



Seeing the big picture

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THIS MONTH:

- Best-fit fluid handling for Africa
- Automatic wet batching for concrete
- Renewable energy: a business case approach
- Tech4RED, hydrogen fuel cells and development partnerships

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Technology for rural education

A highlight of my travels this month was a trip to Queenstown and Cofimvaba – as a guest of Air Products – where I witnessed the launch of the dti's Technology for Rural Schools Education Development programme. The only thing I don't like about this initiative is its acronym, Tech4RED.

From Johannesburg, Cofimvaba is not that easy to get to. We flew to East London the day before and then drove to Queenstown where we stayed overnight. The following morning involved a shorter drive of 80 km to Cofimvaba, which is just a few kilometres east of Sabalele, the birthplace of Chris Hani. Formerly the Transkei, the region has a rich political history and the Matanzima family members remain active supporters of development in the area.

While rural, Cofimvaba does not give the impression of being neglected. It has grid-, telephone- and cellphone-connectivity and satellite dishes. Largely dependent on agriculture, the region is blessed with two things: land and water.

The atmosphere on arrival was festive. Tents had been erected at the Mvuzo Junior Secondary School, and happy schoolchildren, traditionally dressed Xhosa women and men in suits were all happily mingling.

A science expo had been set up. The dti's HySA initiative was powering model vehicles using miniature fuel cells; and in a bright green container covered with solar panels, an organisation called Solar Turtle from Stellenbosch was displaying its 'bottled electricity solution' – 12 V deep-cycle batteries incorporated into bottles with car-charger connections instead of lids. The bottles are 'sold' for 'wireless' lighting and low-power charging in homes without electricity, and exchanged when depleted for 'full' bottles charged using a solar system in the container.

Nelson Mandela Metropolitan University, Nelson Mandela Bay Science and Technology Centre; the Foss Discovery Centre from Fort Hare; NRF; SciBono; Air Products; and Sasol were also among the exhibitors. A group of young Mvuzo schoolchildren enthusiastically showed their orange tablet devices to visitors.

The formal events of the day began with the signing of a memorandum of understanding between the dti, Anglo American Platinum, Clean Energy Investments and Air Products, for the expansion of the pilot hydrogen fuel cell backup power project to include 26 more schools in the region. This was followed immediately by the unveiling by Science and Technology Minister, Naledi Pandor, of the hydrogen fuel cell plant at Mvuzo Junior Secondary School.

There is a sense of comfortable synergy between these partners and their individual aspirations. The dti has long been promoting a hydrogen economy, through HySA and other initiatives. Fuel cell technology, like catalytic converters, is an obvious market opportunity for South African and Anglo's platinum, while Air Products, which reforms over 90% of the country's hydrogen, has an excess capacity of some 6.0 t/day. And, given South Africa's current predicament, stringing together the words clean, energy and investment in a company name has to spark immediate interest.

By adding rural education, with its associated corporate social investment credentials to the projects '*raison d'être*', the local development of hydrogen fuel cell technology for backup power makes even more sense, even if difficult to justify based on direct cost comparisons at this present time.

While the opening of the fuel cell plant was my core reason for attending the event, the backup power system is only one part of the much more ambitious Tech4RED programme. At its starting point is the use of modern ICT as part of daily classroom activity, via Android-based tablet devices loaded with targeted educational applications. Initiated back in 2010 by Pandor's predecessor, Derek Hanekom, the programme involves much more than simply using tablets, however. In her launch presentation, Pandor pointed out that, as well as ICT and e-learning, the project involves science and technology, very directly, and includes a strong educational focus on nutrition, health, agri-science, water, sanitation and health.

As was obvious from the number of speeches at the launch – the Chris Hani District mayor, the Eastern Cape's education MEC and Minister Pandor from DST on the public side, along with Anglo's Andrew Hinkly, Air Products' Sizwe Nkondi and Gavin Coetzer from Clean Energy Investments on the private side – this programme has depended on a large number of stakeholders.

This initiative, according to Pandor "demonstrates that collaboration between the public and private sectors is essential to improving living conditions in society".

This Cofimvaba event took place while our President was launching the AU summit by playing golf, a summit that was buried in the days that followed by the al-Bashir fiasco. But Tech4RED, the co-operation between its diverse stakeholders and the impeccable behaviour of the Cofimvaba schoolchildren left me feeling quite optimistic about our long-term future.

Peter Middleton

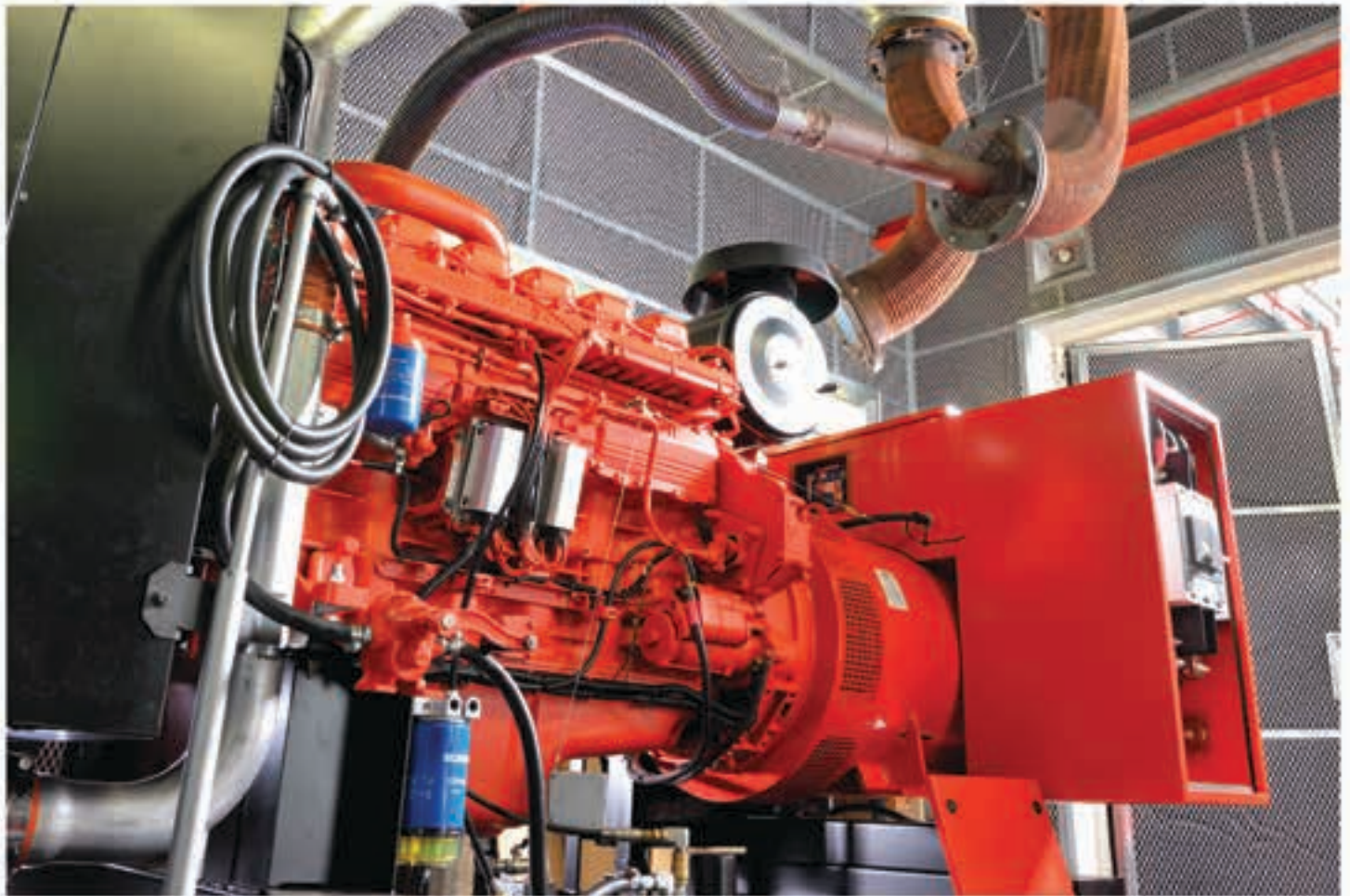


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ON THE COVER



Handling flexibility and 'out-of-the-box' automation

With the launch of its specialised application Maxolution and the new Variolution concept with its library of configured end-user solutions for the automotive, food and beverage and logistics applications, SEW Eurodrive has established a new and more flexible approach to factory automation and production line handling. *MechTech* talks to Ute Schoeman, the company's South African MD.

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Features

Special report

8 Unilever's SA capacity transformation project

Unilever's R1.4-billion Khanyisa Home Care factory in Boksburg was opened on June 2, 2015. The following day, the company's Indonsa factory expansion was opened in Durban, a R511-million investment.

Pump systems pipes valves and seals

10 Best-fit fluid handling for Africa

MechTech talks to Set Point's Letaba pumping division heads, Bernd Irle, Brubin's general manager and Ian Duke, general manager of Letaba Industrial.

13 The Pump Guy: When is a pump problem not a pump problem?

14 Weir Minerals Africa adapts to meet mining challenges

17 Pump rental: reap benefits while reducing costs

18 Mag drive exports buoy local pump manufacturer

Sustainable energy and energy management

20 Renewable energy: a business case approach

MechTech talks to Dave Smith, the newly appointed managing director of Jasco Renewable Energy about balancing technology and financial sense in this challenging emerging sector.

22 Servicing Africa's genset manufacturing sector

25 Solar installation reduces grid reliance by 40%

26 Solar modules study reveals better energy recovery

27 Large, modern gensets now available in Africa

Robotics, automation and mechatronics

28 Automatic wet batching for quality concrete

Ready-mix wet batch plants – with capacities ranging from 30 m³ to over 240 m³ per hour – are a more cost-effective alternative to the traditional dry 'Karoo' batch plants that currently dominate the local market.

29 IT automation unlocks innovation

31 Port of Ngqura's automated mooring system

Modern transport and vehicle solution

32 UD Trucks launches Quester range

UD Trucks Southern Africa launched its new Quester extra heavy truck range earlier this year, which includes 13 derivatives in its line-up. This article summarises its modern features.

35 Container handling expansion for Durban harbour

Innovative engineering

36 Tech4RED, hydrogen fuel cells and development partnerships

On June 12, Minister of Science and Technology, Naledi Pandor launched the Technology for Rural Education and Development Project (Tech4RED). *Peter Middleton* attends and reports.

Regulars

1 Comment

4 On the cover: Handling flexibility and 'out-of-the-box' automation

6 Industry forum

38 Products and services

40 Nota bene

Handling flexibility and 'out-of-the-box'

With the launch of its specialised application Maxolution and the new Variolution concept with its library of configured end-user solutions for the automotive, food and beverage and logistics applications, SEW Eurodrive has established a new and more flexible approach to factory automation and production line handling. *MechTech* talks to Ute Schoeman (right), the company's South African MD.

“SEW has developed excellent technologies for automotive, food and beverage and logistics applications. These industries are at the core of the German economy, so it is not surprising that their supporting technologies are highly developed in Germany. But the country is weaker in other industries such as mining and the heavy industries. Its engineers are more comfortable developing solutions for highly automated, large volume industries,” argues Schoeman.

Historically, SEW was seen as a component manufacturer, selling individual products for inclusion on machines being built by OEMs or systems' integrators. “Our sales engineers would go to OEMs and try to convince them of the merits of using SEW equipment on the machines they had been commissioned to build. The machine builder then chose to use individual drives and gearboxes based on costs and convenience. These would be plugged into designs developed to meet rigid specification from the user,” she says.

“Then, about five years ago, SEW decided to approach end-users directly, one of the first being Audi on the automotive side. The idea was that, instead of supplying single function components for traditional machines and production lines, we would go directly to end users of our products to find out exactly what they needed to achieve and, using the full complement of our product range and engineering expertise, we would design modern, integrated and flexible systems to move sub-assemblies and components to where they were needed on production lines,” she explains.

SEW engineers in Germany have since developed hundreds of customised automation solutions for clients including BMW, VW and Audi. But these successes were seldom advertised because they were end-user owned and involved large amounts of application specific embedded knowledge. “These

integrated solutions, therefore, were not seen as globally marketable products,” Schoeman explains.

Recognising this, SEW Eurodrive decided to explore better ways of promoting and extending its end-user driven technologies. Two concepts were developed. The first being the Variolution® packages of scalable drive solutions. Looking at end-user applications that had already been sold to end-users, SEW Eurodrive developed a series of generic solutions for various different industrial applications. “We had sold over 500 customised palletising solutions in the food and beverage industries, for example and, while these were all customised to suit the specific applications, a common engineering approach could be identified. Instead of every engineer restarting from scratch to design a palletising machine, selecting drives, inverters and gearboxes to build a new solution from scratch, SEW developed packaged solutions as starting points for palletising applications. When an engineer visits a site that needs a palletiser, he or she now has Variolution application modules that can be used to specify, in general, which components will be needed for the machine. The proceeding customisation then becomes very easy,” Schoeman tells *MechTech*.

Variolution scaleable drive solutions are embedded in a SEW application called Movitools, which contains configured solutions with libraries for palletisers, conveyors, cranes, scissor lift tables for the automotive industry, packing and unpacking systems and much more.

“One step further on, is SEW's Maxolution® concept, which defines the key future direction for SEW Eurodrive. “Maxolution is a solution-based automation concept that looks to use SEW's extensive range of products to provide holistic solutions for manufacturers,” says Schoeman.

Underpinning the concept is to maximise, with respect to efficiency and



flexibility, the movement of parts, assemblies and products at manufacturing and production plants. “Maxolution strives to find the best way to move something from A to B on a shop floor,” explains Schoeman.

“If an assembly plant is using a static conveyor, for example, but needs to increase its output, then a second static conveyor line might be the obvious machine builder's solution. If space is a constraint, then a new building or a new floor might be required.

“But SEW can offer mobile technology to function on a new and open floor plan. Instead of adding a second static conveyor to move product from a fixed point A to a fixed point B, we are able to steer the solutions towards AGVs (automated guided vehicles), which offer a highly flexible solution in that they can operate from any point A to any point B. Increasing production becomes as simple as adding more vehicles, and when production needs to slow, fewer vehicles can be used. Fixed conveyors, on the other hand, have an inherently limited production capacity and, once installed, the path from A to B cannot be changed easily,” Schoeman points out.

Maxolution is an automation solution for the long-term future of a manufacturer. It offers maximum flexibility and scaleability for fluctuating production requirements and for future expansion and growth.

“An AGV is like a big workbench on wheels. It has built-in SEW technology to move and to guide it. But the worktable surface can be fitted with customised

automation



Above: Using contactless energy transfer between cables in the floor and the vehicle, SEW AGVs offer a highly flexible solution that they can transport required products from a dispatch point to any point on an assembly line.

Right: Electric monorail systems (EMS) for overhead transport involve some fixed infrastructure but the individual carriers are self-propelled and their numbers can be changed to suit daily needs.



SEW's Maxolution® system solution for transverse carriages, used for materials handling of incoming goods and around the commissioning stations. The transverse carriages are compact and are highly reliable. The energy transfer is contactless and thus wear-free and unaffected by environmental conditions.

automation or jiggling to suit one or a number of applications. At automotive plants, for example, a complete front axle and engine is loaded onto an AGV for delivery to the line. The assembled car body is then lowered into position and the entire drive train is bolted into place in a single operation. The car moves up and on and the 'empty' AGV returns to the mechanical assembly line. "This is the future of manufacturing!" exclaims Schoeman.

Describing the typical requirements of at a bottling plant, she says that the movement of bottles between a filling machine and a labelling machine has, in the past, been done with conveyors. "The new way is for an AGV to be loaded at the filling machine, which then autonomously transports the bottles to the labelling machine." Instead of having a static line, AGVs transport the bottles to any available labelling machine. As the production needs increase, more vehicles can be added to accommodate the transfer needs. And to increase overall plant capacity, additional filling or bottling machines can be added without having to add new conveying infrastructure.

The AGVs can be programmed, via embedded smart technology, to take the optimum route to the most available machine down the line, and can transport the same batch of bottles all the way through from filling to palletising.

Also, in line with Industry 4.0 tech-

nology, each machine, AGV or processing station has built-in intelligence and autonomy so that each can quickly and flexibly be reconfigured or optimised to better suit production needs at any particular time. The individual machines and handling systems, while communicating and reacting to each others needs, are 100% independent of each other, which allows them to adapt to changing circumstances without having to reconfigure the whole line.

These modern systems are also less sensitive to breakdowns. A breakdown anywhere along a traditional production line affects all operations upstream and downstream of the problem. The new mobile approach allows any 'module' to be replaced and, once its intelligence is transferred, the new module will perform exactly like the replaced unit.

"Maxolution does not only involve AGVs. Electric monorail systems (EMS) can be used for overhead transport of assemblies, for example," Schoeman adds. "While these do involve some fixed infrastructure, the individual carriers are self-propelled and their numbers can be changed to suit daily needs. They also have built-in intelligence so that it is possible to track exactly where each carrier is and what it is carrying. Since they operate overhead, EMSs also keep the floor clear for maximum safety and flexibility," Schoeman informs *MechTech*.

