

THIS MONTH:

- Hydraulic pump and motor solutions
- A local quest for quality geared drives
- Pinetown's carbon-neutral truck assembly plant
- PLM deployment – the impacts of cultural change

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Load shedding: a responsible response

“Why are you so hard on Eskom?” I was wryly asked by an Eskom insider following my March comment, which, like today, was written during ongoing load shedding. And while load shedding is currently worse – we are experiencing a sixth consecutive day at Stage 2 and 3 and a further week of power cuts is predicted – I know it is necessary.

My response to the accusation? It annoyed me that it took another major national power crisis to highlight the importance of routine maintenance. Technical people know that any plant will break down unless it is looked after. They should not be ignored for political reasons.

Load shedding, while undoubtedly inconvenient, annoys us more because it highlights our (literal and figurative) powerlessness. It makes us realise how totally dependant we are on the grid-connected supply. This drives us to spend money on rechargeable lighting, gas cookers, power generators and off-grid solar electricity options. Our instinct is to ‘get off the grid’ at all costs – until the actual costs of and consequences of 100% off-grid solutions are calculated – but this initial reaction is born out of anger, not sense.

Crown Publications recently invested in an inverter-based backup power system to cater for load shedding events in a part of our building not connected to our generator. The system uses an 8.0 kW (13 kVA) inverter powered by a battery bank (12 off 105 Ah batteries) to supply continuous power for computers and lighting. So far, it’s working well. During load shedding, the batteries discharge and when the power returns the batteries are recharged.

While not meeting all of the electricity needs, the solution minimises inconvenience during load shedding and the associated Eskom-directed anger. The cost? Roughly R75 000 – a justifiable investment and a sensible decision for any business seeking to secure a continuous electricity supply.

Does such a system help Eskom? Not directly, but it could. Imagine such a system in a house. It could be interconnected via the distribution board to the low-power circuits (lights, TV and DSTV, computer sockets, sound system, etc), so that these circuits are unaffected during a power outage. In addition, a timer could be fitted to routinely switch these circuits off the grid during peak demand periods. Every system installed would, therefore, be able to reduce peak grid demand, regardless of whether load shedding was being implemented or not.

The batteries would still be charged using Eskom electricity. Using timers, though, it would be relatively easy to charge the batteries during off-peak periods, helping the utility, via load-shifting, and reducing costs should time-of-use tariffs ever be implemented.

One investment step further on sees solar panels – or wind turbines along our coastal regions – being fitted to charge the batteries. While off-grid solar solutions require large and expensive battery banks to cover occasional three-day periods without rain or wind, by taking a ‘helping the grid’ approach, the solar panel and the battery investment could be reduced to cater for as much or as little independent generation that a householder can (or is willing) to fund.

A 240 W solar panel can now be sourced for between R3 000 and R4 000 and, based on eight hours of sunshine, each 240 W PV panel adds about 1.92 kWh of stored energy into the batteries. Four solar panels would, therefore, be able to put 7.68 kWh per day into a battery bank, which is about the amount of energy required to recharge a bank of twelve 105 Ah batteries that have been discharged by 50%. That is, sunshine permitting, for an additional investment of around R16 000 Crown would be able to recharge its batteries following load shedding without using Eskom power.

For less than R100 000, the deal price on www.autodealer.co.za for a 2009 Toyota Yaris or a 2013 Toyota Etios, it is possible to fit a home with a system that maximises electricity supply convenience, reduces electricity bills and helps Eskom to reduce its peak demand. We perhaps can’t justify the expense based on payback periods alone, but isn’t this the responsible thing to do?

The Eskom grid belongs to the people of South Africa. We have a right of access to nationally generated electricity, along with the responsibility to pay for it. Also though, we have an opportunity to empower ourselves, not in the sense of living independently of state-owned assets, but to reduce our dependence on centralised services and, at the same time, reduce the burden on the national utility.

Let’s start taking responsibility for our consumption; investing in long-term local solutions to meet some of our own needs, and, instead of being hard on Eskom, let’s make sensible decisions that, at least in part, help to solve the problem.

