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Credits

Marketing & Sales:
Mandla Nkosi
Kelvin Dube
Angel Nakazwe

Design and Layout
Rekai M Mutisi
rmutisari@gmail.com

**Davianos Publishing
South Africa:**

Number 10 Sail Place Bloubastrand

Tel: +27 81 441 8801,
Cell: +27 71 735 3324

Zambia

79 Luella , 19th Ave Nkana East
Kitwe Zambia
Tel: +260 767906383 Phetuko Nkatha

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ABB and Epiroc advance collaboration on underground trolley solutions for mining

- Collaboration advances the development of underground trolley system solutions for mine haulage fleet decarbonization
- The Memorandum of Understanding between the companies follows recent success of implementing the world's first battery-electric underground trolley truck system at Boliden's Kristineberg mine

ABB and Epiroc have signed a Memorandum of Understanding (MoU) based on underground trolley equipment to collaborate on joint, comprehensive and integrated solutions for the mining industry to increase productivity and safety, and achieve decarbonization targets. The MoU builds on past technology deployment successes in

Swedish mines.

Under the terms of the agreement, the two companies will have teams in collaboration to carry out a comprehensive feasibility assessment of their collective offerings. This review aims to meet the de-manding requirements of industrial applications in mining, considering productivity, sustainability, and high-power, automated and safe operations. Any resulting solution would be ruggedized for harsh underground mine environmental conditions and built to approved standards.

The recent track record of ABB and Epiroc includes the first battery-electric trolley truck system for underground mines, developed together with Swedish mining company Boliden. According to ABB's Mining's

Moment report, 76 percent of global mining companies believe vehicle electrification will bring significant benefits both in terms of sustainability and efficiency. Additionally, 42 percent plan to invest in haulage fleet decarbonization by 2026. In light of this, ABB and Epiroc believe it is time for action.

As mining customers increasingly seek solutions to support this crucial electrification of their vehicle fleets and move to fully decarbonize their operations under environmental, societal and economic pressures, ABB and Epiroc believe they have complementary, specialized expertise in trolley solutions for underground systems to provide integrated offerings using today's existing technologies.

"Collaboration within the mining

industry is crucial to accelerate the transformation of our mining customers' decarbonization journey," said Wayne Symes, President with Epiroc's Underground division. "We are excited to deepen our partnership with ABB by developing a strategic roadmap for sustainable, innovative mining, beginning with the decarbonization of mining truck fleets, expanding on the trolley system to meet the wider needs of the industry with the target set to increase both safety and productivity."

"The decarbonization of mine haulage fleets is becoming increasingly pressing as we look towards 2030 sustainability goals," said Max Luedtke, Global Business Line Manager for Mining, ABB Process Industries. "We must encourage collaboration across the industry to speed up the change needed, and Epiroc is aligned with this approach. We know from our recent Mining's Moment report that 71

percent of mining companies agreed that successful partnerships are key to gaining momentum in the energy transition. Technology players demonstrating a strong commitment to open standards and asset interoperability facilitate these efforts, so we look forward to discovering what else we can achieve with Epiroc and the wider industry."

ABB is a global technology leader in electrification and automation, enabling a more sustainable and resource-efficient future. By connecting its engineering and digitalization expertise, ABB helps industries run at high performance, while becoming more efficient, productive and sustainable so they outperform. At ABB, we call this 'Engineered to Outrun'. The company has over 140 years of history and more than 105,000 employees worldwide. ABB's shares are listed on the SIX Swiss Exchange (ABBN) and Nasdaq Stockholm (ABB). www.abb.com

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ABB Electrification a key player in shaping South Africa's energy future

ABB Electrification is set to attend the upcoming Africa Energy Indaba 2025 from 4 to 7 March in Cape Town, a key gathering of industry leaders, policymakers, and stakeholders shaping the future of the energy sector. As a committed player in the electrification space, ABB Electrification aims to engage with decision-makers, gain insights into evolving market needs, and contribute to the discussions that will influence Africa's energy transition.

The Africa Energy Indaba serves as a platform for high-level dialogue on the continent's energy challenges and

opportunities. ABB Electrification's presence underscores its commitment to understanding the specific needs of the African energy sector and aligning its solutions with the region's energy transformation goals.

The opening plenary panel, 'Balancing Africa's need for Development and a Just Energy Transition', will look at the dual challenges faced by Africa of meeting its growing energy requirements while mitigating climate change. The region will need to use its own resources depending on energy reliability, availability, and cost considerations, and adopting a decarboni-

ation timetable that matches Africa's specific developmental needs.

"The energy landscape is evolving rapidly, and Africa is at the forefront of this transformation. Our participation at Africa Energy Indaba allows us to connect with industry leaders, policymakers, and partners to better understand the challenges and opportunities in the sector," says **Etienne Delpont**, Senior Vice President for the Electrification Smart Power and Smart Building of ABB South Africa.

Other topics to be discussed include aligning the financial returns

of investing in Africa's energy sector with social and environmental goals, the risk management associated with such investment, and supply chain considerations in transitioning Africa's energy sector.

High-level panellists include H.E. **Dr. Kgosientsho Ramokgopa**, Minister of Energy & Electricity, South Africa; H.E. **Minister Teddy Lwamba Muba**: Ministry of Hydraulic Resources & Electricity, Democratic Republic of Congo; and H.E. **Eng. Ahmed Jama Barre**: Ministry of Energy and Minerals, Republic of Somaliland.

ABB Electrification brings extensive expertise in delivering safe, smart, and sustainable electrification solutions that support energy efficiency and reliability. By engaging in critical discussions at the Indaba, ABB aims to contribute to shaping policies and strategies that will drive Africa's energy future.

With an increasing focus on decarbonisation, digitalisation, and distributed energy solutions, ABB Electrification remains dedicated to supporting the continent's energy transition through collaboration and innovation. The Africa Energy Indaba provides an opportunity to listen, learn, and explore partnerships that will accelerate the journey toward a more sustainable energy landscape.

"ABB remains committed to delivering smart and future-ready electrification solutions that empower businesses and communities. Our participation in the Africa Energy Indaba underscores our role as a trusted partner in shaping Africa's energy future through cutting-edge technology and sustainable solutions," comments Delpert.

As Africa transitions toward a more sustainable and efficient energy ecosystem, ABB continues to provide the technologies and expertise necessary to support this transformation. By

offering a diverse portfolio of products and digital solutions, ABB is driving progress in energy management, electrification, and automation across industries.

Electrifying the world in a safe, smart, and sustainable way, ABB Electrification is a global technology leader in electrical distribution and management from source to socket. As the world's demand for electricity grows, our 50,000+ employees across 100 countries collaborate with customers and partners to transform how people connect, live and work. We develop innovative products, solutions and digital technologies that enable energy efficiency and a low carbon society across all sectors. By applying global scale with local expertise, we shape and support global trends, deliver excellence for customers and power a sustainable future for society. go.abb/electrification

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Growing demand for staple foods in Africa drives Bühler's growth

Johannesburg (South Africa), 23 January 2025 – Opportunities in strengthening local supply chains, especially within food processing and agribusiness, will be the main focus for Bühler Southern Africa in 2025, says MD Marco Sutter. "The African market remains pivotal, with ongoing growth in the staple foods like maize as well as rice and pulses, driven by increasing demand for locally produced, high-quality food products." In addition, the mining and

infrastructure sectors present opportunities to deploy innovative technologies that enhance operational efficiency and reduce environmental impact.

The African market is essential to Bühler's growth strategy. With a young and rapidly growing population, the continent offers immense opportunities to build resilient food systems and manufacturing hubs. "Our focus is on delivering tailored solutions that address local challenges while

enabling scalability and sustainability. This market not only drives our business growth but also aligns with our mission to feed the world sustainably," says Sutter.

Sustainability remains at the core of Bühler's vision. In 2025, it plans to enhance its green supply chain initiatives by localising more manufacturing processes, thereby reducing transportation-related emissions. "Collaborating closely with our partners, we

remain steadfast in our commitment to achieving carbon-neutral production by 2030 while continuously improving the energy efficiency of our solutions. Aligned with our sustainability goals, we aim to reduce energy, water, and waste in our customers' value chains by 50% by 2025 and decrease greenhouse gas emissions in our own operations by 60% by 2030," says Sutter.

Last year was a challenging year, shaped by various external factors. Elections across many African countries brought a degree of uncertainty, while rising steel prices, increased transport costs, and limited access to foreign exchange in several regions posed significant hurdles. "Despite these challenges, Bühler remained resilient, focusing on innovation and customer-centric solutions," he adds.

The food and beverage sector saw steady demand, particularly in the staple foods markets and grain storage, as the need for efficient and sustainable food systems continues to grow. The mining sector performed robustly, driven by demand for material handling solutions and an increasing focus on energy-efficient technologies.

"Looking ahead, our strategy prioritises strengthening local supply chains and driving sustainable practices to support our customers and communities effectively," explains Sutter.

Bühler also embarked on various upgrades last year, says Francois Knoetze, Head of Manufacturing. These included installing First in First Out (FIFO) racking to improve stock utilisation, new compressors to ensure better energy efficiency of air production and newer welding machines. Knoetze points out that the main benefits for Bühler's clients and growth potential following the upgrades is increased throughput driving shorter lead times.

On the corporate social responsibility front, last year Bühler was involved with upgrading The Little Star Day Care Nursery School, a testament to its commitment to community welfare. It also focused on employee well-being by establishing new facilities such as a nurse's room, entertainment areas, and safer parking solutions. Successful initiatives like the Student Career Day Expo and Heritage Day celebrations fostered a strong sense of

community within and outside Bühler.

Looking ahead, by continuing to spend up to 5% of turnover on research and development a year, Bühler's mission is to develop innovative technologies, machines, and services for the food, feed agriculture and mobility industry. This differentiates it in the market through high performance, productivity, reliability, and improved sustainability.

"This year we will continue empowering communities through various initiatives and educational projects. Skills development remains a priority, with plans to expand training through our collaboration with MathU and our Global Learning Festival. Workshops and internships will assist to nurture future innovators, building on the success of our Student Career Day Expo. "As we look ahead, Bühler remains steadfast in its commitment to shaping a more sustainable and inclusive future. We invite all stakeholders to join us on this journey as we innovate, collaborate, and grow together," concludes Sutter.

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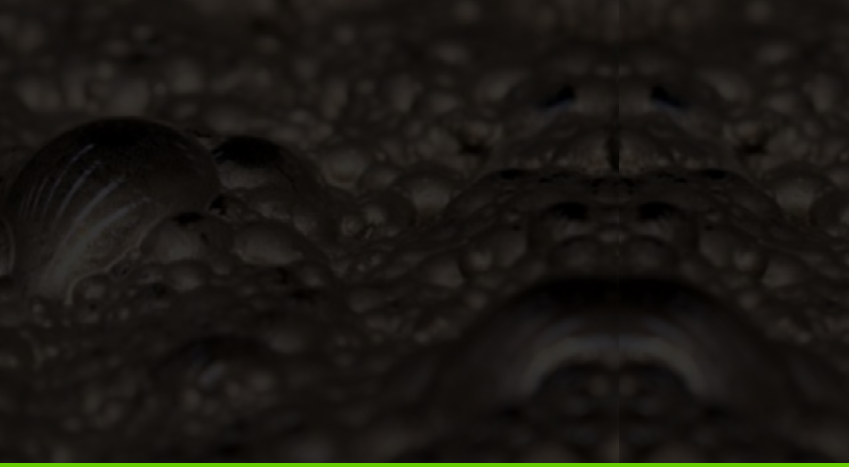
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Corobrik navigates challenges, looks to embrace opportunities in 2025



Despite an unpredictable and volatile business environment in 2024, leading brick-maker Corobrik re-mained adaptable and nimble. "We have worked hard to make our operations more agile, shifting capacity between product lines to meet market demands. There is room for improvement, but we are far better equipped to respond to change than before," comments CEO Nick Booth.

