

AFROX

Cyrogenic Freezing solutions



A Member of The Linde Group

THIS MONTH:

- The African trend towards mobile plant
- Urgent! Upgrading SA's air pollution systems
- African solutions and the 50/50 localisation drive
- Innovative engineers for finals of first Africa Prize

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Air pollution: the need to act

In London in December of 1952, cold and windless conditions and an anticyclone conspired to form a thick layer of smog over the city, which lasted from Friday 5 to Tuesday 9 of that month. Known as the Great Smog of '52, this event has gone down as one of the most severe air-pollution incidents in the UK's history. Visibility was reduced to a few yards, making driving difficult or impossible. It brought road, air and rail transport to a virtual standstill; all concerts, sporting and outdoor events had to be cancelled; and the smoke was reported to be so toxic that it choked cows to death in the fields.

In the following weeks, government medical reports estimated that 4 000 people had died prematurely during the five-day period and 100 000 more became ill with respiratory-related conditions – and recent research suggests that the total number of directly attributable fatalities was nearer to 12 000.

The event led to the promulgation of the Clean Air Act of 1956, which introduced smoke control areas, smokeless fuels and the long-term drive towards the use of cleaner burning coals, electricity and gas as substitutes for household fires. This Act was a milestone in the development of legislation to protect the environment.

But how much have we forgotten?

In current times, Singapore publishes a daily 'Haze situation update' based on the pollutant standards index (PSI) which typifies air quality based on six air pollutants: sulphur dioxide (SO₂), particulate matter (PM₁₀) and fine particulate matter (PM_{2.5}), nitrogen dioxide (NO₂), carbon monoxide (CO) and ozone (O₃). The three-hour PSI index used in Singapore has a five point scale: 0-50 (good); 51-100 (moderate); 101-200 (unhealthy); 201-300 (very unhealthy); and above 300 (hazardous). The index is seldom much better than 'moderate' and has hit 400: during the 'Great Singapore Haze' of June 2013.

A 2014 'expose' by Chinese reporter Chai Jing called 'Under the Dome', has led China to declare 'war on pollution'. This followed a three day period in January 2014 where Beijing residents saw a reading of 755 on the US Environmental Protection Agency's (EPA) Air Quality Index (AQI), which defines its hazardous range as between 301 and 500 – with values above 100 deemed 'unhealthy for sensitive groups'.

China's 'pollution war' is embedded in its lamely named 'Air Pollution Action Plan', which calls for limiting coal to 65% of the primary energy mix and prohibiting any increase in coal use in three major urban regions along China's coast. In addition to displacing coal, the plan also promotes the installation of desulphurisation, dust-removal equipment and other pollutant treatment technologies in industrial boilers, furnaces and power plants, particularly those close to cities.

The emissions debate in recent times has been driven by CO₂ emissions for the mitigation of global warming. While undoubtedly a serious problem demanding urgent action for our long-term future, sometimes it seems that directly dangerous pollution is tolerated, while politicians endlessly debate global emission limits.

Our South African equivalent of the UK's Clean Air Act is the Air Quality Act 39 of 2004, as amended according to the Air Quality Amendment Act 20 of 2014. This amended Act came into force on April 1, 2015 and applies to all emitters of air pollutants. From a dust pollution perspective, the Air Quality Act limits solid particulate emissions levels in industrial environments to 100 mg/Nm³ until 2020, and from then on to 50 mg/Nm³.

Unfortunately, however, the Act's provision for exemptions has been invoked to exclude Eskom from this requirement. The utility, therefore, which is the country's largest emitter, need not meet these pollution-limiting standards until 2020.

As Jeremy Kirsch of Clyde Bergemann points out in our lead maintenance feature this month, the air pollution control systems at Eskom power stations are failing – and this is clearly visible from Google Earth! "Under the current license, 150 mg/Nm³ is permissible, but few stations are achieving anywhere near that," Kirsch suggests, adding that most power stations with ESPs are emitting more than 200 mg/Nm³ on a regular basis.

He goes on to contrast the two stacks at the Duvha power station, one bellowing smoke and the other emitting very little. "The bag filters are running quite well, but at stations such as Tutuka and Lethabo with electrostatic precipitator (ESPs), all the emission stacks are bad," Kirsch reveals.

While South Africa is far from free of 'haze', we do not yet have the problems that London had or those that China and Singapore now have. Most of our power stations burn coal, though, and so well maintained modern pollution control systems are essential to minimise air pollution levels and its consequences. In the scramble to overcome load shedding and electricity supply issues, let's not forget the importance of investing in these systems.

Peter Middleton



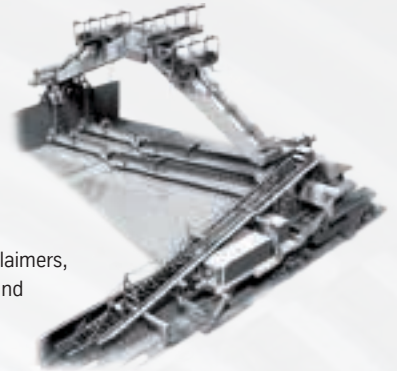
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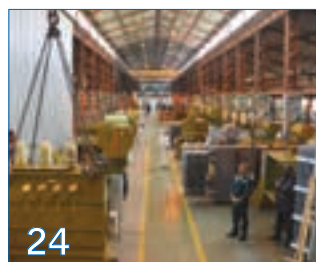
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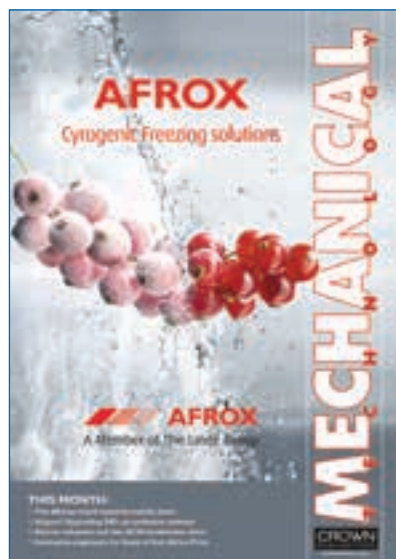
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ON THE COVER



Afrox's catered cryogenic freezing solutions

Afrox, the local Linde-owned gas specialist in southern and South Africa, is now offering modern, hygienic and energy-efficient cryogenic freezing solutions to the local food processing industry. *MechTech* talks to Hendrik Pretorius, Afrox's cryogenic applications specialist about the Linde Cryoline® range, a new benchmark for the frozen food market.

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Features

Special report

8 The African trend towards mobile plant

Following the acquisition of Trio Engineered Products of the US, currently distributed in South Africa by Pilot Crushtec International, Weir Minerals discusses the trend towards mobile plants in Africa.

Proactive maintenance, lubrication and contamination management

10 Urgent! Upgrading SA's air pollution systems

MechTech talks to Clyde Bergemann Africa's Themba Masimula, senior sales engineer; and executive director, Jeremy Kirsch about the company's air pollution control solutions.

12 Mario on Maintenance: Progressive strategies in proactive maintenance

15 Automatic lubrication for 24/7 reliability

Materials handling and minerals processing

16 SA French and Elephant Lifting Equipment merge under Torre Lifting Solutions

The incorporation of SA French and Elephant Lifting Equipment under the umbrella brand of Torre Lifting Solutions, combined with the extensive distribution network of the Torre Industries Group, will allow the company to offer total lifting solutions.

18 An improved alternative to conventional chute systems

19 Clarifier-thickener and filter press for Mufulira smelter

20 Life-cycle service agreement for mill availability

23 Overbelt magnets delivered to coal mine

Local manufacturing and beneficiation

24 African solutions and the 50/50 localisation drive

MechTech talks to Louis Meiring, Group CEO of Zest WEG, about local manufacturing and the transformation of the company into a developer of African power solutions.

27 Composite parts in less than five minutes

28 Acquisition to integrate electrical and mechanical services

29 Thread cutting machine enhances productivity

Heating, cooling, ventilation and air conditioning

30 WSP in Africa achieves two 5-Star ratings

Group Five's new 24 000 m² head office has now also received an As Built 5-Star Green Star rating. Alison Groves, sustainability consultant, WSP | Parsons Brinckerhoff, talks about some of the buildings features.

33 Ventilation fan retrofit for Black Rock Manganese

34 SAP data centre adopts on-demand cooling

Innovative engineering

36 Innovative engineers for finals of first Africa Prize

The UK's Royal Academy of Engineering (RAEng) has selected four African inventions as finalists of the first-ever Africa Prize for Engineering Innovation.

Regulars

- 1 Comment
- 4 On the cover: Afrox's catered cryogenic freezing solutions
- 6 Industry forum
- 38 Products and services
- 40 Nota bene

Afrox's catered cryogenic freezing solutions

Afrox, the local Linde-owned gas specialist in southern and South Africa, is now offering modern, hygienic and energy-efficient cryogenic freezing solutions to the local food processing industry. *MechTech* talks to Hendrik Pretorius (right), Afrox's cryogenic applications' specialist about the Linde Cryoline® range, a new benchmark for the frozen food market.



To make best use of its air gas products from air separation units, Linde has established a global team of cryogenic and food freezing specialists. Based in Sweden and known as the 'industrial and mechanical engineering team' these specialists, from all over Europe and America, were charged with developing a new range of modern cryogenic freezers and to apply their experience to manufacturing freezing equipment suitable for use in food processing applications across the globe.

The group identified a company in Sweden for the manufacture of the new Linde designs and has maintained a specialist presence in Sweden to oversee the manufacture of Linde cryogenic equipment.

"The Linde Cryoline family is a range of cryogenic freezing and cooling solutions for the full range of foodstuffs," says Pretorius. "In South Africa, we use mostly liquid nitrogen, although in Europe equipment is also designed to use carbon dioxide as the cryogen," he says, adding that "what Linde has done is to benchmark the design and manufacture of cryogenic freezers with the

best technologies available in terms of costs, hygiene standards, manufacturing technologies and frozen food quality".

Cryogenic freezing with liquid nitrogen at -196 °C is done to achieve fast freezing, not only to increase production times, but to preserve the texture, look, freshness and quality of the food products. "As well as immediately arresting bacterial growth, which is the core function of food freezing, the faster you freeze food products, the smaller the ice crystals in the individual cells of the food. Larger ice crystals tend to pierce the cell structure, so by keeping individual crystals small, overall damage to food cells is significantly reduced," Pretorius explains.

In addition, fast freezing locks in moisture, reducing dehydration. "For hot cooked 'oven-to-freezer' products, such as crumbed fish or chicken, fast freezing also prevents condensation accumulating around the outside of the product, which keeps the crumbs crisp. Slow freezing processes, on the other hand, cause crumbed coatings to become soft when defrosted," he informs *MechTech*.

Describing how the process starts, Pretorius says that food-grade nitrogen is stored in bulk liquid tanks onsite.

"Because of the properties of nitrogen, it needs to be stored at around 2.0 bar, which allows it to be used at its coldest. If stored at higher pressures, the dew point temperature rises, so at 30 bar, for example, the usable freezing temperature of the gas rises to around -149 °C. At 2.0 bar, you can get it out at about -189 °C," he explains.

Cryogenic freezing usually involves direct contact between the liquid cryogenic gas, such as nitrogen, and the food product being frozen. The cryogen is usually sprayed onto the food as it passes through a 'tunnel' on a conveyor belt. "Gaseous nitrogen is not good enough for this application because you lose the additional advantage of the latent heat of vaporisation, where the liquid nitrogen absorbs heat from the item being frozen while evaporating off its surface," says Pretorius.

Cryoline tunnel freezers

Describing Linde's tunnel freezers, Pretorius says that the design combines the highest levels of food hygiene with the best available control systems. Suited to individual food pieces or ready meals, such as meat patties and pieces, fish fillets and whole fish, pizzas and many dairy and bakery products, Cryoline® MT tunnel freezers are designed to be very easy to dismantle and clean, with a stainless steel all-welded construction, internal run-off troughs and smooth and sloping surfaces to ensure that no bacteria accumulates in water traps.

Control is achieved via an HMI and with a built in plc. At the heart of freezer control is a valve system that governed the exact amount of cryogen that flows through the spray bars above the food conveyor. Temperature sensors inside the freezer cabinet monitor the set point so that the cryogen flow can be adapted accordingly.



Suited to individual food pieces or ready meals, such as meat patties and fish fillets, Cryoline® MT tunnel freezers are designed to be easy to dismantle and clean, with a stainless steel all-welded construction, internal run-off troughs and smooth and sloping surfaces.



Above: High capacity new-generation Cryoline® XF spiral freezers offer the smallest footprint and the latest hygiene standards available. **Right:** XF spiral freezers offer two to three times better heat transfer rates compared to traditional spiral freezer technology. **Far right:** Cryoline spiral freezers are able to maintain consistent temperatures at every point along the product's travel.

Independently controlled fans that circulate the cold evaporating nitrogen, along with product retention time, adjusted via the speed of the belt, are some of the other variables that can be used to control the freezing rate and achieve the ideal result – and for multi-product use, up to 30 different control settings can be entered, allowing the operator to easily switch from one product to another. “Generally, individual quick frozen (IQF) products need to end up at a temperature of $-18\text{ }^{\circ}\text{C}$,” he says.

One step further up in terms of technological sophistication is the Cryoline® CW (Cryowave) multi-purpose freezer, which combines high quality IQF freezing functions of the MT tunnel freezer with Cryowave controllable belt vibration technology. “This is ideal for small products in contact with each other, such as peeled prawns, which would otherwise tend to clump. While being sprayed, the wavelike vibratory motion at the front of a CW freezer dislodges individual pieces of product from the conveyor surface and from contact with other pieces. This forms an outer crust on each piece that locks in moisture and prevents clumping,” he explains.

“But the CW freezer can also be used as a standard tunnel freezer, simply by disengaging the wave vibration. This makes it ideal for operations offering large varieties of different frozen food types,” Pretorius adds.

Another variation of the tunnel freezer is the Cryoline® CS (super contact) freezer, designed to handle delicate, sticky, marinated and other hard to handle products. These rely on contact with a very

cold stainless steel belt surface to freeze the product. By using a thin disposable plastic film between the belt and the product, belt marks are eliminated, hygiene is maintained and cleaning is simplified. “Super contact freezers are also suitable for freezing liquids, such as pasta sauces. Once a surrounding shell has been frozen in a moulding tray, a pallet of sauce is placed directly onto the belt surface to freeze the core. At the end of the process, each pallet looks like a block of chocolate, which is then broken up in a pallet breaker before being added to packets of frozen pasta,” he explains.

Cryoline® XF spiral freezers

This high capacity new generation spiral freezer offers, according to Pretorius, “the smallest footprint and the latest hygiene standards available”.

“The design concept underpinning a spiral freezer strives to achieve 100% cooling contact with the product – and only spiral freezers can achieve this. The boil off of liquid nitrogen sprayed onto the product creates a low temperature evaporating gas, which is further circulated around the food on a spiral conveyor to maintain consistent temperatures at every point along the product's travel. Using the best heat transfer technology available, XF spiral freezers offer two to three times better heat transfer rates compared to traditional spiral freezer technology,” says Pretorius. “These units reach their set point sweet spot very quickly and, from then on, only a soft spray of liquid nitrogen is necessary to maintain the temperatures required for perfect freezing,” he adds.

“The local systems we supply are all solutions for particular freezing applications. On any new development or the extension of an existing application, we customise the selections and applications to best suit the specific circumstances of the client,” Pretorius assures. “While the basic machines remained the same, we need to position the spray bars for full coverage of the belt and to look at different nozzles, nozzle placements and belt types, for example,” he informs *MechTech*.

“For ultra-quick freezing of some products, for example, a liquid bath is added to instantly freeze the outer casing before passing the food into the spiral freezer,” he adds.

“Food is a growth market in southern and South Africa. We are following the European trend towards ready-meals and pre-packaged foods. All supermarket now offer these frozen products and consumers are expecting increasingly higher quality.