Peter Middleton


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ON THE COVER



The bigger, better BMG World

To further improve operating efficiencies and delivery service, BMG has embarked on an expansion and supply chain re-engineering project, which involves centralising its distribution and engineering facilities around the expanded BMG Park site in Johannesburg.

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Features

Special report

8 Shaw Controls showcases local capability

Valter Luiz Knihs, Zest WEG Group automation and systems director, along with the Shaw Controls team, showcases the company's local design and manufacturing.

Power transmission, bearings, bushes and seals

10 A local quest for quality geared drives

MechTech talks to John Beukman, Bonfiglioli South Africa's national quality assurance manager, about the importance and value of complying with global quality standards.

13 Drag chain for mobile equipment lines

14 Moving airport baggage handling into the future

17 1 000th TPCL fluid coupling shipped

Computer-aided engineering

18 PLM deployment – the impacts of cultural change

This white paper was the basis of a focus group session 'PLM Deployment: Success vs. Transformation' at Product Innovation (PI) Düsseldorf, 2015.

21 Designing the future pump

22 Sasol's ultramodern future space in Sandton

23 A collaboration to make buildings more energy efficient

Hydraulic and pneumatic systems

24 Hydraulic pump and motor solutions

MechTech talks to Axiom Hydraulics' Neill Simpson about the company's use of SAM Hydraulics' pumps and motors in custom-designed solutions for the local market.

27 Upgraded R-series compressors deliver enhanced value

28 Pneumatic connection technology in 2015

29 Compressor Technique expands vacuum solutions

Structural engineering materials, metals and non-metals

30 Error-free field pressure tests on PVC pipelines

Field pressure testing of PVC pipelines has proven to be a contentious issue in South Africa, with consulting engineers and installers often having different interpretations of how testing should be conducted. DPI Plastics has developed a 'how-to' guide on field pressure testing to ensure that the integrity of a pipeline is not compromised as a result.

34 Materials engineering in practice: Where have all the poppies gone

35 Crash tested modular guardrail system

Innovative engineering

36 MAN SA's carbon-neutral Pinetown assembly plant

MAN Truck & Bus South Africa has announced the conversion of its Pinetown assembly plant to solar power. "...it is great to see that some 53 years after MAN started in South Africa, we have made this significant step towards attaining a degree of self-reliance in terms of energy supply," says managing director, Geoff du Plessis.

Regulars

1 Comment

4 On the cover: The bigger, better BMG World

6 Industry forum

38 Products and services

40 Nota bene

The bigger, better BMG World

To further improve operating efficiencies and delivery service, BMG has embarked on an expansion and supply chain re-engineering project, which involves centralising its distribution and engineering facilities around the expanded BMG Park site in Johannesburg.

The R350-million expansion of BMG's distribution and engineering facilities in Johannesburg is well under way. "The objective of this development programme is to centralise functional and support operations onto one site to improve supply chain processes across the Group," says Vasu Govindasamy, BMG's supply chain projects manager. "Through this rationalisation initiative, BMG strives to achieve cost optimisation, improve regionalised branch office support and enhance customer service capability.

"This supply chain re-engineering project is necessary for BMG to continue to provide high levels of operating efficiencies and delivery service in line with

substantial growth. With an increase of the existing 15 000 m² under-roof warehousing facility to 24 000 m², the re-developed Droste Park warehouse will carry approximately R700-million of stock, with an additional R400-million strategically located throughout the Southern African region. In addition, the workshop under-roof area will increase from 1 500 to 10 400 m²." This project, which is due for completion in December 2015, encompasses modifications to existing buildings and the erection of new structures.

To reflect the company's ability to supply integrated engineering solutions to Southern African industries, BMG Park will be renamed BMG World. Functional

operations at BMG World will include a product warehouse and distribution centre for the entire product range and a manufacturing centre and general engineering workshop.

BMG has invested in the latest materials handling equipment, including high bay reach trucks, to optimise volumetric efficiency. Special machinery at the new facility includes eight dock levellers that will handle approximately 120 containers a month.