The Variolution and Maxolution con-

cepts turn the manufacturing environment on its head. "Instead of thinking about lines of production, it becomes possible to start with an open space and locate machines to maximise the use of that open space without fixed constraints," she says.

Turning attention to applying the concept in South Africa, Schoeman says that keeping abreast of the technology available today, even if is limited only to SEW technology, is "hectic". "We send our own engineers for regular training in Germany, but local OEMs don't have that luxury."

As with Variolution, generic Maxolution configuration modules now exist for AGV, EMS and many more of our mobile 'Movi' solutions for other end-users, OEM machine builders and systems integrators. These packages allow a wide variety of user applications to benefit from the specific successes and experiences of SEW's past implementations," Schoeman tells *MechTech*.

"We have started at the top, with highly integrated end-user solutions. Shown what an SEW-based package can do, taking into consideration energy efficiency, accuracy of output, production efficiency and flexibility. And for end-users, we offer project management services for entire installations, using machine OEMs who know SEW equipment and can handle complex automation projects," Schoeman concludes. □

New MD at Xylem South Africa

Xylem South Africa, a division of the global water technology leader, Xylem Inc, recently announced the appointment of its new managing director, Pierre Fourie. After an exhaustive local and international search for the right candidate, Fourie's skills set, technical background and solid management experience was a "perfect fit" for this important leadership role within the company.

"I am extremely excited about working with the talented pool of people at Xylem," Fourie says. "Especially due to Xylem's involvement with a vast range of clients in the mining; municipal and agricultural spheres.

"Water is a global concern, in terms of scarcity and accessibility for day-to-day consumption and within commercial processes – especially within Africa. With the top-tier products in Xylem's arsenal of products; including globally renowned brands such as Flygt and Godwin pumps; the company is poised to assist clients and communities to gain access to water for a variety of uses, while helping them to conserve fresh water and limiting energy usage." Fourie underlines this commitment to world-leading water solutions on the African continent saying, "we are uniquely positioned to deliver what clients need within an African context – and our team is set to roll out a few excellent initiatives in the near future. I am proud to be a part of it."

Fourie is deeply committed to employee development: "It is a key motivator for me to harness the collective skills of



Xylem South Africa's new MD, Pierre Fourie.

all our employees into a cohesive whole. I want employees to feel free to approach me and their managers with new ideas. I want them to be able to identify and seize opportunities knowing that they are supported by management and the wider team at our company." This ties in with Fourie's strong focus on skills development for employees.

Upcoming initiatives include: the opening of its new rental depot in Johannesburg later this year, which will be the largest pump rental hub in Africa; and the opening of Xylem's first branch in the Eastern Cape. Fourie will be heading up these initiatives and managing the South African team from the company's head office in Boksburg, Gauteng.

www.xylemwatersolutions.com/scs/south-africa

Oerlikon Leybold Vacuum pump agency secured

Integrated Pump Technology has secured the agency and distributorship for Oerlikon Leybold Vacuum, for sub-Saharan Africa. The agreement covers the full line of fore- and high-vacuum pumps, systems, vacuum systems, vacuum gauges, leak detecting instruments, flanges, fittings, valves and accessories.

Graham Russell, CEO of Integrated Pump Technology, points out that this will allow the company to broaden its product offering to include vacuum technology. "This underlines Integrated Pump Technology's business philosophy of partnering with leading specialist suppliers of technology solutions that add value to complex processes." The Oerlikon Leybold Vacuum is already well known in South Africa, with a relatively large installed base of products.

Russell explains that fore vacuum pumps are used in general industrial applications such as pick-and-place systems, food and packaging and as backing pumps for high vacuum application. High vacuum pumps are typically used in research laboratories and the coatings industry.

pump-technology.com



A single stage rotary vane vacuum pump from Oerlikon Leybold Vacuum.

SANSA launches SPOT 6 and SPOT 7

The South African National Space Agency (SANSA) reached another milestone with the launch of its high-resolution SPOT 6 and 7 National Mosaics satellite imagery and ortho-bundle (mapping) data at the CSIR Convention Centre in Pretoria. High-level researchers and representatives of various government departments, as well as public and private institutions attended the launch.

With a resolution of 1.5 m, the SPOT 6 and 7 earth observation satellites are sure to enter the SPOT series into a new era. These two satellites form a small constellation, and were deployed into the same orbit on September 9, 2012 (SPOT 6) and June 20, 2014 (SPOT 7). The two satellites replace a single satellite, SPOT 5 that was decommissioned at the end of March 2015.

"We are very excited to harness the

potential benefits of the SPOT 6 and SPOT 7 satellite imagery products to further address national issues, including tackling food security, agricultural issues, energy, rural development and urban planning, especially at local government level," says SANSA CEO, Dr Sandile Malinga.

He adds: "SPOT 6 and SPOT 7 are crucial decision-supporting tools for South Africa. The defence, intelligence and police departments will benefit greatly from these highly responsive sensors that increase acquisition capacity and simplify data access."

SPOT 6 and SPOT 7 cover wide areas in record time and their agility capability makes them useful for disaster monitoring. Both products can accommodate last-minute urgent task requests with high levels of data detail.

"Using satellite data provides repetitive, reliable and consistent information about the planet on a global scale. When combined with 'in-situ' observations, it's an extremely powerful tool for monitoring our environment, including low-cost housing mapping, which helps government with future planning and development. More importantly, with the two satellite we are in a position to provide two seasonal mosaics per year," says SANSA Earth Observation managing director, Dr Jane Olwoch.

SPOT 6 will aid agriculture by making available information about vegetation and providing water quality analysis. Among other data, these products are strategically in line with the SANSA goal to collect, assimilate and disseminate earth observation data to support South Africa's policy making, decision making, economic growth and sustainable development initiatives.

www.sansa.org.za

Metso's Lokomo celebrates 100 years



Metso's president and CEO Matti Kähkönen.

Metso's Tampere unit, better known locally as Lokomo, is celebrating its 100th year of industrial existence in May in Tampere, Finland. Oy Lokomo Ab started operating in Tampere in April 1915. Today Metso's Tampere unit is the company's most important global competence centre for mobile crushers and all the company's crushing and screening equipment is developed in Tampere.

"Throughout its history, Metso's Tampere unit has boldly transformed and

developed fresh innovations to meet the needs of the day. An excellent example of this is the unit's evolution into a globally significant crushing equipment competence centre for today's Metso," says Metso's president and CEO Matti Kähkönen.

Lokomo started its operations in 1915 as a steam-engine factory competing with the local Tampella. The company's name stems from the word locomotive. Just a couple of years later, Lokomo manufactured its first crushers, which were delivered to the National Board of Public Roads and Waterways. A key driver behind the production of locomotives and crushers was the company-owned steel foundry, which was very modern already back in the 1920s.

Today, the Tampere factory has over 700 employees and manufactures the bulk of Metso's mobile crushing plants, of which more than 7 000 have been installed in the past 30 years.

www.metso.com

Eaton signs deal with Diesel Electric Services

Power management company Eaton has signed a premium distribution partnership deal with Diesel Electric Services, which is a company that specialises in generator sets, distribution boards and associated products.

Diesel Electric Services has business relationships with various consulting groups as well as end users garnered over 23 years of the company's existence. Their products and services are sold throughout Africa in countries including Zambia, Angola, Nigeria, Cameroon, Zimbabwe, Mozambique, Ghana, Congo, Swaziland, Lesotho, Namibia, Botswana, Ivory Coast, Malawi, Rwanda, Burundi, Madagascar, Tanzania, Mauritius and South Africa.

Eaton and Diesel Electric Services will help customers achieve performance-

optimised data centres with unmatched reliability, increased efficiency without sacrificing uptime and a more flexible data centre design.

"Collaborating with Diesel Electric Services will allow us to showcase our local expertise in meeting customer needs across Africa," says Shane Kilfoil, managing director, Eaton Africa.

Diesel Electric Services will also be utilising Eaton products and solutions to manufacture their own range of branded engines and alternators, generator control systems, diesel/gas driven generating sets, specialised products for base-load transmitter stations, UPSs, fuel conditioning systems, switchboards and reticulation installations.

www.dieselectricservices.co.za

Set Point's Level 3 BBBEE status

Set Point Group and its seven divisions recently achieved a Level 3 BBBEE status, a great breakthrough for the group that offers analytical solutions, mining manufacturing support and fluid handling products.

This milestone ensures that the company's business strategies reflect its commitment to the BBBEE process as well as to its transformation goals.

The rating entitles the division's customers to recognise 110% of procurement spend through purchases made by the company.

Set Point Group's divisions include Letaba Group, Meter Systems, African Mineral Standards (AMIS), WearCheck Africa, North West GoPro, Set Point Laboratories and Pneumax Southern Africa.

In brief

Speaking at the Nuclear Africa Conference at Necca's Visitors Centre in Pelindaba, **Rosatom** director of the International Business Department, Nikolay Drozdov noted the potential use of nuclear reactors for desalination purposes. Rosatom believes this could be part of the solution to combat the ever worsening water crisis in Africa.

Dowson & Dobson Industrial looks set to achieve even greater growth following an official takeover by the **Actum Group**, which comprises Actum Electronics, Altico Static Control, Connecta and Peter Jones Electronic Equipment, all specialist suppliers of quality top-end products and solutions for niche industries.

Zambia Electricity Supply Commission (ZESCO) has awarded **Aurecon** a contract to provide engineering, design and construction supervision services for the US\$200-million World Bank-funded Lusaka Transmission and Distribution Rehabilitation Project.

ESCO Corporation, a global leader in mining, oil and gas, construction and industrial equipment, has announced the creation of the **ESCO®** Empowerment Trust in South Africa. This follows the conclusion of a Broad-Based Black Economic Empowerment (BBBEE) transaction, which resulted in a new equity structure for ESCO's South African business operations.

seebaWIND Service GmbH has increased its sales in the fiscal year 2014 from €10-million to more than €12 million. In addition, the manufacturer-independent service provider for wind power plants employs 75 people. The company is one of the five most successful manufacturer-independent service providers in Germany.

Volvo Group Southern Africa has officially opened a new dedicated **Volvo Used Truck Centre** in Boksburg, Gauteng. The facility, which is centrally situated near the company's head office and Regional Distribution Centre, was developed at a cost of R3 million.

Booyco Electronics has released its ESI Smart Sensor, which offers users the ability to measure one of 15 different gases from a single controller. This feature sets the instrument apart from other such units, while its modular configuration makes the calibration of the gas sensing instrument simple and easy.

North Safety Products has launched a first-of-its-kind PPE wholesale store, which was recently opened by North MD, Craig Garvie. North boasts one of the industry's most extensive lines of safety product offerings, which are now all available under one roof, following the opening of its store in Isando.

Unilever's SA capacity transformation

Unilever's R1.4-billion Khanyisa Home Care factory in Boksburg was opened by global CEO Paul Polman and Trade and Industry Minister, Rob Davies on June 2, 2015. The following day, the company's Indonsa factory expansion was opened in Durban, a R511-million investment.



Trade and Industry Minister, Rob Davies.

The Khanyisa factory forms a massive part of Unilever's R3.0-billion capacity transformation project (CTP) and is aligned to Unilever's global sustainable living plan (USLP), which strives to reduce the company's carbon footprint while targeting a doubling of the size of the business. The Khanyisa site has, therefore, been designed to deliver a 50% reduction in carbon emissions and a 70% reduction in water usage per ton of product produced.

In addition, Unilever's investments require significant new skills development

related to the state of the art technology being used. "This investment has created much needed indirect and direct jobs in our value chain, helping to build the South African economy," says Polman.

Khanyisa is one of several major projects in South Africa and Africa and is part of an overall strategy to upgrade the local supply chain to world-class levels. The investment will ensure a 67% increase in production capacity from 90 000 to 150 000 t per year. The new factory will produce popular brands in liquid form, such as Omo, Handy Andy, Domestos, Comfort and Sunlight, amongst others.

Polman says: "Transforming our production capacity is one of four critical initiatives that we are driving to meet expected growth in demand. The Home Care factory will enable us to better serve consumers with innovation and green technology, whilst simultaneously improving service levels for customers. Our aim is to have the right stock at the right place in record time, accurately matching the quantities expected by shoppers."



Unilever's global CEO Paul Polman.

The four critical initiatives for the Khanyisa factory are:

- Increasing capacity to meet growth ambitions.
- Improved efficiency to reduce cost.
- Improved technology to improve quality.
- Improved technology to reduce environmental impact.

The brand new factory, a project that began in 2013, includes green and world-first technologies. According to



Unilever's new R1.4 billion Khanyisa Home Care factory in Boksburg.

project

Polman, who is also in South Africa as co-chair of the World Economic Forum on Africa and to launch the company's brightFuture campaign: the new, cutting edge and green technology that has been incorporated into the design of the factory is in line with Unilever's sustainable living plan (USLP) strategy. The USLP aims to double the size of the business while reducing the environmental footprint and increasing positive social impacts.

Speaking at the launch, Minister of Trade and Industry, Rob Davies says the green technology, innovation and energy efficiency are the kind of investments that South Africa welcomes as part of its climate change and industrialisation aspirations. He says the success and growth of Unilever's investment projects in the country will continue to communicate the message of South Africa as an ideal location for investment in Africa.

"Our 7th iteration of IPAP (industrial policy action plan) launched on May 7, 2015, focuses on upscaling our manufacturing sector footprint and full scale industrialisation. With the roll out of the Black Industrialist programme, Unilever's investment could play a key role in knowledge sharing, technology and skills transfer to black industrialists in the FMCG (fast moving consumer goods) and chemicals sector, thus creating an opportunity for emerging companies to be able to participate in the mainstream economy," says Davies.

He adds that Unilever could work with the dti in deepening the supply chain, especially with black industrialists, through backward linkages in agriculture and the FMCG sector as well as building regional value chains on the African continent.

The Khanyisa investment is one of many that have been supported by the dti's 12-i tax allowance incentive scheme. The 12-i scheme has been set in place to support greenfield investments, new industrial projects that utilise only new and unused manufacturing assets, and other projects that benefit the planet as a whole. "We are appreciative of the dti's commitment to improving this country's global competitiveness and reputation with a view to delivering on its growth and development imperatives," says Polman



At the starting point of the Khanyisa Home Care Factory are storage tanks and a modern distribution system for the raw materials required. The factory has a capacity to manufacture 150 000 tons of liquid detergent products per year.

The Indonsa factory expansion

The company's Indonsa factory expansion, another component of Unilever's CTP and USLP, increases the Durban plant's manufacturing capacity to 100 000 t, which will be fully utilised beyond 2020, while reducing its carbon footprint to a total of 41 t. Skills training of 130 factory workers has been implemented to ensure world-class operations.

"This expansion makes the Indonsa site the largest savoury factory in the Unilever world by volume. The site will achieve this growth whilst maintaining the flexibility to accommodate both the complex savoury portfolio and aggressive innovation agenda linked to the growth."

Indonsa, which means morning star in IsiZulu, manufactures savoury foods for Unilever's brands, including Knorr, Robertson's, Knorrox, Aromat and Rajah. The CTP, known as Ingede, was signed off in September 2013 and is fully operational, consisting primarily of four key technical developments:

Mixing capacity expansion: The installation and commissioning of three additional 4.0 m³ dry powder Amixon mixers. These mixers are twice the size of the current three mixers and will be primarily dosed directly from bulk silos.

Automated bulk material supply: The installation and commissioning of 16 bulk silos (6×75 m³ and 10×30 m³)

and a pneumatic conveying system to dose the bulk materials directly from the silos before they enter the new mixers. The system is designed to provide a supply buffer and, at the same time, unconstrained mixing operations.

Reconfiguration of the Indonsa site warehouse:

The current storage of materials will be moved off site along with the conversion of the onsite warehouse to a just-in-time facility, to supply daily call-off from packing and manufacturing halls. This is required due to insufficient storage space in the warehouse for the expected volume growth. Moreover, this creates space for the expansion of the manufacturing facility within the current building's footprint.

Integrated material flow management:

The total integrated site management systems will be upgraded in order to manage, execute and monitor site operations required for the growth. The subsystems will include elements such as dynamic plant scheduling, semi-finished goods management, line material call-off and key decision flow and impact management.

"While we invest in world class factories, we continue to invest in our people who drive our success. The Indonsa team is driven by core values that ensure they are empowered and believe success can be achieved by collaboration and teamwork," Polman concludes. □

Best-fit fluid handling for Africa

Set Point's Letaba Group has three pumping divisions: Letaba Industrial Pumps; Letaba Dewatering; and Brubin Pumps, which now also includes Tuscany blowers and vacuum pumps. Combined under the fluid handling umbrella, Letaba enables Set Point to offer technologies and application-specific expertise across the African economy. *MechTech* talks to Bernd Irle, Brubin's general manager, and Ian Duke, general manager Letaba Industrial.



