compact, rugged compressors

Johnathan Cassell, Portable Air Sales Engineer for Atlas Copco Power Technique.

are engineered for high mobility and ease of transport, often featuring advanced components like aftercoolers and built-in generators, making them the perfect choice for demanding construction and roadwork sites."

For the harsh conditions of mining and quarrying, he recommends high-pressure, high-flow compressors that combine unmatched reliability with superior corrosion resistance. "In the oil & gas sector, where safety is paramount, our ATEX-certified units, equipped with spark arrestors, are purpose-built to perform flawlessly in explosive environments."

Turning his attention to utilities and industrial plants, which prioritise quiet operation and low emissions, he highlights how electric-drive models excel in indoor and noise-sensitive environments by offering efficient and environmentally friendly solutions.

Looking ahead, Cassell offers an exciting glimpse into the future of Power Technique's portable air solutions. Upcoming innovations, including advanced nitrogen generators and specialised dryers for Power Technique applications, are designed to further enhance product efficiency, reliability and versatility.

"These additions underscore our commitment to continuous innovation in meeting evolving customer needs. With such forward-thinking developments, we continue to reinforce our leadership in sustainability as we remain at the forefront of the compressed air industry, delivering cutting-edge solutions that drive operational excellence," he concludes.

www.atlascopcogroup.com

Compressor Longevity with Corena Oils

In an era of frequent load-shedding and voltage fluctuations, the reliability of compressors is under a growing threat. Henry Mc Duling, Sales Manager of Atlas Oil and Chemical, highlights the advantages of using the Shell Corena™ range of compressor oils to extend equipment life and boost operational reliability.

Henry Mc Duling, Sales Manager of Atlas Oil and Chemical.

"Repeated tripping of compressors leads to exponential rises in oil temperature, cutting oil life in half with every incident. This degradation increases downtime, shortens service intervals and raises operational costs," begins Henry Mc Duling, Sales Manager of Authorised Shell Lubricants Distributor, Atlas Oil & Chemical. "To combat these challenges, the Shell Corena™ range of compressor oils is a cutting-edge solution for extending equipment life and boosting operational reliability.

The operator's choice

"Every part of a compressor is meticulously engineered," says Henry Mc Duling, Sales Manager at Atlas Oil. "Operators want to use a lubricant that's equally engineered to deliver performance. Shell Corena oils offer wear protection and long oil life, while helping to maintain system efficiency, ultimately reducing the need for frequent service interventions," he says.

Corena oils use Shell's ashless-technology formulations to deliver extended oil life, with some formulations offering service intervals of up to 12 000 hours under controlled temperature conditions. These oils are especially effective in South Africa's volatile power environment due to their high flash point – up to 260 °C – and exceptional resistance to oxidative and thermal breakdown.

A range of key environmental and technical challenges can threaten compressor performance, including:

- Extremely high or low ambient temperatures.
- Poor water separation in the lubricant.
- Slow air release and foaming.
- Moisture-induced corrosion.
- Shortened oil life due to load cycling and thermal stress.

Shell Corena oils meet these challenges with a host of advanced performance features:

- Extended drain intervals of up to 12 000 hours for rotary systems, and 4 000 hours for reciprocating compressors.
- Fast air release, over five times faster than mineral-based oils.
- Superior protection, reduces foaming, wear, corrosion and contamination

Monitoring and support

Atlas Oil enhances customer assurance by offering oil condition monitoring services, such as Shell Lube Analyst and services from Wear Check. These programmes involve lab analysis of oil samples taken from the machine, helping detect early signs of degradation or equipment issues.

"This enables proactive maintenance," explains Mc Duling. "We not only supply premium lubricants, but we also provide expert recommendations to extend oil and machine life."

Atlas Oil's status as an Authorised Shell Lubricants Distributor is more than a title; it represents a commitment to technical excellence, ethical conduct and world-class service. This partnership provides customers with access to Shell's full portfolio of advanced lubricants, priority stock availability, local expertise and delivery, as well as tailored technical support and training.

"For end users, this means access to Shell's global innovation, paired with the personal attention and service excellence that defines Atlas Oil," says Mc Duling.

Shell Corena™ products available from Atlas Oil include:

- Corena S3 R: a high-performance mineral-based rotary compressor oil with a life of up to 6 000 hours.
- Corena S4 R, a fully synthetic rotary and vane compressor oil with a 12 000-hour life.
- Corena S4 P, a premium reciprocating compressor oil for discharge temperatures of up to 220 °C.

"By using Shell Corena Compressor oil, compressor maintenance companies and their client have peace of mind for missed service intervals," advises Henry Mc Duling. All products are available from Atlas Oil's Boksburg and Delmas branches, with full technical support.

"As a leading supplier of industrial lubricants in South Africa, we provide tailored lubrication solutions and technical expertise, helping clients mitigate challenges such as equipment wear and unstable power conditions, with a strong focus on uptime and cost efficiency," he notes.

"Shell Corena™ compressor oils are a globally respected range of synthetic and mineral compressor lubricants engineered for durability, efficiency and reliability. Trusted by OEMs worldwide, these solutions are built to perform under difficult operating conditions such as those we routinely experience in South Africa," he concludes.

www.atlasoil.co.za

The Shell Corena range of compressor lubricants from Atlas Oil and Chemical utilises Shell's ashless technology formulations to deliver extended oil life, with some formulations offering service intervals of up to 12 000 hours under controlled temperature conditions.

Is your compressed **air system sustainable?**

To achieve a highly efficient compressed air system that reduces the cost of ownership and improves sustainability, a review of the compressors and distribution system is required, argues Allen Cockfield, of the compressed air treatment specialist, Artic Driers International.

Is your compressor set up correctly? Is it fully loading and unloading at the correct pressures? If more than one compressor is in operation, are they working in unison or competing for control of the air system? These are typical questions that need to be answered to ensure that the operational performance and cost-effectiveness of a compressed air supply system are being achieved.

From an efficiency perspective, the output volume (m^3/min) per kW of absorbed power is crucial. "An underperforming compressor is not an asset; it's a power drain. The efficiency of the compressed air system needs to he regularly checked, especially after a major rebuild," notes Allen Cockfield, Chief Executive Officer at Artic Driers International.

Compressors and dryers can also be affected by heat build-up in the compressor room. By reducing the ambient air temperature by 1.0°C, the efficiency of the compressor can be increased by 1.0%. Additionally, lower temperatures make dew points more achievable for air dryers and filtration more effective.

Lower inline filtration temperatures result in significantly reduced oil carryover to the system. For every 10° increase in inlet air temperature to a coalescing filter, the oil removal efficiency moves a decimal point.

All filters are rated at a 20°C inlet air temperature; therefore, at this temperature, 0.01 mg/m^3 of the oil remains in the compressed air line. At 30 °C, the oil remaining in the compressed air will be 0.10 mg/m^3. "Getting the room air temperature down is crucial to air quality in a plant, and to long-term compressor and dryer performance," Cockfield points out.

"Is waste heat recovery from your compressor a possibility?" he asks. A vast percentage of the power a compressor uses is ejected as heat. Hot oil at 90°C from a compressor can be used to feed a heat exchanger. This can be used to heat a changing room, shower, or part of a production process. There are many possibilities," he suggests.

Filtration and drainage

On the issue of compressed air quality, he warns that ignoring the filtration and drainage of condensates is perilous. "If the refrigeration dryer is not ejecting condensates to waste, it will be injecting thousands of litres of condensate into the distribution system every week. And if desiccant dryers are used, the lack of drainage may well lead to bed contamination and the need to replace the absorption desiccant packs – and these are not inexpensive!" he warns.