There will also be specialist assembly and repair workshops for drives, conveyors, hydraulics and pneumatics, as well as electric motors, electronics, gaskets, lubrication systems and filtration. A cornerstone of this overall initiative is reliability engineering – a philosophy aimed at keeping industrial plant at full productive output for as long as possible, without unnecessary maintenance or unplanned stoppages. As a result, output capacities are increased without investment in additional production lines and machinery.

In support of this philosophy, a regenerative load test rig is being installed, which will play a critical role in bringing the tangible benefits of the company's 'world class production efficiency' to South African industry. This 200 kW load test rig has been developed in response to demand from local industry for absolute reliability from new gearboxes. This system uses the latest technology to transmit and apply loads of up to 30 000 Nm, with the lowest energy consumption. This is enough torque to test the majority of Paramax gearboxes in BMG's range, within at least a third of each unit's rated capacity."

BMG's technical resources centre offers services, which positively influence a company's operating efficiencies by ensuring maximised mechanical reliability of plant and machinery. Starting with



A 200 kW regenerative load test rig is being installed to support 'world class production efficiency' in South African industry.



*BMG's expanded facility includes specialist assembly and repair workshops for drives, conveyors, hydraulics and pneumatics, as well as electric motors, electronics, gaskets, lubrication systems and filtration. **Left:** Application of lubrication on a Tsubaki backstop. **Above:** A Tsubaki backstop component is being assembled.*

the initial design concept and running through the specification, manufacturing, quality control, commissioning and after care of the equipment in use, technical resources partners each customer to ensure dependable solutions.

Services include technical applications consulting, product and system design, on-site process analysis, lab and on-site oil analysis, product quality control and assurance, as well as condition monitoring services.

BMG World will also be home to field services. BMG now has 140 mobile technicians with specialist technical skills and equipment to conduct breakdown and routine maintenance on plant. This team carries out troubleshooting and advises on possible productivity improvements, to ensure the highest levels of plant output and reliability.

Specialist services include installation, adjustment, replacement and maintenance of components, shaft and pulley alignment, balancing, condition monitoring, oil sampling and analysis and critical equipment inspections and lubrication schedules. Maintenance training and fault diagnosis also form an important part of BMG's field services.

The upgraded premises will also include significantly expanded training facilities for the Training Academy's practical and theoretical training, to take advantage of MerSETA accreditation for skills development and training. This will be open to both company employees as well as BMG customers. The company is in the process of expanding the scope of its SAQA-aligned training modules and recognises the need to grow engineering skills, not only for its own succession requirements, but also for the development and sustainability of African economies.

BMG's internationally recognised quality management systems endorse the meticulous standards and procedures that have been developed and

entrenched throughout the Group. Quality is of paramount importance and the procedures and instructions that have been developed and entrenched ensure the quality of all products and services meet local and global specifications and exceed customers' expectations.

Accreditations include ISO 9001 2008, as well as functional compliance with ISO 18001 OHSAS (occupational health and safety) and ISO 14001 (environmental).

ICT operating systems include an integrated ERP system, a warehouse management system and an inventory optimisation system.

BMG is committed to providing

24-hour customer process support for production efficiency and reliability-centred maintenance. This is enhanced by advanced technical and design support across all functional disciplines. □

BMG company overview

BMG, which currently generates about R4-billion of the Invicta Group's R10,5-billion revenue per year, is strategically positioned to service all sectors of business, including agriculture, mining, steel processing, robotics, sugar, paper and general engineering, as well as the automotive sector.

The company, which has grown dramatically from a single Bearing Man shop established in Durban in 1974, now has over 140 outlets throughout Southern Africa and continues to expand on the continent. BMG has become Africa's leading distributor of bearings, seals, power transmission components, electric and geared motors, as well as belting, fasteners, filtration and hydraulics. An important area of growth is in the tools and equipment sector.

BMG boasts 10 specialist divisions, with advanced technical skills to support the company's commitment to applying techni-

cal knowledge and depth of experience to maximise the efficiency and profitability for every customer.

Diverse industries can now access critical production efficiency products and services from one reliable supplier – BMG. This integrated approach means that lower production costs and higher production efficiencies are within reach of South African industry, which is desperately in need of distinct competitive advantages.

BMG's critical focus is on entire production processes. An extensive range of quality branded components is supported by engineering solutions and technical services to optimise productivity and enhance process plant operating reliability.