Ian Duke, general manager, Letaba Industrial and Bernd Irle, Brubin's general manager.

Set Point operates as a diversified industrial group with three core focuses: analytical services, through Wearcheck, Set Point Laboratories and African Mineral Standards (AMIS); mining support, through RENG and North West GoPro; and fluid handling, an umbrella covering Meter Systems and Pneumax, along with the Letaba Group – Letaba Industrial Pumps, Letaba Dewatering and Brubin Pumps.

"Set Point has recently been incorporated into Torre Industrial, which makes us even more diversified. The pumping divisions are clustered under fluid handling, with three divisions in the Letaba Group, the first being dewatering," he begins.

Letaba Dewatering

Letaba Dewatering's core business is fluid transfer in the mining, construction and earthmoving industries. The division offers sales and hire services along with full backup support. Available brands include: Varisco self-priming diesel-driven pumps, Sakuragawa submersible pumps, Wilden air operated diaphragm pumps and locally manufactured Madoda electric and single diaphragm motor-operated pumps. "Most of the division's business requires pumps in the 5.5 to 90 kW range for surface and underground dewatering and water transport for the mining construction and quarrying industrial," Duke suggests.

With successful operations in

Steelpoort and Rustenburg, Letaba Dewatering has a strong and growing rental division, which now accounts for around 30% of the division's income. The fleet consists of 49 J6/250 Varisco trailer units, which have a 6-inch outlet and can pump up to 400 m³ per hour. "We also build trailer pumps for some customers. Our largest, called the Zambezi unit, uses a diesel driven Varisco J 12-400 dewatering pump," he tells *MechTech*.

This centrifugal self-priming Varisco pump can transfer 1 440 m³/h (400 l/s) at 15 m of head, making it ideal for customers who need to move large volumes at low heads. Zambezi units, along with other customised trailer options, are also available for hire though Letaba Dewatering. "Rental is growing, because of the compelling argument that the user is not responsible for repairs and breakdowns," adds Duke.

"Letaba is also very strong in Zimbabwe, where we are the sole distributor of Grundfos pumps," continues Irle. In addition, he lifts out the locally manufactured Madoda pump range, which are diaphragm pumps mechanically driven by either an electric motor or a diesel engine. "Like air operated diaphragm pumps, these pumps do not need seals or gland packing. The pumped medium is completely isolated from the mechanical drive – and they can handle abrasive liquids, slurries and large solids," he says.

Letaba Industrial

According to Duke, "Letaba Industrial was formed to pump industrial fluids of a viscous, abrasive and corrosive nature. Our mission is to fit pumps into the industrial market to transfer fluids," he says.

Typical industrial applications include chemicals at processing plants; paint, caustics, acids and milk products, "and Letaba Industrial focuses on one pump brand, Wilden, which we believe is the most versatile pump for use in these industries," he informs *MechTech*.



Letaba Dewatering also builds trailer pumps, the largest being the Zambezi unit, which has a diesel driven Varisco J 12-400 dewatering pump.

Wilden manufactures air-operated double-diaphragm (AODD) pumps. "The key feature of this pump design is variable flow and pressure. These are also positive displacement pumps and, as opposed to being powered by an electric motor or a diesel engine, they operate off a compressed air line," he reveals.

"For industrial applications, these highly flexible pumps transfer difficult media. They have no seals or glands, offer variable speeds and pressures, and are available with options from basic food grade to explosion proof. They are also portable and require no baseplates, couplings or switchgear to install them," Duke points out.

Citing a typical application, he says that Wilden pumps are widely used at milk and yoghurt processing facilities for transferring the raw materials and for cleaning-in-place (CIP) operations. "For CIP, a high speed centrifugal pump is used to pump caustics and nitrics, followed by hot water flush through the pipework. Wilden AODD pumps are used for the offloading and control of all of the raw cleaning materials, transferring them into storage tanks and then into transfer vessels ready for cleaning operations. All bottling and liquid processing lines have systems such as these to maintain the



Wilden's hygienic range of pumps conform to the European Hygiene and Engineering Design Group (EHEDG) standards and are widely used at milk and yoghurt processing facilities.

hygiene standards required," he says.

"On the production side, our Wilden air operated pumps are used to make yoghurt. They transfer accurate quantities, add fruit and fill the tubs," Duke continues, adding that these pumps come from Wilden's hygienic range and conform to the European Hygiene and Engineering Design Group (EHEDG) standards. "This is the highest sanitary standard and has to be used for applications involving alkaline food products such as yoghurt, which have a low resistance to deterioration. Acidic, salted or sugared foods are less sensitive and can be accommodated with pumps that comply to the foodgrade (FDA) standards," he explains. Preventing contamination, however, is a requirement for all food and beverage applications, which makes the isolated diaphragm system ideal for use in this industry.

Wilden offers the largest selection of materials available from any AODD pump OEM to ensure chemical compatibility, temperature and abrasion resistance with the medium being pumped. "We are able to match the diaphragm and lining materials to maximise the performance and life of every installed pump," Duke assures. "As well as pumps for the food and beverage industries, we offer solutions for chemical, petrochemical, pharmaceutical and cosmetics industries," he says.



The SAER horizontal split casing water pump, which, though Tuscany, is now part of Brubin Pumps' range.

Brubin Pumps

Brubin Pumps is an established leader in the manufacture and supply of environmentally friendly and safe pumping solutions in southern and South Africa. "Our magnetic drive pumps, along with a supporting range of process pumps, are backed by international well known manufacturers such as M-Pumps and CDR from Italy, and we have been manufacturing the Magflo brand in South Africa for over 30 years now," says Irle.

Like diaphragm pumps, magnetic drive pumps have a sealless design. The pump is close coupled to the motor but external magnets on the drive shaft transmit the motion to internal magnets connected to the impeller. The inner magnets and impeller are housed in a hermetically sealed chamber, isolating the liquid being pumped from outside access. "This is an ideal solution for preventing leakage and emissions of chemicals, corrosive, explosive and flammable fluids that could be dangerous for people and the environment – or for expensive media where leakage losses directly affect profits," he explains.

"For the Magflo range, we try to maximise local content. We outsource the castings to Stelloy Castings in Bronkhorstspruit and the only imported components on the pumps are the magnets and the plastic powders used for linings. We can source polypropylene (PP) locally, but we have to import polyvinylidene fluoride (PVDF) and Ethylene tetrafluoroethylene (ETFE), which both offer high corrosion and abrasion resistance.

"We believe that localisation is an increasingly important issue," says Irle. "Local manufacture creates employment and it is of increasing concern that Africa is becoming swamped with 'cheap' imports from the East," he notes.

As well as the magnetic drive pump range, Brubin also offers: Allprime self-



Wilden's air-operated double-diaphragm (AODD) pumps from Letaba Industrial are a highly flexible and versatile option for industrial use, particularly for pumping viscous, abrasive and corrosive liquids.

priming centrifugal pumps, a rugged solution for waste water and industrial effluent; BBA units from the Netherlands for applications requiring vacuum-assisted self-priming; and the Pumpex range of submersible technology for drainage in the mining, industrial and sewage reticulation sectors.

"We also distribute Brubin's BA series peristaltic heavy-duty hose pumps for handling viscous slurries. These offer cost-effective environmentally friendly solutions for transfer and dosing applications," Irle adds.

In addition, Tuscany Pumps has recently been brought into Set Points' Brubin Pumps division. "Tuscany's main focus is liquid-ring and air-vacuum pumps and blowers for application such as pneumatic conveying," he explains. Also included in the range are: centrifugal process pumps; positive displacement gear pumps for all viscosity applications; lobe pumps for food and pharmaceutical applications; as well as hand-held drum decanters. Tuscany is also the official distributor of the complete SAER water pump range from Italy, which complements the water products already marketed by Brubin.

"Across our three Fluid Handling divisions, there is very little that we don't cover. Each of us has a focused strategy, though, and in spite of some overlap, we don't tread on each others toes much," Irle assures *MechTech*.

Asked about expansion into Africa, he says that Letaba and Brubin are already strong in Zimbabwe, Botswana, Namibia and Zambia and Set Point has installed pumps all the way up to Eritrea. "Africa is turning towards quality products," Irle believes, "and because of Torre Industrial's strength on the continent, we see exiting expansion opportunities for all of our pumping products," he concludes. □

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When is a pump problem not a pump problem?

While waiting for a flight from Joburg's OR Tambo Airport, Pump Guy, Larry Bachus receives an email that asks "When is a pump problem not a pump problem?", along with the answer, "When it is a pipe problem!" This prompts him to relate the experience of a friend, Don Densmore, about an urgent pump problem on a thermal oil application at a solar power plant in California.



“I have heard, time after time, that someone was in desperate trouble because a pump wasn't working properly. That's right! The darn pump just doesn't work as it is supposed to. My response is always the same: I go there and find out why the pump isn't working as designed. Sometimes it is true that the pump didn't perform as designed, but rarely is it because of a faulty pump,” says Densmore.

Following a request from The Pump Guy, Larry Bachus, Densmore visited a town called Daggett, California (just outside Barstow), where the engineering department of a large cogen solar company had asked him to help with a problematic pump. “I called the company and spoke by conference call with Phil Jones and a battery of engineers. They were convinced that something had happened to a critical pump at the solar plant. They needed someone to determine what should be done. We agreed on a fee and two days later, I drove to the job site in Daggett, California,” he relates.

“The site engineers first escorted me to the conference room. It was apparent they were anxious to get this pump into production as soon as possible. They were willing to do whatever was necessary to fix the pump. Then, we went to see the pump.”

The pump had been in service for 25 years, pumping thermal (very hot) oil. The oil temperature varies between 93 and 232 °C, depending on the time of day and the amount of sunshine. The pumps would then push the thermal oil to a generation facility to produce electricity.

The pump was a Byron Jackson, heavy-duty single-stage pump with 500 mm suction and discharge ports, both located vertically at the top of the pump. It was one of three pumps that operated in parallel, when required, to meet the flow requirements. The three pumps and the piping were coated with thick insulation to handle thermal oil that was being circulated from the solar panels. But the problematic pump was

pipied in a different configuration than the others.

“I noticed the inlet piping was installed in a manner that could not be considered 'good engineering'. However, it had been operating like that for 25-years. With that in mind, I asked for the pump to be started to allow me to gather information from the instrumentation to determine what was going on.

“As the speed was ramped up from the VFD, I could see the pressure on the pump inlet was not as high as it was designed to be. This was a problem. And the inlet pressure began dropping steadily as the speed increased. This indicated an obstruction. I could also hear the pump was definitely suffering cavitation and not pumping as it should. We let the pump run for a couple of minutes and then shut it down. The local managers wanted to remove the pump and get it repaired,” Densmore says.

The pump was fed from a manifold located about 30 m away and positioned about 3.0 m below the pump base. The pipe leading to the pump had numerous elbows with inclines and declines leading to a 500 mm gate valve and the pump suction nozzle. There was no discernible logic to the suction pipe arrangement.

“We cut a small hole in the insulation to reach the pipe wall and installed a pressure gauge at the exit pipe on the upstream manifold. We installed another gauge at the gate valve just before the pump suction nozzle. We started the pump again, and noticed a large difference between the two gauges,” he continues.

The elevation differential across the pipe system could explain 10 to 15 kPa of pressure drop between the gauges. The numerous 90° suction elbows accounted for another 15 to 20 kPa pressure drop. But there was nothing to explain the 240 kPa pressure drop across the suction pipe system.

“We installed some more strategic pressure gauges in the suction pipe system to track the pressure drop. We determined the major pressure drop was

in the vicinity of the suction gate valve, which was totally open.

“We removed the thick pipe insulation before the suction gate. There was a hidden 'Y-strainer' at the entrance to the suction gate valve. No one knew it was there. The strainer didn't appear on the original engineering drawings. Its existence was completely masked by thick pipe insulation that was many years old. After 25-years, the strainer basket was completely full of sludge and oil clots, which were backing up into the suction pipe before the strainer,” Densmore explains.

The clots and sludge would settle to the bottom of the pipe before the strainer when the pump was not running. Then on starting the pump, the sludge would lodge into the dirty strainer basket. This was the reason the pressure continued declining as the pump speed increased on start-up.

“At first, I recommended they remove the strainer from the pipe. But there was no time to build a spacer pipe or spool to replace the strainer in the suction pipe scheme. So, I recommended they leave the strainer in the pipe, but without the basket. Besides, there were known strainers in other parts of the pipe system to capture and remove clots and sludge.”

The client started the pump. The suction pressure was adequate with respect to its margin above the NPSHr. “As I drove home, the pump was running like new. The vibrations, cavitation and stress had disappeared,” he reveals.

“In all my years of solving problems with pump systems, I find that almost 70% of the pump problems are not really pump problems but system problems. The pipe system being worked with must, therefore, be understood and, to do so, one should always have a gauge on the suction side as well as on the discharge side of the pump,” advises Densmore.

Larry Bachus' next seminar trip to South Africa is planned for late October this year. Contact Phindi or Tiny (phindi@2kg.co.za, tiny@2kg.co.za) at 2KG Training to register. □

Weir Minerals Africa adapts to meet mining challenges

Gavin Dyer, regional managing director for Weir Minerals Africa and the Middle East, talks about achieving business growth in the current economic climate and the company's ever-improving value proposition.

Weir Minerals Africa aims to be one of the top three suppliers in terms of market share in each of its product offerings, says Gavin Dyer. "Both organic and inorganic growth forms a vital part of our strategy. We continually look at businesses that are a good fit or that are complementary to the market and/or manufacturing capabilities that we possess.

The latest acquisition by the Weir Group was that of Trio Engineered Products which designs and manufactures a wide range of crushers, vertical shaft impact (VSI) crushers, mobile plants and conveyors for the mining, sand and aggregates industries.

Dyer adds that Weir Minerals remains cognisant of the many challenges facing its customers in the mining industry, and is continually adapting its strategy to meet the needs of its customer base. "With the decline in mineral resources pricing over the last 12 to 15 months, it

is not only the mining industry that has had to change the way it does business.

"It would be naïve not to have adapted our business operation and model to meet the challenges of this fast changing and challenging environment. The pace of change will continue to quicken, and it is our challenge to continue to adapt going forward. We have proven, even in the most adverse of circumstances, that our business model is robust," Dyer says.

"In this market, value add and value proposition are critical and our focus is to ensure we assist our customers in reducing their operational costs wherever possible. The introduction of new technology has proved extremely successful to date. Other than the new pump technologies that have been launched, Weir Minerals has made material improvements that have added significant life to our customers' pump installed base, thus reducing maintenance costs and increasing productivity. The International Procurement Leaders' Award for Collaboration, awarded to Anglo American and Weir Minerals for the savings achieved from the introduction of wear reduction technology into their installed base of old technology pumps, bears testament to the success and value of such an initiative. Over the last five years, technology has been a key issue for our business. We see this as a differentiator in what has become a highly commoditised market.

"In order to compete effectively, our local manufacturing facilities have been upgraded to state-of-the-art and best-in-class, with continuous improvement at the heart



Workplace safety is a key message at all sites, and extends to safely getting home after the day's work.

of everything we do. Our Weir production systems and lean manufacturing processes continue to drive unnecessary costs out of the business," Dyer says.

"Within these systems, we have created an environment that promotes effective measurement and, in most instances, self-management, thus creating the ownership which supports productivity. Skills are always an essential element in a highly technical environment and our on-going training programmes and knowledge sharing ensure that we have access to these increasingly scarce skills going forward. We have a large artisan training programme that supports the critical areas of the business and where the market is unable to provide these resources."

An important part of Weir Minerals Africa's strategy on the continent is community upliftment and development. "We look at local employment in each of the areas in which we operate, uplifting these skills and allowing staff to make a positive contribution to their local communities. Being an engineering focused organisation, we have a number of projects underway to help with the upliftment of maths and science skills within these communities.

"Safety is a way of life at Weir, but we appreciate that our staff are even more at risk outside the workplace, particularly on the roads. We have extended health, safety and environment (HSE) initiatives to include home, road and personal safety outside the workplace. We also view it as our duty to contribute to the economies in which we operate, and we have adapted our business model accordingly," Dyer concludes. □



Weir Minerals Africa now offers a wide range of Trio products such as crushers, screens, feeders, chutes and material handling solutions.

Secunda's second dedicated pump workshop

AESPUMP has opened a second dedicated workshop at its Secunda facility, this one to service Sundyne machines and magnetic drive pumps from subsidiaries HMD and Ansimag.

The new facility joins a dedicated flame-proof pumps workshop supplementing the main floor, where general pumps such as end-suction and split-case machines are serviced.

Both dedicated workshops approach clean-room environmental standard, and both are comprehensively equipped with cranes, inspection tables and workbenches fitted with rotatable clamps and vertical motor stands for no-load run tests on gearboxes. In addition, the Sundyne workshop has its own component parts washer.

AESPUMP is soon to upgrade its test bay, currently equipped for end-suction pumps and sump pumps, to also suit the Sundyne range.