“Afrox's catered freezing solutions provide the best quality freezing available, no-matter what the application. Our combined equipment, gas and application-specific knowledge can accommodate the most complex applications. In addition, we offer cost effective financial solutions, via our rental offering, which makes for much lower capital investment costs, along with lower floor space requirement and reduced electricity bills,” Pretorius concludes. □

BBBEE empowerment trust to benefit previously disadvantaged employees

A firm belief that its employees are the glue that holds any business structure together and drives it towards sustainability forms the rationale behind the Zest WEG Group's strategy to establish an empowerment company – Zest Empower Co (Pty) Ltd – which will have a 25.1% shareholding in Zest WEG Electric, the entity responsible for all sales within the borders of South Africa.

Louis Meiring, CEO of Zest WEG Group, explains that the Group's history is characterised by fairness, trust and respect, a passion for its work, excellence in customer service and the recognition of all people and communities. The group has operated a CSI initiative and its outreach has stretched across many areas of South Africa.

The beneficiaries of the empowerment trust include all permanently employed, previously disadvantaged employees across all the South African operations of Zest WEG Group Africa. In an effort to outline the benefits that these employees

will experience, the organisation launched a road show, which was taken to all its operations in the country. The road show clearly explained the complexity and significance of the trust and emphasised the Group's passion for its people, the recognition of their loyalty and the contribution they make to the company's success.

"It was critical to the success of the initiative that we maintain a high degree of transparency. The concept has been well accepted by employees and has stimulated increased levels of two-way communication, a positive contributor to driving improvements within the company," says Meiring.

Finding the most sustainable model, that would secure the interests of the business and simultaneously provide

benefits for our employees, was approached in a methodical and careful manner over an 18-month period. After careful consideration we believe that the current model is not only synergistic to all stakeholder needs, but is also extremely sustainable," he adds. As part of the restructuring process, Zest WEG Electric will be introducing a new non-executive board member – Jack Phalane an attorney from Fluxmans.

"The company will continue on the strong foundation created over the past 35 years and will remain dedicated to the unwavering commitment and support to our customers. This new structure, we believe, will return us to a Level 4 BBBEE contributor status," Meiring concludes.

www.zest.co.za

Dust control contract for copper mine's acid plant

Tenke Fungurume Mining in the DRC, one of the world's largest producers of copper and cobalt, has awarded John Thompson Air Pollution Control (John Thompson APC) a contract on the recommendation of Johannesburg-based engineering and project management contractors Hatch Goba.

Hatch Goba, local subsidiary of the international Hatch engineering and project management group, made the recommendation on the basis of John Thompson APC's longstanding track record as a provider of dust control and air-cleaning solutions for large mining and industrial installations and its extensive expertise in the design and provision of reverse-pulse bag filter systems.

The multi-million rand fast-track dust

control and collection contract is for the design, manufacture and supply – including delivery to site – of three reverse-pulse filter baghouses to be installed in the mine's second sulphuric acid plant currently under construction as an extension to the existing ore processing plant.

www.actom.co.za



Zest WEG Group's is characterised by fairness, trust and respect, a passion for its work, excellence in customer service and the recognition of all people and communities.

ABB wins a large power plant automation order

ABB, a leading power and automation technology group, has won an order worth over \$160-million from Eskom, South Africa's national electricity provider, to supply control systems, software and instrumentation for the 4 800 MW Kusile coal-fired power station under construction near Witbank.

Kusile will be the fourth largest coal-fired power station in the world and will help boost South Africa's capacity. It's among a new generation of high-pressure, high-temperature power installations, also known as supercritical, whose efficiency surpasses that of conventional coal-fired power plants, producing lower emissions and reducing fuel costs.

Kusile will be the first in Africa to use

wet flue gas desulphurisation technology in all its plant boilers. Eskom, which generates more than 90% of its electricity from coal-fired stations, is installing state-of-the-art clean coal technology to help ensure a long term, reliable source of base load electricity for the region.

ABB is supplying a complete control and instrumentation solution for the entire plant, including boiler protection and plant simulator, engineering, installation, commissioning, optimisation and training. ABB is a leader in providing automation and software for advanced clean coal power plants, including supercritical installations such as Kusile.

The project further strengthens ABB's leading position as a global provider of advanced automation and software solutions

to electricity utilities, with several systems already installed in South Africa, Lesotho, Malawi, Botswana, Zambia, Zimbabwe and the Democratic Republic of the Congo.

"ABB's state-of-the-art energy efficient technology solutions will help boost power supplies and bring reliable power supply to consumers," says Claudio Facchin, president of ABB Power Systems division. "We are pleased to continue with our contribution to the development of South Africa's power infrastructure through our power, automation and software capabilities."

ABB power plant automation and software ensure more effective plant operations, providing greater awareness and enabling faster response and better decisions that improve plant availability and efficiency.

www.abb.com

Major industry award for SA fan specialist

Local fan and ventilation specialist, MechCaL was the recipient of The Department of Science and Technology (DST) Minister's Award for Sustainable Performance at the 2015 Technology Top 100 Awards.

MechCaL was evaluated in its entirety to determine the impact that the company has had in the marketplace. Described by the DST as "the ultimate measure", this award is given in recognition of companies that demonstrate a holistic approach to managing their operations and proving themselves as role models to all South African industry.

In essence, the Sustainable Performance Award recognises the value that an organisation contributes to both its internal and external communities. Such an organisation should demonstrate not only the ability to manage its TIPS™ elements within its own operations, but also its ability to manage impact on the environment, its commitment to BBBEE, job creation, employment equity and in some instances, private and public partnerships.

Part of what judges look for in determining a winner is the ability of an organ-



At the TT100 awards are Gavin Ratner, MD of MechCaL, Minister of Science and Technology, Naledi Pandor, and Professor Roy Marcus, TT100 chairman.

isation to make a meaningful difference to communities, whilst at the same time contributing to organisational ecology.

MechCaL's managing director and spokesperson, Gavin Ratner, accepted the award on behalf of his team. "Everyone in the company feels honoured and immensely proud to have our achievements and innovation recognised on the TT100 platform. It confirms that MechCaL is a leader in the field of innovative and environmentally friendly ventilation technology," said Ratner on receiving the award.

www.mechcal.co.za

Corrosion Awareness Day

The cost of corrosion to the South African economy is approximately 5% of GDP, as found by studies by the University of Witwatersrand and Mintek in 2005. This is equivalent to the direct contributions to the economy made by our mining sector. Worldwide, corrosion costs the world economy in excess of 3.0% per annum, equivalent to US\$2.3-trillion in 2014.

Corrosion is a primary cause of bridge collapses, deterioration of piers, roads and transportation equipment such as cars. The loss of potable water from water main corrosion and the environmental damage caused by corroded sewer lines is a significant contributor in many countries throughout the world.

Up to 30% of the costs associated with corrosion could be saved if known technologies and methodologies were implemented. "It's a matter of calling in people with corrosion prevention expertise at the start of projects and following through with the necessary monitoring and maintenance," she adds.

"Corrosion knows no national boundaries. Toxic materials, released from corroded equipment in one area, pollute

the air and water farther afield. Acid rain generated in one country not only pollutes the local environment, but can also cause corrosion damage far beyond that country's borders and even beyond the borders of its neighbours. And toxic material ends up in the world's waterways and can poison sea life, killing many species and making others toxic to humans.

Following the first Corrosion Awareness Day, declared in 2010 to build upon Earth Day (April 22), on 24 April the World Corrosion Organisation, the Corrosion Institute of Southern Africa and Corrosion Associations throughout the world joined together to highlight corrosion and to make governments, industry, and the public aware of the high cost of corrosion – to our environment, our resources, and mankind.

"We need to work together to safeguard our planet, preserve our resources and protect our fellow humans. This is, like global warming, a matter of survival – corrosion will have a profound effect on the quality of life of our children and grandchildren and the habitability of our planet," concludes Sealy-Fisher.

www.corrosioninstitute.org.za

In brief

FLSmidth's South African operation has cemented its reputation as a leader in improving efficiencies, reducing costs and increasing throughput for its customers in the mining and minerals processing industries by successfully achieving ISO 14001 and OSHAS 18001 accreditation. "A lot of our clients are looking for such accreditation and stipulating it when we go to site," says René Camfferman, manager of the risk department.

With 45 years' experience in the general plant hire industry, **SPH Kundalila** has now grown its fleet to over 320 items of plant to position itself to offer specialist services in materials handling, crushing and screening, loading and hauling, rehabilitation and other turnkey solutions.

Bobcat Equipment Rental and **Goscor Access Rental**, part of the Imperial Group, joined forces to provide an end-to-end lifting equipment solution to meet essential materials handling duties during the construction of a wind farm in the Western Cape. Says Brent Viljoen, branch manager of Goscor Access Rental in the Western Cape: "by joining forces with Bobcat, we could provide the customer with a complete rental solution consisting of telescopic handlers, work-at-height machines, qualified operators and back-up service."

In line with its commitment to environmental sustainability, South Africa's steel-making giant **Scaw Metals** has sponsored steel and engineering industry federation, **SEIFSA's** Environment Stewardship Award, one of the categories of the upcoming SEIFSA Awards for Excellence, which aims to celebrating excellence in the manufacturing sector in general and the metals and engineering industries in particular.

Brandhouse, part of Imperial Retail Logistics, rented 15 Doosan 3.5 t LP-gas forklifts for liquor handling during the busy festive season "to ensure a clean, quiet and comfortable working environment for operators inside the warehouse", according to warehouse manager, Kavinesh Beeputh.

Shaw Controls, a company of the **Zest WEG Group**, is on a major expansion drive to cater for increases in the demand for key products such as electrical houses (E-Houses), fully withdrawable motor control centres (MCCs) and modular variable speed drives (VSDs). Bevan Richards, managing director of Shaw Controls, reveals that next year it will embark on the design and establishment of a 4 000 m² standalone E-House and container conversion facility.

Leading South African battery manufacturer, **First National Battery**, has officially launched its new image by unveiling its revamped logo. The redesign marks the beginning of a new era for the award-winning company as it rolls out major changes and upgrades across its production facilities and fitment centres.



The African trend towards mobile plant

With the acquisition of Trio Engineered Products of the US, currently distributed in South Africa by Pilot Crushtec International, Weir Minerals sees a trend towards mobile plants in Africa. Gavin Dyer, regional managing director, Weir Minerals Middle East and Africa, along with Sandro Scherf, managing director of Pilot Crushtec International and Mike Burke, former owner of Trio Engineered Products discuss the issue.

The latest trend in the mining and minerals industry “is a move towards the design and construction of modular plants,” says Dyer. In support of a strengthened comminution offering, the Weir Group has acquired Trio Engineered Products of the US. This further improves Weir Group’s position to capitalise on the modular plant trend and to increase its market presence in the sand and aggregate sector.

Trio’s range of products is currently distributed in South Africa by Pilot Crushtec International, a relationship that will remain intact after the acquisition. Trio designs and manufactures a range of crushers, screens, feeders,

washers and materials handling solutions for the aggregate and minerals sector. Weir Minerals Africa delivers innovative engineering solutions to customers in the minerals, oil and gas and power sectors.

The agreement to acquire Trio will leverage significant opportunities for both Weir Minerals and Pilot Crushtec International in accessing new market opportunities and utilising their specific engineering excellence and expertise. “Modular systems comprise easily available modules that can be on site and operational within a day or two. This methodology is being adopted by the entire market, and certainly in the crushing and screening sector,” says

Sandro Scherf, managing director of Pilot Crushtec International.

Another advantage of modular plants is that, in terms of any potential process changes, these can be slotted in easily. “Sometimes the requirements change, as with the aggregate sector when another product fraction is called for. Tracked mobile plants are the easiest in terms of mobility, but due to high capital and operational costs, these are not always the best option. Semi-mobile modular plants have a lower capital cost, as they usually do not rely on diesel power. They are far cheaper to operate and can still be relocated quite easily.”

Scherf adds that modular plants offer benefits of easy relocation without the high costs of operation of tracked fully mobile machines. “The original equipment manufacturer (OEM) market in Africa is still quite depressed, which has meant a renewed focus on customer service and aftermarket support,” says Dyer. “We have always been close to our customers, from a technical service



Zamm Imports’ impressive plant, with all crushing equipment supplied by Pilot Crushtec International.



This Pilot Crushtec modular custom-built plant has now increased Umhlali Quarry's output of road stone aggregate.

and aftermarket point of view, and that is unlikely to change with our agreement to acquire Trio."

Pilot Crushtec International will still source products from Trio Engineered Products in the US. "Trio has a long-standing relationship with Pilot Crushtec, which has successfully taken the Trio products to market in Southern Africa," says Mike Burke, former owner of Trio Engineered Products. "I have no doubt that this acquisition will position Weir Minerals to offer comprehensive solutions to comminution clients, whether in the aggregate or mining markets."

Dyer concurs that the OEM market remains depressed in Africa, which is why the Trio acquisition is such a strategic move as it broadens Weir Minerals' market focus. "This is an ideal opportunity for companies to optimise their plant and to increase efficiencies and throughput. It will also allow them to become 'leaner and meaner' in preparation for the upturn."

"Yes, it is a tough market at the moment. However, I think we are more fortunate than most in that Weir Minerals Africa has a large installed base in Africa and that our aftermarket segment is doing really well. We find that as mining companies scale back on projects and operations, the service trend actually goes up," Dyer says.

"Even in the downturn of any business cycle, as tough as it is, I think there are valuable lessons that an organisation takes out of that, together with valuable structural changes it has to go through in order to survive the lean times. It is about how you approach those structural changes and how you adapt so that, at the same time, you do not lose sight of your long term strategy, which in our case has been constant growth," Dyer says. □

HPGR technology cuts energy costs

Modern mining operations are focused on achieving 'more with less' and are therefore always on the lookout to optimise processes, especially major energy-consuming ones such as comminution. "Our focus is on helping customers recognise the benefit of utilising high pressure grinding roll (HPGR) technology and assisting them to quantify whether payback can be achieved, based on available capital," says Ekkhart Matthies, Weir Minerals, global comminution vice-president.

"The key to success in our business is being where the customer needs us, which is at his operations. Providing trained service personnel and beneficiation experts result in optimisation opportunities for the customer in reducing the cost per ton of product, as well as continuing to differentiate Weir Minerals in the market. Another major opportunity lies in optimising Brownfield plants by means of the new HPGR technology, thus enabling them to treat ore more economically and effectively," Matthies adds.

Extensive test work undertaken by Weir Minerals in Germany gave the green light for dry air classification in tandem with HPGR technology. The end result is a closed HPGR circuit, which results in twice the amount of fine end product as well as much lower energy consumption compared to traditional milling circuits.

"Conditions have to be taken into consideration, however, and not all opportunities will be suitable. An open mind and some innovative thinking are prerequisites. We are partnering with German mineral processing universities such as the University of Freiberg to better understand the relationship between very fine material and moisture content," Matthies says.

The critical aspect from a customer's point of view is on-going technical support, longevity of wear components and the speed of the change-out of the HPGR rolls. "We continue to drive development in this area and believe our studded tyre technology, pioneered by KHD Humboldt Wedag, along with our global support network and swing frame design for quick roll change-outs,



Above: A Weir Minerals HPGR at final assembly stage at the company's manufacturing facility in Venlo, The Netherlands.

Left: Machining of the special geometry holes as the first step in creating the studded wear surface of an HPGR grind roll.

currently surpasses our competitors' offerings and meets all customer requirements. On top of the existing technology we always drive for more and work continuously on improvements to support the customers' needs," he claims.

Weir Minerals has long been a pioneer of such technological development, and was one of the first to market studded tyre technology, which resulted in a step change in tyre life. "We continue to tailor our product offering to better meet the needs of the market. With Weir Minerals' global footprint we can deliver wherever our customers are located," Matthies continues.