BMG's B-BBEE strategy, which is aligned to the organisation's strategic objectives, has been pivotal to the expansion and improvement of business performance and operations. The company now has Level 3 certification, with recognition as a 'value adding supplier' (VAS). □

Delba Electrical awarded fifth SKF Electrical Rewinder Certification

SKF South Africa has awarded Delba Electrical their fifth Electrical Rewinder Certification status.

Delba Electrical was the first officially audited and approved company to receive



SKF's Anton Theunissen congratulates Armando and David Balocco on Delba Electrical's fifth Electrical Rewinder Certification.

the SKF Certified Electrical Rewinder Certificate when the programme was first introduced by SKF to the South African market in December 2006. "The objective of the SKF programme, which is audited every two years, is to improve motor repair effectiveness for enhanced motor reliability and improved mean time between failures (MTBF)," explains SKF distributor development manager, Anton Theunissen. "The programme is a three-way partnership between the electric motor rebuilder, the SKF authorised distributor and SKF."

Delba Electrical, established in 1963 and headquartered in Springs, Gauteng, is one of Southern Africa's most trusted and respected motor repair, rewind and design specialists. The fact that Delba was the only company to have been certified in 2006 and to have remained certified, bears testament to the electric

motor refurbishing specialist's reputation of excellence in electric motor design, repair, rewinding and testing – a reputation that spans more than 50 years.

Delba is in the final stages of completing the construction of a new heavy engineering facility. According to Delba managing director, David Balocco, the new large motor repair workshop's 100 t lifting capacity will open up a whole new line of business as the company will now also be able to offer rewinds on large motors.

Delba also continues to invest in SKF's Reliability Systems equipment and will also shortly commence with the implementation of the latest Apple iPad-based SKF apps for the control and monitoring of all processes involved with the rebuilding of customer motors. This will include the cloud-based SKF CART system. www.skf.com

Industrial gas company celebrates 46th year

Air Products South Africa celebrated its 46th anniversary on the 12th March 2015. Part of the global organisation Air

Products and Chemicals Inc (APCI), Air Products South Africa has enjoyed steady growth since being locally founded on March 2, 1969.

The company is the largest gas supplier in the on-site and pipeline markets, and a leader in the bulk, cylinder, specialty

gas and chemicals supply markets. Air Products also offers significant in-house engineering expertise and specialist skills, which have been instrumental in the construction and commissioning of sixteen air separation units (ASUs) in South Africa, to date.

Based on careful market analysis and a strong focus on the needs of its customers, the two most recent ASUs were built in 2014: 'G-Plant' at the company's flagship facility in Vanderbijlpark, and its new plant at the Coega Industrial Development Zone (IDZ) – the first of its kind in the Eastern Cape. These two state-of-the-art production facilities form part of a current investment pipeline of R2-billion.

Air Products South Africa attributes its success in the market to consistently building on and strengthening its long-term customer relationships; and to being responsive to the changing needs of its customers. 2015 will see a further rollout of the company's investment pipeline in the form of facility expansions and upgrades, as well as the introduction of new technologies to further enhance customer service.

Air Products is confident that its strategic, long-term investments in security of supply, infrastructure and – above all – excellent customer relationships, will support its ongoing sustainability and stability for many more decades to come. www.airproductsafrica.co.za



Air Products' aligned business strategy executive team: Back row from left: Josua le Roux, central support; Rob Richardson, on-sites; Sizwe Nkonde, packaged gases; Nalanie Naidu, human resources; Maropeng Bahula, technical; and Seelan Gounden, supply chain. Front row: Mike Hellyar, managing director; and Keith Foster, financial director.

CSIR spinout company wins product award

ReSyn Biosciences, a biotechnology spin-out company from the Council of Scientific and Industrial Research (CSIR), has won a prestigious new product award at the Society for Lab Automation and Screening (SLAS) conference for its range of innovative MagReSyn® products, which help scientists find disease mechanisms faster. The SLAS conference and exhibition event was held at the Walter E. Washington Convention Centre in Washington, DC, from 7-11 February, 2015. The new product award is given to companies that design unique and novel technologies based on the potential impact these products are likely to have in the field of automation, screening and drug discovery.