Formed in 2012 from the Secunda-based rotating equipment repairs division of sister company AESSEAL, AESPUMP initially offered only minor servicing such as the replacement of gears, bearings, packing and gaskets, but increased demand quickly led to expanded machining facilities and the installation of lathes and a balancing machine.

Besides Sundyne, the company is today

an approved service centre for KSB Pumps, Hidrostal, Ecochem Pumps, Franklin Electric, Netzsch, Helico and SS Pumps.

General procedure in all three workshops follows the same pattern. Incoming pumps are first stripped, after which the parts are cleaned of residual product by trained crews wearing protective clothing, and inspected and assessed for repair.

AESPUMP is classified as a Sundyne Channel One partner, complying with strict standards in sales, service and repairs. Inspection teams from the parent company regularly audit stock levels, training standards and business plans, and examine the workshops for craneage, washing facilities, workbenches, tools and cleanliness.

In the new Sundyne workshop and its sister flame-proof pumps facility, cleanliness is ensured by separation from the main workshop with its dust and metal waste from drilling, turning and machining work.

All three workshops are periodi-

cally inspected by independent authorities to ensure compliance with ISO 9001, ISO 29001, ISO 14001, OSHAS 18001, MASC (Mining and Surface Certification) codes and the SANS 60079-01/1 (electric apparatus for explosive gas atmospheres) standards for flame proofing, including OD 014 and OD 015.

AESPUMP augments its offering with free gearbox run-tests on pumps serviced outside the facility, with customers' technicians in attendance to gain hands-on training and experience.

Training of AESPUMP's own service technicians is ongoing, with rotational training programmes equipping them with the skills needed for on-site problem diagnosis as well as workshop service and repairs. □



AESPUMP's new workshop for Sundyne, HMD and Ansimag machines.



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Pump rental: reap benefits while reducing capital costs

According to Lee Vine (left), general manager of Integrated Pump Rental, a sister company to Integrated Pump Technology, pump users stand to reap definite market advantages from pump rental, while at the same time reducing their capital costs.

Pump rental is still not a common practice in South Africa, unlike more mature markets such as Europe and the United States. "The local market is often unsure about relying on the equipment and services of a third party," Vine says.

"It is typical for South African companies to believe that owning their own pumps is the only route open to them. However, by aligning themselves with a knowledgeable and well-equipped rental company they will be able to quickly realise that, in many instances, rental provides them with market advantages while simultaneously reducing capital expenses," says Vine. "It is for this reason that Integrated Pump Rental has been launched."

Its rental fleet includes Grindex submersible drainage and dewatering pumps, diesel-driven pumps and accessories. In addition, value-adding services such as dam cleaning and pontoons, pump flotation modules and pipe floats are available. All products used by Integrated Pump Rental are ISO 9001 certified and full technical advice on the most suitable pump for specific applications is provided by its experienced team.

Vine points out that, for smaller companies, owning their own pumps is really not an option. This factor excludes them from bidding for contracts that depend on the use of pumps. Access to a reliable pump rental source could be the all-important differentiator when tenders are awarded. In another instance, contractors may be awarded an entire contract but are forced to sub-contract the pumping portion of the contract, thus diluting their possible profit margin.

Two of the main advantages of renting, as opposed to buying pumps, are that that they are not added to

the company's balance sheet and are fully deductible as a company expense. Cash flow is also not adversely affected by renting pumps as there is no large capital outlay.

By entering into a rental agreement based on the projected time of rental, customers are able to ascertain upfront what their rental costs will be. In addition, there is no depreciation of equipment, since the contractor simply returns the pump to the rental company after the pumping portion of the contract is completed.

"Part of Integrated Pump Rental's service level agreement (SLA) is the provision of a full maintenance service. This entails regular inspections of pumps before and during contracts to ensure that uptime is emphasised.

"Routine testing and ongoing maintenance of our pump fleet by our experienced team of technicians provides customers with the reassurance that pump availability remains high. Should a pump be taken out of service, it will be immediately replaced with a similar pump to ensure continuity of operation," Vine assures.

Integrated Pump Rental takes complete responsibility for all maintenance of pumps on site and ensures that a

A full range of Grindex drainage pumps is available for dewatering applications.



The Grindex Bravo 500 pumps are best suited to slurry handling applications.

complete maintenance record is kept, allowing them to determine when proactive, scheduled maintenance is required and when equipment reaches end of life. It recently commissioned a 90 kW test tank facility at its 1 200 m² premises in Bartlett, Johannesburg, which includes a warehouse, rental division and full service and repair capability.

Integrated Pump Rental and Integrated Pump Technology are synergistic operations. "Some customers may wish to determine which pumps work best for them in various applications. By renting prior to purchasing a Grindex pump, they are able to familiarise themselves with each model and then decide which specific product is the best fit for the application," Vine points out. □

Mag drive exports

buoy local pump manufacturer

Exports of highly advanced magnetic-drive pumps for the petrochemical and hazardous materials industries have buoyed local manufacturer KSB Pumps and Valves in the face of somewhat suppressed sales in traditional southern African markets.



Jan van Vuuren of KSB Pumps and Valves with a cut-away RPHmdp mag drive pump for use in hazardous applications.

With the locally economy feeling the pinch of unstable world markets, made worse by mining industry strikes and lower commodity prices, the growing export order book for locally developed and manufactured magnetic drive pumps is a welcome boost for South Africa's pump manufacturing industry.

The advanced home-grown hermetically sealed RPHmdp API685 magnetic-drive pumps were originally developed for Sasol Secunda more than a decade ago to simplify the operation and maintenance of the company's many pumps in hazardous environments. With a solid track record at Sasol, other hazardous materials plants around the world are currently scrambling to switch to KSB's RPHmdp 'PI682 Plan 53' pump design, which completely excludes materials being pumped from the drive-end, making for a safer and less complex pumping environment.

Simply and safer

According to KSB Pumps and Valves Product manager for API and multi-stage pumps, Jan van Vuuren, the success of the new type of pump is its intrinsic safety and comparatively simple construction and setup. Old Plan 53-type pumps have mechanical seals that require additional hydraulic systems and

pipes to be installed in order to seal the fluid line and prevent leaks; whereas RPHmdp pumps are standalone and do not require any sealing systems.

This has led to companies like PCK Schwedt Refinery, one of the biggest key supply refineries in the world, Petrobras refinery in Brazil, Ancap refinery in Uruguay and the BASF Lemongras chemical plant in Malaysia placing orders for the KSB pumps. "Many more enquiries are currently being handled and looking at the amount of interest this year and the amount of quotes that we are working-on, it is safe to say that we will be exporting many more pumps in future.

"Our magnetic drive pumps are being recognised and are in demand in flammable, aggressive chemical and explosive industries. Tightening legislation in Europe and the rest of the world has also become far stricter and our solution makes it easier to comply with legislation.

In high demand

"So far there are quotes for more than 100 pumps in industries working with anything from hot oils to propane, liquid gas, petroleum and by products as well as refining chemicals. We are also receiving enquiries about our pumps from companies handling Avgas, ethanol and any number of other dangerous, toxic, flammable or hazardous materials," says Van Vuuren.

Sales manager for chemical, petrochemical and industry for KSB Pumps and Valves, Kenneth McGeehan, explains that the pumps are certified by all recognised authorities, including ATEX for safety as well as the CE rating for safe assembly and quality standards from design to manufacture. They also carry AEC approval for Russian applications.



International standards are adhered to in order to ensure that every pump manufactured by KSB Pumps and Valves meets and surpasses all requirements.

"The good news locally is that we are awaiting the passing of clean fuels legislation, which will require refineries to upgrade parts of their refineries to process clean fuels. This will be a big boost to the whole local pump sector in southern Africa. We have already had success with the installation of RPHmdp pumps at Sasol Wax for hot oil pumping, Senmin for caustic soda pumping, Sasol Secunda for propane, propylene, methane and methanol pumping, as well as many others.

Full product line-up

"The pumps are available in different sizes in a number of different materials and configurations to suit individual companies' requirements. Ultra-efficient Peek-Can composite material pumps with minimal eddy-current losses are also available," adds McGeehan.

KSB Pumps and Valves has also been supplying training on American Petroleum Industry (API) standards and has done training in Asia, Germany, France, South Africa and Russia for the chemical, petroleum and mining industries.

"Once companies are familiar with the operation of the new pumps there will be very little reason to make use of dated technology and our pumps are expected to become standard across the globe wherever dangerous substances are being pumped," he concludes. □

Extensive gear pump range for viscous fluids

The Viking range of internal gear pumps continues to sell steadily into South Africa through local distributor Mather+Platt, which reports that carefully maintained local stock holdings are helping to secure urgent orders.

Wadeville-based Mather+Platt has distributed Viking pumps for more than 20 years. Viking is widely recognised as one of the world's leading manufacturers of positive displacement pumps such as internal gear pumps, external gear pumps, vane pumps and rotary lobe pumps. In South Africa, these pumps are widely used in mining and industrial applications, where they transfer viscous fluids with viscosities of up to 440 000 cSt.

The pumps have applications in petrochemical processing (bitumen, pitch and viscous oils), chemical processing (sodium silicate, acids, plastics, paints, resins, adhesives and mixed chemicals), pulp and paper (acids, soap, lime, kaolin and sludge), and the food industry (chocolate, butter, fillers, molasses and vegetable fats).

The internal gear pumping principle, invented by Viking Pumps' co-founder Jens Nielsen, uses two rotating gears, which un-mesh at the suction side of the pump to create a vacuum, which pulls fluid into the pump. The spaces between the gear teeth transport the fluid on either side of a crescent to the discharge side, where the gears re-mesh to discharge the fluid.

Mather+Platt's Viking range of gear pumps is extensive, comprising six distinct lines.

There are universal seal pumps in 12 sizes, comprising heavy duty, foot-mounted models with enlarged bearing housings that allow seals and seal technologies to be exchanged without removing the pump from the flow line. Materials of manufacture include stainless steel, steel, ductile iron and cast iron.

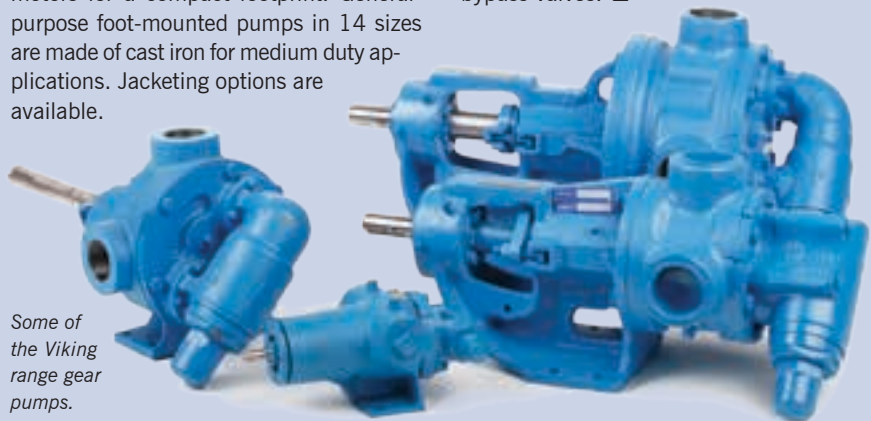
High-speed compact pumps in six sizes are recommended for medium- to heavy-duty applications. No speed reducer is required and materials of manufacture are as for universal seal pumps.

Motor speed pumps in six sizes are manufactured in ductile iron, and may be foot-mounted or close-coupled to IEC frame motors for a compact footprint. General-purpose foot-mounted pumps in 14 sizes are made of cast iron for medium duty applications. Jacketing options are available.

C-flange-mounted pumps in eight sizes are made from cast iron for medium-duty applications, and these do not require speed reducers either.

For applications in which leakage and fugitive emissions must be eliminated, or where downtime for seal maintenance would be problematic, there are mag-drive pumps in 12 internal gear and 22 external gear sizes, which replace shaft seals with magnetic drives.

Mather+Platt can custom build Viking pumps for special applications. Examples include abrasive liquid pumps with hardened construction and silicone carbide seals, and ammonia pumps with double mechanical seals, pressurised seal chambers and oil reservoirs, lubricated idler bushings, and adjustable return-to-tank bypass valves. □



Some of the Viking range gear pumps.

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Jasco's grid-tied solar PV project at its own premises, built to proof the concept to new customers.

Renewable energy: a business case

MechTech talks to Dave Smith (right), the newly appointed managing director of Jasco Renewable Energy. With qualifications in electrical engineering and business and more than 20 years of experience in utility power, network development, transmission and telecoms, Smith brings an ability to balance technology and financial sense to this challenging emerging sector.



“The power supply situation in South Africa is an issue that needs to be addressed as a matter of urgency. The cost of unserved energy, in other words the indirect cost of not supplying power to those who need it, can and will have a significant impact on growth and the economy. There are also widespread concerns relating to on-going electricity price increases. The reality is that we need to look at alternative sources to sustain the supply of electricity. Independent studies have shown that renewable energy has the potential to achieve just this, and I am excited to be a part of growing this emerging market in South Africa,” begins Smith.

With a degree in electrical engineering from the University of Stellenbosch,

as well as a Master’s degree in business leadership from the University of South Africa’s Graduate School of Business Leadership, Smith has nearly 20 years of experience with Eskom – including electrification, system planning, network development and transmission on the engineering side – before moving into telecommunications management and development. In 2008 Smith joined Broadband Infracore as chief executive officer and saw the company through to commercial launch, after which he worked as an independent business consultant before joining the Jasco team.

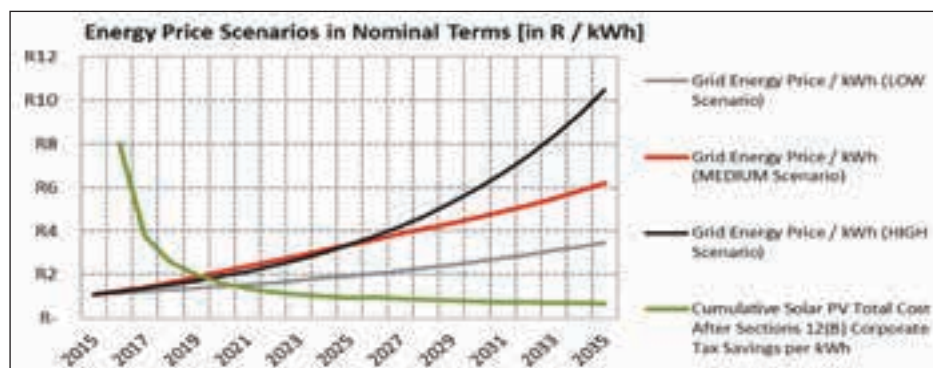
“The initial focus of Jasco Renewable Energy will be on solar solutions at a commercial level, including rooftop, carport and ground-based solutions. Solar

represents a significant investment for businesses, and costs are reducing and payback periods are down to within six to eight years. We believe the technology is now economically viable for South African businesses.

Jasco Renewable Energy is targeting systems in the 100 kW to 1.0 MW range, commercial entities such as shopping malls, hospitals, offices and property groups with rental portfolios. “But the upper end of this offering is only being limited by licensing issues. Currently, any system above 1.0 MW requires an independent power producer (IPP) license, which involves another level of complexity,” he reveals.

“Jasco has a long standing energy management and optimisation skills capability and, at the starting point of our renewable energy offering we go into a clients premises to monitor their energy usage. Initially, we give advice on energy efficiency interventions, such as efficient lighting and heating. There is no sense in installing a PV solar system in an inefficient environment,” Smith advises.

The first stage of developing a PV



A comparison of grid and solar PV energy prices for different Eskom price escalation scenarios. Smith argues that the compound impact of utility price increases over the next 10 to 20 years makes grid-tied solar PV solutions “very attractive in the long term”.



approach

plant would be to assess the building and determine the space available for solar energy collectors. "If we compare the irradiance values (kWh per m² per year) in South Africa to those of Germany, which has the highest per capita penetration of PV solar in the world, then our potential for solar energy is significantly higher.

"Germany has a solar PV generation capacity of between 30 and 35 GW, which is almost equivalent to the total available generation capacity of Eskom. And our irradiance levels are, on average, nearly twice those experienced in Germany. In practice this means that we could produce the same amount of power using half of the PV panel area as that required for an installation in Germany," Smith estimates.

The business case

While the strongest argument in favour of PV solar installations has been the environmental one, Smith believes that all installations have to make financial sense. "There are a number of drivers and customer motivations that could add value to a commercial entity and these need to be understood before deciding on a solution package. Our model is to complete a business case for every customer that details all of the economic consequences and benefits," Smith tells *MechTech*. "In order to secure investment funding, it is the chief financial officer (CFO) that needs to be convinced," he reasons.

The primary concern for businesses in the longer term is mitigating against the rising costs of electricity from the utility. Pointing to a chart showing electrify tariff

increase scenarios from 2015 to 2035, Smith says, "we expect large structural changes in pricing over the next five years of between 13% and 16%, followed by steadily falling rate rises, settling to a minimum of 6% by 2029/2030. The compound impact of these price rises over the next 10 to 20 years makes grid-tied solar PV solutions very attractive in the long term," Smith suggests.