"While there has been positive sentiment following the elections, we are yet to see tangible economic improvements. Global trade policies and economic trends remain unpredictable, making flexibility a key focus for us," adds Nick.

The residential sector continues to show promise, particularly if interest rates ease further. "We are optimistic about growth here," highlights Nick, adding that green shoots have started to appear in the Gauteng infrastructure segment, such as schools and clinics.

"Gauteng remains the economic

engine of South Africa. Any growth in the province will have a marked impact on the overall economy and GDP in particular." However, the anticipated uptick depends on government payment processes becoming more streamlined.

Corobrik's state-of-the-art factory Kwastina performed exceptionally well in 2024, particularly in terms of face bricks and bespoke designs. "Architects have embraced our expanded range of special shapes and coatings," says Nick. "This aligns with our sustainability goals, though we are keeping a close eye on long-term gas availability post-2027. To future-proof operations, we are actively exploring renewable energy and other sustainable solutions."

A cornerstone of Corobrik's success is its reputation for innovation and quality. "Architects value our commitment to bespoke, innovative products," says Nick. "This positive perception helps us stand out, even as we navigate challenges."

Nick remains cautiously optimistic

about the year ahead. "I hope 2025 allows us to stick to a single plan. While volatility will persist, we are aiming for greater stability and alignment across the industry."

The company will again host its flagship Corobrik Student Architecture Awards in 2025 and continue its support of the South African Institute of Architects (SAIA). Nick adds that industry bodies such as SAIA are critical for members to have a single point of contact in terms of regulation and compliance. "SAIA and similar organisations must continue to evolve and support the built environment sector," he urges.

Lastly, Nick extends his gratitude to Corobrik's staff and clients. "Our resilience and adaptability in 2024 would not have been possible without their dedication and support. Together, we are poised to embrace the opportunities 2025 will bring. Corobrik will continue to focus on bespoke products that position clay face bricks as the sustainable building material of choice," he concludes.



Enabling Africa's solar potential – lighting the way with technology

By Joyce Moganedi, Solutions Sales Manager - ABB Energy Industries

As the global population continues to grow, energy demand also rises. To meet this increasing demand, it is crucial to integrate renewable sources into the energy mix. Among these renewable sources, solar power is playing a vital role in building a more sustainable future with lower emissions.

According to Statista, the global solar power sector is expected to grow by 7.3 percent annually between 2024-2029. The study also explains that among developing countries, Africa and the sub-Saharan region will see an exponential increase in energy demand in the coming years and with many households still in need of electricity, scaling up solar power projects using automation and digital solutions from partners like ABB can help bridge the gap.

However, balancing renewable power supply with end-user demand is challenging as the share of renewables grows. ABB assists customers throughout the renewable power value chain, including consulting, generation, storage, transmission, monitoring, control, and optimization.

Solar power and Africa

With evolution and technological innovation, the first photovoltaic (PV) or solar cell, which converts light energy to electricity, was invented in 1954.

Today PV panels and concentrated solar power plants (CSP) are used in generating electricity as part of the clean energy transition. CSPs utilize mirrors or lenses to concentrate sunlight to heat a fluid that drives turbines, and solar home systems (SHS), thereby providing electricity to households.

With 53 percent of Africa's population still in need of electricity, according to a 2023 report by UN Trade and Development, tapping into the region's vast resources and opportunities in solar power will help secure its future. But utilizing these resources requires investment in solar power projects and building infrastructure including robust grid systems that help transmit electricity to consumers. According to the International Renewable Energy Agency, only two percent of global renewable energy investments went to Africa in the past two decades.

ABB has been supporting the solar power sector since the 1990s with automation, electrification and digita-

lization solutions, exhibiting technology expertise in how best to harness, control and store solar energy and efficiently convert it into a reliable power source, ready for transfer into the local grid. Let us delve deeper into how ABB is enabling the solar power projects in Africa.

Supporting the solar revolution

ABB's portfolio of products, systems and solutions for the solar power industry is extensive and cater for industrial and home use. Photovoltaic applications focus on delivering continuous operation, higher reliability, and return on investments.

In Africa, ABB has supported several solar power projects as the automation and electrical solutions provider. ABB has supplied state-of-the-art ABB Ability™ Symphony® Plus SCADA automation platform which is an open, flexible and scalable platform which serves as a reliable and secure platform for solar applications.

Solar power is a bright spot in Africa's energy landscape holding a promise to illuminate many more lives. And ABB's design, engineering and commissioning capabilities will help harness this untapped clean energy and secure the region's future.



RS GROUP CEMENTS ITS POSITION AS AN ESG LEADER WITH CDP A-LIST SELECTION

The company has also retained its Platinum EcoVadis Medal and been listed in the S&P Global Sustainability Yearbook for the second year running

RS, a global product and service solutions provider for industrial customers, has announced its inclusion in the prestigious CDP A-list, having improved its CDP rating this year from A- to A for its commitment to climate action, environmental transparency and disclosure.

Alongside this, RS Group has retained its Platinum EcoVadis medal for a third year running, placing the organisation in the top 1% of the 150,000+ companies rated. It has also been listed in the S&P Global Sustainability Yearbook for a second year, positioned in the top 15% of companies in its industry.

CDP improvement

CDP is the most extensive and presti-

gious benchmark of climate action and disclosure globally, with two-thirds of global market capitalisation, from 130 countries, disclosing critical environmental data through CDP. The A list is reserved for the top companies showing advanced climate leadership.

Andrea Barrett, Vice-President Social Responsibility & Sustainability says: *"Being one of a select few companies globally to reach the CDP A list, is testament to the hard work of all our teams to decarbonise our business and supply chain and offer our customers more sustainable products and service solutions.*

"But the work doesn't stop here! We're continuing to accelerate our 2030 ESG action plan to protect our people and the planet, support our sustainable growth and create more long-term value for all our stakeholders."

Progress highlights include:

- Providing our customers with sustainable product alternatives. Supported by a range of 30k Better World products and the creation of an industry-leading claims-based sustainable product framework.
- Upgrading our distribution sites to be more automated, energy efficient and sustainable to provide a better service to our customers and reduce our environmental impacts. Supported by a 57% reduction in Scope 1 and 2 emissions since 2019/20 ,
- Cutting the distance our products travel by sourcing, storing and shipping closer to customers and suppliers and switching to less carbon intensive modalities. Supported by a 26% reduction in intensity of Scope 3 product transport emissions since 2019/201,

Brian Andrew, Managing Director of RS South Africa, adds: "Sustainabil-



ity is a core pillar of our business strategy, and we are committed to driving positive change within our industry and beyond. These accolades reinforce our dedication to reducing environmental impact and delivering innovative solutions that support our customers in achieving their sustainability goals."

Additional accolades

RS Group's retention of its Platinum EcoVadis medal remains a further testament to the organisation's invaluable work by a globally trusted provider of business sustainability ratings for thousands of companies worldwide. It was recognised as advanced under the key themes of Environment, Labour & Human Rights and Sustainable Procurement.

For the second year running, RS Group has been listed in the S&P Global Sustainability Yearbook, based on S&P Global's Corporate Sustain-



ability Assessment (CSA), an annual evaluation of companies' sustainability practices. With only 780/7,690 companies globally featured in the 2025 yearbook, S&P Global recognised the significant progress RS Group has made to advance sustainability in its operations, packaging and logistics.

Andrea Barrett continues: "We are proud to be recognised by such highly regarded ESG ratings. These achievements demonstrate the hard work of teams across every area of our business who are committed to delivering value-generating initiatives that positively impact our people, customers, suppliers, shareholders and communities, as we strive to make amazing happen for a better world."

Brian Andrew concludes: "This recognition reflects our ongoing commitment to sustainability and responsible business practices. At RS South Africa, we are focused on driving positive change through innovative solutions that benefit our people, communities, and the environment. We are proud to align our efforts with global ESG principles as we continue to create lasting value for our customers, stakeholders, and society at large."



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FUCHS LUBRICANTS SOUTH AFRICA doubles sales volume thanks to a growth strategy and investment



An aggressive growth strategy in South Africa and Sub-Saharan Africa over the last decade has resulted in a CAGR of 6% in volume sold since 2015. "The result of this is that sales volume has nearly doubled in this time," said Paul Deppe, managing director of FUCHS LUBRICANTS SOUTH AFRICA and Regional Vice President of Sub-Saharan Africa.

Paul Deppe was speaking at the official opening of the expanded facility of FUCHS LUBRICANTS SOUTH AFRICA in Isando. "This growth would not have been possible had the FUCHS Group not the confidence and desire to support its subsidiary in South Africa." More than R650 million has been invested in creating capacity at the South African subsidiary over the past eight years. "It is a huge confidence boost in the country and the FUCHS business in South Africa," said Paul Deppe.

Joining the event from FUCHS SE was Dr. Ralph Rheinboldt, chairman of the South African subsidiary and member of the FUCHS SE Executive Board responsible for EMEA, Dr. Sebastian Heiner member of the FUCHS SE Executive Board and CTO, and Matthias Spethmann, Vice President of EMEA OEM sales.

"FUCHS has marked a significant milestone with the completion of its expanded plant in Isando", said Deppe. The project commenced in 2020 with the purchase of an adjacent site to accommodate the company's growth. This expansion follows the initial investment in a new grease plant commissioned in 2018.

The newly built facility, which now spans 6ha, doubling its previous size, represents a R500 million investment in "creating capacity" and technological advancement. The project includes a new office complex, warehouse, laboratory, tank farm, oil lubricants blending plant, and state-of-the-art filling machines. Completed in December 2024, the expansion has increased production capacity by over 40%.

The development has been a key factor in FUCHS's growth, which now employs nearly 450 people, up from 250 in 2015. No staff redundancies took place during this period, with the company continuing to invest in employee training and upskilling.

FUCHS worked closely with several partners, including global engineering firm DRA Global, the Engineering, Procurement, and Construction Management (EPCM) consultant. Other consultants who contributed significantly were GPD Studio (architect), ILS (warehouse designer), ASP Fire (fire engineer), Stadler & Schaaf (plant automation), and Handson Electrical (electrical engineer).

Among the highlights of the new facilities is the modern office complex, which serves as the head office for South Africa and regional office for Sub-Saharan Africa. It is designed to house 110 people in a sustainable, energy-efficient environment, certified net-zero carbon by the Green Building Council of South Africa.