"The high-performance products, MagReSyn, are capable of expediting

research, assisting scientists in making discoveries faster, and helping to find the mechanisms of disease. Identifying the cause of a disease is the key component in their eventual diagnosis and treatment," ReSyn Biosciences CEO, Justin Jordaan says.

The products were developed by Jordaan and his team at the CSIR from a proprietary technology platform, which is subject to an international patent application.

The MagReSyn products evaluated in this study provided the highest reproducibility and data quality, providing the means to improve inter-lab co-operation for cancer discovery research. They were used in an automated platform and described as 'excellent' for a process used to identify the mechanisms of cancer. www.csir.co.za

African oil and gas aftermarket service launched

The recently established Voith Africa Power, Oil and Gas (POG) Division covers the full scope of maintenance, servicing, upgrades and repairs across Africa. The company has filled a gap in the local market by providing a comprehensive and dedicated aftermarket services offering.

Voith is globally-recognised as a leading OEM for high-speed rotating equipment, including; high-speed gearboxes, fluid couplings, geared fluid couplings, variable speed drives, turbine controls and torque converters. Voith Africa POG vice president Derain Pillay states that the division boasts global technology and expertise that is customised for local operating conditions.

"With our dedicated African presence, qualified experts assist local clients in configuring, operating and maintaining their equipment for each particular application in the most efficient and cost-effective manner," he says.

Pillay adds that the Voith Africa POG division also provides maintenance contracts in order to increase the availability of the equipment, while reducing downtime and unnecessary costs. "A high percentage of our business is aftermarket, thereby providing clients with the peace-of-mind that we are the market-leading experts in equipment inspection, repairs, upgrades and overhauls," he continues.

Due to the unique African climate and terrain, operating conditions are challenging. To proactively address this issue, the Voith Africa POG division supplies

critical spares and skilled service engineers for breakdowns or upgrades upon request. In order to add the greatest value to our client base, every order is solution-specific to ensure optimal productivity.



Voith Turbo's vice president of the Power, Oil & Gas (POG) division, Derain Pillay.

"Voith prides itself on reliability, advanced engineering, and longevity of its products. As a result, we are currently in the process of signing reputable agents and distributors to fully access the entire region," he observes.

The Africa POG division also has unlimited access to Voith's pool of global resources and expertise. "Should a complex challenge arise that the local team is unable to deal with, we will endeavour to send an international expert onsite to resolve this."

While Voith Africa POG division focuses on the entire Africa region, Pillay notes that Angola, Algeria, Kenya and Nigeria have been identified as key markets for measurable growth. "We are currently supplying a large amount of equipment to an offshore floating production, storage and offloading (FPSO) oil facility in Angola, in addition to power plants and oil pumping facilities in Kenya," he concludes. www.voith.com

Competing on a global stage

Tega Industries South Africa has completely overhauled its manufacturing plant to TÜV Rheinland-certified ISO 9001 standards in order to supply its rubber and engineered products to markets in Africa and across the globe.

The company has invested more than R1.0-million into its new plant in Vulcania, Brakpan. The investment, as well as the company's trained technical and production staff, enable Tega to supply locally manufactured good to any one of the company's operations in more than 72 countries worldwide.

According to Tega Industries SA quality manager, Siya Rala, all the necessary processes, procedures, equipment and staff have been put in place and audited by the TÜV Rheinland team. "Obtaining ISO 9001 accreditation establishes our

credentials and allows our global operations to pick and place orders from our facility with confidence.

"Likewise our customers in Africa and further abroad also have the assurance that they are dealing with a company that is able to meet the world's highest quality requirements in terms of design, manufacture, supply and service of products in mineral processing and other sectors," says Siya.

"The new factory has been fitted with new equipment and laid out according to the most efficient and productive workflow methods possible. We also have a newly built lab with world-class facilities to enable us to undertake our own product testing, as well as in process and finished product testing," he concludes. www.tegaindustries.com

In brief

Blower and compressor supply specialist **Airgas** has announced the appointment of Johan-Ernst Linström as sales manager. As of January 2015, Linström officially assumed sales all responsibilities for the sub-Saharan subsidiary of German-based **Aerzen** – specialists in the design and manufacture of roots blowers, turbo blowers, screw compressors, rotary lobe compressors and gas meters.