Comparing PV generation costs to utility tariffs, Smith argues that, because PV costs fall with time and the utility price increases, today's unit price for PV "starts at around R8.00 per kWh and falls to parity with grid prices at around R2.00/kWh by year six". "From then on, the PV system investment is creating value for the company, and these systems have a typical life in excess of 20 years," he assures. In the long term, PV unit costs level out at R0.80 to R1.00 per kWh in present value terms, while utility costs are likely to be somewhere between R3.50 and R10.50, depending on the price trajectory actually followed.

In South Africa, a carbon tax has been proposed for introduction in 2016. "The first 60% of a company's carbon emissions will be tax free – and some energy intensive users may benefit from a higher threshold – but thereafter, all businesses will be liable to pay R120/ton of CO₂ emissions in tax. In our business case, we convert this liability into a benefit, based on conservative assumptions, to further strengthen the financial case for adopting renewable solutions.

"On top of that, based on the costs of investing in a renewable plant, there are government incentives for companies to adopt renewable energy solutions. Adopters can claim, as a Section 12B wear and tear tax allowance, 50% of the investment in the first year, a further 30% in the second year and the remaining 20% in the third," reveals Smith.

A further energy efficiency tax benefit is listed in Section 12L, "but we haven't yet found a customer that would benefit. This is because of the precondition that the taxpayer demonstrates a 35% reduction in energy consumption in the first year of the installation. So if you had a facility consuming 100 kWh per year, you need to provide audited proof that your consumption has dropped to below 65 kWh for the year to claim any benefit at all," he points out.

Why? "Because a solar system cannot produce maximum power early in

the morning and late in the afternoon, morning and evening demand depends on the grid-based supply and these peaks make it difficult to achieve average savings of more than 35% from a grid-tied PV solution," Smith responds.

"Hybrid solutions, on the other hand, rely on a PV systems sized to exceed daytime consumption so that extra energy can be stored in batteries for later use. The stored energy can then be released to meet the evening and morning demand while the sun's energy has not yet built up," he continues. "With these systems it is possible to get the full 12L benefit, but the investment costs currently outweigh the value of the benefit," he adds.

While hybrid PV systems with energy storage are not 100% off grid, they can be used to significantly reduce a company's dependence on the grid. Most obviously, during load shedding events these systems use the stored energy to make up for the losses from the grid. Also, though, during peak time of use tariff periods, stored energy can be used to mitigate against peak tariffs. "Fully off grid systems, on the other hand, almost always require standby fossil-based generation, such as gas or diesel generators or hydrogen fuel cells, which tend to result in much weaker financial arguments for the additional investment required," Smith suggests.

To cater for the environmental and sustainability reasons for adopting renewable energy technologies, Jasco Renewable's business case portfolios also calculate the accurate CO₂ equivalents and carbon footprints. This data is needed for sustainability reporting, for King III corporate governance compliance and for listed companies on any of the world's stock exchanges, which are required to produce integrated annual reports to show investors that responsible decisions are being made with respect to the environment.

"Every single customer, no matter what their motivation, gets a full financial analysis for the renewable system they have chosen," Smith says. "While green issues matter, it is the financial benefits of these systems that will, undoubtedly, drive growth in PV use. Generally, CFOs make decisions based on 1-3 year time frames, and some may stretch that to five years. Mindset change is still required towards thinking more long term, but payback times are already close the typical CFO's horizon," he concludes. □

Servicing Africa's genset manufacturing sector



Vert Energy's managing director, Grant Robertson.

Vert Energy has extended its range of electric power generation (EPG) components and service to meet growing demand from generator set builders and electro-mechanical power transmission industries. Services the electro-mechanical power generation sector in Africa encompass the supply of dependable components to generator manufacturers, with the support from repair and maintenance facilities throughout the continent.

“Increasing energy requirements have placed power utilities under enormous pressure throughout the African continent, which is why companies are investing in alternative sources of electricity production,” says Vert Energy's managing director, Grant Robertson. “Vert Energy has established turnkey solutions partnerships in diverse sectors, including mining, shipping, agriculture, general engineering, shipping, the railways, gas and petrochemicals.

“Through an extensive range of quality branded EPG products and a highly skilled team of technical experts, the company plays a major role in providing dependable power to companies, even in Africa's most remote regions.

“As part of our commitment to the genset manufacturing sector, for the swift supply of reliable components, Vert Energy has made a substantial investment in sourcing the finest components that produce electric energy from mechanical energy and which withstand harsh operating conditions.

“The company has been appointed exclusive distributors in sub-Saharan Africa for leading power generation brands, complemented by genuine spare parts and accessories. EPG components include Leroy-Somer (LS) alternators, DEIF generator controls and Covrad heat exchangers.

“A critical part of our service is the availability throughout Africa of factory and OEM trained technicians who cope



Vert Energy's Leroy-Somer Partner alternators are known for ease of integration, enhanced energy savings, high performance and reliability in demanding applications and harsh environments. The modular design means that the basic universal unit can be adapted to be driven by any prime mover.

efficiently with electro-mechanical breakdown situations or routine preventative maintenance procedures.”

Leroy-Somer is the largest global producer of alternators for gensets and is committed to providing clean energy solutions. LS alternators, with ratings in excess of 20 000 kW, are suitable for all generation applications – whether for supplying electrical power on board a ship, electricity to deprived regions, or for preventing interruptions in the mains supply.

These alternators, which are known for ease of integration and enhanced energy savings, are also recognised for high performance and reliability in demanding applications and harsh environments. The modular design of these alternators means that the basic universal unit can be adapted to suit any make of prime mover.

The LS industrial range of low and medium voltage alternators, which include 50 or 60 Hz, four or six pole versions with power ratings from 10 kW to 3 900 kW, are designed for gensets driven by diesel or gas engines.

The AREP (auxiliary winding regulation excitation principle), a Leroy-Somer patent for standby generators, is a brushless, self-excited excitation system known for its efficient performance in harsh environments and for enhancing safety. It enables a short circuit current of about three times the rated current to be maintained for 10 seconds. This means that a circuit breaker can be tripped if there is a fault, without disturbing other



Johnny Canada, technical service manager, Vert Energy, is rewinding an exciter stator below deck on a vessel, while the vessel is fully operational.

loads supplied by the alternator.

Customised high-, medium- and low-voltage LS alternators, also available in either 50 or 60 Hz and with 4 to 24 poles, are rated from 500 kW to 25 000 kW and can be driven by diesel or gas engines, turbines fuelled by gas or steam, wind turbines or hydro turbines.

Also in the LS range are alternators designed for specialised applications, for example, in agriculture. The

robust Tractelec is a generator driven by a tractor's power take-off (PTO) shaft, providing an alternative source of



energy production. This 3-phase Partner alternator, which operates efficiently in demanding farming environments, is coupled to a gearbox with oil-cooled lubrication and an electrical protection and distribution box.

Servicing isolated parts of Africa

According to Robertson, the company's "highly skilled technicians" have the expertise to assist with inspections, diagnostics and repair procedures; re-assembly, installation and commissioning, as well as the implementation of preventative and predictive maintenance programmes. "It is important, especially in isolated locations, to have a secure and efficient power supply and a reliable support facility. For this reason, our on-site service offering is well received, particularly by companies in remote areas. This field service includes inspection and fault finding, as well as refurbishment and repair of most types of generator.

"Where repairs are not possible on site, work is undertaken at Vert Energy's Johannesburg workshop, or at a certified repair facility in Africa."

Apart from the company's 24-hour assistance with any emergency electro-mechanical breakdown or repair situation, Vert Energy also offers a customised preventive and emergency maintenance programme, designed to minimise the downtime of either prime power or standby generators.

Proactive maintenance management not only increases reliability of a system, but also upholds consistent procedures and schedules and maintains the factory warranty coverage of

every component. The company uses original spare parts and accessories, according to stringent OEM specifications.

Preventative maintenance for diesel engine generators also reduces long-term operating costs and ensures extended service life of the system. By following diesel maintenance procedures and a manufacturer's recommendations, the risk of failure on critical power applications during start up is reduced.

Project successes

Vert Energy's recent projects include the re-winding of a 750 kVA exciter stator, in situ below deck, on board a vessel out at sea near Mozambique, without any interruptions to the normal operation of the ship. Vert technicians also installed and commissioned new generators aboard a vessel in Namibia during a recent the retrofit programme. These units were tested under various loads and operating conditions out at sea.

Other notable challenges involved the servicing and maintenance of three 7 000 kVA alternators at a gas turbine power plant in Nigeria and the restored operation of a faulty 800 kVA, 525 V generator in Lesotho.

Vert Energy is the authorised sales and support partner of Leroy Somer EPG (Electric Power Generation) products in southern Africa and carries a full range of genuine spare parts for low and medium voltage LS alternators. Spare parts, such as diodes, varistors and automatic voltage regulators (AVRs), are always readily available and complement the full range of alternators from 20 kVA to 2 000 kVA, which are carried ex-stock in the Johannesburg warehouse.

Vert Energy also offers an intensive product training programme, which entails an in-depth look at the value of alternators used in electric power generation. □



The removal of the rotor from a 1 650 kVA alternator with a failed stator at Vert Energy's Meadowdale premises in Edenvale, Gauteng. The unit is being stripped and checked to ensure there is no damage to the rotor.



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ACTOM and leading global fan producer TLT-Turbo form local joint venture company

ACTOM has joined international fans company TLT-Turbo GmbH of Germany in forming a joint venture (JV) company to cater to both the Sub-Saharan and local market for all types of large fans.

The market comprises mainly the industrial, mining, process, metallurgical, cement and power generation industries. The formation of the JV company, TLT ACTOM (Pty) Ltd, and the technology and licence agreements signed by the two partners took effect from May 1, 2015.

ACTOM and TLT-Turbo negotiated the new international partnership after ACTOM's technology agreement with international ventilation fan producer Solyvent Fläkt Woods AG was dissolved as a result of the acquisition of that company's international fan division by an opposition fan manufacturer.

TLT ACTOM retains the existing technology agreements with Fläkt Woods for categories of fans used in industry and for heating, ventilation and cooling (HVAC) systems used mainly in large commercial applications.

The large fan systems covered by TLT ACTOM's new technology partnership incorporate axial flow and centrifugal fan units with power ratings of up to 15 MW.

TLT-Turbo GmbH is wholly owned by Power Construction Corporation of China, a Chinese state-owned industrial conglomerate which is one of the world's 500 largest companies.

Craig Johnston, Managing Director of TLT ACTOM – which formerly traded as ACTOM Mechanical Equipment – said: “The new partnership arrangement places us in a much stronger position than before in two major respects. Firstly, in partnering TLT-Turbo in a 50-50 JV company we have a closer and firmer association with our international partner than applied previously.

“Secondly, we are entering the local power generation market with much

stronger credentials than before. There is an established installed base of TLT-Turbo large axial flow fans at Eskom's Majuba power station and their fan systems are being installed and commissioned at both of Eskom's new power stations, Medupi and Kusile.”

Rainer Redinger, Managing Director of TLT-Turbo, said: “The formation of the JV company is a big step forward for us in the Southern African region as it enables us to serve our local customers better. We now have a local company with the necessary expertise and a well-established presence to give full support to our local customer base and with the capacity, backed by our well-proven systems, technology and service knowhow, to expand our business in the region in all types of fan applications and to become a full after-sales service provider.”



A large centrifugal mine ventilation fan system from TLT ACTOM.

Solar installation reduces grid reliance by 40%

Having installed a 353 kW_p solar photovoltaic grid-tied installation at its Isando manufacturing plant, voestalpine has offset its reliance on the national grid by 40%. The resulting savings to the plant's operational costs will repay the R7.3-million investment within nine years.

With the increasing costs and decreasing reliability of grid power, together with a gradual decrease in the cost of photovoltaic technology, self-generated alternative energy is becoming more common and viable as industries seek a more profitable, sustainable business model.

The voestalpine Isando facility manufactures railroad turnouts mounted on sleepers for use to guide trains across changing tracks. "Our design of an optimum solar-powered solution for voestalpine was based on an analysis of the plant's energy load profile prior to the installation; the availability of elevated north-facing roof space, which was checked and to see if it was strong enough to support the panel; as well as an electronic solution that would minimise or prohibit the flow of power back into the grid," explains voestalpine's energy consultant Warwick Stark, director of Rawlyn Consulting.

As per voestalpine's requirement of needing three comparative quotes, Rawlyn assisted in establishing an invitation-based request for proposals (RFP) to quote on the required 353 kW_p solar photovoltaic plant, a plant size determined by analysing voestalpine's past annual average load profile. Rawlyn then assisted voestalpine in the evaluation of the proposals on a technical basis in order to determine the final winning bid.

In order to further reduce the capital expenditure, Rawlyn assisted with an application to the Department of Trade and Industry for Manufacturing Competitiveness Enhancement Programme (MCEP) 'green energy' project funding for 30% of the total cost of the project.

Designed to yield a usable 483 412 kWh/year, the photovoltaic installation will effect annual savings of over R600 000 against an annual electricity bill of R1 374 000 prior to the installation.



Above: The voestalpine Isando facility has 1 384 photovoltaic panels installed across the north-facing roof spaces. The panels provide a low-maintenance solution that will last 25 years.

Left: The panels form an array of strings that feed 20 high-quality SMA dc to ac inverters that effectively handle the fluctuating electrical quality of the grid power.

The 353 kW installation consists of 1 384 photovoltaic panels, each measuring 1 640 x 990 mm, forming an array of strings that feed into 20 dc to ac inverters, as well as associated ac cabling.

The project was contracted to SUNCybernetics, the local partner of SUNFarming. SUNCybernetics has identified SMA Solar Technology as its preferred inverter supplier, which it believes produces the most reliable, consistent interface with the fluctuating quality of South Africa's electrical grid. The inverters also throttle the incoming transfer of solar power according to the needed load, preventing the electricity from feeding back into the grid.

The voestalpine Isando facility will also benefit from SUNCybernetics' partnership with the North-West University's engineering department, through which research on power quality and power

factor improvement analyses will be conducted and performance and savings reports presented to voestalpine. An optimum cleaning regime will also be devised, taking into account the environmental conditions endured by the panel array.

The installation requires minimal maintenance, and with the correct cleaning regime, PV panels are rated to last for a period of 25 years, at which point their production efficiency will have dropped to 80% of their performance rating.

SUNCybernetics also trains nominated plant personnel in the use and operation of the photovoltaic system. "This installation is in line with voestalpine's progressive approach to creating operational sustainability. We have previously optimised the electricity consumption at its Isando and Kimberley facilities through the replacement of high bay lighting systems with induction lamps," Stark concludes. ▣

Solar modules study reveals better energy recovery

Independent research by Arup into the performance of four solar photovoltaic (PV) module technologies in South Africa, has found that First Solar's advanced modules can offer over 4.0% more energy than conventional silicon PV panels.

A report conducted by Arup, an independent engineering consultancy, has determined that First Solar's advanced PV modules outperformed mono- and polycrystalline silicon PV in South Africa.

The study, commissioned by First Solar, examined the performance of First Solar's thin film modules and panels and those from top tier poly- and mono-crystalline silicon PV module manufacturers, in a utility-scale setting at three sites in South Africa. The consulting firm used sophisticated modelling techniques to examine the projected energy yield of the four module types in three hypothetical solar PV plants, with a capacity of about 84 MW (dc) each, in Bloemfontein, Upington, and Vryburg.

Engineers from Arup conducted 24 energy yield simulations, using plant design parameters that were kept constant across all technologies, and examined the energy yield probability for the first year of production for each module type. The analysis factored in site-specific meteorological data, which included temperature,

irradiance and other weather data. This industry-standard approach ensured that the hypothetical plants closely represented actual onsite conditions based on a typical meteorological year.

The analysis clearly demonstrated that, in South Africa, First Solar's advanced modules could deliver more energy per year than polycrystalline silicon panels and mono-crystalline silicon panels in both a fixed-tilt configuration and with the use of trackers. The report revealed that, at the three hypothetical sites:

- First Solar modules offered a 1.3% energy yield advantage over monocrystalline silicon technology and as much as 4.2% more energy than polycrystalline silicon panels, in a fixed-tilt configuration.
- Using single-axis trackers allowed First Solar's modules to deliver 1.7% more energy than monocrystalline silicon technology and 4.3% more than polycrystalline panels.

"This research is particularly important in light of the highly competitive tariffs that we're seeing in South Africa's

Renewable Energy Independent Power Producer Procurement Programme. It's clear that every kilowatt-hour of energy is important and that selecting the right technology for a utility-scale PV Power Plant can add a significant financial upside to the project value," says Justin Wimbush, renewable energy business leader at Arup Southern Africa.

First Solar's advanced thin film PV modules have set the industry benchmark with over 10 000 MW installed worldwide. Offering highly predictable energy in all climates and applications, the modules have been independently tested to pass accelerated life and stress tests beyond industry standards. Offering both, a superior temperature coefficient and superior spectral response, they have been independently certified for reliable performance in high temperature, high humidity, extreme desert and coastal environments.