Dedicated test facilities in Cologne and Chile, with two additional ones soon to be installed in the United States and Australia, allow Weir Minerals to accurately simulate site conditions. "Here we can tweak parameters to derive optimum settings for optimised performance, without compromising production."

Weir Minerals also has an extensive service network. "This network guarantees the closest and best contact with our customers. Once the equipment is in operation, we keep on working on extending the lifespan of the wear parts. We have examples where we have doubled the lifespan by partnering with our customers and optimising the wear pattern of an HPGR roll on a step-by-step basis.

"All of this enables us to truly understand the needs of customers and work on a tailor-made solution that enables the customer to manufacture and design a flow sheet on a lowest possible cost-per-ton basis," Matthies concludes. □

Urgent! Upgrading SA's air pollution systems



Clyde Bergemann Africa's Themba Masimula, senior sales engineer and Jeremy Kirsch, executive director.

According to the DEA's National Environmental Management: Air Quality Act 39 of 2004, as amended according to the Air Quality Amendment Act 20 of 2014, solid particulate emissions levels in industrial environments are reduced to no more than 100 mg/Nm³ from April 2015.

"Unfortunately though," says Kirsch, "the Act also makes provisions for 'exemptions' and last year Eskom put in an application for exemptions for all South African power stations. This application was granted on Tuesday February 24, 2015, which means that Eskom is effectively exempt from meeting nationally binding emission limits for a further five years," he reveals. This five-year exemption period takes the utility to the 2020 requirements, which halve emission limits again, down to the ultimate goal of 50 mg/Nm³.

"The air pollution control systems

Because of Eskom's focus on the backlog of essential maintenance on the generation side, the legal requirements for improved emission control at South African power plants have been shelved for a further five years. *MechTech* talks to Clyde Bergemann Africa's Themba Masimula, senior sales engineer and Jeremy Kirsch, executive director, about the company's air pollution control solutions.

at our power plants are failing," warns Kirsch, "and anyone can see this from Google Earth," he says showing a current image of the Duvha power station. "I call this 'the tail of two stacks'. Half of the Duvha units have fabric filters, which work relatively well, while the other half have electrostatic precipitators (ESPs)," he points out. Smoke is seen pouring out of one of the stacks, while the other looks reactively clean.

"150 mg/Nm³ is permissible under the current license, but few stations are achieving anywhere near that," he suggests, adding that most power stations with ESPs are emitting more than 200 mg/Nm³ on a regular basis. "The bag filters are running quite well, but at stations with ESPs such as Tutuka and Lethabo, all the emission stacks are bad," Kirsch believes.

The reasons? "Mostly maintenance, although the coal quality, with its high ash content, and multiple-supplier purchasing policies do not help," he responds. "The coal industry has been opened up, which has led to wider tolerances and more mixed coal quality. This creates havoc in the furnace and with the pollution control technologies," he says.

Citing a German power station that receives coal from 124 different sources, he relates that as each load of coal comes in, by rail or barge, a sample is taken and analysed before determining where to stockpile the delivery. "The coal is blended to achieve consistency in terms of calorific value and ash. This makes it easier to control the power station's output and its emissions. But coal for Tutuka, for example, is delivered by 1 000-odd trucks per day. This makes it very difficult to look ahead and manage the coal quality and consistency. Power station managers don't always know where the coal is from and are faced with the impossible task of achieving consistency," says Kirsch.

ESP upgrades, an interim solution

Describing Clyde Bergemann Africa's response to the problem, Masimula says that well designed and maintained ESPs should be able to control particulate emissions to below 100 mg/Nm³. "For the foreseeable future, we still need to carry on using ESPs, but we can't continue to use the existing units with dated technology without the quantity of ash going up the stacks increasing dramati-



Clyde Bergemann offers proven wet and dry ESP technology which feature: a low maintenance design with an electromagnetic rapping system located outside the gas stream; a rigid (Rigitrode®) anode design; and Modulok™ collecting electrode plates that overcome distortion for improved plate alignment and structural integrity.



Clyde Bergemann's retrofitted pulse jet fabric filters feature: a patented stepped inlet manifold design for uniform gas distribution and reduce pressure drop; a patented inlet vane system to uniformly distribute gas flow and reduce bag wear; lower total pressure drop, which reduces I.D. fan power consumption and operational costs.

cally,” he argues. “To make a difference towards retrospectively achieving the 2015 limits, the existing ESP technology needs to be upgraded,” he adds.

He explains how traditional electrostatic precipitators work: “The flue gas exiting the power station boiler is full of particulate – up to 2 000 mg/Nm³ – that you don’t want entering the environment. ESPs have negatively charged plates (cathodes) spaced at about 400 mm apart, forming channels for the flue gas flow. Between these plates are positively charged rows of wire anodes.”

In principle, by creating a high-strength electric field between the wire anodes and the plate cathodes, solid particulate are subject to the effects of an electric field and are drawn towards and adhere to the negatively charged plates. A rapper is then used to ‘knock’ the plates, which dislodges the dust settled against them, which drops into hoppers below for transportation away to dumps.

“Key to the efficiency of the system is the electric field strength between the plates, which has to be in the order of around 33 000 V/cm. Given a distance between the anodes and the cathode plates of 20 cm, ESPs need a potential difference of 660 kV to bring the field strength up to the point where sparks can just begin to jump across the gap,” Masimula tells *MechTech*.

Achieving a consistent geometry is important to maximise the efficiency of this technology and Clyde Bergemann has developed several innovations to make this possible.

First, the traditional tensioned wire technology results in some wires becoming slack, which changes the distance between the wire and the plates on either side. “At 3 000 V/mm, it doesn’t take much movement to significantly change the field strength, strengthening it and causing flashing when too close to the plate on the one side, and weakening the field between the plate on the other side,” he explains.

During retrofits, Clyde Bergemann replaces tensioned wire electrodes with solid electrodes. “These are round hollow bars with spikes welded onto them in the horizontal direction of flue gas flow. This guarantees the spacing between the anodes and cathodes and makes it easier to maintain an optimised field strength,” Masimula explains.

A second innovation involves the plate design. “We put in modular plates of thin

steel strips with an interlocking system that allows individual strips to slide relative to one another. Old technology plates are typically 25 m long and, while they are straight at 21 °C, at 140 °C flue-gas temperatures, thermal expansion causes them to warp. Our modular system allows the expansion to happen without the geometry between the plates and the bars being affected,” he adds.

Clyde Bergemann solutions also include several other improvements: “Instead of using revolving hammers on a shaft for the rapping system, we have developed an external rapping device. A well thought out busbar system is used to get the mechanical shock into the plates through a system that uses an electromagnetic coil, which lifts an iron bar and drops it onto the plates to knock off the dust,” he explains, adding that, on the electrical side, “the transformers used are important because they need to produce a very stable voltage under condition of occasional sparking”.

Also, Masimula believes that workmanship and skill are critical. “One has to get the geometry of construction 100% right for ongoing efficiency. It is difficult and expensive to fix a system after it has been inadequately installed,” he says.

Kirsch describes a Clyde Bergemann conversion to a more modern ESP by a sister company in the USA. “The roof of the existing ESP was lifted, all of the plates and wires removed, the height was extended and the whole system was refitted with our technology – and the job was completed five days inside of the original eight-week schedule,” he informs *MechTech*.

Converting existing ESPs to bag filters

While some people argue that ESP systems are capable of meeting the 50 mg/Nm³ requirements that come into force in 2020, Kirsch says that this is unlikely outside of laboratory conditions and is made more difficult when burning high-ash coal. The ash from Southern African coals is also reasonably inert and hence the electrostatic effect is reduced. The gradual conversion of current ESP technology to bag filters will therefore be necessary before the legislation comes into force.

“While superficially simpler, bag filters come with other complications,” says Kirsch. “The initial material used for the filter bags needs to be able to withstand

a combination of thermal and chemical attack. If not selected correctly, filter bags can fail in very quickly resulting in no filtration and very high costs to replace and repair the systems. In addition, a small percentage of filter bags will fail and these need to be constantly replaced while the filtration system remains online.

“Today, we have settled on a high-tech glass-filled poly-phenylene sulphide (PPS) material that is resistant to acids and suitable for the current operating temperature of our flue gases (120 to 140 °C),” Kirsch says.

While Clyde Bergemann makes no grand claims that its technology is fundamentally different to its competitors, Kirsch notes a few key design differentiators: “For the inlet manifolds for our bag filter units, we have adopted a stepped design, as opposed to the more common tapered manifold designs,” he says. “A massive volume of gas comes into these units and each filter taps off some of that volume. This leaves a lower volume being passed on to the units further down the line. If the manifold piping remains unchanged throughout then, as the volume reduces, the flow velocity decreases as more and more gas is tapped off. This causes the gauge pressures to change, resulting in different pressures in different areas of the system,” he explains.

“By accommodating these fluctuations using stepped manifold ducting, we achieve a constant velocity across the whole system and that translates into constant pressure and very stable dust filtration,” he adds.

“We are also specialists in construction modularisation. We are able to build the units at ground level and then lift them into place when all the units have been completed. At ground level, construction is quicker and our consistency and quality is better.

“This allows us to manufacture the units on site and in advance of a shut down. Then, when the shut down happens, we can simply strip out the existing system and refit the replacement. We are able to retrofit two to three units per day, which would, in the past, have taken at least a week.

“In the USA, Clyde Bergemann delivered on the largest bag filter order in the world. And we are ready and willing to harness this expertise to help Eskom resolve its worsening emissions problems,” Kirsch concludes. □



Progressive strategies in proactive maintenance

In this issue's maintenance column, Mario Kuisis describes the importance of categorising assets into appropriate maintenance strategies and to progressively introduce new approaches as maintenance maturity grows.

The first article in this series discussed the evolution of maintenance strategies as we see them today, broadly described under the terms passive, reactive, preventative, predictive and proactive. It was shown that an optimised asset management system would invariably incorporate all of these strategies, in a mix to suit the type and criticality of the asset as it pertains to the owner. It sounds perfectly logical, but how to go about it practically? A good place to start is to categorise assets in terms of the strategy to be adopted. Just like planning, it needs some time out to take in the big picture.

This is beneficial for many reasons, but the following are important in the context of proactive maintenance:

- It will bring focus to the assets that really matter.
- At a later stage, when considering predictive maintenance, it minimises the investment needed.

Let's consider the kind of thinking that goes into categorising assets by maintenance strategy.

Any asset or component that is low

cost, quick and easy to repair or replace and has no significant production, safety, environmental, consequential or reputational risk associated with its failure is eligible for passive maintenance. **Passive maintenance** requires no further consideration in respect of the categorised asset, as there is nothing to do. It only requires a decision to identify which assets are appropriate choices for this maintenance strategy.

Reactive maintenance is a good option when there are no significant production, safety, environmental, consequential or reputational risks associated with failure, but repair or replacement is a moderate cost and/or not straightforward. In this case, foresight is required to prepare for the eventuality, so that when failure does occur (as it will), there is a known process to repair or replace the faulty asset in as short a time frame as the situation demands.

This may mean ensuring availability of internal resources and establishing a relationship with a preferred service provider so as to affect repair or replacement without undue delay in a cost effective

way with appropriate specifications and quality processes in place. The internal resources could include trained personnel, strategic spares, special tools, handling equipment, etc. Typically, no operational costs are incurred, other than possibly the holding of strategic spares.

Preventative maintenance becomes attractive when the consequences of failure justify it. This can be due to high cost and complexity of repair or replacement and/or when significant loss of production is a likely result. Safety, environmental, reputational and other consequential risks associated with failure are also increasingly important. If these outweigh the costs of conducting reactive maintenance, then it is an appropriate strategy for the asset in question.

The important point is to think about these factors and make the best business decision, but there are no hard and fast rules and the process also needs repeating every few years as circumstances change. The extent and frequency of preventative maintenance can of course also be adapted. Usually, the OEM will provide all the information necessary for internal preventative maintenance or for outsourcing to third parties. For some specialised equipment, the OEM may be engaged to advantage.

If one were to stop here, life for the maintenance practitioner would be relatively easy. Unfortunately, it is no longer good enough for most industrial plants and utilities because the unplanned outages that would result thrust to the heart of competitiveness, quality of supply and reputation. Often safety and the environment are also at play. In the end, business sustainability itself can be threatened. Hence, a more proactive approach is required.

The next step in the chain of progression is, therefore, to consider which assets would benefit from **predictive maintenance**. This is a crucial step in many ways and more complex than it would appear. But what do we mean by predictive maintenance? In this discussion the



An SDT ultrasound detector is being used here to determine the optimum lubrication level for a bearing. This exemplifies how predictive maintenance tools and techniques can be added to a preventative maintenance strategy to further failure.

definition of predictive maintenance is understood to include all forms of condition assessment or condition monitoring that is conducted with the asset *in situ* in the assembled state.

A condition assessment is a 'snapshot' of asset condition determined at a single point in time. Condition monitoring involves either continuous on-line or regular trending of periodic assessments. In predictive maintenance, the insight into asset condition may be used to trigger an intervention, but this is not a given because, in many circumstances, run-to-failure is a good option. The predictive maintenance benefit is that there is no longer an unplanned outage – unless the prediction is ignored!

A degree of maturity must first be achieved to bring the concept of predictive maintenance into reality, for its acceptance and practical application to the benefit of the organisation. Only then can the question of which assets to consider for predictive maintenance be properly answered. This should not be surprising, as there is a necessary period of learning required. Not only in how to use the technology, but also in the nature and extent of knowledge obtained that was hitherto unseen and unavailable. It takes time to build confidence in this new business tool. It is quite normal to have initial responses such as: "I don't know if I can believe there really is something wrong with my machine, so why take it down? I will wait and see. If it fails I will believe it next time". Acceptance takes time.

The danger is that this period of learn-

ing and confidence building can become extended. When the smart young guy with the fancy gadget is proven correct, the old hands often feel threatened and defensive instead of embracing it as an aid to better business. In the meantime, the predictive maintenance team becomes somewhat alienated and protective of their new-found skill. So silo building begins. There is a natural tendency for this to occur when predictive maintenance is first introduced into an established organisation.

If the two components of proactive maintenance – preventative and predictive maintenance – are confined to silos, the path is easier, but significantly less rewarding. First prize is to have the predictive and preventative teams working together very closely – this is the essence of proactive maintenance and essential for fully realising its benefits. What it also means is that an effective and comprehensive proactive maintenance strategy cannot be introduced into an existing organisation without passing through the predictive maintenance phase. As with many things in life, learning to walk is essential before we can learn to run.

When the opportunities afforded by a mature and effective predictive maintenance programme are fully realised, prior thought processes on preventative and even reactive maintenance must be revisited. When taken to their conclusion, it should be realised that the investment in predictive maintenance is more than offset by the reduced costs and risks associated with traditional

reactive and preventative maintenance strategies alone.

What about predictive maintenance methods? Not very long ago the choice in technology was both very limited and costly (vibration, oil analysis and infra-red thermography) and so too the applicability. It also made selection easy. Now there is very little that cannot be done and costs have tumbled. Not only in choice of method, but often also in terms of whether conducted in-house or outsourced, on or off-line, periodic or continuous, local or remote, manual or

Safety, environmental, reputational and other consequential risks associated with failure are also increasingly important. If these outweigh the costs of conducting reactive maintenance, then it is an appropriate strategy for the asset in question.

automatic defect detection, manual or inclusive diagnostics, manual or inclusive prognostics, etc. On the surface it would appear to be simply a question of economics, but this is deceptive and is best left as a topic for a separate discussion.

In order to realise the cost and reliability benefits of a full proactive maintenance strategy, it is important take a progressive approach. It is only when an asset has already been categorised and successfully managed, based on preventative maintenance strategies, that predictive maintenance strategies and tools can be added to further reduce failure risks and their consequences. □



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Automatic lubrication for 24/7 reliability

SKF business development manager, reliability systems, Eddie Martens describes the advantages of using automatic lubrication systems to extend equipment life and improve reliability and productivity.