Atlas Plant Hire (APH) has placed an order with Atlas Copco Construction Technique for two QAS 500 kVA Prime 400 Volts 50 Hertz diesel-driven generators to provide critical standby power for various mining applications. Atlas Copco's QAS on-site generators are intelligent 'multi-taskers' that efficiently deliver power to operate a wide range of electrical equipment in a variety of applications.

Criterion Equipment, suppliers of TCM forklifts, container handlers, electric three- and four-wheeled forklifts and electric reach trucks, has appointed Graham Clare, branch manager, KwaZulu-Natal.

EBH Namibia has embarked on a number of initiatives in order to analyse and review its potential impact on the natural environment; and also to address concerns regarding its operations and potential environmental risks. "As a responsible, internationally ISO-accredited business, EBH Namibia's environmental ethos has always been focused on pollution prevention and we adhere very strictly to all governing port regulations," says CEO, Hannes Uys.

The Hot Dip Galvanizers Association SA are inviting submissions for award winning projects ahead of its awards evening in August this year. Submissions should include: a motivation as to why the project should be chosen as a winner; its impact on the hot dip galvanizing industry; technical information; and a minimum of five full colour photographs. Entry forms are available at www.hdgasa.org.za.

Hytec Services Africa (HSA) has officially appointed Zimbabwe-based **Hilmax Private Limited** as a distributor in that country. With effect from February 2015, the family-owned Hilmax, which has hydraulic hoses and fittings as its core business, now distributes the entire range of the Hytec Group products.

To test a new method of financial and non-financial reporting, **Kumba Iron Ore** has submitted its first climate change report to London-based Carbon Disclosure Project (CDP) using a digital reporting software developed by **Arkk Solutions** and the carbon and climate change advisory firm **Promethium Carbon**.

Shaw Controls showcases local



At a Shaw Controls media breakfast function on March 10, 2015 Valter Luiz Knihs (left), Zest WEG Group automation and systems director, along with the Shaw Controls team, showcased the company's local design and manufacturing capability at its Robertsham premises in Johannesburg. *MechTech* reports

Contextualising the Zest WEG and Shaw Controls' offerings, Knihs says that we are living in an electrical world. Since Thomas Edison developed the first viable incandescent lamp, electricity use has spiralled, first due to the increased use of lighting and electrical machines, then through the electronic revolution and today due to the ever-increasing use of digital devices.

In consequence, many ways of generating, distributing and using electricity have emerged with the Zest WEG Group offering solutions at every level: WEG electric motors, components and VSDs from Zest WEG; plant installation services from EnI, transformers from WEG Transformers Africa; cogeneration and renewable energy solutions from Zest Energy; backup generators from Generator Set Division; and the electrical panels, switch gear and sub-station solutions from Shaw Controls. "We even offer complete industrial automation solutions," adds Knihs.

Shaw Controls manufactures switchboard panels and control systems from 24 V up to 36 000 V (36 kV) for the industrial, mining and infrastructure sectors, having recently extended its product offering to encompass low voltage (LV) and medium voltage (MV) applications.

Introducing the importance of thorough design and quality manufacturing to achieve the safety requirements for electrical panels, Knihs shows a few videos highlighting the potential consequences of arc-flash faults.

"Electricity is invisible, but when something goes wrong it can cause serious problems, injuries and fatalities," he says, before showing a video of a substation experiencing arc flash. We see the bright light associated with arcing for a few moments before the whole substation explodes into a ball of flame.

Arc flash occurs when the air between electrical conductors changes from being an insulator into a conductor, providing a short-circuit path for current between electrical connections. Once initiated, the severity of an arc flash increases because the electrical resistance of the air decrease as the arc temperature rises. The arc, therefore, draws more and more current causing the conducting path to get hotter and hotter, until something melts or explodes to break the circuit.