He advises that dew point monitors be installed and alarms set to ensure that compressor users stay on top of condensate issues. These can connect to horns & lights , as well as to the plant SCADA system. The investment in these monitoring systems will pay for itself very quickly.

Regular mobile or fixed air quality audits to monitor dew point, particle, and oil carryover performance are a wise habit. A fixed-base monitoring station also makes sense, depending on the end-user requirements.

There are numerous types of condensate drains available on the market. These include:

- Timed solenoid.
- Float level drains.
- Timed ball valve drains.
- Large capacity ball float valves.
- Capacitance level-controlled drains.

"These will all require some routine maintenance to ensure adequate drainage: a condensate drain that is malfunctioning is a condensate generator! Capacitance level drains can signal the SCADA system if it has jammed. Any form of compressed air dryer reacts badly to liquid water, because it is designed to remove water vapour. Liquids can destroy adsorption materials, and they affect a refrigeration air dryer's ability to reach its target dew point.

Air system pressure losses

Determining the pressure losses in a compressed air system is best achieved by logging the compressed air flow and pressure using a data logger. The following must be determined:

- The cut-in and cut-out pressure of the compressors.
- The compressor room delivery manifold pressure losses.
- The pre-filtration pressure loss.
- The air dryer pressure loss.
- The after filter pressure loss.
- The air distribution system pressure losses.

Simultaneous data logging is preferred, as it provides a more comprehensive overview. If using a compressed air auditor , choose with care. Auditors play a critical role in conducting in-depth analyses. The power required to increase the pressure of a compressed air system by 1.0 bar is not a linear relationship; it requires a 5% to 8% increase in energy consumption relative to the full-load power of the compressor.

Compressed air leaks

Leaks cost millions of rands every year. It is vital to minimise leaks. With ultrasonic leak detection, this is simple. "Ultrasonic leak detection not only finds the leaks, but photographs them, quantifies the actual air lost and the cost to the company. It even writes a report for you!" Cockfield advises.

It is estimated that 25-30% of a compressed air system's energy is wasted into the atmosphere every year. Pressure losses cost money for every bar pressure loss, 8.0% of the power (kW) is wasted.

"A compressed air system leak audit should be undertaken at least once a year, to tag the leaks and fix them! We often see last year's audit leak tag on a leak that was not rectified," he says.

In conclusion, he asserts that a properly installed and well-maintained compressed air system is a sustainable asset that significantly enhances a production line's effectiveness, resulting in reduced downtime and substantially lower maintenance costs. If neglected, it can cost a small fortune and could dramatically affect the business's bottom-line profit, making it unsustainable.

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Steven Lara-Lee Lumley, technical development and training manager for condition monitoring specialists, WearCheck.

Dispersant additives: the crowd-controller in engine oil

Steven Lumley, Technical Development and Training Manager for WearCheck, focuses on how dispersant additives in oil function and why they make effective crowd controllers at social events.

Whenever I think of dispersant additives, an image of a night-club bouncer comes to mind. I know this might seem like a stretch of the imagination, but humour me. Among their many duties, night-club bouncers are also responsible for crowd control in their place of entertainment. Crowd control involves defusing potentially volatile situations by dispersing (keeping apart) club-going patrons who might otherwise want to 'agglomerate' into a brawl.

Similarly, the function of a dispersant additive is to disperse undesirable elements like soot particles that might otherwise agglomerate into larger particles. In this respect, dispersant additives and night-club bouncers display a high degree of commonality – they discourage agglomeration through the process of dispersion.

Unlike night-club bouncers, however, our dispersant additive utilises some pretty nifty chemistry, so let's take a look at how this additive controls crowds of soot particles in oil.

Dispersants are non-metallic, ashless cleaning agents that inhibit sludge formation by keeping insoluble contaminants, like soot, dispersed in the oil and preventing them from coating metal surfaces. They are also mainly found in engine oils.

Dispersants are organic complexes containing nitrogen compounds – polymeric alkylthiophosphonates and alkylsuccinimides – which keep insoluble soot dispersed in the oil. The insolubles are bonded to dispersant molecules by polar attraction, which prevents them from agglomerating.

So, why all the fuss about soot particles agglomerating? Well, soot particles are sub-micron in size when formed, but with progressive fuel usage, large quantities of these particles are continually deposited in the oil. They will eventually agglomerate into larger particles, which can cause a range of problems, including increased soot contamination, sludge formation, higher operating temperatures, loss of anti-wear performance and increased viscosity. Additionally, the increased soot loading puts further strain on the oil's ability to function optimally.

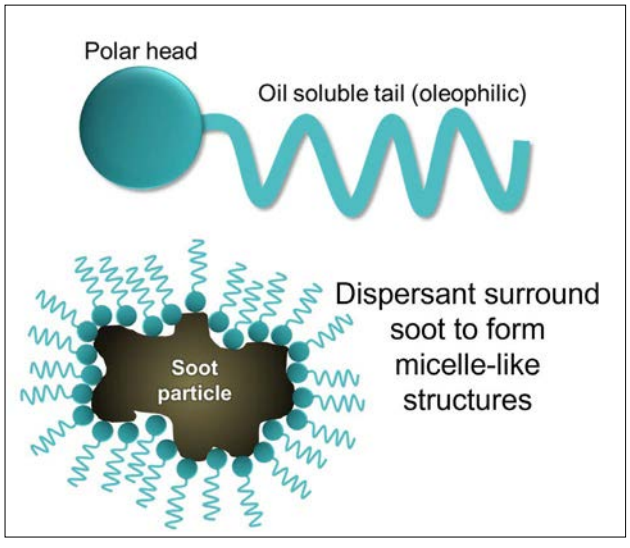
With many engine manufacturers seeking to extend oil-drain intervals, controlling soot agglomeration has become even more challenging for this additive, as longer oil-drain intervals result in increased soot loading of the oil. If the engine oil does not adequately disperse soot, it can cause sludge to form on rocker and front engine covers, bearings to fail, valve bridges and fuel-injection links to wear and filters to plug.

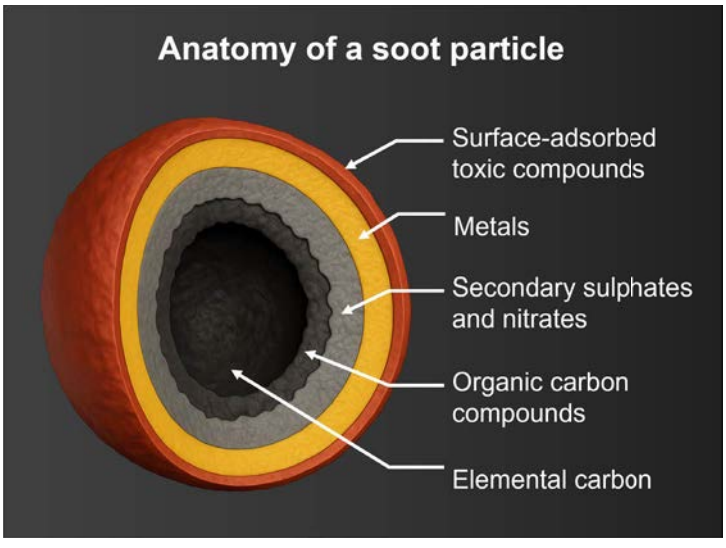
The durability of the oil and additive system, in relation to its ability to disperse soot and maintain a regime of reduced wear, has led to significant changes in additive formulation in recent years. As such, lubricant blenders have had to increase the treat rate of this additive. These days, dispersants are typically one of the major components of fully formulated engine oils, comprising between 30% and 60% of the total additive package.