The new 7 000 m² warehouse, four-and-a-half times larger than the previous one, incorporates SAP warehouse management technology supported by integrated scanning systems, and design incorporating narrow and wide aisle racking for flexibility and to maximize space utilization. The automated fire system conforms to NFPA standards and includes automated spill barriers. In addition, sustainability elements such as rainwater harvesting and a solar PV system which will increase total renewable energy supply to 30%.

A critical part of FUCHS value offering is quality control and product development. With the growth of operations, the laboratory has been renovated and upgraded. The upgraded laboratory supports FUCHS's commitment to quality control and product development.

The expansion of the oil lubricants production capacity includes a new tank farm, blending plant, and

filling hall designed for future growth. The tank farm includes capacity for 1 300m³ of base oil storage, 120m³ of heated additive storage and 300m³ of blending capacity.

There are 3 new filling lines, an IBC and drum line, a 20L filling line and Small Pack filling line currently configured to fill 5L and 1L pack sizes. All 3 lines have a high degree of automation. The IBC and drum line features a diving head piston nozzle to limit foaming and a load cell with level sensors for accurate volume and weight measurement. The 20L line and Small Pack filling line all have a range of quality features like weight checking, cap sensing, induction sealer sensing, label vision sensing and batch code printing.

"This expansion is set to enhance FUCHS's operational efficiency, quality control, and production capacity, ensuring continued growth and customer satisfaction. The company extends its gratitude to its employees, consultants, and customers for their unwavering support throughout this transformative journey," concluded Deppe.



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Inside the expanded plant at FUCHS LUBRICANTS SOUTH AFRICA

Leading lubricants manufacturer and supplier FUCHS LUBRICANTS SOUTH AFRICA introduced customers to its new expanded Isando facility during a customer day on 26 February 2025. Manufacturing Executive Thami Mzolo, who has been involved with the project since joining the company in early 2024, comments that it is the most efficient plant built and upgrade he has ever been involved with.

“We contracted out the EPCM project to DRA Global and they did a fantastic job in terms of attention to de-tail on the design and execution, to the extent that we commissioned the plant a full month ahead of schedule. Since commissioning, we have achieved a 100% right first-time manufacturing result in the new plant.”

FUCHS embarked on the second round of its investment strategy, ‘Creating Capacity’, in mid-2020, explains MD Paul Deppe. “We purchased neighbouring land and as Phase 1 of the project we built a new warehouse and head office in Isando, both completed at the end of 2022. The new warehouse is 4.5 times larger than the old one, significantly reducing congestion and improving storage for raw materials, packaging, and finished goods,” says Deppe.

“The aim of the customer day was to showcase our new facilities and increased capacity. As the leading in-dependent lubricants manufacturer, this will unlock significant further opportunities and markets for us,” comments Deppe. “It was not just the actual technology we showcased, but also the level of control, automation,



and integration with our new SAP ERP system.”

Now that the expanded facility is up and running, Mzolo’s mission is to maintain flexibility while taking advantage of the high efficiencies and ensure FUCHS’ commitment to their customers of a quick turnaround. “The focus now is to look at further operational efficiencies in our processes to unlock more capacity and enhance our flexibility by removing inefficiency and waste,” says Mzolo.

The aim of the project was to move the high-volume, fast-moving, large-batch products out of the existing plant. State of the art technology has been incorporated into the new tank farm, blending plant, and filling lines, while the existing plant remains.

Mzolo highlights key advancements in FUCHS’ new production facility. The new plant has increased available manufacturing capacity by over 40%.

litres of base oil storage and 120 000 litres of additive storage. The blending process is fully automated, with a control system seamlessly integrated into the SAP ERP system. This ensures precise dosing and consistent processing of materials, maintaining the high-quality standards FUCHS’ customers have come to expect.

Three new state-of-the-art filling lines have also been introduced which significantly increases the capacity of filling of IBCs, drums, pails, and small packs, typically 1 litre and 5 litre pack sizes. Bulk line filling is fully automated using loadcells to ensure the correct quantity is filled every time, and both drums and IBCs can be packed interchangeably. The new 20 litre pail line, also using loadcells for the filling, has a vision system to ensure correct labelling and a cap sensor that ensures good quality product at the end of the line.

The Small Pack Line features ten mod-

we are working hard to ensure that the existing plant continues to deliver high-quality products to customers when they need them,” says Mzolo. The lubes filling plant consists of ten filling lines, namely three drum lines, three 20 litre lines, one IBC line, and two small pack lines, including the new Small Pack line.

On the other side of the facility is the grease plant that was commissioned in 2018. It has been instrumental in supplying high-performance grease products to customers across diverse industries. Robust systems and well-trained staff ensure consistent production and quality. “Grease plant capacity can be increased by 25% by introducing an additional shift, which demonstrates our ability and readiness to meet future demand.”

The demand for specialty greases is growing significantly, which means that FUCHS’ expanded grease plant is ideally positioned to supply custom-

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Graphalloy® bearings and bushings from ISO-Reliability Partners

A range of graphite-metal/alloy bushings and bearings is available from ISO-Reliability Partners. Graphalloy® is an ideal solution for any bearing or bushing application where lubricants fail due to the surrounding environment, says Craig FitzGerald. Known as Graphalloy®, the material is a graphite-metal/alloy that is solid, uniform, self-lubricating, non-galling, and can operate in temperature extremes from -260°C to 535°C, with a low friction coefficient.

"The material is basically graphite in solid form, with the pores filled with metal," explains FitzGerald. Graphalloy® is the registered name for graphite-metal/alloy materials manufactured by the Graphite Metallizing Corporation under ISO 9001:2015 Certification. Such bearings do not require oil or grease lubrication and instead depend on the combination of graphite and metal for lubrication and durability.

It means these bearings are extremely long-lasting. Whereas oil and grease-lubricated bearings can seize, and thermo-plastics fail, Graphalloy® provides lifetime cost-savings and significant operating advantages over

conventional bearing materials. Such bearings have operated for up to 20 years in some applications without any maintenance requirements.

The alloy is available in over 100 grades with specific properties to meet a diverse range of engineering solutions and specifications. FDA-accepted grades are available for food-contact equipment, while NSF® International and WRAS certified water grade for municipal well and water treatment applications.

Standard designs are available as pillow blocks, cam followers, and bushings, which can be customised to OEM requirements or retrofit applications. Graphalloy® bushings are ideal for remote locations and applications where lubrication is difficult or impossible to apply, such as cam rollers, vertical shaft guide bushings, or dampers. "There is no production loss due to bushing failure, product spoilage, or replacement or maintenance costs," highlights FitzGerald.

Graphalloy® is particularly advantageous in extreme conditions where traditional bearing materials fail. Its ability to withstand harsh environments makes it suitable for high-tem-

perature furnaces, ovens, and submerged pump applications where conditions such as high humidity, caustic substances, or abrasive materials are present. It can also be used in cryogenic applications, demonstrating its versatility across a broad temperature spectrum. In addition, its non-galling nature ensures smooth operation even in instances of marginal misalignment or shaft deflection.

Another significant benefit of Graphalloy® is its resistance to chemical corrosion, making it ideal for use in the chemical, wastewater, and process industries. Applications where traditional lubricants would wash-out, degrade or contaminate the environment benefit greatly from Graphalloy®'s solid, self-lubricating properties.

ISO-Reliability Partners is an own emblem manufacturer (OEM) of class-leading micro fine oil filtration solutions, vacuum dehydration systems, automated water removal for compressed air, and high-efficiency industrial air scrubbing. "Our high production standards ensure customer satisfaction and unrivalled protection of their critical production equipment," concludes FitzGerald.

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GreenIron to deploy ABB technology for greater circularity in metals and mining industries



1. Swedish pioneer for fossil-free metal production chooses ABB distributed control system to manage and automate its process
2. Order supports GreenIron's ambition to lead the industries' transformation to a circular economy and reduce CO₂ emissions
3. Latest version of ABB technology will create optimizations and efficiencies and is key to GreenIron's scale up and commercialization

ABB has been selected by GreenIron, an innovative Swedish company working in the mining and metals industries with its patented materials reduction technology, to provide automation and control system solutions for a first commercial facility in Sandviken, Sweden.

GreenIron's hydrogen-based reduction technology will be industrialized for fossil-free and energy-efficient production of metals, producing fossil-free sponge iron that can then

be used in industries such as steel-making. A single furnace is expected to reduce carbon emissions by around 56,000 tonnes per year compared to traditional coal-based methods, with the only residual product being water. Scaling up to 300 furnaces would correspond to roughly 35 percent of Sweden's annual CO₂ emissions.

The integration of the ABB Ability™ System 800xA® distributed control system (DCS) will enable the scaling up of GreenIron's operations. The

powerful automation platform will manage the entire industrial process, with the capabilities to integrate control, safety and power management into one system. It will mean overall plant visibility for optimizations, efficiencies and better decision making based on data and insights.

GreenIron paves the way for circular production processes by producing valuable raw materials from residual products such as landfills and residues as well as virgin ore. The sponge iron products can be used in steel or other metal fabrication processes, including electric arc furnaces, smelting plants and foundries.

“The collaboration with ABB is a crucial part of our scaling up and future growth as we commence commercial production,” said Ulrika Molander, Chief Operating Officer of GreenIron. “ABB’s system will enable us to make informed decisions, stabilize operations at every stage, and analyze data for our continued journey. It’s an exciting time for us.”

“Together with GreenIron we’re working on fulfilling sustainability objectives that are demanded by the metals industry and wider society,” said Martin Björnmalin, Local Business

Line Manager for Metals, ABB Process Industries Sweden. “This is the type of project that underlines our actions in helping industries to outrun leaner and cleaner, and also aligns with an innovative process developed by our customer over many years. With this order, we will work on supporting an impactful industrial solution, bringing our technologies that are entirely scalable for future expansion. Our people are also using their expertise from mining and metals to ensure productivity and efficiency through centralized control rooms, production scheduling, and cost and resource modelling.”

ABB and GreenIron’s technologies are compatible with renewable, intermittent power sources like solar and wind. The goal is to contribute to the creation of a CO2-free value chain, from the extraction of ore to the production of steel and various metals. Together, these industries account for around eight per cent of global CO2 emissions, according to International Energy Agency (IEA) figures.

As industries undergo increased digital transformation, System 800xA remains key to ensuring safe, efficient and reliable operations, enabling the collection of valuable data and analyt-

ics for real-time insights. ABB’s DCS technology has been at the heart of process and energy industry operations for more than 40 years.

ABB is a global technology leader in electrification and automation, enabling a more sustainable and resource-efficient future. By connecting its engineering and digitalization expertise, ABB helps industries run at high performance, while becoming more efficient, productive and sustainable so they outperform. At ABB, we call this ‘Engineered to Outrun’. The company has over 140 years of history and more than 105,000 employees worldwide. ABB’s shares are listed on the SIX Swiss Exchange (ABBN) and Nasdaq Stockholm (ABB). www.abb.com

ABB’s Process Automation business automates, electrifies and digitalizes industrial operations that address a wide range of essential needs – from supplying energy, water and materials, to producing goods and transporting them to market. With its ~20,000 employees, leading technology and service expertise, ABB Process Automation helps process, hybrid and maritime industries outrun – leaner and cleaner. go.abb/processautomation



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Incentive solutions foster well-being in the workplace

Rewarding adherence to safety protocols is more than a procedural step; it is a strategy for fostering a workplace that values well-being, says adumo Payouts CEO Steve Mallaby. "While some employers may question the need for additional compensation, viewing it as redundant, a well-structured incentive shows employees that their safety and well-being matter. This approach transcends the transactional and reinforces genuine care and commitment," explains Mallaby.