"An arc flash releases an enormous amount of energy," says Knihs, before showing another video of a pair of technicians opening a panel to do maintenance. Just as the one walks away and while the other is disconnecting a breaker, an arc flash occurs that engulfs the technician in flames. Knihs follows this with a video showing an arc flash underway behind an enclosed panel. After a few moments, an explosion occurs blasting the door off the front of the panel. "Here we see that the arc flash blew out against everyone around them."

As a result of real events such as those shown, Knihs reveals that, two year ago, legislation was passed forbidding any electrical work to be done with the door of an energised electrical panel open. The door must be kept closed to shield people in front of the equipment from the effects of an arc flash.

In addition, manufacturers must prove that electrical panels can resist a gas explosion without allowing anything to be projected into the space in front of and around the panel. All explosive pressure must be channelled upwards and out through the top of the panel. "Shaw Controls' products conform to these standards and are tested to prove that they do," Knihs adds, showing one last video of a panel under test. Once the arc flash is initiated, we see a burst



of flame projected safely out of the roof of the panel.

Moving on to Shaw Controls' efforts to prevent arc flash and cope with its effects, Knihs says: "Shaw Controls offers a complete product line from MV switchgear to LV withdrawable motor control centres (MCCs), which are all locally manufactured and independently certified in accordance with IEC 62271-200 and IEC 61439-1/2 standards." According to IEC specifications, LV covers applications of up to 690 V, while the MV range is from 1.0 kV up to 52 kV. In addition, Shaw Controls has recently received ISO 9001 accreditation from Bureau Veritas.

LV switchboard panels include SC 100, SC 200 to SC 300 models, which can be configured for various applications at different fault levels and current ratings. This gives Shaw Controls the flexibility to be able to offer fit-for-purpose solutions. A recent addition to the Shaw Controls product range is the CCM 03 ZA withdrawable MCC, which is an already well-established product of WEG Brazil. This highly successful MCC solution will now be manufactured in South Africa.

All electrical panels include both a mechanical and electrical interlock system to ensure maximum safety, while the construction itself is robust. Switchgear panels are manufactured using bent steel profiles and enclosed on all sides by steel plating. Over-pressure relief devices in the top provide for pressure relief in the event of internal arcing. Shield-type MV

capability



The distribution board workshop and production line at Shaw Controls.



A fully withdrawable MCC board, one of the new products manufactured by Shaw Controls.

switchgear units have metal divisions separating the compartments.

The general busbar configuration comprises one or more rectangular bars, manufactured from electrolytic copper with tin-plated fittings. The LV compartment is located in the upper front part, which houses the measuring instruments, protection relay, terminals, thermostats and contacts. This is completely isolated from the MV via a steel plate, with its own closable door.

The Zest WEG Group recently also announced a significant expansion of Shaw Controls' manufacturing capabilities. This is to cater for the significantly extended product range as well as the increased demand for Shaw Controls' E-housing solutions. This expansion will include the design and establishment of a 2 000 m²



An LV fixed semi-withdrawable MCC manufactured by Shaw Controls in Robertsham.



Shaw Controls' modern manufacturing facility features the latest technology. Switchgear panels are manufactured using bent steel profiles and enclosed on all sides by steel plating.

standalone E-house and container conversion facility. Shaw Controls' E-houses represent a cost-effective alternative to traditional containerised solutions manufactured in standalone marine containers.

The expansion of Shaw Controls is in line with the Zest WEG Group's strategy of extending its manufacturing capability to boost its presence in the local market and in Africa, which is perceived as a major growth area. "Our aim is to position the Zest WEG Group as a regional hub of WEG and in so doing position Shaw Controls as the number one panel builder and systems integrator in Africa," says Louis Meiring, CEO of the Zest WEG Group.

Shaw Controls will also be able to leverage the expertise of the Zest WEG Group to offer a total solutions package

for its customers' complete electrical requirements, from switchboard panels and control systems to transformers, switchgear, MCCs, distribution boards, motors and also full installation if need be. "Our product range can be integrated with the rest of the Zest WEG Group companies for turnkey projects," Knihs says.