"The results of this extensive analysis validate the suitability and superiority of our module technology in real-world conditions, here in South Africa. It also makes the case for the solar industry to move away from legacy metrics, such as nameplate capacity, and to focus on what truly matters, which is energy," says Nasim Khan, vice president for First Solar in Africa. "It is evident that not all PV technologies were created equal and that, in the same configuration, 1.0 MW of First Solar modules will yield more energy than 1.0 MW of crystalline silicon-based modules in actual operating conditions, due to semiconductor physics. We hope that this effect will be considered in the energy predictions and financial models used in the development and evaluation process of new solar power plants in South Africa."

A fully vertically integrated solar energy company, First Solar consistently accounts for the PV industry's largest investment in research and development (R&D). It is also a leading developer of utility-scale solar energy projects, having developed some of the world's largest solar power plants, such as Desert Sunlight (550 MW) and the Topaz Solar Farm (550 MW) in the US. Additionally, with a portfolio of nearly 3 000 MW, First Solar is also the industry's operations and maintenance (O&M) services leader. The company's global footprint includes two manufacturing facilities in the United States and Malaysia, and an office in Cape Town, South Africa. □



Powerhive, a company offering off-grid solar PV generation, metering and control solutions in Africa, has successfully completed field testing in Kenya, paving the way for its commercialisation of its solution. Powerhive makes use of First Solar's advanced module technology and its metering solution allows customers to pre-purchase electricity for commercial and residential use through mobile banking services.

Large, modern gensets now available in Africa

Industrial operations across Africa can lower their fuel costs and minimise their impact on the environment with the new range of high-horsepower QSK95 Series generator sets launched locally by the African division of Cummins – a global leader in the manufacture, sales and servicing of diesel engines and related technology.

The QSK95 generator sets are Cummins Power Generation's most powerful diesel generator sets to date, offering up to 3.5 MW at 60 Hz and 3.75 MVA at 50 Hz. They are engineered with the highest kW/m² power to footprint ratio in their class, resulting in a 20% improvement in power density.

The durable and robust QSK95 Series generator sets are ideally suited for mining, oil and gas, or any project where harsh conditions, challenging environments and the demand for reliable, continuous remote power exist. These generator sets are also engineered to deliver reliable, mission critical power protection without interruption – an uptime requirement shared by data centres, hospitals, water and wastewater treatment plants, and utilities.

“Over 8 000 hours of operation, the QSK95 can achieve fuel savings of more than US\$400 000 (R4-million+). The

series is designed to lower the total cost of ownership by reducing installation expenses, fuel costs and maintenance requirements –all while maintaining Cummins' high standards of reliability,” says Cummins Southern Africa Power Generation director Kobus Coetzer.

Fewer maintenance requirements, longer service intervals and 25 000 hours to major overhaul make these generator sets ideal for prime power applications. They ramp up to 100% of rated load in a single step, and are ready to accept facility load in less than 10 s.

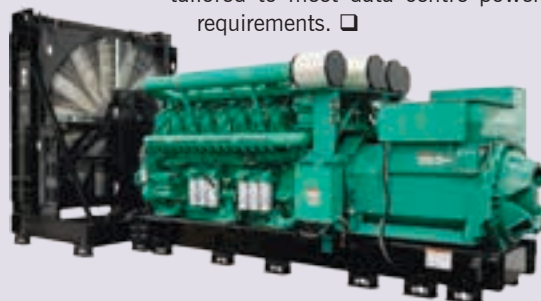
Other features include:

- Reduced costs, thanks to three-year/1 000 hour oil and filter change intervals.
- Low temperature after-cooling, which optimises radiator package sizing and contributes to the generator's smaller footprint.
- Condition-based maintenance sensors that monitor air and fuel filter restrictions and prompt filter changes only when required.
- A single shaft, dual element cooling pump that minimises

potential leaks and failures.

- A positive flow circulating pump in the coolant heater that enables even heating throughout the engine block for faster and more reliable starts.
- An oil cooler that provides access to the thermostat without lifting the engine.
- A mounting rail design allows the alternator to slide back on the chassis without being lifted.
- Larger engine hand holes facilitate cylinder block access without dropping the oil pan.
- Global availability of technicians, parts and engineering support.

The QSK95 Series generator sets are available in multiple rating options for specific power generation applications, including: continuous, prime power, mission critical and standby. Cummins also offers a data centre continuous (DCC) rating specifically tailored to meet data centre power requirements. □



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Automatic wet batching for quality concrete

Ready-mix wet batch plants – with capacities ranging from 30 m³ to over 240 m³ per hour – are a more cost-effective alternative to the traditional dry ‘Karoo’ batch plants that currently dominate the local market.

Pan Mixers South Africa (PMSA) is the largest supplier of concrete brick, block and paving making machinery in Africa.

To maintain its competitive edge, the company recently entered into a local partnership with Italian-based construction machinery manufacturer, IMER. The partnership will see PMSA stock and distribute IMER wet batch plants to industries across Southern Africa.

Globally, wet batch mixing plants are the standard for ready-mix and site batching. PMSA marketing and sales manager Quintin Booysen indicates there is a noticeable shift towards this trend in southern Africa, where high-strength and high-quality concrete is required in minimal time.

“There is a definitive trend among plant owners looking to move towards wet batching. PMSA and IMER have identified this as a major growth sector and, as a result, we recently received two orders for IMER wet batch plants to showcase to existing and potential clients,” he explains.

The IMER wet batch plants from PMSA are fitted with either a planetary or twin-shaft mixer, depending on the capacity of the plant. Booysen points out that the aggregate is batched automati-

cally from bulk aggregate storage bins onto a weighing conveyor belt.

“The weighed aggregate is fed into the mixer where cement and water are automatically added. The concrete is then mixed by the forced action of mixing paddles and arms before being discharged fully mixed into the transit truck or even directly into a pump, as may be required in the case of on-site batching. The plants have an average 90-second cycle time between mixes,” he adds.

In dry batch plants, aggregate is loaded into a weighing hopper by front-end loaders until the correct weight is reached. The aggregate is then sent via a conveyor belt to the transit truck. Cement and water are then added and the constituents are then ‘free-fall’ mixed in a cement mixing truck.

Once sufficient time has passed with the drum rotating at high speed, an appointed ‘batch-man’ located on an inspection platform typically inspects the consistency of the concrete in the truck and, if required, adds more water before giving approval for the truck to leave the yard.

An experienced ‘batch-man’ is required to estimate when the concrete is homogenous. When the truck arrives on-site, the foreman may request several

more minutes of high-speed, high-rev mixing before the concrete is discharged.

Wet batch plants create fully mixed concrete, which ultimately reduces costs, as it eliminates the need for high-speed mixing in the truck prior to dispatch. “It also reduces wear and tear on the fleet of trucks, which is the ready-mix plant’s highest capital expense,” Booysen continues.

What’s more, there is also no need for manually checking the truck before dispatch, as the mix is completely homogenous by the time it is discharged into the cement truck.

Proven performance of wet batch plants

When comparing the quality of concrete produced in dry versus wet batch plants, research conducted by the Italian Institute for Concrete found that wet mix plants produce concrete of an undoubtedly higher quality than a dry process.

Various reasons were cited, including: lower permeability of the concrete produced; repeatability, which reduces the standard deviation; and a reduction in errors made by inexperienced or inattentive personnel.

The research also found that, when using the same water/cement ratio, concrete produced in a wet batch plant had higher workability. This ultimately results in a reduction of the water/cement ratio for higher strength concrete, that is, compared to the dry mix process, less concrete is needed for a same strength concrete or the same amount of concrete produces a higher strength concrete.

Finally, the research showed that the mixing effect of wet concrete mixers facilitates total cement hydration, as confirmed by mix designs with a higher strength class that use the same quantity of cement. Given these findings, Booysen is confident that PMSA and IMER can achieve measurable growth in sub-Saharan Africa through industry-specific wet batching plants.

“IMER is an internationally-recognised wet batching plant manufacturer, and bearing in mind PMSA’s standing throughout Africa, I am confident that this partnership will bring considerable value to our local target market, which in turn will lead to sustainable growth long into the future,” he concludes. □



Automated IMER wet batch plants, now available in South Africa from Pan Mixers, create fully mixed concrete, which ultimately reduces costs, as it eliminates the need for high-speed mixing in the truck prior to dispatch.



IT automation unlocks innovation

In this article, Shailendra Singh, business director, Africa, Wipro (left) discusses the effect that IT automation and the 'Internet of Things' is likely to have on businesses of the future.

Embracing IT automation at the core of business operations is critical for companies looking to innovate, transform, and compete in ever more demanding markets. With many large enterprises' IT environments increasing in complexity, the idea of clinging to manual static processes that require constant human intervention and maintenance is not a viable solution for the future. Next-generation automation tools essentially make it simpler to maintain and evolve the organisation's IT estate via sophisticated self-learning and self-healing systems.

The trend of recent years towards cloud-centric and on-demand models of IT provisioning, helps to pave the way for more efficient and more automated integration between systems. It is against this backdrop that the benefits of widespread automation start to become possible.

Intelligent automation – in other words, the combination of artificial intelligence and automation – allows entire systems and processes to work flawlessly without the need for human intervention. This is truly a paradigm shift from remedial, manual infrastructure management to a proactive, automated management strategy via predictive analytics and self-healing mechanisms. But perhaps most valuably, as core functions start working autonomously, human capital resources are freed up to focus on higher-value, more strategic IT initiatives. Greater levels of automation help in getting rid of redundant tasks to make this possible.

This re-deployment of skills and resources often means energy can be diverted to other areas of the business – such as research and development, innovation or new ventures. The result is often greater levels of agility and enhanced delivery of products and services to customers.

Innovation benefits

Widespread automation across the IT estate also enables the organisation to more easily connect new systems to

the core enterprise architecture. These could be within the enterprise and also between the partner companies, broader ecosystems and industry value chains. Extending this concept further, automation can allow organisations to tap into even more extendable innovation networks by easily connecting to partners, customers and ideas generators across multiple platforms. For example, a Canadian mining company exposed certain of its geological surveys and invited innovations to develop modelling software that would identify the best areas to mine. This open-innovation, crowd-sourcing initiative yielded profitable results for both the mining company and its innovation partner.

In fact, as the concept of the 'Internet of Things' gains momentum, automation will assist companies in seamlessly connecting any number of connected devices and sensors – with the potential to generate new business models and innovation opportunities. In this new era, we will start to see everything from self-driving cars, to virtual customer assistants and advanced robots with self-learning abilities – all entering the commercial space and starting to impact business and create new innovation opportunities.

According to the forecasts of research giant Gartner, this era of smart machines is likely to be the most disruptive in the history of IT.

IT automation also brings greater efficiency. Clients realise huge cost savings on maintenance when shifting to automated managed services models. These savings in the back-end allow funds to be re-diverted to innovation efforts at the front-end. Furthermore, automated and software-

defined environments give organisations the flexibility they need to succeed in a digitised world. Agile programming of the applications and infrastructure is essential in creating a dynamic models where new ideas can be quickly tested – either to be discarded or further explored and potentially commercialised.


As organisations gain awareness of the benefits of automation in the early stage of the automation maturity cycle, the focus starts to shift to new innovations that allow the company to reach higher levels of automation maturity. In many different ways, IT automation is the key that unlocks a company's innovation strategy – allowing them to be more competitive while improving productivity, efficiency and, ultimately, the delivery of products and services. □


Intelligent automation – in other words, the combination of artificial intelligence and automation – allows entire systems and processes to work flawlessly without the need for human intervention.

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Port of Ngqura's automated mooring system

The automated mooring system (AMS) at the Port of Ngqura in South Africa's east coast is poised to improve port efficiency and safety, cementing the deep-water port's position as a leading trans-shipment hub for the sub-Saharan region.

The new mooring system at the Port of Ngqura comprises 26 mooring units, the last of which arrived at the port in March 2015. "Procured from global engineering group, Cavotec, the mooring units were designed, custom manufactured and installed to meet the specific environmental conditions of the Port of Ngqura. They will complement manual berthing teams at the port by stabilising container vessels on the quayside at the click of a button, reducing docking and undocking times from between 10 and 40 minutes to less than 10 seconds," says Transnet National Ports Authority (TNPA) chief executive, Richard Vallihu.

Port manager, Mpumi Dweba, adds that Ngqura experiences significant long wave effects and strong winds, particularly in the winter months, which frequently cause berthed vessels to move excessively, impacting cargo operations, safety and the port's efficiency.

"This unique vacuum based automated mooring technology is used in only a few ports internationally, but will be the first in the South African port system, proving once again that the Port of Ngqura is the leader in deploying new technologies to improve port operations and the safety of vessels," she says.

Technicians from Cavotec have been on site since November 2014 assembling and testing units at Berth D100, one of four berths at the Ngqura Container Terminal that will be equipped with the technology. Dweba said the pilot berth was selected because it was most severely affected by weather conditions.

Local skills transfer was a central requirement of the contract and Cavotec will upskill local mechanical and electrical companies to provide ongoing technical support, maintenance and repairs to the port. In addition, Ngqura maintenance staff has received specialised training, while operational training will take place after the units have all been installed.

Cavotec's AMS technology uses remote controlled vacuum pads, recessed in or mounted on the quayside, to moor and release vessels in seconds, increasing productivity. It also dramatically improves safety and operational efficiency.

Says Ngqura Port Engineer, Gerrit du Plessis: "A unique capability of the AMS is that the vessel will be kept almost static whilst alongside the quay, with movements restricted to within 50 mm. This is made possible by the design of the pneumatic AMS units, which can move both vertically and horizontally in response to wind and wave action, as well as 'walk' up and down the vessel to accommodate tidal variations." □



The new automated mooring units along the Ngqura quayside.

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UD Trucks launches Quester range



UD Trucks' new Quester extra heavy truck range is "robust and easy to maintain" and can handle "tough daily use, especially off-road".

UD Trucks Southern Africa launched its new Quester extra heavy truck range earlier this year, which includes 13 derivatives in its line-up. This article summarises its modern features.

"The Quester range is the first in a new generation of UD Trucks specifically developed for growth markets across the world, including the very unique African market," begins Rory Schulz, managing director of UD Trucks Southern Africa. "It combines UD Trucks' Japanese quality heritage, its global resources and insight with the expertise of our local specialists," he says.

The main aim of the range is to make the fleet owners' day simpler and more productive. "Quester is UD Trucks' most cost-efficient truck yet, not only when you buy it, but also when you drive it. It cuts fuel costs and maximises uptime, giving operators a dependable payback that will help them succeed in their business," Schultz adds.

"We believe that Quester is a range that will excel with respect durability. Robust and easy to maintain, it is essentially a business tool that can handle tough daily use, especially off-road," explains Schulz. "And all of this is backed up by a wide range of configurations with easy body mounting, offering customers a tailored and purpose-built solution for all types of applications."

The development of the Quester range started in 2007, when the UD Trucks project team travelled to customers in eight developing markets to get feedback

and to experience each site's unique operational environment.

Being part of one of the largest commercial vehicle manufacturers in the world, UD Trucks was able to utilise the company's global resources, as well as design, technical and manufacturing expertise from across the globe, to develop the Quester range to exacting standards. The result is an extra-heavy vehicle at the forefront of UD Trucks' global aspirations of being a modern smart truck supplier that excels on the essentials while retaining its inherent Japanese heritage.

"More than 400 full-time experts from different nationalities have contributed to the design, development and production of the Quester range and associated offerings," continues Schulz. "We have spent 1.5 million engineering hours and 65 000 test hours to ensure that this vehicle delivers on its promises in actual operating conditions."

Everything in and around the Quester is developed to create strong, efficient and robust solutions for day-to-day operations. Some of these quality elements include three-piece steel bumpers, in-vehicle diagnostics, easy maintenance, as well as UD Genuine Service and Genuine Parts.

Range and performance

The range for southern Africa includes



13 model derivatives, including freight carriers, truck tractors, rigids and specific construction applications such as tipplers, tankers and mixers. Also, for the first time, UD Trucks will offer an 8x4 option for related sub-segments within the market.

UD's two-engine options have engines with wide torque bands to adjust to operating conditions such as high-traffic scenarios, as well as for operations on tarred and gravel roads, and of course for cruising conditions.

The 8-litre GH8E engine has already built a good reputation for its economy and performance, which makes it ideal for distribution and construction work. The engine is turbo-charged with an air-to-air intercooler and delivers 243 kW at 2 200 rpm, and 1 200 Nm of torque at between 1 400 and 1 600 rpm.

The 11-litre GH11E engine offers good torque of 1 734 Nm at low revolutions, which results in a quick response to acceleration. It delivers 278 kW of power at 1 900 rpm. An electronically controlled cooling fan reduces losses and it has an engine-driven power take-off with a torque output of up to 650 Nm.

UD also offers a UD extra engine brake on the 11-litre engine derivatives, which uses the engine as an auxiliary braking device. The GH11E engine boasts a sturdy, dependable design featuring an overhead camshaft, four valves per cylinder and a precisely controlled electronic injector unit.