When conducted effectively, such a programme can encourage employees to remain vigilant and motivated, shifting the culture towards safety as a shared goal. It not only improves morale and job satisfaction but also reduces safety incidents, enhancing productivity and sustaining profitability. Beyond workplace benefits, incentive-driven safety programmes can positively impact surrounding communities, as they reflect a mining company's commitment to safe and fair working conditions.

adumo Payouts is also dedicated to improving financial security through its payout mechanisms, designed to enhance employees' economic partic-



ipation. By partnering with credible payouts providers, companies ensure that employees receive incentives that are paid out separately from their wages, with clear, transparent access to these funds.


"We ensure these incentive payouts are protected from debit orders and garnishees deductions, thus enabling employees prioritise savings and manage debt more effectively," explains Mallaby. adumo Payouts has plans to introduce additional benefits for mineworkers, with an emphasis on empowering the growing number of women in the sector. He emphasises the pivotal role of their payout model

in fostering financial independence for female employees, whilst in the future also providing crucial support to families impacted by workplace incidents and fatalities.

adumo Payouts recently collaborated with South African iron-ore producer Kumba Iron Ore on its 'Leading with Care' initiative at the Kolomela iron ore mine in the Northern Cape. Integrating adumo Payouts' card-based incentive system with Kolomela's app, the programme offers a seamless voucher-based reward system for safety and production achievements, reinforcing a culture of recognition and care at every level.



Intelligent Automated & Future Proof

A large yellow and black Epiroc SmartROC D65 down-the-hole drill rig is shown in a mining environment. The rig is positioned on a rocky surface, and its long vertical mast extends upwards. The background features a sunset or sunrise sky with soft, colorful clouds over a dark, forested horizon.

The SmartROC D65 down-the-hole drill rig brings the future of mining within your reach today. Give your operation the chance to profit from the added intelligence of this market-leading drill rig.

The efficient SmartROC D65 consistently delivers high-quality blast holes with accuracy and precision. It is loaded with smart features such as automated drilling and rod handling. The extra-long feed option with 8 meters pipes makes it possible to drill 16m production holes with just one rod-adding. It's also possible to drill 229 mm holes (9 inches) thanks to the power of the COP M7 hammer. All these features and flexibility are packed in a rig which is economical to run due to the intelligent control of the compressor and engine rpm.

The SmartROC D65 also uses 300 liters less hydraulic oil than previous versions and features fewer hoses and pumps. This helps to further reduce costs and makes servicing easier, whilst increasing sustainability and reducing the environmental impact of the rig. The SmartROC D65 is controlled via an advanced rig control system displayed on a touch screen inside the comfortable, air-conditioned FOPS and ROPS-certified cabin. It presents everything from drilling parameters to real-time Measure While Drilling data (MWD). A SmartROC rig from Epiroc can significantly raise quality across the whole operation.

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Innomotics Powers Largest Heat Pump System in the Netherlands

- Innomotics, ENECO and Johnson Controls successfully complete collaboration project
- Innomotics' motors and drives help deliver 25-27 MW of sustainable heat from treated wastewater
- 30,000 tons of CO2 emissions reduced annually, heating 20,000 households

Utrecht, February 03, 2025 – Innomotics, a globally leading provider of electric motors and large drive systems, has played a pivotal role in the realization of the largest heat pump system in the Netherlands. It is located at the municipal wastewater treatment plant in Utrecht. The system harnesses residual heat from 65 million liters of treated wastewater daily, generating 25-27 MW of heat. This translates to 15% of the district heating demand in Utrecht and Nieuwegein or approx. 20,000 households in total. Thanks to Innomotics' state-of-the-art motors and frequency drives, the project achieves unparalleled energy efficiency while saving 30,000 tons of CO2 annually.

Innomotics supplied:

- 8 Perfect Harmony GH180 frequency drives
- 8 A-Compact Plus units, with one spare, providing optimal operational flexibility

The system consists of four heat exchangers, each with two compressors driven by an Innomotics 1MW motor, which in turn are each controlled by an Innomotics GH180 frequency drive. These components are integral to extracting residual heat from 65 million litres of treated wastewater daily. The system uses ammonia—a natural, environmentally friendly refrigerant—to supply heat to the Utrecht district heating network. Additionally, 1 MW of extra heat is recovered from the motors and drives, contributing to the district heating network's efficiency.

"This project exemplifies how advanced motor and drive solutions can transform energy challenges into sustainable opportunities," said André Hillebrink, Technical Sales Support Professional at Innomotics. "We are proud to contribute to a system that not only brings us closer to achieving renewable energy goals but also directly benefits local communities."

Collaboration project with showcase character

The project is the result of a seamless collaboration between ENECO, Johnson Controls, and Innomotics. ENECO spearheaded the development of the facility, Johnson Controls provided the advanced heat pump systems, and Innomotics delivered the cutting-edge motor and drive technologies that ensure its exceptional performance. Combined, the companies have created a replicable model for modern urban renewable energy systems.

"This project exemplifies ENECO's commitment to innovation and sustainability. Innomotics' innovative motors and drives were essential to the success of this project," said Sander Tensen, Manager Engineering at ENECO. "Innomotics' cutting-edge technology and reliability ensured that we could achieve both high energy efficiency and substantial CO2 savings, making a real difference for our district heating network and the environment," adds Sander Tensen.

Detecting Lubrication Issues in Gearbox Testing by IR Monitoring

Monitoring Temperature Rises to Ensure Gearbox Health and Preventing Damage in End-of-line Inspections

Detecting Insufficient Lubrication during Gearbox Testing through a Rise in Temperature

Lubrication is crucial for every transmission gearbox. If lubrication is too low or absent, friction between the gears increases the housing surface temperature, leading to excessive mechanical wear.

Once a vehicle is manufactured, it undergoes a test bench assessment before leaving the factory for sale. As part of the end-of-line testing, manufacturers need to check the thermal behaviour of the gear transmission boxes. An excessively hot gearbox after a short drive or uneven heat distribution may indicate insufficient lubrication, necessitating further inspection. This inspection is vital because inadequate lubrication can cause the gearbox or differential housings to overheat, leading to permanent quality issues for the internal components if not detected in time.

Manually checking for sufficient lubrication in the gear housings is time-consuming and requires operators to be highly meticulous during inspection, as thermal issues could be identified too late. Attaching contact temperature sensors to every gearbox is also impractical and labour-intensive in production. Lubrication cannot be visually checked in a bench test, and even if a temperature sensor is attached to the gearbox, it might be faulty or need to be connected to another test bench data acquisition system.

Implementing automated thermal imaging solutions can streamline this process.

Quickly Detecting Temperature Varia-



tions to Ensure Proper Lubrication and Preventing Gearbox Damage

Thermal imaging cameras, such as the PI 640i, quickly and accurately detect temperature variations. They ensure that gearboxes are appropriately lubricated before they leave the factory, saving time and enhancing the reliability and quality of the final product.

An infrared camera measures the surface temperature of the gearboxes and differential housings, which are sealed and opaque. Once the engine is switched on, the gearboxes' surfaces become hot if the moving gear inside is insufficiently lubricated or not lubricated due to mechanical friction.

Low-temperature thermal imaging cameras, such as the PI 640i or the Xi 400, effectively measure the surface temperature. The lacquered metal boxes are advantageous as the coating increases their emissivity, allowing low-temperature thermal imaging cameras to be used. The speed of measurement is a key advantage, as Optris infrared cameras can connect to control systems to send visual, audible, or alarm signals at specific temperature thresholds. This ensures a quick response to fault situations, such as sending a signal to shut down the motor immediately if there is a risk of gear damage.

This testing process can also be automated. Thanks to the compact in-

stallation, the operator can save time efficiently with minimal effort without negatively affecting parallel testing processes.

High Thermal Sensitivity and Fast Response: Essential for End-of-Line Gearbox Testing

The Optris Xi 400, Xi 410, and PI 640i thermal imaging cameras offer an advanced solution for quality assurance in final inspections. They enable fast and precise measurement of gearboxes and differential housings. Lubrication can decrease over time due to seal ageing. By monitoring temperature distribution in real-time, the cameras can detect anomalies immediately and send signals to the appropriate control authorities for a prompt response.

These thermal cameras detect and communicate with peripheral devices such as data loggers, PLCs, and simple controllers. Their application extends beyond final inspection to include preventive maintenance of stationary motors used in these systems.

Optris infrared cameras provide detailed thermographic data, enabling immediate analysis and adjustment. They offer various communication options, including remote communication and adjustment via Ethernet networks, such as the control room.

The sophisticated, license-free PIX Connect software opens many possibilities for implementing a detection system that easily integrates into existing processes without disrupting manufacturing or inspection workflows. This enables customers to optimise and significantly enhance the efficiency of their processes.

The New Era of Pump Wear Technology



The efficient operation of slurry pumps in the mining industry is critical and pump wear technology is playing an increasingly significant role in monitoring and maintaining pump performance.

An innovative solution that is making waves in the industry is the KSB GIW® SLYsight technology. This advanced slurry pump wear monitoring technology is changing the way pump wear is detected and managed and is leading to improved pump performance with longer equipment lifespans.

According to KSB Pumps and Valves' Market Area Manager for Mining, Jacques Pretorius, the transportation of abrasive and corrosive mixtures in mining operations is the task of slurry pumps. The nature of this duty inevitably results in wearing of sacrificial components. It is crucial for slurry pump users to manage the results of this wear in relation to maintaining optimum pump efficiency. Although traditional methods of monitoring and managing pump wear through manual inspections and scheduled maintenance

are common, they come with limitations such as time and resource expenditure.

"Additionally, such approaches are reactive, meaning wear is often only identified after it has impacted pump efficiency leading to higher maintenance costs and potential downtime. Therefore, there is a pressing need for a more advanced solutions that can offer precise and timely insights into the wear status of slurry pumps, enabling a more proactive approach to

maintenance.

"KSB GIW® SLYsight utilises custom sensors, in strategic locations, to measure the actual wear rate of a slurry pump's parts including the internal clearance between the suction liner and the impeller - also known as the "nose gap." The data collected by the sensors as the pump runs is shared through periodic reports.

"This enhanced monitoring system delivers data during nose gap adjustments that not only contributes to the pump's maximum wear life but also enables operators to make an efficient and safe adjustment while the pump is operating," says Jacques.

He adds that integrating KSB GIW® SLYsight technology can prevent unforeseen shutdowns and streamline operations. At the same time, the technology helps avoid premature replacement of sacrificial components BEFORE they reach their maximum service life. By implementing this system, slurry pump maintenance planning becomes more straightforward, eliminating uncertainty. . The great-

est advantage is its ability to supply maintenance teams with data that was once inaccessible. This technology enhances the understanding and management of pumping equipment wear by providing visual data reports and monitoring capabilities.