Now for the nifty chemistry part of how this additive works its magic. Dispersant additives work by enveloping the soot particle in a single layer. The polar head of the dispersant molecule clings to the particle, directing the additive's oleophilic tail outward to dissolve into the oil. This keeps the soot particles suspended in the oil, prohibiting them from agglomerating with other soot particles or depositing onto component surfaces.

In the next instalment of the lube series, we will introduce bulk property chemical additives, starting with detergents.

www.wearcheck.co.za





Dispersant additives envelope the soot particle. The polar head of the molecule clings to the particle, directing the oleophilic tail outward to dissolve into the oil.

From real-time monitoring to predictive intelligence

Christo Visagie, Director at BBE Group, talks about how advances in digital technologies are transforming the operation of mine ventilation and cooling systems, integrating real-time air quality monitoring with historical ventilation data to enable faster and more informed decision-making.

As South Africa's mining sector faces growing pressure to improve safety, efficiency, and environmental performance, mine ventilation and cooling remain critical levers for progress.

Rapid advances in sensors, data analytics, Artificial Intelligence (AI) and machine learning are making mine ventilation and cooling more dynamic and predictive. These tools enable mines to create responsive systems that adapt in real time to underground conditions.

Real-time air quality monitoring uses sensors to continuously track conditions such as airflow, gas concentrations, temperature and dust levels. This enables ventilation systems to respond based on predicted outcomes, thereby maintaining air quality compliance and ensuring worker safety.

Beyond real-time decision-making, these insights also contribute to building data on historical trends that feed into predictive ventilation control systems. By understanding past patterns, mines can forecast future ventilation needs more accurately and simulate the effects of system adjustments before making them.

Without insight into how a ventilation system will respond to control system changes over the next five minutes or the next twelve hours, mines risk making adjustments that could have unintended, even catastrophic, consequences. It can also lead to serious air availability issues and costly production losses. Predictive models help avoid this by simulating control system changes in advance, allowing teams to assess outcomes before implementation.

Shifting from reactive to proactive ventilation management

Advanced data-driven ventilation modelling enables the accurate forecasting of underground airflow and temperature requirements, optimising airflow in active working areas while avoiding over- or under-ventilation to maintain safe working conditions. When combined with real-time monitoring, predictive control tools enable mines to dynamically adjust ventilation, enhancing energy efficiency, improving air quality and increasing worker comfort. This shifts from the historic trend of reactive ventilation management to proactive management.

In the past, a poor ventilation decision could take hours to correct. Now, predictive tools allow ventilation teams to simulate changes in a calibrated model, confirm outcomes instantly, and only implement adjustments that deliver desirable results, thus eliminating guesswork and delays.

VUMA Live: enabling safer, smarter mining

As a global leader in mine ventilation and cooling, BBE Group's VUMA-live software brings together historical and live data for immediate risk analysis and rapid response to changing underground conditions. It also enables mines to simulate scenarios, forecast risks and implement preventative control measures, allowing faster, smarter decisions and accurate future planning.

"Having the right information and knowing exactly what's happening underground is essential," says Christo Visagie, Director at BBE Group. "Quick wins often come from simply surveying the mine and building and calibrating a ventilation model with tools like VUMA-network. Digital technologies play a critical role in supporting faster and smarter decision-making that ultimately leads to healthier working environments and improved production."

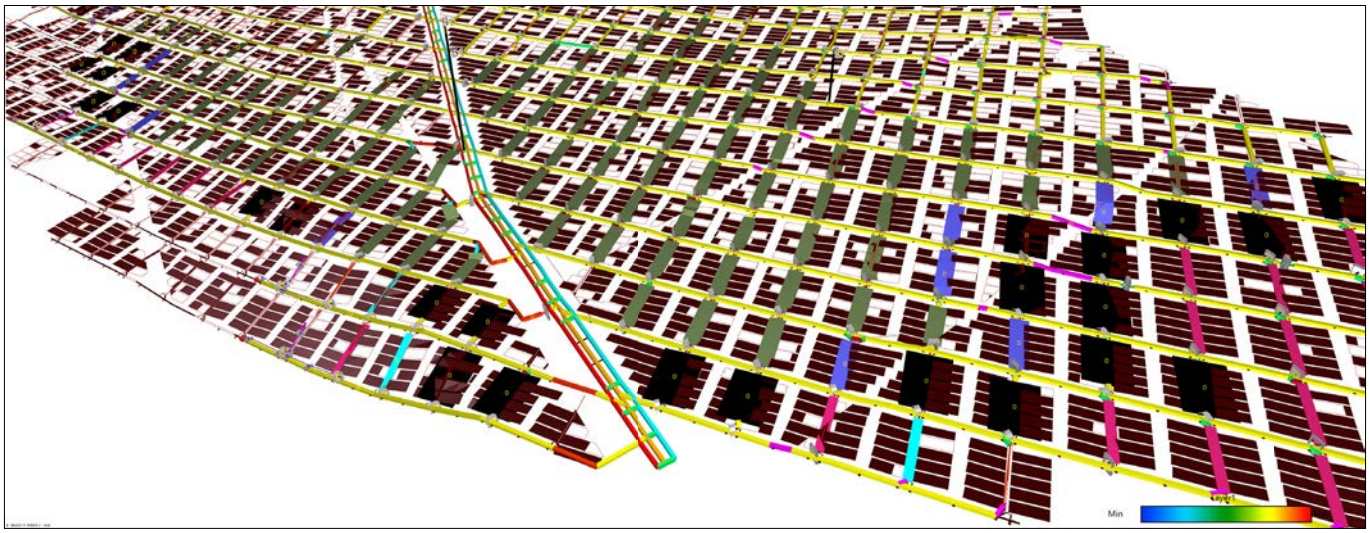
Scalable, future-ready solutions

Predictive ventilation systems are often seen as prohibitively expensive, but Visagie explains: "Long-term benefits like improved energy management and increased ventilation availability offset initial cost. This boosts production potential and allows for additional underground activity within the mine."

For existing mining operations, intelligent ventilation solutions are scalable and can help bridge the gap between legacy infrastructure and next-generation advancements.

Highlighting this, Visagie says: "By installing real-time monitoring on primary ventilation in phases, even legacy mines can start understanding what their ventilation system is delivering or capable of doing. This insight enables smarter ventilation planning and helps future-proof South African mines for a safer, more sustainable future."

https://bbegroup.com



BBE Group's VUMA-live software brings together historical and live data for immediate risk analysis and rapid response to changing underground conditions.

Major HVAC order for Tanzania

Booyco Engineering has successfully supplied 20 HVAC systems, comprising A009 evaporator units and B009 condenser units, along with installation kits and compressors, to a mining operation in Tanzania.

Booyco Engineering has successfully fulfilled a significant order for Tanzania, supplying a total of 20 HVAC systems to a mining operation in that country. Comprising ten of its A009 4kW 24 VDC evaporator units and ten of its B009 7,0 kW 24 VDC condenser units, the scope of supply included installation kits and compressors. Brenton Spies, Managing Director at Booyco Engineering, says that Tanzania's mining industry, primarily operated by international companies, adheres to stringent health, safety and operational standards. "Given the high temperatures and humidity levels in that region, having a reliable HVAC system is crucial for both operator comfort and equipment performance, and this is where Booyco Engineering's HVAC solutions were the ideal choice to ensure optimal machine performance and operator safety," he says.

These locally manufactured HVAC systems will be installed on heavy-duty mobile mining and construction equipment, including Caterpillar 349 75-ton excavators, Komatsu 325 dump trucks, and Caterpillar 770 G haul trucks.