Powertrain

The heart of every Quester is the integrated powertrain that performs optimally



Above: The ergonomic layout of the dashboard increases the safety on the road. The large 4.5-inch display ensures readability and displays information on UD's innovative fuel coaching system. **Left:** The range for southern Africa includes 13 model derivatives, including freight carriers, truck tractors, rigids and specific construction applications such as tippers, tankers and mixers.

because they were specially designed and manufactured to work together. They combine the efficiency and durability of a Quester engine with a selection of globally proven components.

Quester utilises proven UD SYNCRO transmissions. For the 11-litre engine there are 9 or 12-speed options available, while the 8-litre engine range has a 9-speed transmission. Input torque on both transmissions can be up to 2 000 Nm.

For rough and hilly operations, Quester offers hub reduction for the 6x4R, 8x4R and 6x4T configurations. The vehicle's rear axle housing is also made from fabricated steel to handle heavy loads. The 6x2R configurations can also be provided with a bogie-lifting axle, which is used to lift the axle into the unladen condition. This lifting function gives the truck more traction when activated.

Chassis frame and cab

Fleet owners are constantly looking for new ways to transport more cargo on every run, without the worry that the added capacity will compromise the truck's safety. The chassis frame is made from cold-formed steel and produced using a rolling form process that gives the chassis extended strength and flexibility.

By having a wide product range and many available wheelbases, Quester is able to maximise the payload depending on the application and business needs of fleet owners. Due to the robust design and axles, Quester is intended to operate at high gross combination weight (GCW) to give it a competitive load carrying capacity.

"The potential of Quester lies in its versatility. The range offers customisation for a variety of adaptations that will suit varied transport requirements. For

example, Quester is designed for ease of superstructure installation with comprehensive bodybuilder instructions and drawings. The parallel side members, designed bodybuilder mounts and a range of power take-offs add to the ease of installation," says Schultz

The product line-up is available with a large wheelbase range direct from the factory, from 3 500 mm up to 6 285 mm. Available axle positioning includes 4x2T, 6x2R/T and 8x4R configurations for distribution and mining work.

The T-ride rear suspension on the 6x4T/R has been especially designed for rough conditions and is particularly suitable for construction where durability and reliability are of the highest importance. Rubber springs between the springs and rear axles contribute to good comfort under all axle loads, while rubber journalled V-stays and reduction rods ensure smooth operation. A system of coil springs supports the entire cab, absorbing road shocks and vibrations. This is a reliable system that keeps maintenance costs to a minimum.

Within the cab of the Quester it is all about efficiency, productivity, space and safety. This is place for long work hours. The cab has specifically been designed with the driver's needs in mind, making it easy to work with precision.

The ergonomic layout of the dashboard increases the safety on the road. The large 4.5-inch display ensures readability, and also displays information on the innovative fuel coaching system that comes standard with every truck in the range. The in-vehicle diagnostics, including engine performance and early warning of malfunctions through pop-up messages and warning lamps, also appear on the dashboard.

Quester's cab has passed the globally rated ECE R29/ AIS029 crash safety test in order to ensure the safety of the driver.

Fuel economy

The Quester range has built-in fuel economy, because the different driveline options give customers the ability to optimise the powertrain with respect to power output, transmission and axle ratios. The well-specified powertrain ensures that the engine operates at its peak efficiency at all times, enabling good fuel consumption and high average speeds.

"As it is the highest cost for fleet owners, cutting fuel expenses was a priority for UD during the development of the Quester range," reveals Schulz.

Quester's built-in fuel coaching system constantly monitors the performance of the driver in real time. This system keeps the driver informed of the truck's current fuel consumption and if they are driving at the optimum speed and in the correct gear. Fuel Coach is also able to advise the driver which corrective action to take in order to get back into the efficiency 'sweet spot'.

UD Trucks has also included a new interactive telematics system as standard on all Quester models, which also monitors fuel economy and even fuel theft. "Quester gives fleet owners 100% control of their fuel expenses, while saving 30% on diesel costs," Schulz says.

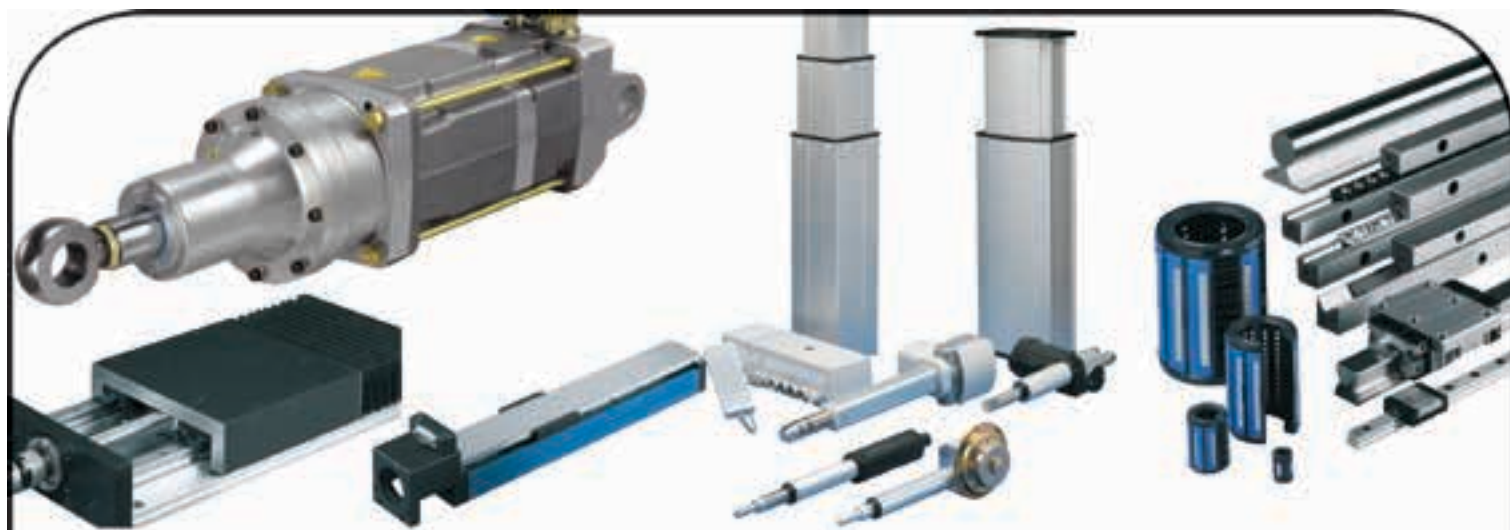
Aftermarket support

UD Trucks is offering a free three-year or 150 000 km UD Basic service contract with the sale of every Quester unit.

The new vehicle's telematics system, which is managed by the UD Trucks Call Centre, "monitors the heartbeat" of the truck as it provides real-time positioning, information on preventative maintenance and manages the breakdown assistance.

This also provides fleet owners and UD dealers with all the information they need to do the required preventative maintenance on time, and to schedule standard services more efficiently. This means that fleet owners are able to keep their trucks running productively for longer.

With 70 franchised dealers already present along major routes and trade corridors in southern and east Africa, fleet owners are able to get complete support from UD Trucks no matter where they operate in the region. "Ultimately, Quester addresses the top concerns every fleet owner has, namely fuel consumption, durability, productivity and maintenance in a smart and modern fashion," concludes Schulz. □

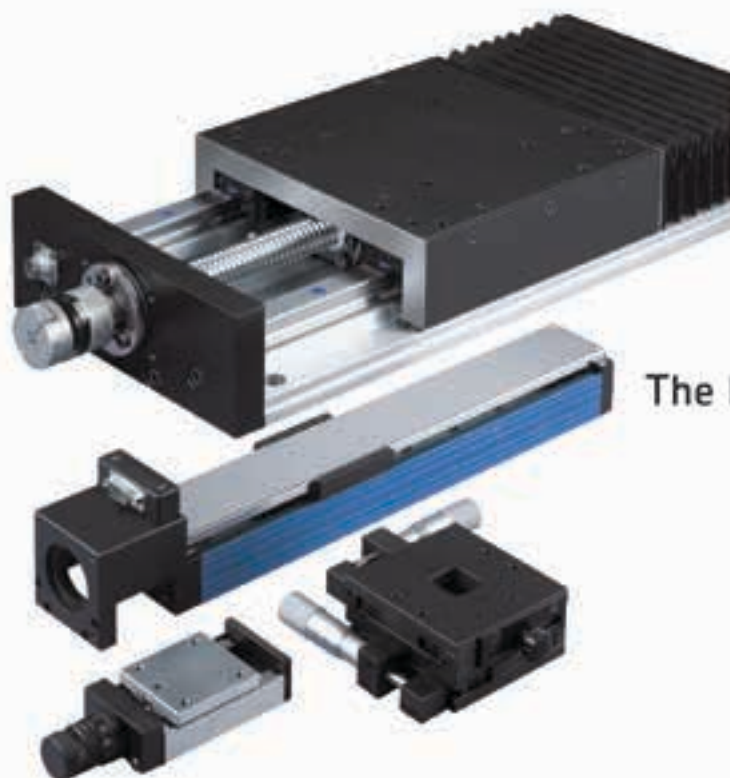


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Container handling expansion

for Durban harbour

Freight management and logistics specialists – Intermodal Connections – which was established a year ago just 10 km from the Durban Port, has expanded its fleet of container handling equipment to meet growing demand in the region for swift, safe and reliable cargo handling.

It's not all doom and gloom at the Durban Harbour. In spite of port congestion, deteriorating road conditions, strike action and disruptive power outages, the expansion of the container handling capacity is good news for KwaZulu-Natal's logistics sector.

"Intermodal Connections' original investment in a 45 T container handler has been boosted with the delivery of a mobile container handler, variable reach trucks, forklifts and a combination loaded container handler and forklift truck," says Jo-Ann Mellon, managing director, Intermodal Connections. "Reliable handling equipment plays a critical role in enabling Intermodal Connections to honour our pledge to provide logistics solutions at international standards.

"Many of our customers are exporters and importers in highly competitive markets and require absolute reliability in every part of the supply chain to ensure cargo reaches its destination safely, in the most efficient and cost effective manner.

"Cargo handling services include the handling of unitised commodities and break-bulk cargoes, unpacking and repacking of containers and cross docking. A dependable freight, stock and document management completes our supply chain service, to and from any destination in the world."

The company's carefully designed facility – a 10 000 m², 23 m high warehouse with 2 000 m² of open yard area – accommodates all types of cargo, including project cargo and out of gauge cargo.

Under-cover loading, off loading and packing facilities enable work to continue in all weather conditions. These amenities include truck off-loading bays and a drive-through area that prevents truck congestion and facilitates easy manoeuvrability for drivers. This facility, which encompasses four container loading docks, also has the capability to ground containers.

New to the fleet is a lightweight Mobicon mobile container handling system, designed to efficiently lift loads onto and off trucks in the warehouse and to safely carry containers around the site. The Mobicon container handler, with a 33 t lift capacity, has increased operational efficiency at the plant, also reducing demurrage costs for trucks waiting to be loaded and unloaded.

Two Meclift variable reach trucks are used for swift and safe container stuffing and handling, increasing efficiency during container handling procedures. These compact reach trucks also ensure enhanced safety on site. Unlike conventional forklift trucks, robust Meclift machines, with a lift height of 6.0 m, are able to drive into containers or reach inside a container for easy loading and unloading of cargo and equipment.

Specialised lifting attachments enable efficient and safe handling of paper reels, steel coils, sheets and rebar, as well as rolls of wire with mass of up to 15 000 kg.

The company's fleet also includes a Taylor TEC combination loaded container handler and forklift truck, with a rated



Jo-Ann Mellon, Intermodal Connections' managing director, with a Meclift variable reach truck offloading 26 bundles of aluminium profiles.



The Mobicon mobile container handler, with a 33 T lift capacity, has increased operational efficiency at the plant and reduced demurrage costs for trucks waiting to be loaded and unloaded.

container capacity of 34 927 kg. This machine is able to efficiently cope with three-high stacking of loaded containers.

Also in the plant are four robust forklift trucks, with capacities up to 4.0 t.

Intermodal Connections, a level 4 contributor to broad-based black economic empowerment (B-BBEE), efficiently handles all aspects of logistics and shipments to ensure optimum efficiency of domestic and international trade. □

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Tech4RED, hydrogen fuel cells and

On June 12, 2015 at the Mvuzo junior secondary school in Cofimvaba, a rural village in the Eastern Cape, Minister of Science and Technology, Naledi Pandor launched the Technology for Rural Education and Development Project (Tech4RED). *Peter Middleton* reports.



Following the signing of a memorandum of understanding for expanding the use of hydrogen fuel cell backup power systems in rural schools are, from left: Gavin Coetzer of Clean Energy Investments; Anglo American Platinum executive head of marketing, Andrew Hinkly; Minister of Science and Technology, Naledi Pandor (on behalf of the DST); and Air Products South Africa MD, Mike Hellyar.

Led by the DST in partnership with the Eastern Cape Education, Basic Education (DBE), Rural Development and Land Reform departments, along with private sector partners, Anglo American, Air Products and Clean Energy Investments, three schools in Cofimvaba – Arthur Mfebe Senior Secondary, St Mark Junior Secondary and Mvuzo Junior Secondary – are now using hydrogen fuel cells for backup power to support e-learning programmes.

The core focus of the Tech4RED project is to integrate science, technology and innovation to improve the delivery of basic education in six identified areas: information and communication technology (ICT), science education, nutrition, sanitation technologies, energy and health. And following a successful pilot at these three schools, 26 more schools in the district are set to benefit from the programme.

Fuel cells for backup power

Backup power is critical to the success of ICT projects such as these, because of their dependence on the rechargeable tablets and associated computer equipment. If the power fails for any length of time, ICT-based education grinds to a

halt, hence the installation of the three hydrogen fuel cell systems at the Cofimvaba schools.

Anglo American Platinum sponsored the three pilot systems, including installation, ongoing maintenance and operational costs. Air Products is supplying the hydrogen to fuel the systems, while Clean Energy Investments, a South African company co-owned by the DST and Anglo American Platinum, dealt with procurement, installation and commissioning.

At the Mvuzo site in Cofimvaba, Gavin Coetzer, CEO of Clean Energy Investments, takes a few guests into the schools hydrogen fuel cell plant. Mounted on a concrete platform behind a palisade fence, the space is dominated by two banks of seven red hydrogen cylinders, with a 1,5 m high cabinet in one corner housing the fuel cell.

Opening the fuel cell cabinet Coetzer points out the fuel cell itself, which occupies less than a quarter of the cabinet space. “Each one of these ribs, is a single 0.7 V cell that can deliver 110 A. There are 50 of these pressed together to prevent gas leaks, giving us a capacity of 5.0 kW of power,” Coetzer explains.

The built-in electronics manages all energy coming in from the 50 cells and

combines it to produce a single 48 V circuit connected to an inverter, which converts the power into 220 V ac which is connected to selected circuits via the school’s distribution board. When the power from the grid goes down, these circuits immediately switch over to inverter-based power so that no interruption is detected by the schools ICT or charging systems.

“For the first 45 seconds, however, the power comes from a small battery inside the fuel cell. This is to allow the backup system to complete its safety checks before switching over to hydrogen-fuelled generation. The fuel cell initially checks for leaks. It takes air and pumps it into the cells and monitors to ensure the cells maintain their pressure. Only after a successful leak check will it allow hydrogen to enter the system,” he says, adding that a hydrogen sniffer detects any build up of hydrogen in the air around the fuel cell while the system is running. If hydrogen levels rise above 2.0% – half of the minimum percentage of hydrogen in air required for combustion – the inlet gas supply valves are immediately shut off.”

Addressing hydrogen safety issues, Coetzer points to the normally closed solenoid-actuated (magnetic) valve that can only open the hydrogen supply when energised. Also, while many people believe hydrogen to be a very dangerous gas, it is, in fact, less dangerous than petrol or natural gas. It is much lighter than other fuels, so if released, even while burning, it rises into the air fourteen times faster than air, whereas petrol or natural gas can gather in strong concentrations on the ground. “Hydrogen dissipates much faster than other fuels, almost eliminating the risk of explosive quantities accumulating,” he assures.

On the maintenance side, Coetzer says that a modem connected to the rural system enables everything that is happening on the site to be monitored from Johannesburg. “We continuously monitor the system remotely, tracking data such as the power being drawn, power outages and hydrogen pressures.

“But fuel cell systems, apart from a variable speed fan to suck air through the cells, have very few moving parts and don’t suffer from friction wear or corrosion. The limited number of mechanical

development partnerships



A view of the 5.0 kW hydrogen fuel cell plant at Mvuzo Junior Secondary in Cofimvaba.

parts makes it easy to identify and isolate problems. This allows us to use the ICT staff in the schools to do first line maintenance," he reports.