By comparing KSB GIW® SLYsight technology to traditional wear monitoring practices it becomes clear that the field of pump maintenance is shifting. The limitations of periodic inspections and human intervention including subjective interpretation and variations in precision are intrinsic to traditional methodologies. Although these approaches served their purpose, they often lead to strategies that only address wear once it has already impacted pump performance.

KSB GIW® SLYsight by comparison employs real-time monitoring of wear and introduces an objective lens that enhances accuracy and eliminates guesswork. This technology enables much more informed decision-making that can pre-emptively counter potential wear and tear issues before they escalate. By freeing up resources and allocating time and manpower more efficiently, the new system is clear improvement over traditional manual inspections.





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Keys to Successful Conveyor Safety & Maintenance Training

*Jerad Heitzler, Training Manager /
Martin Engineering
Todd Swinderman, P.E. and CEO
Emeritus / Martin Engineering*

Bulk-handling conveyors are massive, powerful systems that move tons of material per hour in complex networks over long distances. Whether the systems are in a mine, cement plant, port, or quarry, their size, speed, and power present the risk of catastrophic injury in the blink of an eye. This makes training essential, no matter what activity is happening around a conveyor.



Training Challenges

Many industries are facing the retirement of workers with expertise and knowledge, leaving them without adequate mentorship. This has both good and bad aspects. Although basic on-the-job training passed down from worker to worker is valuable, it can leave organizations vulnerable to past workers teaching bad habits.

Unless the operations personnel have solid, real-world knowledge in bulk material handling to make educated decisions when addressing problems, bad habits are easily perpetuated. Knowledge needs to help maintenance workers avoid costly and dangerous trial-and-error learning.

Understanding how and why accidents happen is also critical in preventing them from occurring. Having knowledgeable trainers who address the symptoms of problems with workable long-term solutions will reduce unsafe practices and improve

efficiency while enhancing profitability.

Seek Deeper Understanding

In many operations, there is a lack of qualified conveyor trainers. Equipment vendors and third-party trainers can be highly effective sources of training. However, with hundreds of companies providing such services, expertise and approaches can vary widely.

Training specialists from equipment manufacturers who offer training programs like Martin Engineering, focus on overall conveyor performance and safety training. Combining deep industry experience and modern engineering will significantly improve operating decisions, resulting in higher productivity, fewer safety incidents, and reduced unplanned outages.



Qualified teachers should provide a variety of delivery methods based on different learning styles. For example, they should provide good graphics for visual learners, clear documentation for those who learn best by reading, demonstration models, or actual equipment for hands-on learners. These methods should all be designed to increase the probability of measurable positive results.

The Payback on Quality Training

Organizations that embrace an effective training culture from the top down show significant performance advantages over the competition. This is reflected in safety, productivity, and environmental records, as well as above-industry-average financial returns and share prices.

While many training efforts aim to

maximize productivity, improving safety is a key element in achieving this objective. Insufficient safety training can be incredibly costly to an operation. When companies ensure workers have adequate training on particular risks, costs are minimized. Instead of simply teaching workers how to maintain a conveyor system, educators must also help students understand the consequences of not performing adequate maintenance.



With over 80 years of solving bulk handling challenges, the Martin Engineering Foundations™ Training has established itself as the most detailed and comprehensive conveyor belt maintenance and safety training system in the bulk handling industry. Using the Foundations™ textbooks, onsite trainers provide both classroom and hands-on training on the equipment trainees experience daily. The free online Martin® Foundations™ Learning Center, accessible by computer, tablet, or smartphone, supports the lessons and is available 24/7. It uses a mix of text, photos, videos, webinars, online events, and live experts available to answer questions.

Martin trainers use the most effective training approach, which examines a plant's specific conveyor challenges and helps companies run cleaner, safer, and more productive operations by treating the root causes of their problems. When workers and management understand why specific actions are essential and the cascading effects of poorly trained staff, they are more likely to adjust their behaviors and reap the benefits.



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Pratley reflects on a thriving 2024 despite economic climate



Local manufacturer Pratley continues to grow well despite weaker economic conditions last year, comments CEO Andrew Pratley. The company aims to launch at least two or three new products every year, and certainly 2025 will be no different. "We have world-class prod-

ucts unlike any others on the world market and continuously roll these out to new export markets."

Pratley's strategy to tap into such new opportunities is to identify suitable distributors in export markets with a similar business and ethical culture.

"We focus on companies that are quality conscious, have technically sound sales teams, understand the local market and operating environment, and have a distribution network that fits our product range," highlights Andrew.

Export growth continues to be a critical driver for Pratley's overall expansion, with Africa offering significant opportunities across all its divisions. "Notably, we have made remarkable progress over the past year in having our electrical termination products specified for numerous large-scale projects across various countries, especially in Europe, Africa and the Middle East," reveals Andrew. In addition, Pratley has dedicated sales teams focusing on the African market, working closely with distributors to maximise synergy and deliver exceptional results.

With regard to its adhesives division, Pratley made significant progress over the last year in perfecting the performance of many of its existing products. In most instances it has managed to optimise existing formulations while also taking performance and reliability to even higher levels.

"This is thanks to an extremely competent R&D department as well as newer production technologies that went online this year. Over recent years we have diversified our range of adhesive products significantly. In the past, we mainly focused on high-strength epoxy and acrylic based adhesives," says Andrew.

In 2024, the company also took major strides towards energy sustainability, installing at least 600 kW of solar power with more to come. This has not only mitigated unnecessary production stoppages due to unreliable electricity supply issues but has also lowered the company's carbon

footprint.

"Pratley takes the stance that whatever we install or do, we need inhouse expertise to maintain and manage the system, so we are not completely reliant on external support. We achieve this by getting our internal personnel to get actively involved in each and every installation," says Andrew.

Another exciting development has been to significantly upscale the capacity of the Cape Town and Durban branches in terms of building infrastructure. The extra capacity will come online within the first quarter of 2025. "This move also allows for significantly increased warehouse capacity in the Western Cape, especially in relation to our mineral products. It will ensure we have even larger quantities of product at the doorsteps of customers, especially for the wine filtration and farming sectors in this region," highlights Andrew.

Pratley has also made a considerable investment in upgrading its training facilities over the last two years, as training and skills development remain a priority. "We offer in excess of 1 000 products, many of them for use in hazardous locations. These products must be selected correctly and installed by competent personnel or installers. This can only be done safely if personnel are well trained," notes Andrew.

Pratley's training facility provides this theoretical and practical product training, at no charge to customers. "We are passionate about safe electrical

installations in hazardous locations where explosive atmospheres are present. Our training facility is world class."

"Training and education are the foundation for the future of South Africa. Strategically, we are also going to increase the number of training sessions we present in 2025, thanks to recent resourcing and upgrading of our world-class training facility," says Andrew.

Looking ahead to 2025, Andrew remains optimistic about continued growth. "The further longer-term outlook for the economy is somewhat obscured due to all the moving parts of late, not only in South Africa but also what is playing out on the world stage.

"Certainly, there seems to be positive sentiment towards the Government of National Unity. However, it is still early days. Its stability and efficacy will be crucial. Interest rates and fuel prices have eased and brought some relief, which should put consumers and businesses on a better footing going into the New Year," says Andrew.


However, he predicts that the success of 2025 will also be determined by how geopolitical tensions play out globally. "The new administration in the United States is going to be a key determinant of what happens next. As always, from a Pratley perspective, we will continue to do what we have always done and use our many strengths and capabilities to our advantage," concludes Andrew.




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Premium lubricants improve plant and equipment productivity

Dramatic improvements in plant and equipment productivity are possible through innovative solutions and superior performance lubricants from ISO-Reliability Partners. "In all instances, we work together with end users to deliver on our promises of higher availability and reliability of production and processing equipment," says Craig FitzGerald. Benefits include increased production, lower cost of operation, reduced electricity consumption, and lower carbon footprint.

ISO-Reliability collaborates with brands such as Bel-Ray and Royal Purple to achieve the best possible output performance from machinery.

"We have strong relationships with the world's premier lubrication manufacturers," says Craig. Product offerings include environmentally accepted lubricants, biodegradable lubricants, non-toxic and food-grade lubricants, and EU Ecolabel certification.

In an environment where stricter government regulations are in direct contradiction to reducing operating costs, more manufacturing plants should be turning their attention to lubrication reliability best practices.

Speaking about lubrication in large open gear systems, Craig explains that, historically, manufacturing plants with open gear systems have made

use of asphaltic compounds to provide a 'cushioning' effect. A vast majority of these open gear compounds contained lead, which ultimately provided protection for the gears.

However, in recent years, many of these lead-containing products have been removed from the market due to it being classified as hazardous waste material. The resulting products have led to diminished performance characteristics with less protection for gears.

Where asphaltic products have traditionally been used, there is often a build-up of hardened lubricant product in the roots of the gears. This build-up presents multiple problems



to provide protection for high-load, heavy-shock applications such as large shrouded open gears used in the mining, mineral processing, and cement industries.

As the official distributor for the Bel-Ray lubricants in South Africa, ISO-Reliability Partners has been instrumental in the implementation of lubrication programmes using CLEAR GEAR® at manufacturing plants across Southern Africa. These include Sibanye Platinum's site in Rustenburg and DRDGold in the North West.

Past experience with converting mills to CLEAR GEAR® has seen a power consumption reduction of about 12% and reduced pinion vibration of up to 15%. Due to the lubricant's ability to remain on the gear, hydrocarbon contamination of the process fluid was eliminated, leading to increased recovery of Platinum Group Metals (PGMs) by between 0.75% to 1%. Noise levels have also been reduced in line with Sibanye's 'Zero Harm' philosophy.

"Proprietary micro fine filtration systems and premium lubricants provide customers with total asset protection, improved power efficiency, decreased environmental contamination, extended equipment life, increased production, and improved reliability and availability of the plant," says Craig. He concludes that CLEAR GEAR® is leading the way to improved plant performance and significantly cleaner operations, with a considerable financial gain for end users.

related to cleaning and mechanical interference that can result in root build-up or stress on the pedestal mountings.

Modern large gear systems are often overloaded, and to attempt to cope with the problem, operators apply increased amounts of lubricant – usually two to three times more than recommended by the American Gear Manufacturers' Association.

In response to the problems associated with traditional open gear lubricants, global leading lubrication manufacturer Bel-Ray specifically developed CLEAR GEAR®, a heavy-duty synthetic oil designed





ROMPCO a key participant at Africa Energy Indaba 2025

The Republic of Mozambique Pipeline Investments Company (ROMPCO) will be a key participant at the Africa Energy Indaba 2025 from 4 to 6 March at the Cape Town International Convention Centre (CTICC) in Cape Town, South Africa. This premier event serves as a pivotal platform for energy professionals, policymakers, and investors to engage in discussions and collaborations aimed at addressing Africa's energy challenges and opportunities.