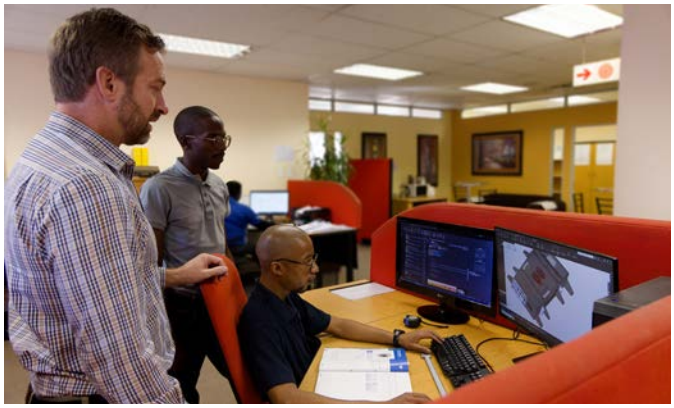
Additionally, Spies continues, the remoteness of Tanzanian mining operations necessitates highly reliable HVAC systems that minimise downtime and maximise equipment availability. "Our solid track record in delivering proven solutions tailored for harsh environments played a key role in securing this order." He points out that Booyco Engineering, which is celebrating its 40th anniversary this year, has extensive experience in supplying mobile HVAC systems for extreme conditions.

To ensure the longevity and optimal performance of these HVAC systems, Booyco Engineering has provided the mining operation with critical spare parts supported by technical backup. Strengthening Booyco Engineering's Footprint in East Africa

Spies says that this order aligns with Booyco Engineering's broader strategy of expanding its presence in East Africa, particularly within the SADC and Great Lakes regions. "By delivering specialised HVAC and air filtration solutions tailored for African mining conditions, we continue to reinforce our position as a trusted HVAC equipment and service provider."

www.booyco.co.za

Each Booyco HVAC unit is engineered with precision and durability in mind, using robust components to withstand high temperatures, humidity and heavy-duty operational demands.



Left: ***Designed for harsh African mining conditions, Booyco Engineering's HVAC systems will help a Tanzanian miner maintain operator comfort and optimal machine performance.*** *Right:* ***Robust HVAC units, manufactured locally by Booyco Engineering, will be installed on CAT 349 75-ton excavators, Komatsu 325 dump trucks, and CAT 770 G haul trucks operating in remote Tanzanian mine sites.***

Manufacturing at a crossroads, resilience must give way to reinvention

Amith Singh, National Manager for Manufacturing, Nedbank Business and Commercial Banking, argues that while South African manufacturing has long been recognised as resilient, the shifts reshaping the global and domestic landscape now call for a reinvention as a national imperative.

The South African manufacturing sector has, for too long, been characterised by its resilience in the face of shocks. In recent years, this resilience has been tested by energy instability, port inefficiencies, geopolitical headwinds and supply chain disruptions. And yet, despite these pressures, many manufacturers continue to move forward, driving output, sustaining employment, and investing in capability.

However, as we head into September, resilience by itself is not enough. The moment calls for reinvention, grounded in an understanding of the shifts reshaping the global and domestic landscapes.

Volatility is the new baseline

We have moved from recovery into an era of complexity. Globally, inflationary dynamics, fiscal tightening and shifting trade corridors are shaping markets. Conflicts in Eastern Europe and the Middle East persist, while regulatory changes such as the EU's Carbon Border Adjustment Mechanism (CBAM), now in its reporting phase, are redefining competitiveness.

Locally, challenges are equally stark. Energy reliability and cost remain binding constraints. Logistics bottlenecks at ports disrupt the imports of critical inputs, such as green steel, and delay exports. Manufacturers now often plan ahead by six to eight months to secure raw materials and maintain throughput.

Yet despite these constraints, firms are not pulling back. Many are investing in plant modernisation, process automation and greener technologies. The question is no longer 'how do we survive?' but 'how do we lead?'

Strategy-led manufacturers are ahead

The Nedbank-NAACAM carbon emissions study, released in June, highlighted this divide.

More than 60% of firms, including small and mid-sized players, lack a baseline for their carbon emissions. Yet the pressure is mounting. More than half of companies reported that customers have already requested emissions data, and nearly a third stated that carbon reduction requirements are now included in sourcing contracts. What was once considered optional is fast becoming essential.

At the same time, the sector is deeply tied to export markets. Almost 70% of respondents sell into Europe and the UK, the regions where regulations such as CBAM are toughest. That reliance means South African suppliers cannot afford to wait. And yet, while many businesses are familiar with the broad direction of global regulation, decarbonisation remains a long-term consideration for the majority, primarily for locally owned firms that are not yet feeling immediate compliance pressure.

The mindset is also split. Roughly a third of manufacturers view decarbonisation as an opportunity, while another third see it as a threat. For exporters and multinationals, it is a strategic priority. For others, it is still seen as a cost burden. Unsurprisingly, the top barriers cited were cost, regulatory uncertainty, and a lack of clarity on how to measure emissions.

When asked what support they need most, three key themes emerged. Firms want solutions to improve energy efficiency, access to cleaner input materials, and affordable finance to fund the transition. This is precisely where partners like Nedbank are stepping in to help close the execution gap and turn ambition into action.

A partner for reinvention

Nedbank has aligned its model to sector realities. Our specialised manufacturing team engages directly with industry to support areas such as retrofits, energy diversification, decarbonisation strategies and CBAM compliance.

Our suite includes

- Sustainability-linked finance and green asset funding.
- Streamlined supplier payment systems.
- Digital banking platforms engineered for manufacturers.
- Support in trade finance and export markets.
- Joint investment in research, toolkits and skills development.

Through our collaboration with NAACAM, we have also launched a carbon readiness toolkit for automotive components, equally applicable across other manufacturing subsectors.

Case study on Malben Engineering

Malben Engineering, a Tier 1 automotive supplier, has been among the first South African firms to pilot green steel in production. Their shift was driven by OEM requirements and the strategic need to reduce export risk exposure.

Amith Singh: Nedbank has a specialised manufacturing team that engages directly with industry to support areas such as retrofits, energy diversification, decarbonisation strategies and CBAM compliance.

Green steel carries a current premium of €200 to €300 per ton, but Malben chose to move early, securing European mill partnerships and joining the Manufacture 2030 emissions reduction programme.

The outcome is stronger brand equity, diversified input sources, and increased interest from global buyers. Their decision underscores that early adoption can be a catalyst for growth, rather than simply a compliance exercise.

Looking ahead to reinvention as a national imperative

Our reindustrialisation path cannot rely only on resilience. Firms must embrace decarbonisation, digitisation, and reskilling not only to comply with regulations but also to access markets, investment and trade incentives.

Manufacturing remains foundational to the economy. At Nedbank, we are not bystanders. We are enabling reinvention alongside the sector, ensuring our country's manufacturing sector does more than endure: it leads.

Think bigger. Think Nedbank Business and Commercial Banking.

https://business.nedbank.co.za

Air Products launches **Midlands CO_2 Facility**

Air Products' launch of its latest production asset, the Midlands Carbon Dioxide (CO_2) Facility in Sasolburg, underscores its strategic decision to diversify its CO_2 sources to fill market gaps during peak summer demand periods or when existing sources are unavailable.

Air Products' new Midlands CO_2 Facility in Sasolburg.

The Midlands CO_2 Facility, which was successfully commissioned in April 2025, enables Air Products to provide a secure supply of product to current and potential new customers. The company embarked on this journey in 2019, when a potentially rich source of CO_2 gas from the Sasol Midlands N-Butanol plant was identified. The raw CO_2 gas was recognised as being suitable for recovery, purification and liquefaction.