The increased reliability and accuracy of automatic lubrication of machine components compared to manual lubrication practices deliver a number of important and substantial cost saving benefits to end users.

The lubricators allow a large number of lubrication points to be covered with premium quality SKF lubricant. “The comprehensive SKF DialSet computer program ensures correct and measured application, which saves on lubricant and prevents under- or over-lubrication,” explains SKF business development manager reliability systems, Eddie Martens. “This reduces the risk of equipment failure and costly unplanned downtime and extends equipment life. In addition to a shrinkage in maintenance costs, up-time and thus productivity is improved as production does not need to be halted to apply lubricant.” The dispensing function and lubricant levels are easily checked through the transparent container.

System 24

SKF’s System 24 automatic lubricators, which are available in two different volumes, 125 ml and 60 ml, provide a reliable, user friendly and cost effective solution for the continuous supply of quality lubricant to plant machinery components.

The SKF DialSet computer program, with iOS and android apps, also allows for quick and easy determination of correct SKF System 24 settings for the particular application. The SKF System 24 can also be temporarily de-activated



SKF TLMR series of automatic lubricant dispensers are available with 120 ml or 380 ml easily replaceable lubricant cartridges for applications requiring high lubricant consumption in heavy industries.

when machinery is not running, for example during scheduled maintenance.

The unit’s ergonomic and easy-to-read dial enables the dispensing rate to be set by hand, without the need for special tools, over a user-selectable time period from one to 12 months. The system is easy and inexpensive to install, as no special tools are required.

After use, the batteries can be easily removed from the SKF System 24, allowing the unit to be disposed of in an environmentally friendly way. In addition, all SKF’s System 24 automatic lubricators are ATEX certified.

Dispensers for heavy applications

The TLMR series of automatic lubricant dispensers from SKF is ideally suited for difficult-to-reach or hazardous lubrication points on general machinery.

The lubricant dispensers deliver maximum discharge pressure of up to 30 bar

SKF’s comprehensive range of System 24 automatic lubricators.

and provide reliable operation in temperatures ranging from -25 °C to 70 °C. The TLMR 101 lubricator is powered by standard-sized, Lithium AA batteries, while the TLMR 201 utilises 12 or 24 V dc power.

Both models are available with 120 ml or 380 ml easily replaceable lubricant cartridges for applications requiring high lubricant consumption in heavy industries such as mining, oil and gas, and food and beverage.

Martens concludes that automatic lubrication is particularly suited to any application that is subject to high levels of contamination or in demanding, hard to reach, remote, and hazardous areas. □

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SA French and Elephant Lifting Equipment merge under Torre Lifting Solutions

The incorporation of SA French and Elephant Lifting Equipment under the umbrella brand of Torre Lifting Solutions, combined with the extensive distribution network of the Torre Industries Group, will allow the company to offer total lifting solutions to its customers in South Africa and across the continent.

Covering the full spectrum of lifting equipment, from consumables to tower cranes and electric overhead cranes, SA French and Elephant Lifting Equipment are well positioned to undertake heavy lifting tasks. Operating in this sector requires a strategic combination of suitable products and well-honed knowledge and skills to allow optimum product selection for the provision of application-specific lifting solutions.

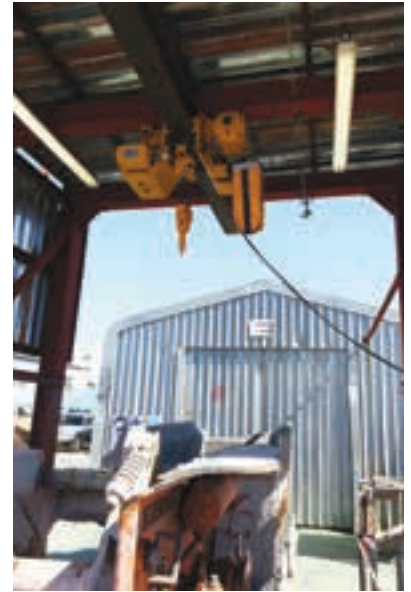
The market in Africa requires a blend of standard products and specialised bespoke lifting solutions. Typical off-the-shelf products being supplied into Africa include chain blocks, lever blocks, webbing slings and chain slings, which are used for maintenance and new installations. This type of lifting equipment is quite basic and does not require any specialised input from the supplier.

“On the other side of the scale, where heavy machinery is being lifted into position or large sections of a structure need to be erected, it would be necessary to provide a custom solution. In this instance, the technically adept lifting

solutions provider would work collaboratively with riggers to ensure that the equipment being used to perform the lift is legally compliant, safety compliant and fit to undertake the task,” Elephant Lifting Equipment managing director, Grant Walton, says.

One of the newest additions to the Elephant Lifting Equipment range is an ultra-compact steel wire rope hoist, which is suitable for lifting in areas where height restrictions or confined spaces are an issue. “This lightweight hoist’s design allows it to be run on a smaller beam, without compromising any of its lifting capacity. In the past, close-coupled hoists were used but they were impractical and also provided limited additional headroom,” Walton points out.

Elephant Lifting Equipment’s engineering team has in-depth experience across a wide range of custom lifting projects including participation at Medupi and Kusile power stations and mines in Africa from the Copperbelt region in Zambia and the Democratic Republic of Congo, up to the gold mines in West Africa.



The Tusker low headroom hoist in operation.

Involvement in a number of African countries is through a network of strategically situated local distributors and agents, through South African-based project houses or through EPCMs and end-users who purchase products directly from Elephant Lifting. “Some market sectors, such as the oil and gas sector, require above average technical support and services. In these instances, Elephant Lifting Equipment would establish a branch in close proximity to the customer, such as the one in Pemba,” says Walton.

For many years SA French’s Potain cranes have been a constant presence across African skylines, both in the built environment as well as on mines. The ability to assess the requirements for a particular construction project, supply and erect the most appropriate tower crane solution, whilst adhering to safety and other statutory regulations, has resulted in a large African footprint for the company.

Quentin van Breda, executive chairman of SA French, says that enabling each site where the company’s tower cranes are operational to be as independent as possible often involves the transfer of technical and maintenance skills to local companies, commonly at the time of commissioning of the crane.

“Generally, the tower crane ranges used in Africa are similar to those selected in South Africa, from a 1.0 ton lifting capacity at a 50 m radius, right



For many years SA French’s Potain cranes have been a constant presence across African skylines.



A specially designed 20 t capacity lifting beam for handling sugar bags.



A double girder top riding electric overhead crane.

up to 10.6 ton capacity at 80 m radius. The entire spectrum of tower cranes is used, with heavy capacity cranes proving popular on mines because of the size of the machinery and components being used in beneficiation plants.”

He says that in Africa there are still many suitable lifting applications where tower cranes are not being utilised. “This is not to say that a tower crane is necessarily superior to a mobile crane, as each has its specific market sectors. However,

we do distinctly see that tower cranes are being under utilised in general industrial applications,” Van Breda says.

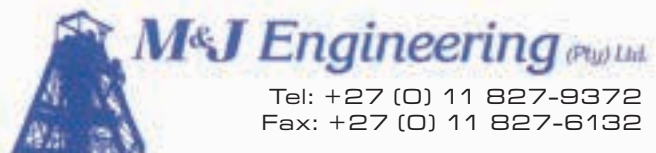
He adds that operating in Africa involves an understanding of the logistical challenges, which include the remoteness of some project sites and the fact that each country has completely different cultural and business needs. The ability to adapt to each application is critical to successful implementation of projects. □



A ‘C’ hook from Elephant Lifting Equipment that is used for lifting steel coils.

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An improved alternative to conventional chute systems

Mark Baller, managing director of Weba Chute Systems, talks about the different approach used by his company for the handling of bulk materials.

Weba Chute Systems should not be compared to conventional chute systems, but should rather be seen as an upgrade or improved alternative, says Mark Baller, managing director of Weba Chute Systems. “Our chute systems adopt a completely different approach to the control and handling of bulk materials.”

The Weba Chute System is based on the lined ‘super tube’ or cascade system, whereby the majority of the material runs on other material at all times. The bottom layer of particles in the product stream moves in a tumbling motion and subsequently does not slide down the chute. This not only reduces the wear significantly, but in many cases the lip remains completely covered by



Above: Control of material from the transfer point will optimise belt life.

Left: Each Weba Chute System is custom designed for a specific application.

material and never needs replacement.

Weba Chute Systems takes this means of controlling material movement a step further by designing the internal angle of the transfer chute to match the product discharge velocity with the belt speed, which either completely eliminates or greatly reduces spillage. “Extensive experience and technical expertise, coupled with applications knowledge, has positioned Weba Chute Systems as the leader in its field,” Baller notes.

Each Weba Chute System is custom designed for a specific application, taking into account factors such as belt width, belt speed, material size and shape, as well as throughput. When applied to a Greenfield project, this locally designed transfer system achieves the optimum design configuration for a specific application.

Both retrofit and Greenfield projects using Weba Chute systems and solutions can realise an 80% reduction in material degradation as well as greatly reduced dust and noise levels. Other benefits include reduced production losses due to less blockages, significantly reduced spillage and vastly improved safety levels. Inspection and maintenance are facilitated by easy access, while the Weba Chute System does not require ongoing supervision, which translates into reduced labour and related costs. □



Weba Chute Systems control material movement in such a way as to match the product discharge velocity with the belt speed, completely eliminating or greatly reducing spillage.

Clarifier-thickener and filter press for Mufulira smelter

Mining and minerals processing equipment manufacturer FLSmidth is in the process of delivering an EIMCO® clarifier and thickener (E-CAT®) and a Shriver® filter press to Mopani Copper Mines in Zambia for its Mufulira smelter. The equipment removes and dewateres dust particles from the water system.

Ricus van Reenen, sales manager for products at FLSmidth, explains that FLSmidth's E-CAT technology, which boasts no moving parts at all, combines optimised flocculation, high rate clarification and high density in a single compact unit. It streamlines liquid-solid separation flow sheets by optimising chemical settling aids and providing a dedicated escape route for displaced free liquid.

The fact that there are no moving parts translates into a lower cost and lower energy consumption, meaning reduced maintenance in the long run. The E-CAT also has a smaller surface area than conventional thickeners, and therefore a smaller footprint, which optimises space on constrained sites, particularly in remote locations in Africa.

In addition, the self-diluting feed makes for optimal flocculant utilisation and no external dilution pumps are necessary. Good overflow clarity means that effluent can be re-used, while the dense

underflow cuts down on the energy needed for drying. The smaller ponding area also means reduced handling volumes.

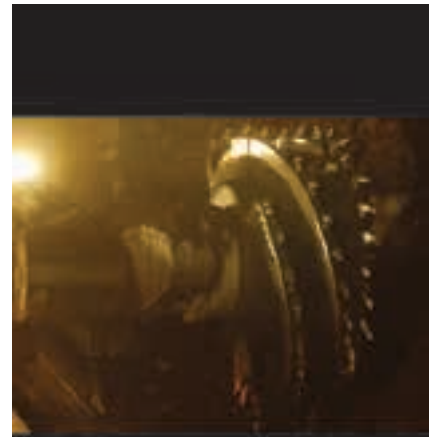
"FLSmidth has a long history in terms of dewatering technology. In addition to having the biggest reference base in terms of equipment installed, we also have the largest range of filtration equipment on the market. It is this combination of technology and innovation, combined with our value-added services, that allows us to offer 'one source' total solutions for our mining clients," Van Reenen concludes. □



FLSmidth has supplied an Eimco clarifier and thickener (E-CAT) to Mopani Copper Mines in Zambia for its Mufulira Smelter.



A Shriver® filter press, also supplied by FLSmidth to the Mufulira Smelter, for dewatering concentrate. These industrial grade heavy-duty machines, are designed for long life, low maintenance, easy operation and cost-effective filtration and more than 30 000 have been installed globally.



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Life-cycle service agreement for mill availability

Metso has signed a three-year life-cycle service agreement with the Kevitsa copper and nickel mine in Sodankylä, Finland. Kevitsa is owned by Canada-based First Quantum Minerals (FQM). Central to the agreement is Metso's commitment to reduce production downtime associated with mill liner changes and maximise grinding efficiency over the life of the contract.

Metso has signed a three-year contract to take complete responsibility for the supply, installation and optimisation of the mill liners at Kevitsa, one of FQM's nickel-copper-platinum group elements (PGE) mines. Metso and Kevitsa's common goal is to increase the mill's availability

and production efficiency and to reduce the total cost of ownership so as to help increase mine profitability.

"This solution will raise our utilisation rate to a new level and will contribute significantly to our sustainable competitiveness in the challenging market situation," says Timo Ikäheimonen, planning manager at FQM's Kevitsa Mine.

As part of the service agreement, Metso aims to increase the time between shutdowns through optimisation of wear parts' selection as well as decreasing the duration of shutdowns. Metso will reduce shutdown times through advanced planning and the delivery of its patented Megaliner™ grinding mill wear parts. Thanks to the fast installation process of Metso's Megaliner, downtime is reduced. Additionally, the use of Megaliner parts in grinding mills increases work safety as the attachment parts are inserted from outside of the mill. With this set-up there is no need for workers to be in the danger-zone of the liners while installing liner bolts.

"With this FQM Kevitsa mine cooperation agreement, we aim to reduce the concentrator plant downtime, secure



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availability and commit ourselves to the continuous development of the plant's operations," says Metso Finland's Olli Kellokumpu, sales director for minerals.

Installation will begin in the latter part of 2015. The agreement will be booked in phases into Metso's orders received throughout the term of the agreement.

First Quantum Minerals is an established and rapidly growing mining and metals company with seven mines and five developing projects around the world. The company produces copper, nickel, gold, zinc and platinum-group metals. Upon completion, developing projects in Zambia, Panama and Peru will increase FQM's annual copper production capacity to more than 1.3-million tons. □

New HP5 cone crusher

Metso, a leader in reliable, sustainable products and services in mining, aggregates, oil and gas and other process industries, has introduced its new cone crusher to the global market. Metso designed the new HP5 cone crusher with safety, simplicity and eco-efficiency in mind. Automatic settings, specialised maintenance tools, reduced emissions and energy-efficient motors are just a few of the improvements built into this new cone crusher.

The Nordberg® HP5TM follows the successful HP3, HP4 and HP6 as the fourth model in an all-new range of high-performance cone crushers. The design of new Nordberg HP5 leverages Metso's 100-plus years of crusher know-how and experience with more than 9 000 HP cone crushers in operation worldwide. The result is a crusher that delivers a perfect combination of efficient crushing action, optimal feed size, high performance and the lowest cost per ton.

With 5% larger feed size compared to the HP400 and higher capacity than the HP500 in tertiary applications, the HP5 is at the top in its class. In addition, a higher cavity density improves inter-particle crushing action for end-products with more consistent gradation and superior shape.

An advanced fastening system for the mantle and bowl liner eliminates the need for backing material and makes liner changes safer and faster, while thicker liners result in more material to wear. The HP5 cone crusher is also easy to disassemble, and all components are accessible from the top or the side. The bowl and head are easily and safely removed with no interference.

A new motor support allows the belts to be stretched hydraulically, and lifting points have been redesigned to easily and safely lift the HP5. Platform guards help to ensure operator safety and protection.

The HP5 also features Metso's innovative IC70C crusher automation system. The IC70C is precisely designed to meet customer expectations and crushing plant requirements for consistent production, safety and easy control of crusher parameters.