"These events assist with networking as it gets industry players in the same place at the same time to discuss issues of mutual interest. Some of the discussions lead to business partnerships and potential unblocking of challenges," comments Motlokwe Sebake, GM of Commercial and Stakeholder Management at ROMPCO.

"The Africa Energy Indaba is a catalyst for partnerships, investment, and policy alignment that directly support ROMPCO's growth, sustainability, and

role in Africa's energy transition. Our aim is to also position us as a leader in gas transmission in the region," adds Sebake.

ROMPCO believes that natural gas is critical for a sustainable energy mix in Africa. Countries that have abundant natural gas resources include Angola, Mozambique, Tanzania, Egypt, Morocco, Libya, and Nigeria. However, some or most of these resources are considered stranded, as they are far from markets where they are needed.

Natural gas is one of the cleaner options of the dispatchable energy when compared with other fossil fuels, as it has the lowest carbon footprint of all hydrocarbon fuels. Coal has the highest greenhouse gas emissions, followed by crude oil and then natural gas when used to generate the same amount of energy. The combustion of natural gas emits about half as much carbon dioxide as coal and 30% less than oil, as well as having far fewer pollutants per unit of energy delivered.

As the world transitions from hydrocarbon fuel sources to renewable energy, natural gas – due to its lower carbon footprint – is the best fossil fuel to bridge the gap until alternate renewable fuel sources such as batteries and alternative energy sources like green hydrogen become more economically viable to replace natural gas as a fuel.

While battery technology is still too expensive, gas to power (being self-dispatchable) is the best complementary technology to non-self-dispatchable renewable energy such as wind and solar, which currently makes up 9 GW of South Africa's total energy mix.

Sebake reveals that ROMPCO is in the process of defining its Environmental, Social and Governance (ESG) baseline to assess its current practices and performance on various sustainability and ethical issues, including its environmental impact. "The baseline assessment will assist us to measure

business risks and opportunities going forward to ensure we improve our carbon footprint across our supply chain."

Meanwhile, natural gas plays a significant role in the South African economy. According to the Industrial Gas Users Association of Southern Africa (IGUA-SA), the current revenue is more than R500 billion a year, with over 70 000 people employed in the sector. Gas can be used for heating in industries, hospitals, and households, and can also support growth in the transport sector through the use of compressed natural gas (CNG).

Small-scale LNG can allow for natural gas to be transported to key demand areas to substitute expensive and higher green-house gas fuels such as coal and diesel. This will be the initial driver to pave the way for implementation of long-term gas infrastructure that will enable an energy transition to green hydrogen in the future.

"There is currently a high consumption of diesel in the mining sector that can be replaced by natural gas," points out Sebake. A number of mining companies have transitioned to natural gas to reduce costs and to also improve their carbon footprint. Reduced costs ensure a longer operational life of mine and ongoing employment.

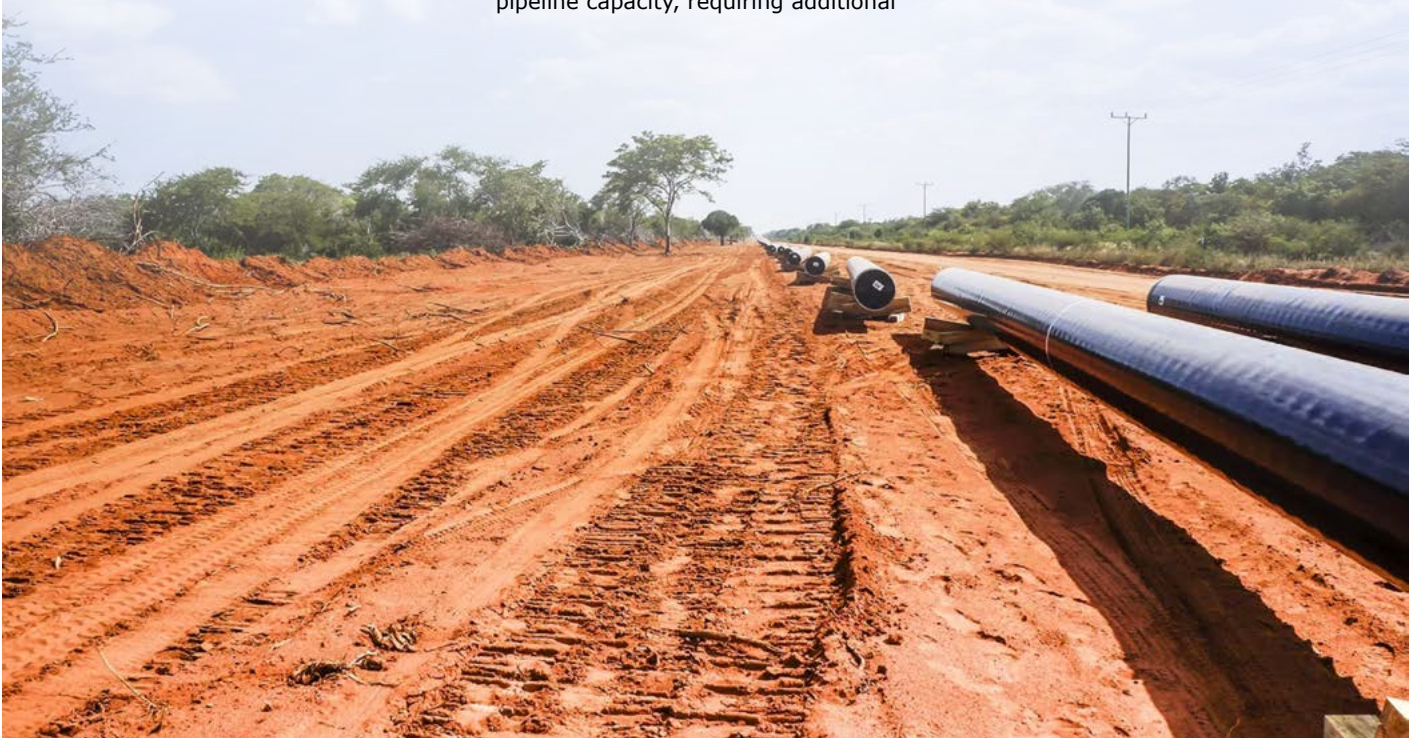
In addition, new demand is coming in from low load factor gas-to-power facilities, which require the capacity for baseload gas as a power source, even though this may not be used all the time. This is likely to take up pipeline capacity, requiring additional

investment to enable the implementation of new power generation facilities. The costs involved may initially seem prohibitive, but ultimately this will be beneficial in adding complementary power stations to support renewable energy.

Sebake says that diversification through virtual pipeline gas (small-scale LNG and CNG) is important to ensure revenue diversification and increase the market reach for natural gas, namely LNG and/or CNG, which may be transported to beyond the current physical infrastructure, thereby contributing to ROMPCO's sustainability.

"ROMPCO is investigating potential investment opportunities with consideration for innovation in construction technology to save costs and build quicker, as well as using potential composite materials that are more durable, less corrosive, and a lot lighter to transport, install, and maintain," says Sebake.

He concludes: "As a cross-border gas transmission company, ROMPCO is aware of the importance of regional collaboration, which we encourage. We are continuously engaging with both governments and participate in all relevant conferences, such as Africa Energy Indaba, as well as key delegate meetings between South Africa and Mozambique and other Southern African countries such as Namibia, Tanzania, and Angola."



Rosond announces appointment of Glen McGavigan as incoming Chief Executive Officer



Experienced mining professional to lead the company into a new era of growth and innovation

Leading drilling and exploration specialist Rosond is pleased to announce the appointment of Glen McGavigan as Chief Executive Officer, effective 13 January

2025. This marks a pivotal moment in Rosond's history as it welcomes an industry leader with over 25 years of diverse experience in the mining value chain into the business.

McGavigan brings a wealth of experience to the role. He holds a master's in mining engineering, a

graduate diploma in rock engineering, a bachelor's degree in geoscience, and a certificate in rock engineering from the Minerals Council South Africa.

His career has spanned key roles, including Head of Geosciences, Principal Geotechnical Engineer, and Senior Geotechnical Engineer. Most

recently, he served as Executive Head of Technical and Projects at Kumba Iron Ore, where he over saw the technical disciplines of exploration, geology, mining engineering, processing, asset management and business improvement. In this role he was also responsible for the company technology transformation as well as expansion capital projects.

Outgoing CEO and incoming Executive Chairman Ricardo Ribeiro expressed confidence in McGavigan's appointment, emphasising his track record of innovation and leadership. "McGavigan's extensive expertise in mining and geosciences, combined with his passion for innovation, positions him perfectly to lead Rosond into its next phase of growth. I look forward to working closely with him as we continue to expand and enhance our value proposition," says Ribeiro.

"I am deeply passionate about using science and technology to transform our industry and create lasting positive impacts in the communities

where we operate," says McGavigan. "Rosond's people, culture, and vision align strongly with my values, which is crucial. The company has immense potential both locally and internationally, and I am excited to build on the foundation of innovation and excellence that has been established over the years.

"As the world accelerates its drive towards decarbonisation, the discovery and development of new orebodies will be critical. Rosond, as a leader in exploration drilling, is well positioned to capitalise on emerging opportunities," elaborates McGavigan.

Rosond's roots are proudly South African. McGavigan, having spent 26 years working in-country, is bullish about the potential of the region. "South and southern Africa remains one of the most attractive junctions for mining on the globe. We look forward to continuing to be a key player in this region."

Looking ahead to Rosond's strategic

expansion into the Middle East through its Rosond Arabia operation, McGavigan highlights the region's potential: "Saudi Arabia is an underexplored market with significant opportunities, particularly for future-facing minerals. The Kingdom's focus on diversifying its economy beyond oil and gas aligns perfectly with Rosond's expertise in exploration and innovation. It is an exciting geography for growth."

Established in 1956, Rosond has a proud legacy of providing cutting-edge exploration drilling, geotechnical services, underground drilling, and mineral resource management. A leader in innovation, the company has introduced robotics and automation in drilling processes and pioneered techniques for deep-level mineral exploration.

Under the leadership of the Ribeiro family, Rosond has forged strong partnerships with leading mining companies both locally and internationally, completing large-scale drilling projects in multiple regions. Its Environmental, Social, and Governance (ESG) programme underscores the company's commitment to sustainability, with a goal of achieving net zero emissions by 2050.

"I have always believed in the principle of doing 'good science'—making decisions based on robust knowledge, applying the right energy, and maintaining unwavering integrity. As I step into this role, my focus will remain on safety, employee well-being, and delivering positive outcomes for the company and the communities we serve," concludes McGavigan.