After an extensive investigation into the composition, quantity, and reliability of this source, it was found that the gas was suitable for producing food and beverage-grade liquid CO_2.

Engineering, innovation and collaboration

Air Products' Managing Director, Charles Dos Santos, comments: "A project of this nature demands collaboration between multiple parties, bringing know-how, assets, technology, specialised resources and skills from the initial project development stages through to design, construction, commissioning and then the long-term operation and maintenance of the facility".

The completion of the Midlands CO_2 Facility journey, according to Dos Santos, is testimony to the collaborative efforts and persistence of the teams involved. "The Air Products and Sasol teams worked closely to optimally define the project interfaces and integrate the new Air Products CO_2 facility into the Sasol Midlands complex. Air Products appreciates and acknowledges the support provided by the Sasol teams."

The key equipment was designed and fabricated by a carefully selected global technology partner that provided innovative, best-in-class technology underpinning the design of the plant.

Utilising in-house resources, the Air Products team project-managed the overall execution phase over 24 months and undertook all procurement activities, including designing storage facilities and utility systems such as cooling and safety systems. "Air Products is known for its highly skilled in-house engineering and project execution teams, and once again, they ensured that the project was executed according to the company's high-quality and safety standards". The project was executed safely with no injuries being recorded.

True to its ethos of emphasising safety, health, the environment and quality to drive continuous improvement and sustainability, Air Products is in the final stages of obtaining FSSC 22 000 certification. This food safety management certification demonstrates the company's alignment with both local and global safety standards, ensuring that the product is suitable for use in the food and beverage industry.

The Midlands CO_2 Facility is a further extension of Air Products' relationship with Sasol, which dates back to 1997 when two 20 km pipelines to supply the Sasolburg facility with oxygen and nitrogen were commissioned. This was followed by the commissioning of an ASU on Sasol's Sasolburg facility in 1998.

"We are proud to launch the Air Products Midlands CO_2 Facility as it is not only a testimony to Air Products' commitment to supply high-quality liquid product to the market but also a demonstration of engineering excellence and the power of collaboration," concludes Dos Santos.

https://airproducts.co.za

Air Products' Executive Team during a recent visit to the Midlands CO_2 Facility, *Back row, from left:* ***Dumisa Gina, Charles Dos Santos and Maropeng Bahula;*** *front row:* ***Sizwe Nkonde, Yukisha Chettiar, Gift Nyambe and Arthi Govender.***

The importance of correct sprinkler systems

The importance of selecting the correct sprinkler systems for commercial buildings is often overlooked, which increases the fire risk potential and raises concerns for fire life safety, says ASP Fire CEO Michael van Niekerk.

"Often, a developer installs the bare minimum sprinkler system, which is fine for certain uses. But if a tenant starts using the building for something more combustible, like storing plastic instead of steel, the system may no longer be adequate," Van Niekerk notes.

This underscores the need for involving certified fire engineers in the design process to ensure the system is tailored to a building's specific use. While there are requirements for certified engineers to sign off on fire protection systems, van Niekerk warns about the risk of substandard installations.

"Unfortunately, sometimes unscrupulous installers cut corners. This is why peer reviews by independent certified engineers are so valuable, as they ensure that the fire protection system meets all necessary regulations," he adds.

Sprinkler systems significantly reduce the risk of injury and death in the event of a fire. They can control or extinguish a fire before it spreads, giving occupants more time to evacuate safely. Buildings with sprinkler systems have an 87% lower death rate due to fire, according to the National Fire Protection Association (NFPA). These systems minimise property damage by controlling the fire early, not only protecting the building structure but also its contents, such as equipment, inventory and sensitive data.

Many building codes and regulations, such as the National Building Regulations Act, require the installation of sprinkler systems in commercial buildings. Compliance with these regulations is not only a legal obligation but also a moral responsibility to ensure the safety of occupants.

Buildings with properly installed and maintained sprinkler systems are less likely to have insurance cover withdrawn due to the risk of extensive fire damage being significantly reduced. By controlling fires quickly, sprinkler systems minimise downtime and allow businesses to resume operations faster, which is crucial for maintaining revenue and reputation.

"Sprinkler systems are a proactive measure to mitigate the risk of fire-related incidents, providing early detection and suppression, reducing the spread of flames and smoke," concludes van Niekerk.

www.aspfire.co.za

Sprinkler systems significantly reduce the risk of injury and death in the event of a fire.

Hydraulics vs V-belts for HP jetting and vacuum pumps

As municipalities and service providers demand greater efficiency, reliability and ease of maintenance from their sewer-cleaning, industrial jetting and vacuuming equipment, hydraulic-driven pumps are increasingly becoming the standard. According to Sebastian Werner of Werner Pumps, although V-belt-driven pumps have long been used in high-pressure jetting trucks, hydraulic technology offers numerous benefits.

"We try to convince all our customers to opt for the hydraulic-driven pump because it's a more modern solution that offers better reliability, less downtime, fewer repairs and ultimately a lower total cost of ownership," he says. "Almost all our trucks use hydraulic-driven pumps, and we only fit the V-belt option if a customer insists on it. Even then, we've developed a more robust system that uses a sturdier single belt because the traditional multi-belt option means that when one belt fails, all the belts need replacing, which is costly and wasteful."

Werner explains that V-belt systems are prone to wear and tear. "Belts can slip, stretch, crack, or break, especially under high loads or in the dusty, wet environments that are typical of sewer-cleaning or industrial jetting or vacuuming operations," he says. "This not only reduces performance but also increases the risk of unplanned downtime."

Hydraulic-driven systems, by contrast, offer superior durability. "With fewer moving parts exposed to environmental stress factors, they're less vulnerable to the mechanical failures that often plague belt-driven setups. This translates directly to more uptime and greater peace of mind for operators in the field."

With fewer moving parts exposed to environmental stress factors, hydraulic drives are less vulnerable to the mechanical failures that often plague belt-driven setups.

Hydraulic drives also offer more flexibility in equipment design. Because hydraulic lines can transmit power over a distance, pump placement is less constrained by the position of the truck's engine or gearbox. "This makes it easier for us to optimise the layout of components and build more compact, ergonomic truck-mounted units," says Werner. "For example, while many of our competitors' V-belts sit underneath the truck, where they can easily be damaged by debris on the road or being knocked, the hydraulic system on our trucks sits neatly behind the operator's cab. This means they are located well above the level where they could be damaged, and it offers much easier access should repairs ever be required."

Maintenance is another area where hydraulic systems shine. While V-belts must be regularly inspected, tensioned and replaced, hydraulic systems typically require only routine checks of fluid levels, filters and hoses. This means fewer service interruptions and lower lifetime maintenance costs.

"Although hydraulic systems may carry a higher upfront cost, their superior durability, reduced downtime and lower maintenance needs result in a lower total cost of ownership over time," says Werner.

"Especially for our customers who own and operate multiple trucks, this long-term value is a compelling reason to invest in hydraulic-driven units," he concludes.

https://wernerpumps.com

Cable care and machine longevity

The management of moving cables and hoses in machine building is crucial to the operation and longevity of the equipment, with modern systems, such as energy chain cable carriers, often replacing conventional systems like cable festoons, reels, or free-hanging loops.

Introduced in South Africa by German polymer manufacturer igus, innovative polymer chains serve as a protective guide for cables and hoses, ensuring they move in a defined, controlled path without tangling, twisting, or wearing prematurely.