Feed and discharge conveyors control, wear compensation, auto setting adjustment and computer remote control are just a few of the many benefits the IC70C system offers. □

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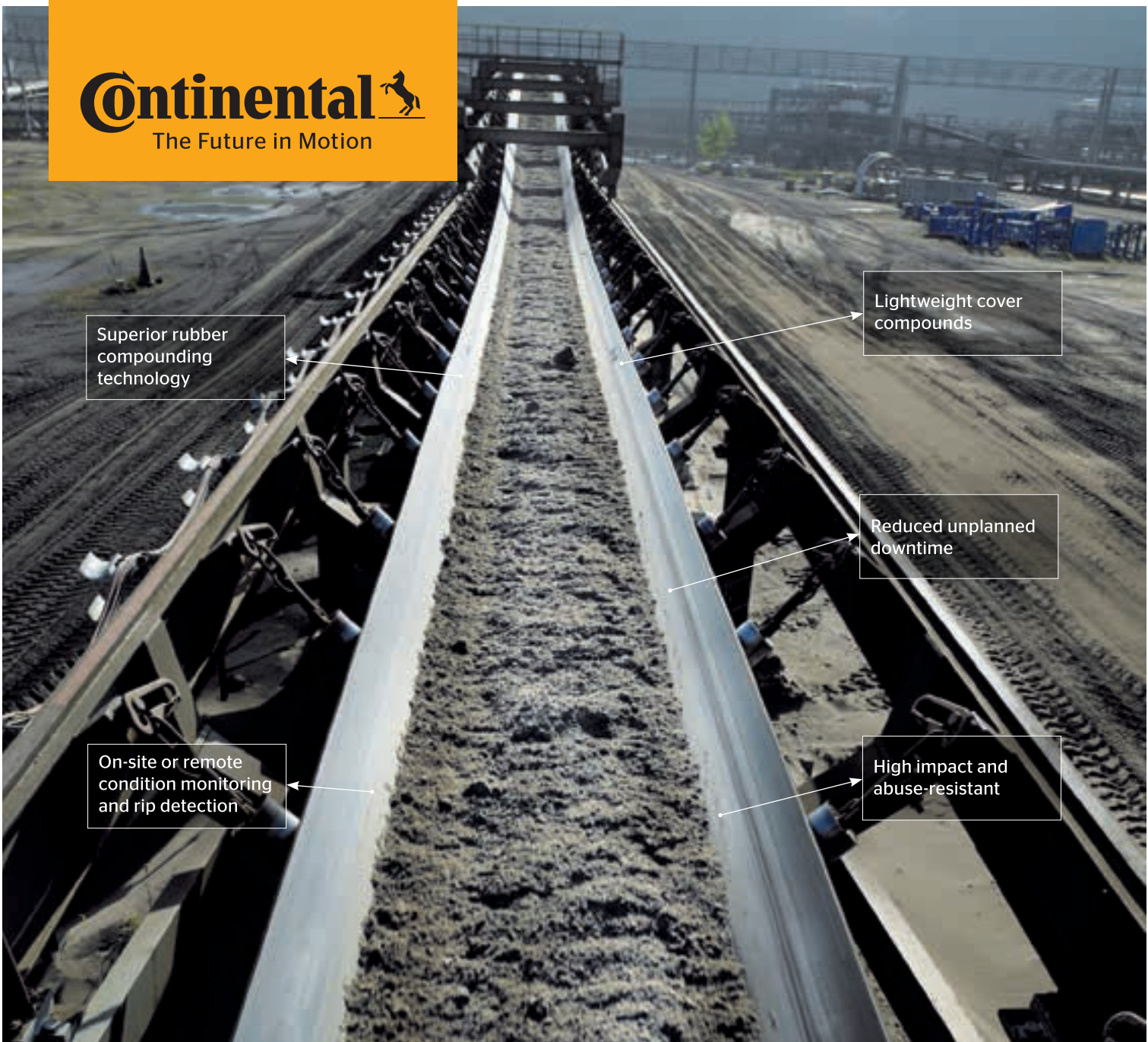
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Overbelt magnets delivered to coal mine

Following the successful completion of an order placed in September 2012, Multotec has received a repeat order for two 33.7 t overbelt magnets for a second phase expansion project at a Witbank/Middelburg coalfield.

Multotec's intimate understanding of minerals processing and handling applications, coupled with its flexibility in being able to offer its customers fit-for-purpose solutions, has resulted in a repeat order for two overbelt magnets sold into a coal mining application in the Witbank/Middelburg coalfields. "This order follows the successful commissioning two years ago of two overbelt magnets at another coal mine in the same group," Willem Slabbert, process and applications manager at Multotec, says.

"Multotec has a good standing within the Witbank/Middelburg coalfields, where our products are supported by our local branches," says Slabbert. Commenting on the latest order, he explains that the application is to remove tramp metal from run-of-mine material in order to prevent it from entering coal gasifiers.

"This is a critical application as the coal gasifiers have very stringent tramp metal removal specifications," Slabbert says. Tramp iron traditionally removed

from coal carrying conveyors includes sections of continuous mine core breaker teeth, conveyor belt idlers, belt joints, wire, roof bolts, metal plates, slings, picks and pick cases, cable hooks, expanded metal, tools, tin cans and other such objects.

Multotec supplied the original overbelt magnets in September 2012, with the latest order representing the second phase of an ongoing expansion project. Stuart Cullum, process engineer, explains that the width of the conveyor belts in this coal mining application is 1.8 m, with the overbelt magnets themselves being 5.1 m wide and 2.45 m high. They incorporate the latest technical specifications of the client, including pulley design, control and instrumentation.

The overbelt magnets are suspended

Right: Multotec's Magnetics Division assembly team standing next to a locally manufactured 33.7 t Longi-Multotec overbelt magnet.



Above: Longi-Multotec overbelt magnets are designed to remove tramp metal from run-of-mine material in order to prevent it from entering coal gasifiers or mill circuits. **Left:** Longi-Multotec overbelt magnets are engineered to effectively remove even the most challenging tramp metal.



over the conveyor on gantries for easy removal for maintenance purposes. Features include an automatic belt-driven self-cleaning system that dumps the tramp iron into collection bins at the side of the conveyor.

The latest two overbelt magnets were transported to Mpumalanga on low bed trucks, and weigh 28 t each without their cooling oil. The latter is added once on site using an oil tanker, with a final total weight of 33.7 t for each overbelt magnet. As per client safety specifications, the overbelt magnets have eight safety chains rated and certified for a load of 16 t each. This is double the normal requirement, with four chains rated at 8.0 t each being the norm.

Slabbert confirms that these are the largest overbelt magnets available in

the Longi-Multotec range. "Through our partnership with Longi, Multotec now has access to a comprehensive range of off-the-shelf air-cooled overbelt magnets for underground tramp metal removal, with the option of flame proofing." Having a standard range on hand means that Multotec can meet customer requirements more quickly, and this reduces lead times significantly.

Multotec is one of the largest suppliers of overbelt magnets in Africa for a range of commodities from coal to iron ore. It has a dedicated team of expert engineers that is able to assess a customer's specific application requirement, taking into account factors such as conveyor belt speed and size, burden depth, the properties of the load on the belt and the size of the tramp metal that must be extracted. □



African solutions and the 50/50

Founded in the 1980s as an importer and distributor of Brazilian-made WEG motors, today the Zest WEG Group is a local supplier and manufacturer of the full range of electrical equipment from generation to utilisation. *MechTech* talks to Group CEO, Louis Meiring (left), about local manufacturing and the transformation of the company into a developer of African power solutions.

From its roots as an electric motors supplier, Zest Electric Motors soon began to realise the need to be more progressive and aggressive to progress in Africa. “Having gained the lion’s share of the South African motor market, it became difficult to grow the business organically,” begins CEO of Zest WEG Group, Louis Meiring. “So in the late 90s, the board decided to re-strategise and a business model was developed targeting a 50% local component threshold to supplement the import of WEG motors,” he says, adding that dependence on imports was seen as a risk, due to the volatile Rand along with potential political uncertainty between South Africa and Brazil, for example.

“This local component target put us on an acquisition route that dates back to 2000. Our first acquisition, which was EML (Electric Motors Laminations), which at that time was importing Chinese motors, and we bought them out as a risk-mitigating alternative and to better understand how the Chinese were operating,” Meiring relates.

The Group’s next strategic acquisition was made to establish a local manufacturing capability. “This happened when we bought Shaw Controls in 2007 and extended our portfolio into the electrical infrastructure required to control electric motors. Shaw gave us an excellent vehicle for diversifying our offering and the opportunity to enhance the synergies with our motor products by offering our own switch gear panels, motor control centres (MCCs), variable speed drives (VSDs) and soft starters when installing motors,” he explains.

MCCs are generally purpose built products that involve significant amounts of design engineering to match the site-specific applications and specifications. “They are also heavy in terms of manufacturing, consisting of rows of panels containing heavy steel plates popu-

lated with electrical components. This renders these products geographically locked, meaning that MCC panels for use in Johannesburg are almost always more competitively manufactured in Johannesburg. This makes the localisation of product lines such as MCCs an absolute imperative. Nobody could succeed in this game with imports,” Meiring points out.

While the acquisition involved a “huge learning curve”, Meiring says that Zest WEG is very pleased with the results. “Shaw Controls has given us a real feel for manufacturing in South Africa and the skills that were needed for successful localisation. We emerged as a genuine local manufacturer. The Shaw workforce made this easier for us, because they had the experience, the know-how, and were absolute specialists in engineering, manufacturing machinery and industrial practices,” he adds.

A year later, coinciding with the first Eskom power crisis of 2008, Zest made its next acquisition, which was to become the Zest WEG Genset Division. “This was in response to the need for backup generators. And since WEG also makes alternators, the links between our motors and gensets made perfect sense.”

While also a local manufacturing and assembly facility, Cape Town-based Zest WEG Genset Division sources premium diesel engines and couples them with WEG alternators. “But gensets also require controls, so our Cape Town facility manufactures changeover panels and switchgear, both for the our gensets and for electrical control and MCC panels for use in Cape Town.

As a natural extension and to cater for increasing site installation requirements, the Zest WEG Group then acquired Enl Electrical, a leading electrical installation, instrumentation and control systems specialist offering services to construction companies across Africa. “At that time,



we had already successfully introduced the switchgear, VSDs and automation and had begun to supply large transformers of 20 MVA and above, for Eskom sub-stations. To-date, we have supplied about 450 transformers over a five-year period, all directly imported from WEG in Brazil.

“When we then reviewed our package, we realised that there was an additional opportunity to have a company within the Group that could take all of the individual company offerings and install them at project level. This led to the acquisition of the electrical installation company Enl, and to the realisation of our 50% local turnover target,” Meiring informs *MechTech*.

Following rapid growth of the combined suite of products, Zest WEG then got involved with a company called Africa Power Team, which was run from overseas and did not really understand the African business environment. “We rescued this business, brought it into the Group and renamed it Zest Energy. After an initial reinvestment period, I can very proudly say that, today, Zest Energy is a very successful local provider of sustainable energy solutions, including: integrated power plants; co-generation systems; custom engineered power generation solutions; and the design of sub-stations, mobile sub-stations, switching stations and so forth.

“This was a successful acquisition for us in terms of product development because it gave us access to Eskom with our mobile substation solution, a strength of WEG in Brazil. These are for emergency situations, when as substation goes down due to any fault – be it a transformer, a

localisation drive



line fault of a switching fault, the utility can drive a mobile substations to the location and replace the entire substation with a mobile unit until repairs are completed," Meiring suggests.

"The original IP came from WEG, Brazil, but a specialist spent six months in South Africa customising the design to suit the harsh local conditions and Eskom's stringent specifications. So today we have a local product that is 100% locally manufactured," he adds.

The most recent acquisition was made to extend the Group's access to locally manufactured transformers. "We have also recently established WEG Transformers Africa (WTA), following the 2013 acquisition of Hawker Siddeley Transformers. While we have been able to supply large imported transformers for several years, because the cost of shipping smaller units constitutes a significant percentage of the total cost, we could not compete on units smaller than 20 MVA.

"WTA has now added the full transformer range to our offering, from 100 kVA up to 20 MVA – and to further reduce our dependence on imports, we are busy implementing a plan to locally manufacture transformers of up to 40 MVA," Meiring reveals.

From a technological perspective, the relationship with WEG Brazil has enabled the entire Wadeville-based WTA transformer factory, which was originally established 1954, to be completely modernised to manufacture the latest designs from its global parent.

"We are currently on a major drive involving all three of our manufacturing entities: Shaw Controls, WTA and

Above: WEG Transformers Africa's controls assembly area.

Above left: WEG Transformers Africa (WTA) now offers transformers from 100 kVA up to 20 MVA and, to further reduce dependence on imports, the company is implementing a plan to locally manufacture transformers of up to 40 MVA.

Right: Kobus Smit attending to the wiring of a containerised generator set for the Zest WEG Genset Division.

Right below: The container yard at Shaw Controls, which is now a specialist local manufacturer of MCCs, switchgear and containerised electrical distribution solutions.

Genset Division, which are going through internationalisation programmes to align their product quality and manufacturing processes with the best practices of the global WEG Group," says Meiring. "Ultimately, for international orders, WEG wishes to be able to choose the most cost-effective factory to use, based on transport logistics, exchange rates and local input costs. So we may end up manufacturing equipment for supply into Australia, for example," he explains.

Addressing our labour challenges, the Zest WEG Group is striving towards more innovative solutions to overcome labour issues. "At the starting point, we believe, is communication. We want to be more inclusive about our business successes and failures. By keeping our staff better informed, we hope to make them feel more involved and more secure.

"Training is also a big issue and the internationalisation programme offers opportunities to up skill our staff to cope with the innovative new materials and machine tools – and the empowerment of people is fundamentally linked to skills," he confirms.

Responding to B-BBEE. Meiring adds that the Group is very close to finalising an employee trust called Zest Empowerment that will pass 25% + 1 share of the local business to previously disadvantaged employees in the company.

From a business perspective, Meiring sees growing opportunities in the power sector across Africa. "We are the only supplier that can communicate tenders, data sheet and specifications sets in the three dominant common languages, English, French and Portuguese," he points out, adding that the Group is already earning 30% of its turnover from African projects outside of South Africa and has targeted 40% in the short term.

"We are positioned to be involved in every aspect of technology that sits between power generation and power utilisation, which puts us in a strong position to participate in the transformation of Africa's power infrastructure," Meiring concludes. □



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Composite parts in less than five minutes

As a joint venture between industry, academia and government to build the future for composite manufacturing, a Schuler high-volume composite press has been installed in the National Composites Centre (NCC) in Bristol, UK.

The National Composites Centre (NCC) in Bristol, UK, is a success story. The unique open-access but secure facility, which is owned and hosted by the University of Bristol, provides a flexible approach with the aim of delivering truly innovative composite solutions. Part of this success story is an innovative Schuler press for high-volume manufacturing of composites that was put into operation late last year.

The upstroke short-stroke press has a press force of 36 000 kN and a clamping surface of 3.6×2.4 m. “We have installed the world’s largest openly accessible high rate manufacturing press for composites,” says NCC business development director, Tom Hitchings. “This is aimed at supporting sectors such as automotive, where developing high-rate, low-cost manufacturing methods for composite components is critical. This press is producing parts in less than five minutes.”

The NCC uses the HP-RTM process (high pressure resin transfer moulding) in which carbon fibre fabrics are placed in a die, filled with resin and hardened by applying heat and the pressure of the press. High-pressure RTM presses not only enable shorter cycle times for complex parts with high requirements regarding geometry and rigidity, but also deliver consistently high part and surface quality. This virtually eliminates voids, i.e., resin-free vacuum pores or gaps

within the part or along its edges.

In the high-pressure RTM process, resin is injected as quickly and smoothly as possible into the vacuum mould which is opened by just a few tenths of a millimetre. This gap injection process enables the resin to spread over the mat with far less flow resistance and thus with low injection pressure. It then quickly infiltrates the mat before polymerisation is started by heat induction.

While the thicker the part, the longer the curing, the vacuum assistance, fast resin injection, high resin pressures and tempered dies mean that the gelling process begins virtually with the wetting of the last fibre. Depending on the part, the necessary resin pressures can also be varied between 60 and 150 bar.