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 up to 100 amps
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 up to 140 amps
 max. 10 poles
 up to 450 m/min
 -30 °C to +55 °C



U20 | U30 INSULATED CONDUCTOR SYSTEM
 up to 1000 amps
 up to 600 m/min
 -30 °C to +85 °C




U15 | U25 | U35 INSULATED CONDUCTOR SYSTEM
 up to 1250 amps
 up to 600 m/min
 -30 °C to +130 °C



ENCLOSED KSL SYSTEM
 up to 200 amps
 up to 250 m/min
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ENCLOSED KBH SYSTEM
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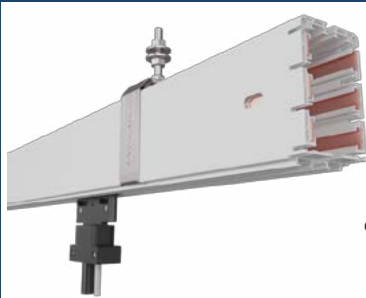
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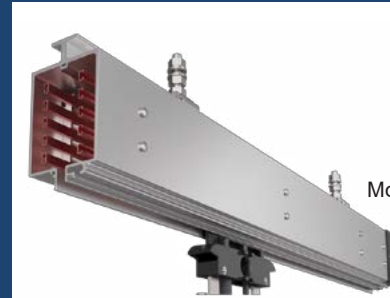
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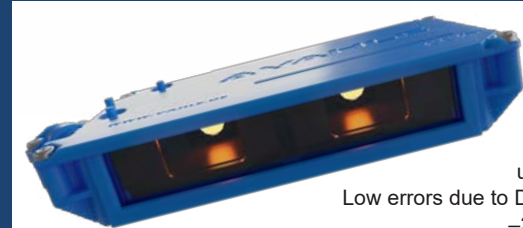
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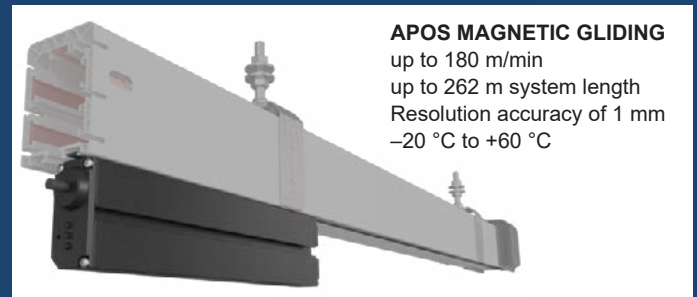
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 up to 100 MBit/s
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 Coexistence with
 existing free radio
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SMGM
 up to 100 MBit/s
 up to 180 m/min
 Can be integrated
 into all common
 EMS profiles
 0 °C to +50 °C

SLIDING THROUGH TIME: Lubrication from stone age to modern age

Part 1 of 3

by Steven Lumley – technical manager, WearCheck

Lubrication from Stone Age to Modern Age



From stone age to modern age, pharaohs to phenols, the history of lubrication is a story that demonstrates how a seemingly simple substance - oil - has propelled human progress, shaped industries, and ushered in a world of smoother operations and optimised performance.

Now, while the field of tribology - which is the science of friction, wear and lubrication - has advanced significantly over the last 100 years, the roots of lubrication extend back further than one might imagine. Lubrication, in its simple form, has been in existence at least since the beginning of documented times.



Early humans recognised the importance of reducing friction, and intuitively understood that applying a lubricant between two surfaces would ease their movement. Before the Common Era, tallow (animal fat) and naturally occurring elements were used for lubrication for chariots and in transporting construction materials. In fact, one of the earliest examples of tribological practices can be found in the ancient Egyptians' use of lubricants to reduce friction in the movement of large stones during the building of the pyramids. Other ancient civilisations like the Greeks and Romans used olive oil and other plant-based oils as lubricants.

Fast forward past the dark ages, (trust me, nothing much happened with lubricant development then) and twelve centuries later, tribology as a scientific discipline begins to take shape during the Renaissance with our favourite Italian polymath - Leonardo da Vinci - whose observations about friction and lubrication laid the foundation for further exploration.

WearCheck is a registered ISO 9001, ISO 14001 and ISO 17025 company

Before the dawn of the industrial revolution, whale oil was commonly used as a lubricant, but with the worldwide decline in whale populations and the widespread use of machines, other sources of lubricants had to be found.

The discovery of crude oil in Pennsylvania in 1859 set the stage for the new oil economy, and led to the development of petroleum-based lubricants, which quickly replaced animal- and vegetable-based lubricants due to their superior performance and availability.

Today, lubricants are highly developed, using complex chemical methods designed to push their potential to the absolute limit. There are specific oils formulated for specific purposes, and our machines - from shipping, to transportation, to industrial factories - work faster and more efficiently than ever before. Our world could not function as it does today without modern lubrication advancements.

But how did we get here? Who first decided that mechanical lubrication was a good idea? And who helped develop these processes over thousands of years to get us to where we are today?

In this trip down memory lane, we will chronicle the significant milestones of lubrication through the ages - but don't be fooled, this isn't your run-of-the-mill timeline of notable inventions and courtly characters. Au contraire, like all good sagas, this tale is filled with intrigue and subterfuge, heroes and villains, great victories and heartbreaking defeats, all played out against the backdrop of human progress. So, join us as we pay tribute to the true significance of these early achievements and the remarkable people through history who pioneered an industry.

ANCIENT HISTORY (AKA A REALLY, REALLY LONG TIME AGO)

3500 BCE (Before Common Era) – 476 BCE

Historical context

Ancient history is the historical time period between the origins of human civilisation and the fall of the Western Roman Empire. Honourable mentions – this epoch includes the birth of civilisation in Mesopotamia, the emergence of written records in cuneiform and hieroglyphs, the rise and fall of fourteen different empires and kingdoms, with guest appearances by the bronze and iron age and one great flood.

3500-ish BCE

The oldest historical evidence of ancient oil use was discovered in archaeological records near the city of Hit in Mesopotamia, modern day Iraq. Hit, which straddles the Euphrates River, is the site of an oil seep known locally as The Fountains of Pitch.

This petroleum-derived pitch (bitumen) had the advantage of being both adhesive and slippery, making it suitable for a variety of applications, and so began our love affair with one of the world's most powerful substances.



Our Sumerian friends used the black goo as a caulk agent for waterproofing ships, as a lubricant on wheeled carts and as an adhesive to secure the handles of various tools, and even as a setting agent for jewels and mosaics, which no doubt made it a firm favourite with the arts and crafts crowd.

3000-ish BCE

Some of the most widely known uses of petroleum in ancient history were undertaken by the Egyptians. There are Egyptian hieroglyphs that depict the use of bitumen as an embalming fluid, to grease chariot wheels and in the construction of monumental structures like the pyramids. Egypt's primary source of bitumen was the Dead Sea, which the Romans later named Palus Asphaltites (Asphalt Lake).

2600-ish BCE



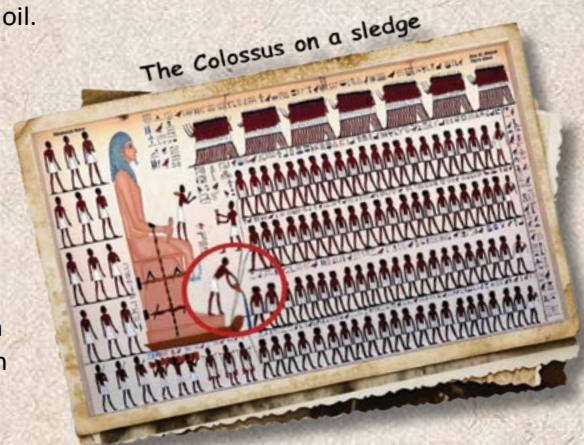
Archaeologists discover a greasy substance on a sled wheel dating back to 2600 BCE that belonged to an Egyptian pharaoh. Analysis later showed that this substance was a mixture of beef and sheep tallow (a rendered form of animal fat made up of triglycerides) mixed with lime powder. This discovery led to the conclusion that our ancient Egyptian friends also used tallow as a lubricant for their sleds to transport materials such as wood and rocks.

1900-ish BCE

Paintings and hieroglyphics found in the tomb of Tehuti-Hetap (a fourth-dynasty nomarch) in Deir El-Bersha in Egypt showed a giant statue of the man himself, being moved with the aid of a liquid that controversially is believed to be either water or oil.

The painting, aptly known as "Colossus on a sledge", depicts many labourers dragging the statue along the ground, with one man standing on a sledge pouring a mystery liquid on the ground, presumably to reduce friction between the two surfaces.

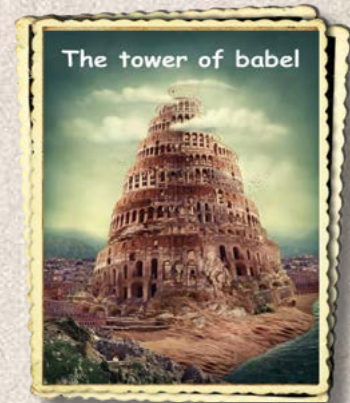
Unfortunately, no traces of this colossus have ever been found, but this has not stopped archeo-tribologists from arguing over whether this depiction was ceremonial in nature or proof of ancient tribological prowess.



1800-ish BCE

Back to Mesopotamia and following hot on the heels of their Akkadian predecessors (the people who conquered the Sumerians), we find the Babylonian civilisation using bitumen to construct roads and bridges. Bitumen was applied to road surfaces to help bind gravel and create smoother, more durable roadways. (Which is not a million miles away from how we make roads today.)

More than a millennium later, the Greek historian Herodotus, often referred to as the father of history, told how bitumen was used as mortar to construct the famous walls of Babylon, and the world's first skyscraper – "Etemenanki", also known as the Tower of Babel.



780-ish BCE

Meanwhile in East Asia, during the reign of the Western Zhou Dynasty, the Chinese discover the friction-reducing properties of a concoction made with vegetable oil and lead, making this momentous event the first historical record of what would later become known as a compound lubricant.

680-ish BCE

The inaugural Olympic Games were held in Olympia, Greece, in 776 BCE, but by 680 BC our Zeus-loving Hellenes had added four-horse chariot racing to the momentous event, and with that, the requirement for high-speed wheel-axle lubrication in the form of animal fat, making this milestone the first historical record of racing lubricants.

200-ish CE (Common Era)



Still in the Mediterranean, but 879 years later and during the Roman Empire heyday - also known as Pax Romana (Roman peace) - we find a multitude of olive oil-based lubricants in everyday use.

Experimentation at the time led to the use of more sophisticated lubricants, including those from olive oil and other vegetable derivatives. The Romans discovered that some of these more viscous liquids not only dissipated heat better than tallow, but also allowed mechanisms to move more freely. Writings by Cato the Elder (famous Roman senator, and historian) recommend that wagon axles should be lubricated with the boiled, viscous by-products of olive oil production.

Greases made from calcium salts and olive oil (basically calcium grease) were used to lubricate axles in horse-drawn chariots used for travel and warfare, and different oils were used in various metalworking processes, to lubricate moving parts in water clocks and to keep door hinges from squeaking in temples.

It was even rumoured that Caligula (3rd Roman emperor and all-round whack job) had his engineers make up a concoction of beeswax and olive oil to lubricate the bronze bearings on the rotating platform of his palatial pleasure barge on Lake Nemi.

These early experimentations marked the dawn of machinery lubrication and the world's love of olive oil as a salad dressing.

THE MEDIEVAL PERIOD (AKA THE DARK AGES)

475 CE - 1400 CE:

Historical context

The medieval timeperiod falls between the fall of the Western Roman Empire and the beginning of the Renaissance, and was mainly characterised by economic, intellectual, and cultural stagnation with feudalism, Viking raids and the bubonic plague also thrown in for good measure.