Widely used in manufacturing, automation, packaging, mining, robotics and machine tool industries, igus energy chains are fast replacing traditional festoon and cable reel systems due to their low-maintenance characteristics and ability to handle multiple energy types, including electrical, hydraulic, pneumatic, fibre optic and even auxiliary components such as hoses, all in one neat, flexible solution.

"Our e-chain cable carriers are increasingly being designed into new systems or retrofitted to festoons and cable-reel systems in many industries. They act as a moving conduit or spine that keeps the cable neat and always protected," says igus South Africa managing director, Ian Hewat.

He cites the following compelling reasons for turning to igus energy chains when designing and building machines:

- Cable-friendly design: igus energy chains have smooth inner surfaces and a controlled minimum bending radius based on cable specification, protecting cables and hoses from micro-abrasions and stress cracks.
- Modular, lightweight and strong: Made from high-performance polymers, igus chains are lighter than metal systems yet offer impressive strength and stability.
- Multi-media integration: igus energy chains can simultaneously carry electric cables, pneumatic lines, hydraulic hoses and even fibre optic cables.
- Predictable service life with warranty: igus backs its products with a guaranteed service life based on millions of lab-tested cycles, with many igus chainflex cables carrying up to a four-year warranty.
- Low-friction, energy-efficient operation: igus chains glide with minimal resistance thanks to their self-lubricating plastic design, which significantly reduces drag forces.
- Maintenance-free: No greasing or lubrication is needed throughout the life of the chain.
- Quick configuration and customisation: Designers can use the free igus online configurators to select, model and download their ideal energy chain setup.
- Intelligent condition monitoring: With igus' i.Sense smart plastics, add-on sensors can be embedded to monitor wear, cable tension and chain motion in real-time.
- Space-saving and safe: Energy chains allow for neatly routed cables and hoses that don't hang or swing, improving machine aesthetics and workplace safety.

igus e-chains are in use across over 50 industries, ranging from CNC machines and robotics to packaging lines, quarries, and marine applications. Their proven versatility makes them a reliable choice across virtually any moving cable application. From travels as short as 100 mm up to the current longest application of 950 m.

https://www.igus.co.za

Sandvik celebrates milestone in community upliftment

Sandvik Mining and Rock Solutions celebrates the FLC certificate handover with proud graduates and team members.

In a powerful demonstration of its commitment to sustainable community development, Sandvik Mining and Rock Solutions recently celebrated the achievement of 39 community members who successfully completed its Foundational Learning Competence (FLC) programme, an essential stepping stone to skills training, employment and economic inclusion.

The milestone event, which brought together learners from five local communities, marks the culmination of months of learning focused on English communication and mathematical literacy: two key pillars for workplace readiness and further education.

"Our support for the FLC programme is grounded in our belief that education is the foundation of empowerment," says Zandre de Witt, CSI Chairman at Sandvik Mining and Rock Solutions. "Foundational literacy and numeracy remain critical barriers to entry into formal training and employment. This programme is helping to dismantle those barriers, giving individuals the confidence and competence to pursue greater opportunities."

Implemented through an accredited training provider, the FLC forms part of Sandvik's broader Corporate Social Investment (CSI) strategy, which prioritises education, skills development and inclusive economic participation. In line with this, successful FLC graduates have been further supported through portable skills training, including hand tools, safety, plumbing, bricklaying and welding, offered in partnership with AIH.

"We view the FLC not as the end, but the beginning of a journey," says De Witt. "Graduates are already progressing to portable skills certification and, ultimately, licences such as Code 8 and 10 driving permits and operator licences. This helps position them for real-world employability across the mining, construction and engineering sectors."

Participants were selected based on clear inclusion criteria: residence in one of the five targeted communities, unemployment status, low formal education levels (below NQF Level 2) and a demonstrated interest in personal development. De Witt says that Sandvik collaborated closely with community leaders and local NGOs to ensure diverse and inclusive representation. "The programme's impact has been far-reaching. On an individual level, learners report improved confidence, communication abilities and numeracy skills, all of which are critical assets in any work environment," he shares. "At a community level, the initiative is helping to foster a culture of aspiration, learning and self-empowerment."

With success firmly established, Sandvik Mining and Rock Solutions is now exploring the expansion of the FLC initiative, both by scaling participant numbers and integrating it more deeply into the company's broader learnership and enterprise development programmes.

"This is not just about education. It is about creating pathways to independence, dignity and sustained opportunity," de Witt concludes.

https://www.rocktechnology.sandvik.com

GEMÜ diaphragm valves certified for drinking water

GEMÜ plastic diaphragm valves have been approved for use in any drinking water application in Germany with immediate effect. The basis for this is the successful examination and certification by the independent certification body, OFI CERT, in accordance with the current specifications of the German environmental protection agency (UBA).

For the installation and repair of drinking water systems, the UBA stipulates that only materials may be used that do not release any substances that pose a health risk to the drinking water or prohibit the growth of micro-organisms. Accordingly, the plastic diaphragm valves from GEMÜ have undergone extensive testing. The result is that valve types GEMÜ 610, 617, R629, R639, R647, R649, R677, and R690, featuring a PVC-U valve body and an EPDM diaphragm, meet all hygiene requirements.

GEMÜ therefore offers its customers tested safety and reliable product quality for use in cold and hot water applications for the drinking water supply.

The GEMÜ Group develops and manufactures valves, measurement, and control systems for liquids, vapours, and gases, and is a global market leader in solutions for sterile applications.

GEMÜ diaphragm valves featuring PVC-U valve bodies and EPDM diaphragms meet all hygiene requirements and have been approved for use in drinking water applications in Germany.

www.gemu-group.com

Damlaagte PV Facility announces commercial operation date

The commercial operation of the Damlaagte renewable energy plant marks a significant milestone for the decarbonisation of Air Liquide's operations in Secunda, the world's largest oxygen production site.

The Damlaagte PV Facility (Damlaagte) has established its commercial operation date, marking the commencement of a 20-year operational period for this 97.5 MW site. It formally commenced commercial operations on Saturday, August 23, 2025.

Located near Parys in the Free State province, Damlaagte connects to the Eskom grid and is expected to provide approximately 270-million kilowatt-hours (kWh) of clean electricity in its first year of operation. The PV Facility is owned by Mainstream Renewable Power (Mainstream), uBuzwe Energy (Pty) Ltd (uBuzwe) and the Thembelihle Trust.

The site, constructed and operated by Mainstream Renewable Power, is the first renewable energy project to supply power under a landmark joint procurement programme by its strategic partners, Air Liquide and Sasol.

The renewable energy from Damlaagte will be supplied to the Secunda site, where Air Liquide owns and operates the world's largest oxygen production site, following its acquisition of the facility from Sasol in 2020. This PPA is the first to come online from a joint initiative between Air Liquide and Sasol to procure a total of nearly 700 MW of renewable power for these operations. This programme is a key enabler for both companies' ambitious decarbonization roadmaps.

"Damlaagte PV Facility coming online marks yet another great accomplishment for us in our journey towards lower carbon intensity," said Simon Baloyi, Sasol's President and Chief Executive Officer. "This year, we have achieved several milestones in renewable energy, including securing an additional 160 MW, bringing the total renewable energy secured in South Africa to more than 900 MW. We are well on track to meet our 2030 Renewable Energy target of up to 2.0 GW.

"The Damlaagte commercial operation is a major milestone for the decarbonisation of our operations in Secunda, the world's largest oxygen production site. It is a crucial step toward our goal of reducing CO₂ emissions from the Secunda operations by 30% to 40% by 2031, and a powerful demonstration of our global commitment to decarbonisation," said Nicolas Poirot, CEO, Africa, Middle East & India (AMEI) for Air Liquide.