Due to the geometry of the part or cavity surface, the die’s centre of loading is not necessarily in the middle of the press. There are also off-centre forces from the injection positions. The parallelism control prevents the slide or upper die from tilting during gap injection and thus ensures smooth and even injection over the entire surface.

Conventional downstroke machines work with a fixed bed and moving bolster, and a slide whose press force is transmitted via cylinders in the press crown. Four servo-controlled, counter-pressure cylinders located at the bed corners ensure parallelism. These are also responsible for the break open force needed to counter the adhesive forces and open the die.

High closing speeds and short pressure build-up times

In the upstroke short-stroke press, the slide only acts as support during the pressing process. From top dead centre, the slide is moved by a drive cylinder to its support position and locked there. The actual working stroke is performed by the bedplate, driven by several short-stroke cylinders. Parallelism is ensured by servo controlling these cylinders. The breakout force in upstroke presses is achieved by the withdrawal of the bedplate. The benefits of the upstroke short-stroke press compared to downstroke designs are the high closing speeds of 1 000 mm/s, the shorter pressure build-up times of under 0.3 s, along with the significantly lower construction height.

The NCC first presented the Schuler press to the public at the formal opening of its new facilities – which have doubled in size – on October 30, 2014. “The centre now has something for all businesses involved in composites manufacture, across all sectors,” adds Hitchings. “Our open-access model provides a flexible approach to enable working with companies of all sizes – from SMEs to Tier 1s and large OEMs. We already have commitments from large and medium sized enterprises involved in renewable energy, aerospace, automotive, defence, marine and rail, and we expect this list to grow. With the addition of the new Schuler press, the NCC will become a catalyst for real change in the industry,” he predicts. □



Left: The UK’s National Composites Centre (NCC) has installed the world’s largest openly accessible high rate manufacturing press for composites. **Right:** The upstroke short-stroke press made by Schuler has a press force of 36 000 kN and a clamping surface of 3.6×2.4 m. From top dead centre, the slide is moved by a drive cylinder to its support position and locked there. Photos courtesy of NCC.

Acquisition to integrate electrical and mechanical services

The recent acquisition of Cetus Turbo Machinery by leading electrical repairer of motors and generators, Marthinusen & Coutts (a division of Actom), will allow the company to offer all industries a comprehensive electrical and mechanical repair service solution on rotating machines as a single service provider.

“Being a single service provider with a market offering of this magnitude, our customers and potential customers no longer need to outsource refurbishments and rehabilitation of large equipment to different service providers,” Mike Chamberlain, operations executive of Marthinusen & Coutts, says. “Our significantly expanded capability enables us to control the entire process, offering peace of mine coupled with optimised cost efficiencies, as the middleman is cut out completely.”

As a ‘one-stop shop’, Marthinusen & Coutts now operates five production workshops covering 32 000 m² in southern Africa. This includes facilities in Cleveland, Benoni, Rustenburg, Kitwe, Zambia and the Cetus facility in Sasolburg.

Significantly, Cetus provides a unique set of mechanical turbine specialist skills which were previously not available within the group.

Rebranded as Actom Turbo Machines, the new addition to the Marthinusen & Coutts stable undertakes maintenance, general servicing, rehabilitation and refurbishment of all types of mechanical rotating equipment, including all types of turbines (low, intermediate and high pressure), steam governors, compressors, blowers, pumps, fans, gearboxes, decanters, centrifuges, filter presses and scrubbers.

This complements Marthinusen & Coutts’ existing range of services for electrical rotating equipment, which includes small, medium and high voltage ac and dc motors, flameproof motors, traction motors, generators, alternators and an-

cially power generation equipment up to 500 MW.

In addition to its well-equipped facilities, Marthinusen & Coutts regularly deploys its experienced team to sites across the continent. The comprehensive on-site capabilities have been used by a number of large blue chip mining and industrial companies to provide high-level repairs, where logistics or urgent time frames discourage transportation of machines to and from the central workshops. The additional mechanical capability makes Marthinusen & Coutts and Actom Turbo Machines one of a few companies able to offer the full electro-mechanical service capability.

Chris Bezuidenhout, founder of the original business, has been appointed managing director of Actom Turbo Machines, and believes that the strong synergies between the two businesses bode well for future growth. “Our customer-service focused strategy will continue and, together with Marthinusen & Coutts, we will grow our market shares significantly. In addition, the financial backing of Actom will facilitate this growth path.”

Actom is the largest manufacturer, solution provider, repairer and distributor of electro-mechanical equipment in Africa, employing about 7 500 people. It has 43 operating units; 44 production, service and repair facilities; and 41 distribution outlets throughout southern Africa.

“Asset management and maintenance is one of our most important and popular market offerings as it adds significant value for customers in terms of ongoing maintenance of rotating equipment. The supply of our specialised mechanical and electrical skills ensures machinery operates at optimum performance levels and maintenance, as well as major servicing, can be planned,” Chamberlain says.

Marthinusen & Coutts and Actom Turbo Machines have a maintenance contract at the Kelvin coal-fired Power Station B for its 60 MW turbo gensets and ancillary equipment. Over the last year, they have successfully overhauled and upgraded three of these gensets and completed the refurbishment of a second 70 MVA synchronous condenser unit for the Société Nationale d’Electricité (SNEL) in the DRC. They are also currently completing the inspections and overhaul of three 30 MW turbines for Nampower’s Van Eck Power Station in Namibia. □



Above: Actom Turbo Machines undertakes general maintenance and servicing, rehabilitation and refurbishment of all types of mechanical rotating equipment.

Left: A high-pressure steam turbine in the Actom Turbo Machines’ workshop.



Thread cutting machine enhances productivity

Threading, cutting and reaming operations can be dramatically improved with the RIDGID Model 1233 pipe and bolt threading machine, which offers enhanced productivity through its impressive ¼-inch to 3-inch pipe capacity and 10 mm to 52 mm bolt capacity.

Dowson and Dobson director, Terry O’Kelly, notes that the new RIDGID Model 1233 thread cutting machine’s key differentiator is its superior oiling technology. “Through head oiling of the dies and workpiece during operation cools the material, reduces friction and threading torque, and speeds material removal to maximise die life and the quality of threads,” he explains.

The RIDGID Model 1233 is operated by a foot pedal switch, which ensures user safety. The machine also features a hammer-type chuck with replaceable rocker-action jaw inserts, and a forward/reverse switch for rotation in the left- or right-hand directions, making it ideal for use on pipes, conduits and rods. O’Kelly assures that, while the machine remains easy to use, customer support is also available.

“Each Dowson & Dobson branch has a RIDGID specialist and complete training is given to customers to start them off. Upon

completion, they receive a certificate of compliance. Service and maintenance is also taken care of by our fully equipped workshop. We offer all customers full services and repairs on their threading machines,” he says.

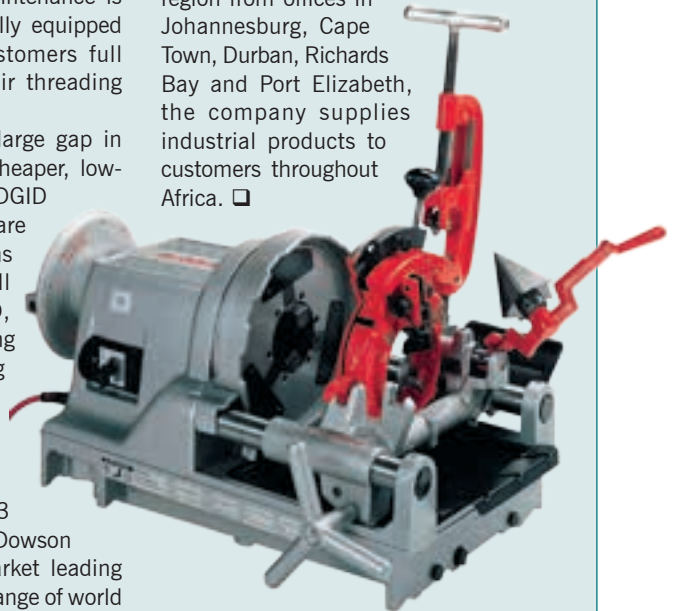
O’Kelly indicates that a large gap in the market exists between cheaper, low-quality machines and the RIDGID calibre of machine. “There are many sub-standard imitations and Dowson & Dobson will only supply US-based RIDGID, which is the longest-standing manufacturer of threading machines in the world, and its technology remains superior to this day,” concludes O’Kelly.

The RIDGID Model 1233 is available locally through Dowson & Dobson Industrial – a market leading supplier of a comprehensive range of world

class industrial products and after sales service solutions.

Dowson & Dobson Industrial has been associated with high-quality products and excellent service since the original company was established in 1906.

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WSP in Africa achieves two 5-Star ratings



Group Five's new 24 000 m² head office on the Waterfall Estate in Midrand, following the award of 5-Star Green Star SA Design certification in 2013 under the GBCSA's Office Rating Tool (v1), has now also received an As Built 5-Star Green Star rating. Alison Groves (left), sustainability consultant, WSP | Parsons Brinckerhoff, talks about some of the buildings features.



Group Five's new 24 000 m² head office has been awarded an As Built 5 Star Green Star rating.

WSP | Parsons Brinckerhoff in Africa, one of the largest multi-disciplinary engineering consultancies on the continent, is "thrilled" that the new Group Five head office has achieved Design and As Built 5-Star Green Star ratings from the Green Building Council of South Africa (GBCSA). The building, located at the Waterfall Estate in Midrand and developed by ATTACQ, received the award in recognition of the environmental sustainability of the building.

The project came about after Group Five made the strategic decision to consolidate all its offices into a new head office and approached WSP to be its sustainable design and building consultants. Alison Groves, Sustainability consultant, WSP | Parsons Brinckerhoff, Building Services, Africa, says: "As the sustainable design consultants for this project we were involved with, and oversaw, all crucial elements of the project related to the sustainability of

the building. From the schematic design stage, right through the construction phase, to the comprehensive reporting and handover, we helped Group Five to ensure that the building reflects the company's commitment to environmental sustainability."

Construction of Group Five's new 24 000 m² head office started in October 2012. The building was awarded a 5-Star Green Star SA Design certification in 2013 under the GBCSA's Office Rating Tool (v1). Once construction was completed a comprehensive assessment was undertaken, and in February this year the building was then awarded a 5-Star Green Star As Built Certification under the Rating Tool.

Indoor environment quality

The primary role of a sustainable building is to provide a comfortable and healthy environment for the occupants of and visitors to the building. To that end, the building has been designed to achieve

a minimum 150% improvement on required fresh air rates and to ensure good quality air for all office usable areas. In addition, CO₂ sensors provide constant air quality readings to the building management system (BMS), which will automatically adjust fresh air rates should CO₂ levels rise.

Additionally, the building has been designed to combat daylight glare, while 80% of the office's usable areas have access to an outside view. Internal air quality is preserved by the use of low volatile organic compound paints, carpets, and sealants, and dedicated tenant exhaust risers extract printer fumes at the source, reducing the build-up of harmful indoor pollutants.



An aerial view of Group Five's 5 Star Green Star building on the Waterfall Estate in Midrand.



Energy and water ecology

"It is important that energy savings are achieved without inconveniencing building users or relying on individuals to take responsibility for energy saving. Occupancy sensors are one example of how automation can realise significant energy savings in a building. Energy meters are extensively used to monitor energy use and identify unusual or excessive consumption. This is an important mechanism to manage the building, and optimise operating schedules.

Group Five also took the decision to install ammonia chillers, which operate at higher levels of efficiency compared to conventional chillers. Additionally, a thermal storage system has been provided to reduce peak energy demand on the national power grid," says Groves.

In terms of water, low flow rate fixtures and fittings were installed throughout the building. These fittings restrict flow, but do not impact on comfort and utility. Further water savings are achieved by capturing rainwater for re-use in irrigation and sanitation. Water meters have been installed throughout the building, which continually monitor all major water usages and aid in early detection of water leaks.

The project elected to use air cooled heat rejection for the ammonia chillers, removing a huge water burden from the operation of the building and ensuring air conditioning resilience in a potentially water-stressed future.

"The site is positioned adjacent to the Juksei River so it was vitally important that the project didn't increase the runoff rate into the river, and that the quality of storm water leaving the site is free from pollutants. To this end, the landscape and storm water management systems

were designed to work together. Two large attenuation dams were built to reduce and infiltrate storm water. The dams form important features in the landscape and provide a habitat for wild life and birds," says Groves. "The bulk of the landscape has indigenous plants that are well-suited to survival without irrigation. These plants are more resilient to local pests and, as a result, require fewer insecticides and artificial fertilisers in order to thrive. Additionally, the gardens planted between the wings of the building use drip irrigation and are regulated by soil moisture sensors where these areas also predominately use rainwater for irrigation."

Transport

The project provided the minimum parking bays as required by the local authority. In addition, five percent of these bays are designed for motorbike parking and a further five percent are reserved for fuel-efficient vehicles. The Waterfall Estate has numerous bicycle routes and is designing the precinct with 'complete roads'. Bicycle storage facilities are provided, as are showers and lockers. As attitudes to bicycle commuting change, Group Five will have the facilities in place that will allow building users to make that choice more easily.

"The site is currently served by the Sunninghill Gautrain bus and we anticipate that, as development increases in the vicinity, the public transport offering will also improve. This will continue to create access to alternative means of transport for the building's occupants," adds Groves.

WSP also worked closely with the project team to ensure the materials used at this site were in line with sustainability requirements – and that overall the greenhouse gas emissions associated with the operational phase of the Group Five Head Office were reduced as far as possible. The team worked closely with Group Five in the 12-month handover period, which included monthly monitoring, quarterly reporting and a full re-commissioning at the end of the project.

"As a construction company, Group Five sought to be on the forefront of sustainable design – bringing best practice initiatives into their very own building. The building is a great example of what can be achieved when partners who share a passion for sustainable design meet," concludes Groves. □

WSP Green by Design achieves 3-Star EBP Rating

WSP Green by Design – a division of WSP | Parsons Brinckerhoff, Africa – set another engineering consulting industry benchmark when WSP House in Bryanston, Johannesburg, was awarded a 3-Star Green Star rating under the Existing Building Performance (EBP) Pilot Rating tool. The rating was certified by the Green Building Council of South Africa (GBCSA).

"We are thrilled with this outcome! When the new EBP tool pilot rating was announced at the annual Green Building Convention last year, we couldn't wait to put it to practice. And what better way to demonstrate its efficacy than with our own building," says Gregory Rice, sustainability consultant, WSP | Parsons Brinckerhoff, Building Services, Africa. "We treated this process the same way we would a client's building or project. We employed our own expertise within WSP Green by Design to identify design features and operations already in practice in the management of WSP House. We then collated these operational plans and design documentation into the submission and this was presented to the GBCSA for assessment of the building under the EBP Pilot Rating."

The Existing Building Performance rating awarded to the project team and the building is a reflection of WSP's commitment to embracing environmental sustainability into the day-to-day operations of the business. Rice says: "Sustainability is at the heart of our business. With this project, we are showing what we put out into the market. At the same time, it is to the benefit of our own staff, building and business operations."

Situated in the Bryanston Place Office Park, some 20 km north of the CBD of Johannesburg, WSP House consists of two floors that are occupied by the campus reception, meeting rooms, campus canteen, open plan office space and a spacious and adaptable functions hall. Additionally, a naturally ventilated single level car parkade below the building and exterior permeable paving provide parking facilities for the building's occupants. Some of the inherent sustainability features of WSP House include: an abundance of natural light throughout the open plan office spaces; shading on the north-facing glazing; occupant controlled blinds; few permanent/ fixed interior features to allow for easy adaptation of space; and a naturally ventilated basement to reduce the build-up of pollutants. The management of WSP House also continually maintain documented procurement, replacement and operations processes.

"Of the operational initiatives for this building that we had identified and submitted for assessment under the EBP Pilot Rating, the points we were awarded were aligned to our expectations across the board and in some instances, even exceeded them.