Long story short, people became superstitious, were mostly illiterate, and there was plenty of violence to go around. Honourable mentions for this period include advancements in armour technology, gothic architecture, the Wells Cathedral Clock and guest appearances by Attila the Hun, Charlemagne, King Arthur and Beowulf.

500-ish CE

During the medieval period, lubrication techniques were less advanced compared to later periods, and likewise the availability of specific lubricants and their use varied by region and technological development. During this dark time, tallow was predominantly used as a lubricant in Northern Europe to lubricate items like pivots and bearings. The stuff was often thickened with agents like clay or lime to form grease that was mainly used to lubricate gearing mechanisms in vertical watermills and post mills, for opening the gates of castles and on carriage wheel axles.

600-ish CE

During the late 7th century, warfare took a nasty turn with the invention of a devastating incendiary weapon called Greek fire – this stuff was nothing less than the medieval equivalent of a napalm bomb. This formidable weapon was invented by a Jewish refugee from Syria called Callinicus of Heliopolis during the reign of Byzantine Emperor Constantine IV.



Greek fire, or liquid fire as it was also known, was used by the Byzantine Empire during naval warfare and sieges. It was a highly flammable and adhesive substance that could stick to targets and continue to burn – not even water could extinguish it. The stuff would be fired at enemy ships from siphons, or hurled in pots, or sprayed using a basic handheld flamethrower-like device, or even used to create fire arrows.

The recipe for Greek fire was a closely guarded secret that was lost to history, so its exact composition is still a matter of speculation and debate, but many historians believe that it was composed of liquid petroleum, bitumen, and quicklime.

In spite of its name, Greek fire was not a Greek invention. The etymology of the term, just like the recipe for the stuff, is also shrouded in mystery, but historical records dating back to this time period claim that the term was coined by western crusaders 100 years after the stuff had disappeared from historical records.



700-ish CE

While Vikings are often associated with raiding and warfare, they were also skilled traders and boat builders. In fact, Viking warriors were considered the quintessential shipwrights of the 8th century and built longships called Drakkars - a term believed to derive from the Old Norse words “dreki” and “kar,” meaning “dragon” and “ship,” respectively.

These ancient mariners are believed to have used whale oil to lubricate the sails’ hinge supports, rowlocks and the rudder axes. This ‘new’ type of oil was obtained from the blubber of whale stomachs.

With their Drakkars well lubricated, these seafaring Northmen could go about their business of exploring new territories and raiding coastal regions.

THE RENAISSANCE (AKA THE AGE OF REBIRTH)

1400 CE – 1600CE

Historical context

Whatever we lacked in the dark ages we made up for in the Renaissance – this incredible period in human history was a cultural, artistic, and intellectual movement that marked a profound transition from the medieval to the modern world and, just like Ferraris, good espresso and Luciano Pavarotti, this movement traces its origins to Bel Paese - otherwise known as Italy

As civilisation continued to develop in Italy through the 15th and 16th centuries, some of the greatest revolutionary minds developed inventions and mechanical tools.



Honourable mentions of this era include astronomical discoveries, the development of artistic and scientific methods, and the invention of the printing press, microscope and barometer, to name a few.

As for guest appearances, the Renaissance was littered with the world's biggest ensemble of overachievers - Nicolaus Copernicus, Galileo Galilei, Johannes Gutenberg, Christopher Columbus, Dante, Andreas Vesalius, Michelangelo and, of course, Leonardo da Vinci.

1500-ish CE

With animal fats and primitive oily compounds in use throughout the world, the next true evolution in lubrication came from the father of invention, Leonardo da Vinci.

Signore da Vinci introduced the idea that the coefficient of friction is the ratio of its force to the weight or load applied. He made significant observations about friction and lubrication, including the concept of reducing friction by using a layer of lubricant between moving surfaces. To this end, he created a self-oiling lubrication system for wheel axles, using bearings, which he lubricated with animal fat and opium oil.

Da Vinci's mechanical inventions and designs, including those related to lubrication, reflected his deep understanding of engineering principles and his desire to improve various aspects of technology during his time. His creations laid the groundwork for many advancements in mechanical engineering and lubrication techniques that followed in the centuries to come.



'The noblest pleasure is the joy of understanding.' — Leonardo da Vinci

1600-ish CE



As iron and brass replaced wooden machine parts, animal fat fell short of our lubrication requirements. As a result, people in Europe began experimenting with mixtures of vegetable oil, including castor, peanut, rapeseed and canola oil. Whale oil, however, saw continued use throughout this century - not only as a lubricant, but also as a fuel in lamps, and for the manufacturing of candles.

Meanwhile on the other side of the pond in the new world, we find Seneca Indians in North America – upstate New York and Pennsylvania - using crude oil to waterproof baskets and wigwams, as a glue to make arrowheads, but mainly for medicinal purposes to cure a variety of ills.

Seneca Oil, as it became known, was traded by the Seneca tribe to European settlers as a tonic, insect repellent and salve that could treat anything from rheumatism to toothache.

THE AGE OF ENLIGHTENMENT (AKA THE AGE OF REASON)

Late 1600 - late 1700 CE

Historical context

The Age of Enlightenment was an intellectual and philosophical movement between the late 17th century and the 18th century, that emphasised reason, individualism, and the pursuit of knowledge and human rights. It played a crucial role in shaping modern thought, including political and scientific developments.

Honourable mentions for this period include René Descarte's first principle of "I think therefore I am", the invention of the steam engine, telegraph, lightning rod, the mechanical calculator and the hot air balloon.

Apart from a think tank of philosophers and engineers, this movement gave us some heavyweights in the natural science fields of zoology, physics and chemistry, with guest appearances by Carl Linnaeus, Daniel Bernoulli, Benjamin Franklin, Anders Celsius and Alessandro Volta, Charles-Augustin de Coulomb and the father of modern chemistry, Antoine Lavoisier.

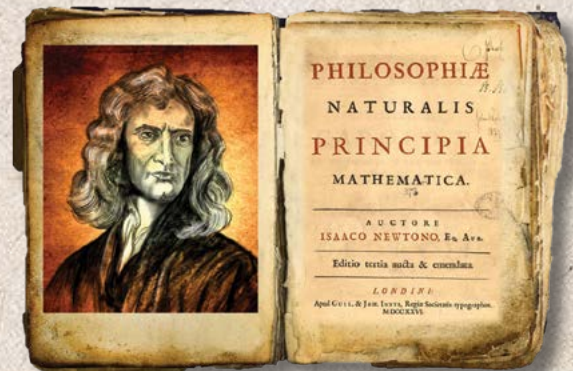
1687 CE

Sir Isaac Newton was an intellectual giant of his time and one of the most influential scientists and mathematicians in history. He made groundbreaking contributions to physics, mathematics and astronomy, laying the foundation for many scientific principles that are still in use today.

Newton's most famous work, *Philosophiæ Naturalis Principia Mathematica*, commonly referred to as the *Principia*, was published in 1687. In this monumental book, he outlined his laws of motion and universal gravitation, providing a mathematical structure for understanding the physical world around us. He also formulated the mathematical framework for understanding viscosity and its relationship to the flow of fluids.

Newton's work in the *Principia* laid the groundwork for the study of viscosity and a fluid's resistance to flow. While he did not provide a comprehensive theory of viscosity or use the term itself, his contributions to the mathematical description of fluid motion and forces within fluids were foundational for later developments in fluid mechanics and our understanding of viscosity in the modern sense.

Isaac Newton's work had a profound and enduring impact on science and mathematics, ushering in a new era of scientific understanding. His work provided the framework for classical physics, and paved the way for subsequent scientific discoveries by geniuses like Albert Einstein, Niels Bohr, Werner Heisenberg and Erwin Schrödinger – the famous theoretical physicist who lost his cat in a box.



1699 CE

Guillaume Amontons was a self-taught French physicist and engineer known for his pioneering work in the field of friction and thermodynamics.

In 1699, Guillaume presented a paper to the Royal Academy of Sciences in Paris, France titled "De la résistance causée dans les machines" (On the Resistance Encountered in Machines), which discussed various aspects of friction and the resistance generated in machines.

Expanding upon the earlier works of Leonardo da Vinci, Amontons' paper explored the frictional forces that occur when surfaces come into contact with each other. This groundbreaking research laid the foundation for subsequent developments in the study of friction and the laws governing it, namely Amontons' first and second laws of friction.

But that's not all! In addition to his work on friction, he also made contributions to the field of thermodynamics. He discovered a relationship between the pressure and temperature of gases, that became known as "Amontons' first law of gas." Not bad for a deaf guy who never went to university.

Illustration of Guillaume Amontons showing off one of his inventions in 1690



The story so far...

 Egyptians using bitumen for construction and embalming. 3500 BCE	 The tomb of Tehuti-Hetap in Egypt shows giant statue been moved with the aid of a lubricant. 2600 BCE	 Ancient Greeks using tallow to lubricate chariot wheel axles during the Olympic games. 200 CE
 Evidence of oil use from the Fountain of Pitch by Sumerians in Mesopotamia. 3000 BCE	 Egyptians using tallow to lubricate sled wheels. 1900 BCE	 Chinese using vegetable oil and lead as a lubricant during the Zhou dynasty. 780 BCE
 Tallow mixed with clay used as a lubricant in Northern Europe during medieval times. 500 CE	 Byzantine empire use Greek fire made with petroleum. 600 CE	 Leonardo da Vinci creates self oiling lubrication system using opium oil. 1500 CE
 Seneca Indians using and trading crude oil for medicinal purposes. 1600 CE	 Vikings using whale oil to lubricate their Drakkars. 700 CE	 Isaac Newton publishes his research on the flow of fluids in the Principia. 1687 CE
 Guillaume Amontons presents his work on friction. 1699 CE		



Be sure to catch the next instalment of our timeline in *Technical Bulletin 89*, where we will brave the age of revolution and take you on a journey through the events that defined one of the most incredible periods of human progress and spawned the modern petroleum industry.

We will recount how the invention of kerosene saved a species of majestic sea titans from extinction and how a small antique shop in London evolved into one of the most prominent multinational energy companies in the world. We will live vicariously through a retired train conductor as he goes wildcatting for oil in Pennsylvania, learn how Rockefeller rose to prominence and discover who the real McCoy was.

About the author...



Steven Lara-Lee Lumley is in charge of technical development and training for WearCheck. She holds an N6 mechanical engineering diploma (HND N6) as well as Honeywell aerospace and ICML III accreditations.

Steven joined WearCheck in 2008 as a diagnostician and worked her way up to the position of senior diagnostician, during which time she diagnosed her millionth used oil sample, in addition to running oil analysis training courses for customers in several countries. In 2015, Steven was promoted to the position of technical manager.

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Head Office KwaZulu-Natal

No. 4 The Terrace,
Westway Office Park,
Westville, KZN, 3629
PO Box 15108,
Westmead, KZN, 3608
t +27 31 700 5460
e marketing@wearcheck.co.za
w www.wearcheck.co.za

Gauteng Office

55 Angus Crescent,
Longmeadow Business
Estate ext. 1, JHB 1609
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