Energy policy and supply are not only about technology, but also have a substantial influence on economic growth and socio-economic development. Construction of Damlaagte began in November 2023, employing nearly 2 000 people from nearby communities, including Tumahole, Schonkenville, and Vredefort. Damlaagte and its partners, Power China Maanda, LeadEPC and Tractionel Holdings, utilised the services of local businesses where applicable and established a skills development programme that trained over 100 people.

"uBuzwe, a member of the Kholosani Group of Companies, is an infrastructure investment company with a portfolio of 17 Renewable Energy assets. uBuzwe has experience in the Solar, Solar Thermal and Wind power generation sectors and currently generates over 1 000 GWh per annum of clean energy. We drive impactful solutions for the development and improvement of critical infrastructure projects across South Africa," says Indiran Pillay, uBuzwe Director.

"We are proud to partner with Sasol and Air Liquide, delivering an efficient and cost-effective solution to their decarbonisation needs. As one of the most successful developers of renewable energy in South Africa, Mainstream is well-positioned as a partner of choice for private PPAs.

These agreements are crucial to unlocking the country's energy constraints, as they can make a significant contribution to our energy security and load-shedding challenges, both quickly and cost-effectively. We are pleased that Mainstream is at the forefront of the energy transition," said Hein Reyneke, Mainstream's General Manager for Africa.

https://www.mainstreamrp.com

Radiometric measurement solutions for extreme process conditions

Henning Springer, MD of MECOSA, the specialist supplier of niche instrumentation solutions, talks about radiometric measurement technology from Berthold for advanced, non-contact density and level measurement applications.

"MECOSA was started in 1982 by my father, Erich K Springer, who was very involved in instrumentation and control at that time, having been a founder of Krohne South Africa in the mid-1970s," begins Henning K Springer, the company's current MD.

"We started with a single agency, Heinrichs Messtechnik GmbH, which is still one of our trusted instrument brands today. Over the years, we have grown to represent more than 20 instrumentation OEMs, mainly European companies, all chosen to meet the needs of increasingly complex local applications," Springer tells *MCA*.

"We strive to provide high-quality measurement signals where conventional solutions fail: slurries in minerals processing circuits, molten steel on continuous casting lines, or any application where a conventional industrial instrument would get destroyed in the processing environment," he explains.

Radiometric measurement, he continues, is an ideal example. Based on the use of a radiation source and a sensor mounted on the outside of a pipe or tank, accurate measurements of density and/or level can be achieved without physical contact with the process material, avoiding exposure of the instrument to harsh processing conditions.

Density and the Berthold radiometric detectors

Berthold Technologies offers a range of radiometric detectors for directly measuring the density of a process material, tracking density changes in a tank, or determining when maximum or minimum allowable levels have been reached.

"For the mining industry, we have been offering solutions based on the Berthold LB414 for several years now. These are ideal for density measurements on underflow pipes of large volume thickening tanks that are used in the mining industry to concentrate ore or minerals," he says.

Thickening involves coalescing solid content from a slurry mix so that it will settle under gravity. This enables solid-liquid minerals separation. The concentrated solids are removed via an underflow outlet at the bottom of the tank, while the clear liquid is tapped off from the top. "Care must be taken to monitor the slurry density of the underflow, because too high a solids content can clog or damage pumps and pipes," he explains.

A SmartSeries Berthold LB414 radiometric detector continuously monitors the underflow density of a thickener.

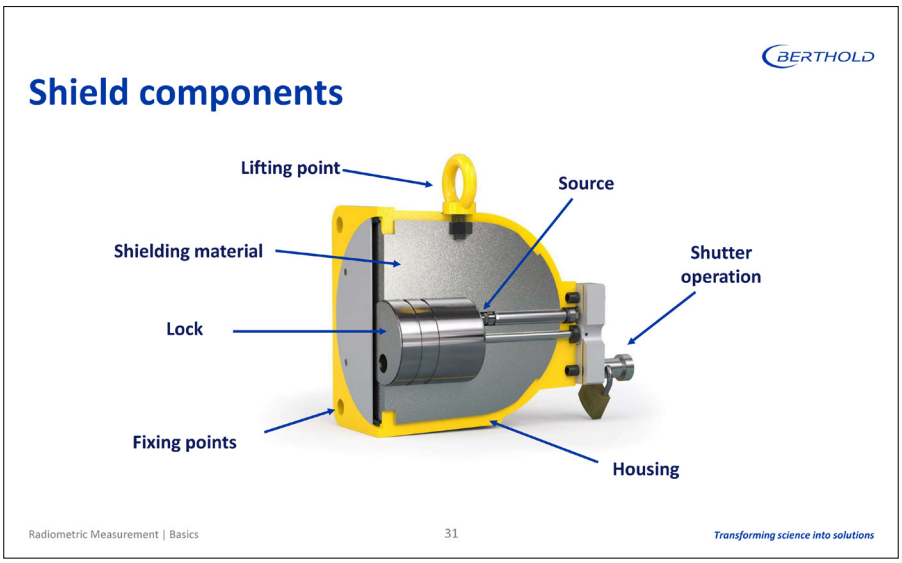
The SmartSeries Berthold LB414 radiometric detector has been designed for use in harsh environments, such as mill circuits and minerals processing facilities. These detectors offer cost-effective and reliable measurement with excellent accuracy and reproducibility, ensuring dependable performance for many years. "Some Berthold radiometric devices use, amongst others, the HART protocol, which not only makes calibration easy – it can be carried out via a push button on the detector, any HART communicator, a PC with service modem, or an infrared remote control – once calibrated, the 4-20 mA HART output can be used to continuously display the measured value, or sent to a process controller, PLC or the plant's DCS," he explains.

"These instruments ensure smooth process flow free from clogging, they optimise flocculant use through feeding rate control and determine and deliver exact mass flows in combination with a flow meter, all of which help to minimise operating costs and optimise recoveries. In addition, the non-contact nature prevents wear or damage to the measuring components. Additionally, the radiometric process is maintenance-free without the need for recalibrations for up to the full recommended life of the source – typically 10 to 15 years," Springer tells *MCA*.

Radiometric measurements principles

When measuring density using a radiation source to penetrate a material, fewer counts per second will be detected for more dense materials, and vice versa. "Like an X-ray, high-density bone is white because fewer rays come through to expose the plate; space is black; and lower-density areas are shades of grey. Typically, the output from our Berthold

The LB430 is an advanced, compact, low-energy radiometric measurement solution that combines the signal and the power supply connections into one, eliminating the need for separate power supply and signal wiring.



A shutter in the Berthold source shield enables the source to be completely shut off and opened to direct the radiation beam accurately.

instruments is an electrical signal of between 4.0 mA and 20 mA, with 4.0 mA corresponding to the lower density value of the calibrated scale," Springer explains.

A typical radiometric measurement arrangement consists of a radiation source that emits gamma rays; a reaction vessel or pipe that contains a process fluid, material or slurry, for which the density and/or the level needs to be measured and controlled; and a gamma radiation detection instrument for capturing the levels of gamma radiation penetrating through the vessel or pipe walls and the material being processed in the tank.

The amount of radiation absorbed by a material depends on the density of the material the rays pass through and the distance they travel through each different material. "This makes radiometric density measurement a reliable solution where other technologies fail. The actual density can be determined regardless of temperature, pressure and any known obstacles in the tank," he adds.

In terms of sources, Berthold instruments use high-energy gamma sources such as Co-60 or Cs-137, for which all atoms except hydrogen have a constant absorption coefficient.