"The feedback we have received through this pilot has also provided us with insight and learning that we can apply to future projects for our clients. Transforming any existing building into a better, greener one truly is a journey," concludes Rice. □



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Ventilation fan retrofit for Black Rock Manganese

Black Rock, operated by Assmang, which is jointly owned by Assore and African Rainbow Minerals, has recently upgraded its mine ventilation system with the help of ACTOM Mechanical Equipment, which extended the fan assembly from three units to four within a three-day shutdown period.

Leading mining ventilation fans manufacturer and contractor ACTOM Mechanical Equipment successfully performed a major mine ventilation fan retrofit project recently, replacing an existing fan assembly with an extended version within a three-day shutdown period at Assmang's Black Rock underground manganese mine near Kathu in the Northern Cape.

As a result of expansion of its mining operations Black Rock required an upgrade of its main ventilation fan system with the addition of a fourth 2,9 m diameter centrifugal fan to the existing three-fan installation, which was designed, manufactured and supplied by ACTOM Mechanical Equipment eight years ago.

"Traditionally we have always produced mine ventilation fans for new installations, either for a new shaft for an existing operating mine or for a new mine that is about to start up, so what was new for us in this project was that it involved a retrofit on an already operating shaft. This meant that we were allowed a very limited shutdown period in which to execute the changeover," says William Nichol, ACTOM Mechanical Equipment's project manager on the project.

"The shutdown period was exceptionally tight at only three days because the mine depends on this main ventilation system for all its ventilation and it therefore necessitated shutting down all mining operations while the changeover of the fan system was carried out."

The retrofit involved having to remove the existing shaft top, replace it with a new one and make the entire system ready to go back into service on the morning of the fourth day. "This required careful preplanning that included coordinating the civils in preparation for the new installation and delivering the fan system, comprising the replacement shaft top and quadfurcation, to site to



A 3D model of the retrofit design. Careful preplanning was required to complete the installation within the three-day shutdown.

The new shaft top being lowered into place over the mouth of Black Rock mine's 500 m deep main ventilation shaft.



The retrofit involved having to remove the existing shaft top, replace it with a new one and make the entire system ready to go back into service on the morning of the fourth day.

preassemble them on site ahead of the shutdown. We were also required to present method statements, safety procedures and an installation schedule to satisfy the mine's engineering consultants overseeing the project as to the soundness of our installation procedures and to ensure that they met all the mine's requirements," Nichol explains.

The installation process, executed at the end of July 2014, went smoothly and was completed well within the shutdown period.

Says Craig Johnston, ACTOM Mechanical Equipment's general man-

ager: "We have been planning for some time to enter the retrofit market for mine ventilation fans. Through the success of the Black Rock Project we have proved that we have the skills and project management expertise to carry out such projects efficiently; and we intend to go all out to obtain more work of this kind.

"We hope in this way to extend the scope of our ventilation fans business, especially in the high end of the industry where we already enjoy a longstanding good reputation as a supplier and contractor on new mine ventilation installations." □

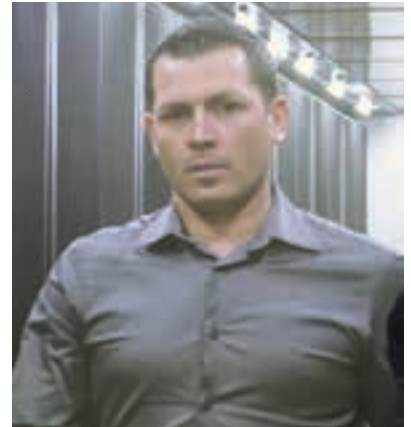
SAP data centre adopts on-demand cooling

Schneider Electric, a world specialist in energy management, has completed the installation of the new data centre for SAP, which includes an intelligent cooling management system to reduce the carbon impact and energy consumption of SAP France's IT room.

Schneider Electric has worked alongside SAP France to design a new data centre to host its information system and professional applications. Installed on the 14th floor of its new French headquarters in Levallois-Perret, the new facility houses an 18-rack integrated IT solution.

SAP, a leader in business applications, is working steadily towards a green business model – compatible with international sustainable economy standards – to meet the expectations of shareholders, customers and employees. The company is therefore committed to improving its economic and environmental performance in the long-term, for example, by reducing its carbon emissions over the next five years to pre-2000 levels.

Within this context, SAP issued a call for tenders to select a provider that could transform 80 m² of office space into a data centre that would be operational in less than six months. The specifications included a number of constraints: The data centre had to have low energy consumption, be intelligent, conform to



"Schneider Electric offered us a turnkey solution including an innovative cooling system, which was a decisive factor in the selection process. But their ability to design the server room in its entirety was a definite asset. It was very advantageous to have a single contact, as it gave us a global view of the planning," explains Joseph Cinquanta, IT account manager at SAP France.

SAP's environmental policy and, above all, be ready for the arrival of 400 employees by July 2014.

Schneider Electric handled all of the energy infrastructure, cooling, power distribution and protection, the raised floor, urbanisation of the white space, as well as the management



Main pic: Schneider Electric's EcoAisle solution ensures hot aisle containment, which increases the cooling efficiency. **Left:** Six new-generation InRow cooling units with hot aisle containment and an Air Flow Controller system were installed in the main data centre, with a further 17 standard InRow cooling units in the service areas. **Above:** For increased availability Active Airflow Controller senses changes in the contained aisle and 'right sizes' the airflow requirements. For visibility, the system operates a simple three colour coding system, green when the system is operating at the set point, blue if the racks are becoming too cold and red if the racks are too hot.

control system via StruxureWare™ for Data Centres DCIM software.

New generation intelligent cooling

For the urbanisation of the IT room, Schneider Electric proposed its InfraStruxure™ solution: an integrated, fully customisable and modular offering that guarantees the highest availability and operational efficiencies of the information system. This solution includes modular power, precision cooling, security, integrated monitoring and management.

The IT room is cooled by a combination of solutions comprising cooling production, distribution and intelligent management.

Cooling production is provided by Uniflair free-cooling chiller units, which are installed on the roof of the building, and because of the narrow French street in which the 22-story SAP building is situated, these required a rather spectacular method of delivery: the chillers had to be winched into place from a Super Puma helicopter.

Cooling distribution is provided by the InRow precision air conditioning system installed within the IT racks. These units capture heat as close as possible to the emission source, i.e. the servers. Connected to the EcoAisle solution, which ensures hot aisle containment, this system increases the cooling efficiency.

A genuine Schneider Electric innovation, the Air Flow Controller connects the chillers installed on the roof to the cooling units installed in the data centre. The latter supplies cooling only when necessary based on the parameters measured in the containment – temperature, hygrometry and air flow – thereby avoiding significant energy loss. This system gives SAP France a target PUE (power use effectiveness) level of 1.3.

This installation also includes 17 service areas, each of which contains two racks and an InRow cooling system, on all floors for horizontal distribution on each different level.

The data centre is managed by StruxureWare for Data Centres, the DCIM software suite from Schneider Electric. This software generates automatic reports, giving the information systems director an overview of the energy consumption and signalling any problems in real time.

The project's success and adherence to a strict schedule relied on two specific factors inherent to SAP and Schneider Electric. At Schneider Electric, cooperation between the different SAP departments is welcomed: "Throughout the project, the strong involvement of SAP IT management together with facilities managers, enabled a state-of-the-art data centre – in terms of energy efficiency and availability – to be built in record time," explains Franck Laporte, data centre sales account manager at Schneider Electric France.

Configuration details

The system consists of:

- Two scalable Symmetra PX160 and PX96 modular UPSs per module of 16 to guarantee optimal efficiency.
- 18 NetShelter SX racks in the data centre and a further 34 racks in the service areas.
- Six new generation InRow Cooling units with hot aisle containment and an Air Flow Controller system and a further 17 standard InRow Cooling units in the service areas.
- StruxureWare for Data Centres DCIM software solution, including Operation and Energy Efficiency modules.
- Automatic LED lighting and automatic door.
- Two Schneider Uniflair free-cooling chillers.
- Schneider Electric cabinets and circuit breakers.
- A Uniflair by Schneider Electric raised floor.

Joseph Cinquanta, IT account manager at SAP France, emphasises Schneider Electric's ability to handle a project in its entirety: "In my 15-year

career, this is the first time I've seen a solution operational from day 1! The all-in-one approach offers definite advantages," he affirms. □

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Innovative engineers for finals of first

Following an open, competitive, application process, which saw entries from 15 countries in sub-Saharan Africa, 12 African entrepreneurs have received business training and mentoring from the UK's Royal Academy of Engineering (RAEng). Subsequently, four African inventions have made it to the finals of the first-ever Africa Prize for Engineering Innovation.

The Africa Prize for Engineering Innovation – an initiative of the RAEng with support from the Shell Centenary Scholarship Fund, Consolidated Contractors Company, ConocoPhillips and the Mo Ibrahim Foundation – aims to stimulate, celebrate and reward innovation and entrepreneurship in sub-Saharan Africa. The intention is to encourage ambitious and talented sub-Saharan African engineers from all disciplines to apply their skills to develop scalable solutions to local challenges, highlighting the importance of engineering as an enabler of improved quality of life and economic development.

In its first competition, innovative engineering projects from Kenya, Tanzania, South Africa and Zambia have been selected as finalists.

The precision spot fertiliser applicator

By Musenga Silwawa, Agriculture Research Institute, Zambia

Like an age-old walking stick, with every

step the spot fertiliser applicator goes ahead of the walker, it inserts fertiliser into the soil while supporting the hand that holds it. It's simple and swift, especially when contrasted to the labour intensive process of bending over after every step to place a rough handful of mineral fertiliser in the ground.

Silwawa drew his inspiration from small-scale farmers who cannot afford to waste fertiliser by applying it to an entire field. Applying fertiliser to crops by hand results in inconsistent application. It's also time consuming, often requiring a big labour force, and has health implications for workers.

Silwawa was assisted by team members Joseph Phakati and Denny Sichula, and is part of a research unit at the Zambia Agriculture Research Institute, which aims to adapt technologies to suit farmers' socio-economic situations and cultural settings.

While previously only focused on the actual innovation, Silwawa says that the mentoring from the Academy has taught him to look at the farmers themselves. "Initially I wanted to conquer the world – and in the shortest possible time," he says. "My attitude after the mentoring and training has changed. I plan more. I have a calculated approach. My team and I are more focused and we have a clear roadmap."

Silwawa struggled to convince Zambian farmers to take on new technology. Today, he believes the Africa Prize has given him a new perspective on how to help people see the benefit of his innovation. "Before the Africa Prize, I saw myself as an innovator. My place was in the lab, and in the workshop. Now, I see myself as a business executive," says Silwawa. "It's easier to see what needs to be done."

The spot applicator is currently undergoing tests at the University of Zambia in preparation for compliance to the International Organisation for Standardisation, as well as South African and Zambian quality standards.

A precise fence security alarm system

Ernst Pretorius, University of Pretoria, South Africa

Hours after visiting a farmer friend in South Africa, 43-year-old electronic engineer Ernst Pretorius had finished his first design of the 'Draadsitter' (fence-sitter). Years later, his innovation has been patented and he is a finalist in the inaugural Africa Prize for Engineering Innovation.

Mounted to the wiring posts of a fence, a Draadsitter detects tampering on fences up to 800 m long. Electric fences are expensive in terms of maintenance and construction, but Draadsitter is both affordable and reliable.

Fences can't be tampered with, fence posts taken down, or Draadsitter devices moved without raising the alarm. Up to 9 999 units can be connected in a network, and a thermometer warns of fires. "There's a big need for the device in combating rhino poaching," says Pretorius, "and protecting wildlife and the livestock of small farmers."

After six months of training through the Africa Prize mentoring programme, Pretorius says that he's had to rethink many naive misconceptions, and grow both his business plan and the actual innovation. "Not only have we combined all the functions into a single, repackaged



Silwawa's spot fertiliser applicator goes ahead of the walker and inserts fertiliser into the soil while supporting the hand that holds it.



Ernst Pretorius' Draadsitter detects tampering on fences up to 800 m long.

Africa Prize

aluminium unit, but the Africa Prize process made me think to add functions I had never even thought of," he says. "I will always be grateful to the Academy for the knowledge I have gained through the Africa Prize."

The Draadsitter works off batteries that last up to three years. It isn't affected by harsh weather or set-off by the sound or flash of thunder and lightning, and has now been tested on fences with up to 22 rows of wiring.

Over the last six months, Pretorius' innovation has attracted interest from game farmers, conservationists and companies across Africa. The product is now in pre-production phase, and should begin rolling out by mid-2015. As for commercial viability, Pretorius is excited, but has learnt from his mentors to be careful.

Low-cost sustainable water filter system

Askwar Hilonga, The Nelson Mandela African Institute of Science & Technology, Tanzania

Imagine living near an expansive water source, yet paying for expensive, bottled drinking water because the river or lake serving the community is polluted. This widespread problem is what led a 38-year-old Tanzanian engineer to experiment with sand-based water filters and nanotechnology.

After an impressive 33 publications on his trademarked Nanofilter, Hilonga is developing his business plan for an innovation that could change the lives of thousands of Africans. Each Nanofilter is bespoke, and absorbs the contaminants that are present in a specific body of water – from heavy metals or minerals such as copper and fluoride, to biological contaminants such as bacteria and viruses or pollutants such as pesticides.

Hilonga is a chemical engineer and lecturer at the Nelson Mandela African Institution of Science and Technology. Described by the institution as a "very prolific young Tanzanian chemical engineer", his aim is to inspire Africans to empower their own communities. Using his knowledge of nanotechnology, Hilonga essentially modernised the traditional sand-filtration methods still widely in use to purify water.



The Nanofilter business plan is for community centres to become water hubs, filtering and selling water that is accessible to the most isolated and under-served communities. Hilonga is shown here installing filters at Gongali Empower Community Centre.

Hilonga is also the director of a university spin-off company called the Gongali Model Company, with the Nanofilter as one of the projects showing how research can be used in everyday life.

The Nanofilter business plan is for community centres to become water hubs, filtering and selling water that is accessible to the most isolated and under-served communities. Here, the water can be purified, and water-borne diseases controlled.

Since embarking on the Africa Prize journey, Hilonga's project has been granted an interest-free loan, filter components have been donated to the company for the initial rollout of 100 filters to test his business model, and a prototype is being used at the Gongali Model Company Community Centre.

Hilonga has more than 30 orders for home-based Nanofilters, 23 entrepreneurs ready to set up their own businesses with the filters, and six local schools set to provide their learners with clean drinking water.

The multi-network mobile phone service

Samuel Njuguna Wangui, University of Nairobi, Kenya

In much of Africa, mobile phone signal strength is inconsistent. As a result, most data and mobile phone users have at least two SIM cards to ensure they can always connect to at least one network. This means airtime is often trapped on a SIM card that isn't in use, and locked-into a particular provider.

This is what inspired the Chura app, a web-based application designed by 27-year old Kenyan software engineer Samuel Njuguna. The app was developed after Njuguna and four friends – now his innovation teammates – experienced this

very problem while trying to finish a university project on time.

Chura – the Swahili word for frog – enables Kenyans to 'leap' airtime between mobile carriers, buy airtime in more convenient denominations, and even exchange it for cash.

Njuguna and his team worked on the application for a full year before it was commercially viable, and Chura has now been chosen as a finalist in the first Africa Prize for Engineering Innovation.

After initial challenges in getting a digital technology recognised, the Chura application now has a copyright and is supported by several mobile carriers operating in Kenya.

Initially marketed to students, Chura has made around 15 000 transactions in the last 14 months, with a 60% return-customer rate. During the six months of mentoring and training provided as part of the Africa Prize by the UK's Royal Academy of Engineering, the application has evolved even further. The team is working on a mobile app, they've reduced the number of steps required to use the service, and introduced a new website.