The remote monitoring system is also used by Air Products to ensure that the hydrogen gas supply never runs out. Currently, the three pilot schools in Cofimvaba are being serviced together. Once the first bank of seven hydrogen cylinders is depleted at any of the schools, that school is immediately switched over to the second bank of cylinders. At the same time, the other two schools are switched to using fuel cell power instead of grid power, to deplete their first bank of hydrogen cylinders. All three schools are then simultaneously supplied from Air Products' Port Elizabeth branch.

"Fuel cell backup power solutions are efficient, reliable, safe and, most importantly, quiet, ensuring a non-intrusive standby," says Coetzer, adding that in some areas without grid connectivity, they can also be feasible for primary power solutions.

"And there is nothing valuable to steal. People steal PV panels, because they can use the panels and the batteries. We don't use copper, the platinum we do use has no value, the hydrogen cylinders are heavy (70 kg per cylinder), dangerous and not in general use. Our experience at cell phone towers tells us that fuel cells, although more expensive than generators, are actually a better option because of the lower risk of potential theft," he says.



Above: Learners from Mvuzo Junior Secondary show off the tablets that are now being widely used in the school's education programme.

Left: The fuel cell itself (middle shelf) occupies less than a quarter of the cabinet space. The unit consists of 50 single 0.7 V cells that can each deliver 110 A. The peak power output from the inverter (top shelf) is 5.0 kW.



Air Products' hydrogen capability

As a pilot project, Air Products chose to be involved in this project for two reasons: first, the project is in line with its corporate social investment (CSI) programme, which is focused on sustainable ways of improving educational facilities in disadvantaged communities.

Second, the company sees long-term value in this project as a means of gaining a better understanding of local needs in order to develop and grow the hydrogen fuel cell market in South Africa. To this end, Air Products has been working closely with Clean Energy Investments and Anglo American Platinum to develop the hydrogen economy in South Africa.

The success of hydrogen fuel cell technology hinges on an economically viable system of hydrogen supply and distribution, not only in the CSI context but also within a commercial context. Air Products South Africa is committed to working alongside other stakeholders to develop a hydrogen distribution solution that is both scalable and economical for the end-user.

Globally, according to Mike Hellyar, MD of Air Products South Africa, Air Products is at the forefront of hydrogen fuelling technology, providing the infrastructure for the 'hydrogen road' in California. Air Products has been chosen as the technology supplier for FirstElement Fuel's initial network of 19 hydrogen-fuelling stations throughout California.

In South Africa, Air Products, in partnership with Sasol, has the capacity to reform 12 t/day of hydrogen from methane-rich gas mixtures. Most of the hydrogen produced is used in the platinum refining process, but the company has significant volumes of additional capacity, ideal for use in a hydrogen economy of the future.

"We believe that hydrogen technology holds the key to a sustainable future," says Air Products' Sizwe Nkonde – general manager of Packaged Gases. "Implementing new, cutting-edge technology means replacing the old ways of doing things, and what better place to start than with our youth?" he asks in his launch presentation.

Says Pandor: "The knowledge and experience gained from the Cofimvaba pilot project and others taking place throughout the country will not only promote awareness of the technology, but will assist in creating a market for technologies that are being developed through the Hydrogen South Africa (HySA) Programme." □

PanelView 800 graphic terminals

Rockwell Automation reduces boot-up time and increases installation flexibility with the new space-saving Allen-Bradley PanelView 800 family of graphic terminals.

The terminals, available in 4-inch, 7-inch and 10-inch display sizes, feature an 800 MHz CPU processor, up to 256 MB of flash, and dynamic memory to reduce boot-up time, making it two times faster than the previous PanelView Component terminal. The terminals also offer improved touch-screen responsiveness and can be configured in portrait and standard landscape mode for greater

installation flexibility.

“The PanelView 800 family of terminals builds on the Rockwell Automation Connected Components Workbench software’s value of giving machine builders simplified engineering, easy configuration, faster installation and reduced start-up time,” said Christo Buys, business manager control systems, Rockwell Automation southern Africa. “This family of graphic terminals is ideally suited for meeting control and visualisation requirements in a wide range of simple, standalone applications, such as pump stations, packaging machines, labellers and stretch-wrap machines.”

The PanelView 800 graphic terminals are specifically designed for use with the Allen-Bradley Micro800 and MicroLogix control systems. The terminals’ high-resolution screens with LED backlights can display up to 65 536 colours, providing a sharp display for a wide range of applications. Built-in Ethernet and serial communications ports (RS232, RS422

and RS485) support easier controller connectivity, while USB and microSD ports make file transfers easier. The terminals are also certified for Class 1, Division 2 hazardous locations.

The Connected Components Workbench software Release 8.0, which includes support for the PanelView 800 graphic terminals, gives machine builders a common environment to program the Micro800 controllers, as well as to configure the Allen-Bradley PowerFlex drives and Allen-Bradley Guardmaster safety relays.

The standard edition is free, and Release 8.0 includes support for the Guardmaster 440C-CR30 safety relay Ethernet plug-in for communications to Micro800 and Allen-Bradley CompactLogix controllers; the Micro800 high-speed counter plug-in feedback axis to ease motion programming; and Micro800 DeviceNet scanner plug-in diagnostics to ease troubleshooting DeviceNet-connected devices.

www.rockwellautomation.co.za



Allen-Bradley PanelView 800 family of graphic terminals, available in 4-inch, 7-inch and 10-inch display sizes, feature an 800 MHz CPU processor and are available from Rockwell Automation.

Effective solutions to pipeline leaks

Solidus Engineering Solutions, apart from its continued involvement in running civil, mechanical and electrical engineering projects timeously and effectively, has also added advanced experience in pipeline technology (PLT) to its offering. This ISO certified company based in eMalahleni (Witbank), Mpumalanga utilises innovative pipeline technologies with several advantages:

- Pipeline repairs can be done while the plant is on line, often obviating the need for a shutdown.
- The company places a strong emphasis on health and safety.
- Products used are durable, rust resistant and can protect against any forms of corrosion without contaminating drinking water or any fluids being moved at a plant.
- Engineers and technicians are highly trained and experienced.
- Pipeline repairs help you to protect the environment.

PLT offers pipeline leak detection; on-line and off-line leak repairs; flange sealing and pipe freezing services; tank leak and pipeline corrosion repairs and protection as well as pipeline reinforcement. The company can work on pipes of all sizes. Most recently they have worked on 200 mm as well as 900 mm diameters.

www.solidusengineering.co.za

Safety laser scanner

Leuze Electronic’s latest RSL 400 series safety laser scanner is available from Countapulse Controls, the leading southern African supplier of sensing, measurement, counting, switching, monitoring and positioning instrumentation. The RSL 400 series consists of 16 device versions, with operating ranges of up to 8.25 m, according to Gerry Bryant, Countapulse Controls’ managing director.

These safety laser scanners can be configured via Bluetooth and Ethernet TCP/IP. Despite the large number of possible field pairs (100), the creation of independent configurations with application-orientated one-step configuration is simpler than ever, Bryant notes.

The devices’ large scanning angle of 270° is especially advantageous, for example, in the case of mounting on corners or edges for front and side guarding and can, depending on the application, replace a second laser scanner.

With two completely autonomous protective functions, two pairs of safety switching outputs and nine other configurable switching outputs, the RSL 430 variant is one device that solves

two protection tasks simultaneously.

In addition to a high insensitivity to dust due to the high scanning rate, the large plain-text display with integrated electronic spirit level ensures simple alignment when mounting the connector unit. The connector unit contains the entire cable management and forms the mechanical and electrical basis of the devices.

The scanner itself can be removed at any time using standard tools and fitted with other RSL 400 devices without the need for realignment, readjustment or lengthy configuration. “This is an important advantage in terms of ease of maintenance and repair,” Bryant adds. Thanks to the Ethernet interface, the devices have full network connectivity.

For safeguarding large areas of up to 160 m², the RSL 410 safety laser scanners feature very simple integration in machine control thanks to an eight-pin M12 connection. Any type of protective/warning field contours (1 field pair/quad) can be accommodated.

www.countapulse.co.za

Leuze Electronic’s latest RSL 400 series safety laser scanner is available from Countapulse Controls.



Warranty repairs for common rail fuel injection systems

Reef Fuel Injection Services has been accredited by Bosch to conduct warranty repairs for its CP4 common rail direct fuel injection system, a standard feature on many of the latest passenger and light commercial vehicles. "This accreditation is a testament to our in-house expertise and the excellent quality of our workmanship, combined with the fact that we have made a significant investment in the latest technology and services," says Warren Hauser, operations manager at Reef Fuel Injection Services.

The latest trend in direct fuel injection systems is higher injector pressures, which improves atomisation of the diesel, resulting in a more complete burn and hence less harmful emissions. The added benefit is improved fuel efficiency and lower fuel consumption.

"These issues are very much in the spotlight at present, particularly in terms of rising fuel costs and increasingly stringent environmental regulations. However, the latest systems such as Bosch's CP4 require specialised test equipment, which is where Reef Fuel Injection Services stands to play a major role," Hauser adds.



Reef Fuel Injection Services has been accredited by Bosch to conduct warranty repairs for its CP4 common rail direct fuel injection system.

The company has the capability to run up, test and report on Bosch's CP4 system as well as to rebuild and calibrate the units. "The diagnostic aspect is critical, especially the calibration. If the injector pressures are out of specification, it can result in substantial damage to an engine. Therefore the perceived cost savings of having such repairs done cheaply at a non-approved repair facility are very short term," Yorke Hauser warns.

Reef Fuel Injection Services is a subsidiary of Metric Automotive Engineering, one of South Africa's most comprehensively equipped heavy diesel engine and component remanufacturer.

www.reeffuel.co.za

Conventional desuperheaters reduce plant maintenance

The locally designed and manufactured conventional desuperheaters from Mitech reduce plant maintenance, are easy to install, and have no moving parts. They are used to reduce the temperature of superheated steam to a predetermined set point within 10 °C of the saturation point of the steam. All units are designed and manufactured in accordance with ISO 9001 and PED quality approval systems.

The system works by feeding spray water to a nozzle or multiple nozzles through a control valve. The valve receives a signal from the temperature controller indicating the demand for spray water required to achieve set point temperature. This water is injected through the nozzle into the main steam line, therefore reducing the temperature of the steam. High-pressure water ensures that there is suitable atomisation of the water, which is absorbed by the steam.

The robust units are easy to maintain and may be mounted in any position. They have a turndown ratio of up to 3:1



and provide an inexpensive and long lasting solution where low turndown is required. Engineered for each application, these desuperheaters provide accurate control to within ± 1.0 °C

Mitech desuperheaters feed spray water to a nozzle or multiple nozzles through a control valve, which receives a signal from the temperature controller indicating the demand for spray water required to achieve set point temperature.

www.mitech.co.za

Tube connection breakthrough

A breakthrough in high integrity tube connection technology offering instrumentation system designers and installers major performance and time-saving advantages is now available from Parker Hannifin – a global leader in motion and control technologies. Designed for working pressures as high as 1 550 bar, the new 'flared cone' technology advances the performance of compression-style tube connections. It provides users with a simple and reliable means of speeding the assembly of instrument tubing systems for

use in higher pressures applications in the oil and gas industries.

According to Michael O'Keane, product-marketing manager for Parker Autoclave Engineers, "Our new FCC technology offers the best of both worlds. It combines the make-up and installation simplicity of compression style connections with the strength of cone and thread, and has more features and higher pressure capabilities than similar technologies."

www.parker.com

New stainless steel butterfly valve

Victaulic, one of the world's leading manufacturers of mechanical pipe-joining systems, has expanded the Vic-300 MasterSeal™ butterfly valve line to include a stainless steel body option. The new grooved-end Series 461 butterfly valve is designed for pressures ranging from full vacuum to 2 065 kPa and for bi-directional dead-end services to full working pressure.

The stainless steel valve features a patented seat design, made popular by the Victaulic Series 761 butterfly valve, which assures full 360-degree sealing. The pressure-enhanced seat compresses to form a larger seating area as the pressure increases. The seat design also contributes to the low breakaway torque capabilities of the MasterSeal valve.

"The Series 461 fits seamlessly into the existing line of Victaulic butterfly valves and we are pleased to offer our customers in South Africa a reliable, cost effective and efficient solution for HVAC, potable water and industrial systems," says Barry van Jaarsveld, Victaulic regional manager for Africa. "This stainless steel valve provides the same high level of reliability the industry has come to expect from Victaulic and is perfect for any application where corrosion is a concern."

The Series 461 is available in 50 to 200 mm sizes with a variety of operators that include both lever handle and gear operation options.

www.victaulic.com



of the set point. The units are lightweight making them easy to install, and with no moving parts in the steam flow, maintenance is reduced.

Mitech desuperheaters are ideally suited for use in the petrochemical, power generation, pulp and paper, food and beverage and sugar industries.

Thorium reactors to avert future water crisis

Within 35 years, South Africa will be short of fresh water. The preferred way to address this is through desalination, but unless the energy crisis is addressed, South Africa is destined for long-term power and water shortages, primarily because power will also be needed to produce clean water.

Trevor Blench, chairman of Steenkampskraal Thorium Limited (STL), believes the solution lies in developing small thorium-based nuclear power stations, which are far safer than uranium-based power stations and more affordable. Thorium reactors use dry cooling or minimal water – either inland fresh water from rivers and dams or seawater along SA's coastline – to create energy and desalinate water.

Blench says, while many parts of Africa are dry, the thorium reactor could desalinate seawater for human consumption and produce water for irrigation. "Millions of people die every year in Africa from water-borne diseases. Our reactor

could produce clean drinking water.

"Thorium represents an emerging and safe technology that is more efficient than uranium, produces significantly less hazardous waste and cannot easily be used for nuclear proliferation purposes," he adds. "The solution to the energy and future water crisis is to develop small thorium-based nuclear power stations deployed at strategic locations."

He points out that South Africa has sufficient thorium reserves to supply all of the country's energy needs for the next 100 years, including use for desalination plants and for the safe production of electricity.

Thorium fuel is currently being tested in Norway. STL owns the rights to the thorium of the Steenkampskraal mine in the Western Cape, which, according to Blench, "has the highest known thorium and rare earth grades in the world".

"Thorium does not produce plutonium in its nuclear waste, neither does it produce transuranic actinides. It is therefore a much cleaner fuel than uranium. Our associate company in Norway, Thor Energy, has manufactured thorium fuel and is now qualifying this fuel for use in commercial reactors. If this is as successful as expected, we will be able to use thorium fuel in our reactor," he says.

Anglo American mined Steenkampskraal during the 1950s and 1960s for its thorium. About a dozen reactors were built in Germany, England and America at that time and "we believe that most of that thorium used came from this mine".

"We are currently designing a nuclear reactor that is appropriate for Africa. Typically, African countries have a total annual electricity production of between 1 000 and 5 000 MW per year. They do not have well-developed grids to distribute electricity and currently generate a lot of their electricity with diesel generators, at very high cost.

"These countries cannot afford to spend billions of dollars buying big expensive reactors, to wait up to ten years building such a reactor only to plug in 1 000 MW of nuclear capacity into their tiny grids," he suggests.

"The reactor being developed will be suitable for African and remote conditions. They will be small, with ratings of around 100 MW_{th} (35 MW_e) and will be the right size for many African countries

such as Namibia, Botswana, Ghana, Kenya and many others. The reactors will be suitable for distributed generation, so that countries that do not have good grids could build several of these small reactors in different parts of the country. And most importantly, they will produce electricity more cheaply than the diesel generators being used today."

Blench believes that if Africa is going to embark on a nuclear future, it should leapfrog the Generation 3 reactors and go straight to Generation 4 reactors. "The technology is available. It has been tried and tested over many years and this generation reactor is intrinsically safe and meltdown-proof.

"Most parts of Africa suffer from power shortages that retard their rates of economic growth and hold down living standards. Our small plants could provide electricity for remote towns and villages all over the continent," Blench concludes. □



Norway-based Thor Energy's test rig containing six thorium fuel rods being installed in the IFE Halden Research Reactor. Photo: T.Tandberg

POWER-GEN Africa and DistribuTECH Africa Cape Town, South Africa, 15-17 July 2015

As Africa's power requirements expands in line with rapid growth and development throughout the continent, there continues to be a driving need for more widespread, reliable and sustainable electricity.

The POWER-GEN Africa and DistribuTECH Africa events bring together ministerial and government officials, academics, executives and professionals from government utilities and municipalities and private enterprise from sub-Saharan Africa and around the world to exchange views, discuss experiences and learn new ways to expand and strengthen the power industry across the many countries of Africa.

Industry diary

June 2015

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www.manufacturingindaba.co.za

Africa Rail 2015

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Sandton Convention Centre, Johannesburg

Tarryn: +27 11 516 4044

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Index to advertisers

Aesseal.....	12
Air Liquide	IBC
Becker Mining South Africa	23
Brubin Pumps	15
Centrifugal pumps book.....	29
Clyde Bergemann.....	27
Festo	31
Ingersoll Rand SA.....	IFC
Lincoln Electric	30
SEW Eurodrive.....	OFC, OBC
SKF	34
TLT-Actom.....	24
Verder Pumps	35
Weir Minerals	16
Zest WEG Group	2
2KG Training	19



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