The radioactive material of the source – Cs-137 or Co-60 nuclides – is encapsulated in a Secure Source Capsule (SSC) with at least two layers of stainless steel to provide maximum safety. For increased corrosion resistance, titanium versions are also available. "Our SSCs offer maximum security, exceeding the best possible classification in ISO 66646. They have double encapsulation, at a minimum, are temperature tested up to 1 200°C for 60 minutes, and drop tested with 20 kg from 1.0 m height," Springer assures.

In addition, to offer better encapsulation and beam alignment, Berthold source capsules are housed in a source shield that is filled with lead. A shutter in this source shield enables the source to be completely shut off and opened to direct the radiation beam accurately.

The new Berthold LB430

Launched earlier this year, the LB430 is an advanced, compact, low-energy radiometric measurement solution. This new system combines the signal and the power supply connections into one, eliminating the need for separate power supply and signal wiring. "The LB430 is powered from the low-current 24 V signal available from the controller, PLC or DCS. As well as powering the instrument, the 4.0-20 mA output signal from the instrument is carried through this same four-wire signal cable," says Springer.

Explaining how this has been made possible, he says much more voltage was needed to power traditional photo-multiplier tubes (PMTs), required to translate the gamma radiation count penetrating the process fluid, first into photons through photoemission, and then, through electron multiplication, into an increasingly stronger stream of electrons needed for the instrument's density signal.

"The new LB430 detector uses a silicon photo-multiplier (SiPM) that works similarly to a digital camera. It uses an array of silicon photodiodes, known as microcells. When each microcell in the array absorbs a photon, it triggers an avalanche multiplication of electrons, allowing an SiPM array to deliver a directly measurable signal in the 4.0 to 20 mA range, without requiring much external power.

Complexities and customised solutions

Every installation of a radiometric detection system, continues Springer, involves a significant amount of customisation. Citing the use of a Berthold system for level control in a continuous casting application, he says that molten steel flows through a nozzle into a mould at a high flow rate. "When approaching the 100% level, the system needs to react very quickly to prevent molten steel from overflowing, which could be a dangerous fire hazard and destructive to equipment.

"Instead of dampening the signal to obtain a smooth, averaged reading, as is typically done when measuring density values or detecting the level in a large tank with slow-moving level changes, we set up continuous casting level measurement systems with very short time constants, allowing them to react rapidly to control the molten metal flow," he explains.

Complications also need to be overcome when dealing with very high-pressure systems, where the density of the gas or air in the tank can get relatively high. This happens in polypropylene production, for instance, because liquid polypropylene is a low-density material and the high-pressure gas tends to distort the density measurement.

"Particularly in the chemical industry, where vessels tend to have high densities, pressures and high temperatures, it is difficult to predict what is happening inside that vessel. Densities might be changing from high to low, and agitators may be creating vortexes, so a more complex set of instruments may be needed to achieve the optimised process control required to make sure that the product being produced is of a consistently high quality," Springer tells *MCA*.

"The most important thing for us at MECOSA is the interaction with our customers to make sure that we fully understand the process and we can design and deliver the right equipment for the application," he says.

"We take care of all the drawings, get all the measurements, and the thicknesses and densities of the walls and any outside lagging or lining material inside a pipe or tank. We always make sure that the measurement equipment we supply is well matched to the application and the on-site process equipment being used," concludes Henning Springer.

www.mecosa.co.za

Reimagining rotation for a circular future

SKF continues to shape the future of industrial performance, setting new benchmarks through innovative, eco-conscious approaches, with circularity woven into the core of its design, manufacturing and lifecycle strategies.

The new SKF purpose: 'together, we reimagine rotation for a better tomorrow' underpins every decision and change the company makes.

The new company purpose: together, we reimagine rotation for a better tomorrow, is already deeply embedded in SKF's DNA: "This underpins every decision and change we make, from product design and manufacturing to the solutions and services we deliver to industry," asserts Micaela Willers, Manager for power transmission and training at SKF South Africa.

Highlighting the pivotal role of product design and development, Willers points to the new SKF Infinium bearing as a prime example of the company's drive to advance circular design principles. As the name implies, SKF Infinium bearings can essentially be remanufactured an indefinite number of times. Engineered with advanced cladding technology and utilising cutting-edge Laser Metal Deposition (LMD), these new bearings can be repeatedly reclad and reused without compromising their quality or performance, marking a significant breakthrough in circularity and additive manufacturing.

"We have not yet set a timeline for introducing this advanced level of remanufacturing locally; however, we already provide a well-established remanufacturing service for larger bearings, which boasts a strong track record in South Africa," shares Willers. She also reveals that SKF South Africa is currently laying the groundwork for establishing a dedicated bearing remanufacturing centre to support Africa's railway industry.

The recently introduced SKF Infinium bearing innovation forms part of a broader set of forward-looking initiatives aimed at improving circularity, reducing carbon footprints and enhancing the lifespan and cost-effectiveness of SKF's bearing and power transmission product ranges.

"By fostering circularity, we strive to transform how people perceive bearings," explains Willers. "Instead of viewing them as disposable consumables to be discarded once 'spent,' we want bearings to be recognised as valuable assets that should be nurtured, serviced and returned to service through remanufacturing when performance begins to decline."

Willers notes that the consumable or throwaway approach not only increases costs over a machine's lifetime but also carries significant risk. "Opting for lower-quality components to cut expenses can lead to major equipment failures and costly repairs," she warns.

"That's why we encourage our customers to adopt a circular mindset. Bearings can be remanufactured by SKF to OEM condition and put back into service." Willers adds that when bearings are seen as assets to be actively managed, plant operators are more likely to engage with SKF's expert services, which are essential tools in reducing the total cost of ownership and extending operational life. "This is unquestionably the most sustainable and cost-effective path forward."

Moving on to emissions, Willers notes that globally, SKF is aiming to achieve a fully carbon-neutral manufacturing footprint by 2030 and net-zero emissions across its entire supply chain by 2050. To support this eco-ambition, the company is engaging in several initiatives with leading steel producers to reduce emissions associated with production. This includes the use of hydrogen direct reduced iron (H-DRI).

SKF, in collaboration with Nordic steel producer Ovako, is now able to produce spherical roller bearings (SRB) with 90% less embedded carbon compared to standard SRB bearings. "We use a high-quality bearing steel produced from 97% recycled steel and leverage advanced manufacturing capabilities within SKF's net-zero factory in Gothenburg, Sweden," notes Willers.

"We take a full lifecycle approach to every installation," she continues. "Selecting the right bearing and ensuring proper installation for our customers are critical, as any errors can significantly reduce the bearing's operational life," asserts Willers.

In a bid to extend bearing lifecycles, SKF supports its products and technologies with the timely delivery of mechanical field services, engineering support, condition monitoring, lubrication systems and remanufacturing solutions. "The implementation of effective lubrication systems and management, for example, will ensure that each bearing receives the correct type and amount of lubricant at the right time," she explains. "To monitor the health of both the bearing and the machine, we offer advanced condition monitoring systems. Once a defect is detected, using AI technology, we can determine both the root cause and the remaining useful life, enabling a safe, scheduled removal, remanufacture and reassembly process."

Willers points out that this holistic approach also extends to enhancing the performance and efficiency of transmission systems in existing equipment. "We take a holistic view of the entire drivetrain, including pulleys, gearboxes, motors and bearings. This strategy will ensure that every element of the rotating system, from correct product selection to power ratings, speeds, and torques, contributes to long-term reliability and reduced total cost of ownership."

"Through the design and manufacture of components with sustainability at their core, we, in partnership with our customers, are driving a better, more sustainable tomorrow. We are reimagining the future of rotation, rolling away from traditional, consumable-based thinking toward a smarter, more sustainable circular approach."

www.skf.com

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