The training by the Royal Academy taught the Chura team, part of the University of Nairobi's C4DLab Start-up Incubation Programme, to collect customer data and base company decisions on this, rather than on intuition alone. Now, Njuguna says, they track customer behaviour to find out where there are bugs that need fixing.

One of these four engineering innovations will win £25 000 when the first Africa Prize winner is announced in Cape Town on 1 June 2015, with £10 000 for each runner-up. □



Samuel Wangui's Chura airtime switch app enables Kenyans to 'leap' airtime between mobile carriers.

Shaft alignment systems with wireless communication



The SKF TKSA 80 shaft alignment system covers a complete spectrum of alignment needs for rotating machinery.

Designed for both novices and experienced users, the new TKSA 60 and TKSA 80 shaft alignment systems from SKF provide a complete built-in alignment process that takes users from preparation and evaluation all the way through to correction and documenting the results achieved. Each system's built-in wireless module eliminates the need for additional

cables and devices, creating a faster, more efficient tool to collect the necessary alignment data. Both units cover a complete spectrum of alignment needs for rotating machinery.

The SKF TKSA 60 is designed for individuals with fundamental alignment knowledge, but without extensive experience. The system reminds users of the correct tools and materials to use before going to the location where the alignment takes place. A built-in visual inspection process helps users identify oil levels, leakages and wear indications. It also helps users compare inspection results to specifications and prioritise corrective actions. Both the TKSA 60 and 80 provide a colour screen for detailed graphics and a measuring distance of up to 10 metres.

The more advanced unit, the SKF

TKSA 80, includes all of the features of the TKSA 60 and additional features including a comprehensive database structure to store OEM specifications for a wide range of rotating equipment. The system also enables users to create and store templates for plant machinery, building and alignment sequence history, all of which optimise management of the alignment process. The TKSA 80 also accommodates large machine train alignment, and reminds users to perform a run out check to look for bent shafts.

"These SKF Shaft Alignment systems are an important addition to SKF's portfolio of sophisticated handheld instruments built on more than 100 years of knowledge of rotating machinery," says Eddie Martens, business development manager: maintenance products.

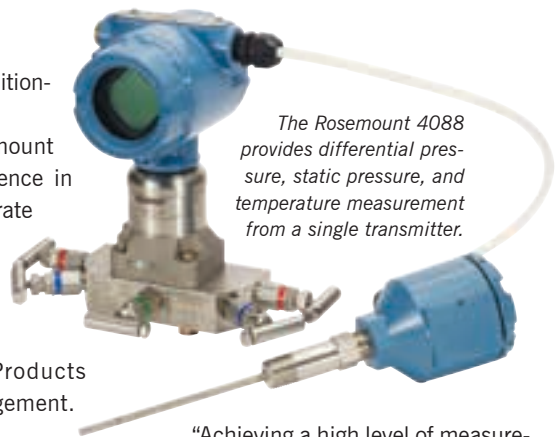
www.skf.com

New oil and gas multivariable transmitter

Emerson Process Management has launched the Rosemount 4088 Multi-Variable™ Transmitter. The device is a new solution for upstream and midstream oil and gas applications, providing differential pressure, static pressure, and temperature measurement from a single transmitter. The advanced Rosemount 4088's extended range capability captures flow rate spikes above the upper range limit of the transmitter to account

for flow that would have traditionally been missed.

"We designed the Rosemount 4088 to make a real difference in the way our customers operate their wells and manage oil and gas production," says Scott Nelson, vice president and general manager of Rosemount Pressure Products at Emerson Process Management.



The Rosemount 4088 provides differential pressure, static pressure, and temperature measurement from a single transmitter.

"Achieving a high level of measurement accuracy and output efficiency over the life of a well is a huge undertaking, and the Rosemount 4088 MultiVariable Transmitter will help companies meet their objectives."

As wells mature and process conditions change, maintaining accurate measurement instrumentation is critical to well stakeholders and leaseholders. The Rosemount 4088 MultiVariable transmitter offers stable performance over the life of the well, ensuring consistent production and minimising service and equipment costs.

The 4088 is typically integrated into a larger oil and gas production network by transmitting data to flow computers and RTUs. The device is designed to easily integrate with Emerson's flow computer products, such as the ROC, FloBoss™, and ControlWave®, but it can be used with any new or existing flow computer or RTU network that accepts Modbus input.

www.rosemount.com

Pressure and temperature data logger with record function

The LEO Record data logger from Instrotech, is an autonomous battery powered instrument with digital display designed to record pressure and temperature over long periods. LEO Record (piezo-resistive) as well as LEO

Record Capo (capacitive) data loggers are ideal for low-pressure ranges and offer high measuring accuracy, resolution and robustness as well as high data security (due to the use of a non-volatile memory). While recording pressure and temperature, they display the actual pressure and record the status. The pressure is measured and displayed up to once per second.

Intrinsically safe (IS) versions of both the LEO Record and LEO Record Capo are available, making them ideal for applications in the oil and gas industry where materials in contact the measured media are stainless steel.

Compatible Logger 4.X software, for configuration and readout of data loggers DCX, LEO Record and Leo Record Capo, is shipped with an interface cable and the software can be downloaded from the internet.

www.instrotech.co.za



Forklifts, reach trucks and tow motors for automotive component manufacturer

Criterion Equipment recently delivered 19 materials handling machines to automotive and industrial component manufacturers, MAHLE Behr South Africa (MBZA). "These new machines will enhance the existing fleet of forklift trucks, reach trucks and tow motors at MBZA's Pinetown head office facility and its Port Elizabeth branch. With advanced features for high productivity and operator comfort, these machines will further improve handling efficiencies at MBZA's plants," says Graham Clare, KwaZulu-Natal branch manager, Criterion Equipment, a wholly owned subsidiary of Invicta Holdings Limited. "This consignment, which is the company's second contract of this

nature with MAHLE Behr, will be supported by Criterion Equipment's five-year maintenance programme.

"MBZA has invested in 17 TCM machines and two Motrec tow motors because of their efficient performance, enhanced safety features, economical running costs and minimal maintenance requirements. Reliable handling equipment is critical for the transportation of a wide range of components, including raw materials such as aluminium, around MBZA's manufacturing plants and to safely dispatch completed products onto trucks.

"As part of Criterion Equipment's commitment to ensuring optimum



Criterion Equipment hands over a new fleet of TCM materials handling equipment and Motrec tow motors to MBZA's Pinetown head office facility.

performance of every machine, regular site analysis forms part of the five-year maintenance programme," says Clare.

www.criterion.co.za

Spin filter technology for VSDs, MCCs and switchgear

Rand Technical Services (RTS) recently supplied spin filters to JB Switchgear Solutions for the variable speed drive (VSD) panels the company has installed for a mining project in the Northern Cape. These spin filters are purpose-designed to accommodate a variety of applications, and offer an extremely efficient answer to the problem of heat and dust build-up, according to Ian Fraser, managing director of RTS.

"Spin filter technology is finding wide application in coal, gold, diamond and other mining environments, which include MCC rooms, control rooms, substations, transformer rooms, machinery spaces and workshops, as a cost-effective solution in both ventilation and filtration," notes Fraser.

JB Switchgear approached RTS to supply dedicated back channel cooling to the VSD panels on the mine, and, according to John Balsdon, projects director of JB Switchgear, the company has not looked back.

"RTS's spin filter technology is a unique ventilation and filtration system that is extremely efficient and ideally suited to many of the items that we manufacture. Electrical and electronic equipment require both cooling – through adequate movement of air – and a high degree of filtration to ensure an environment that is suitable for the sophisticated equipment used in our panels," says Balsdon.

Spin filters, via cyclone technology, provide a cost-effective alternative to conventional dust filtration and air-condition-



JB Switchgear approached RTS to supply dedicated back channel cooling to the VSD panels on the mine.

ing with the added advantage of being virtually maintenance-free. "Because the filter is self-cleaning, it is ideally suited to remote industrial applications where regular maintenance may be difficult or simply neglected," Fraser notes.

www.rtsafrica.co.za

New Southern Africa distributors for personal protection equipment

"We have recognised an urgent need in industry for increased safety for workers and made a strategic decision to further extend Magnet's product offering. Dromex protection equipment complements Magnet's portfolio of electrical equipment, industrial instrumentation and automation systems, to ensure optimum protection for workers in all fields," says Brian Howarth, managing director, Magnet.

The Dromex range, now available from Magnet, encompasses respiratory masks and cartridges, eye protection spectacles and goggles, earplugs and earmuffs, gloves for hand protection and shoes or boots in the footwear range. Also available are lightweight flame retardant and acid resistant body protection garments.

Key products for Magnet include DW-NOMEX® flame retardant suits and SABS D59 flame and acid suits, which are resistant to abrasion, tear and chemicals. This durable work wear, consisting of

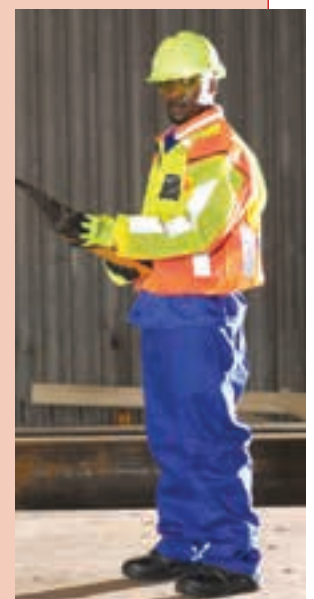
jackets, pants and overalls, meets stringent local and international safety specifications, including the SANS 434 standard for mark bearing work suits.

Dromex footwear is certified to ISO 20345:2011 standards for safety footwear. An easy-to-follow selection chart contains relevant information on classifications, categories and performance requirements to ensure selection of the correct shoe or boot for intended use and potential hazards.

DroVision goggles have a clear polycarbonate mono, scratch resistant lens and an elasticated and adjustable headband for optimum protection and maximum comfort. These goggles, which offer 120° lateral vision, are compatible with other respiratory equipment.

www.magnetgroup.co.za

Magnet has been appointed distributors throughout Southern Africa for Dromex personal protection equipment.



US licenses first autonomous truck

In July last year, Daimler Trucks demonstrated an autonomous truck in action when the Mercedes-Benz Future Truck 2025 drove along a cordoned-off section of the A14 autobahn near Magdeburg. But in May 2015, the American State of Nevada granted Daimler's Freightliner's Inspiration Truck with Highway Pilot the world's first autonomous truck license for road use.

The development engineers of Daimler Trucks transferred the system to the US brand Freightliner and modified it for use on American highways. The result: the State of Nevada certified no less than two Freightliner Inspiration Trucks for regular operations on public roads.

Highway Pilot technology comprises a front radar and a stereo camera plus tried and tested assistance systems such as adaptive cruise control, as seen in the standard Freightliner Cascadia models

and the Mercedes-Benz Actros. For licensing on public roads in Nevada, the technology was further developed and the interaction of components extensively tested. As part of the truck's marathon run, the Freightliner Inspiration Truck covered over 16 000 km on a test circuit in Papenburg, Germany.

As soon as the truck is safely on the highway, the driver can activate the Highway Pilot system. The driver receives a visual prompt in the instrument cluster to activate the Highway Pilot. The vehicle switches to autonomous mode and adapts to the speed of traffic and then the driver receives a confirmation message in the instrument cluster.

The Highway Pilot system uses a complex stereo camera and radar systems with lane-keeping and collision-prevention functions. It regulates the speed, applies the brakes and steers. This

combination of systems creates an autonomous vehicle that can operate safely under a wide range of driving conditions – the truck automatically complies with posted speed limits, regulates the distance from the vehicle ahead or uses the stop-and-go function during rush hour.

The Highway Pilot system does not initiate autonomous passing manoeuvres, as these have to be executed by the driver. The same applies for leaving the highway and changing lanes. Via the user in-

terface the Highway Pilot keeps the driver visually informed about its current status and accepts instructions. The driver can deactivate the Highway Pilot manually and is able to override the system at any time. If the vehicle is no longer able to process crucial aspects of its environment, e.g. due to road construction or bad weather, the driver is prompted to retake control. In addition to a visual prompt in the instrument cluster there is also a subsequent audible notification.

The Inspiration Truck represents yet another demonstration of the consistent way in which Freightliner Trucks technology strategy has developed in the USA. As a global commercial vehicle manufacturer, Daimler is demonstrating how intelligent technologies can be rolled out across brands in the group within short time frames. □



As soon as the truck is safely on the highway, the driver can activate the Highway Pilot system, which uses a complex stereo camera and radar systems with lane-keeping and collision-prevention functions to regulate the speed, apply the brakes and to steer the truck.

Manufacturing Indaba: June 29-30, 2015 at Emperors Palace

With South Africa's economy under pressure and business confidence in decline, the manufacturing industry continues to face tremendous challenges. A shrinking manufacturing base, supply chain challenges, human capital challenges, the threat of other emerging economies and cheap labour continue to threaten the growth and prosperity of the sector.

The aim of the Manufacturing Indaba is to bring together business owners, industry leaders, government officials, capital pro-

viders and professional experts to discuss these challenges and to brainstorm solutions. "The success of our nation depends on a strong and innovative manufacturing base. We must continue to work together to promote prosperity through manufacturing, science and innovation," says Liz Hart, MD of Manufacturing Indaba.

The 2nd annual Manufacturing Indaba will be held from 29 to 30 June 2015 at Emperors Place, Kempton Park.

www.manufacturingindaba.co.za

Industry diary

May 2015

MEIndaba 2015

28-29 May

Emperors Palace, Ekurhuleni, Gauteng

meindaba@seifsa.co.za

www.meindaba.co.za

June 2015

Rapid.tech

10-11 June

Exhibition Centre Erfurt, Germany

Organizer: Messe Erfurt GmbH

www.rapidtech.de

Manufacturing Indaba

29-30 June

Emperors Place, Kempton Park, Gauteng

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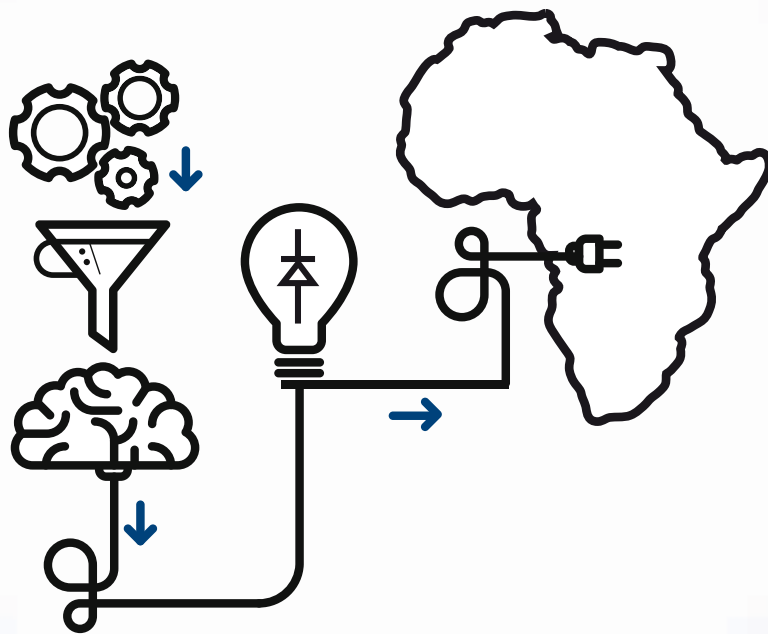
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Index to advertisers

Afrox	OFC, OBC, 32
Atlas Copco.....	26
Becker Mining SA.....	19
BMG	20
Bonfiglioli.....	IFC
Clyde Bergemann Africa.....	29
ContiTech Conveyor Belts.....	22
Crown Publications	IBC
Hytec Fluid Technology	35
M&J Engineering.....	17
Martec.....	13
Metso Minerals	14
Powermite Engineering Solutions	21
ThyssenKrupp Industrial Solutions	2
Verder Pumps SA	15

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