Another milestone achieved by Shaw Controls is that all of its LV products have been successfully type tested to the IEC 61439-1 and IEC 61641 standards. The maximum test rating is 690 V+5% @ 65 kA. "We are at the forefront of testing and compliance in South Africa with all certification being undertaken independently, which helps position the Zest WEG Group at the top end of the local market," Knihs concludes. □

A local quest for quality geared drives



Following local ISO 9001: 2008 accreditation of Bonfiglioli South Africa's reducer assembly facility in Linbro Park, Johannesburg, *MechTech* talks to John Beukman (left), Bonfiglioli South Africa's newly appointed national quality assurance manager, about the importance and value of complying with global quality management systems.

As a worldwide leader in power transmission and control, Bonfiglioli is committed to achieving the highest ethical and quality standards, standards that are documented in the company's Bonfiglioli Quality Management System (QMS). Bonfiglioli is "committed to designing, manufacturing and supplying effective products and services that set a benchmark in the industry. Based on defined procedures and instructions, the Bonfiglioli QMS has been established, not only to ensure the ongoing quality of our products and processes, but also to guarantee continuous improvement", reads the introduction to the Group's quality document.

Historically in South Africa, Bonfiglioli's local assembly facility has operated according to the ISO 9001: 2008 certification of the global group. "But in order to manage the exigencies of supplying top-quality geared drives to southern African industry, a fully supported and functional quality management system is an absolute necessity," says Robert Rohman, managing director of Bonfiglioli SA.

Hence, following local ISO 9001 accreditation by TÜV Rheinland in late 2013, John Beukman was appointed as the company's national quality assurance manager in November last year. "We needed to invest in local resources to better implement the global Bonfiglioli management system as well as to manage our locally accredited ISO 9001 quality system," Rohman adds.

Beukman qualified as Level 1 Inspector at the Southern African Institute of Welding before joining IQS (Inspection and Quality Services), the third party inspection specialist. "While with IQS, I was contracted by a construction company to oversee the quality control of the auxiliary cooling systems for the Medupi Power Station project," he tells *MechTech*.

Having recently returned from training in Italy on the Bonfiglioli QMS, he says that the company's global quality system is linked to its SAP enterprise resource planning system. "Everything from component non-conformances to customer complaints and warranty claims, from anywhere in the world, is captured by the SAP system. So all information relating to product or service failures from branches scattered all over the world, including internal and customer reports, can be fed back, collated and analysed by the group's global system," Beukman explains.

"The underpinning idea is that of continual improvement," he continues. "By sharing information from across the globe, analysing it and feeding it back to management and research and development teams, the company's service offering and its product reliability and performance can be continuously improved to better meet customer expectations. The ultimate aim is to become the preferred partner for industrial drives, by designing, developing and manufacturing innovative products that set global quality benchmarks – regardless of where we are in the world," he says.

Bonfiglioli's Quality Management System is implemented at three levels: corporate level, cascading down to the industrial level and then down to individual plant and business units. QMS procedures have been designed to filter down from the top, and to then feed information from the ground all the way back up to corporate level. "My role is to implement procedures at plant, branch and business unit level and to manage local quality system implementation," he informs *MechTech*.

"An enormous amount of research goes into the development of a new gearbox and significant amounts of time, money and effort is spent ensuring that the quality embedded in the design is



transferred, through component manufacture and all the way down to local assembly operations. The last thing the OEM can afford is to lose the benefits of a quality design through inadequate management of the local assembly processes," Beukman notes.

All local Bonfiglioli branches are, therefore, under pressure from corporate to meet global standards in the final product. "And this is where the SAP-linked analysis processes kick in. Any local problem encountered during a quality test, during commissioning or a later failure in the field is fed back for analysis. And we are also subjected to yearly quality audits from Italy to ensure that every Bonfiglioli outlet in the world is performing to the global benchmark," he confirms.

Pressure to comply with ISO 9001 quality standards is also being applied by Bonfiglioli's local customer base. "We are operating in a much more regulated and demanding local market with customer that insist that suppliers adhere to globally accredited quality standards. Nowadays, potential clients want to look at a local manufacturing or assembly facility and inspect its quality credentials and management systems before they will even consider using that company as a supplier. This increasingly applies to South African mining and project houses, for example, which need to vet a supplier's quality systems before granting approved-vendor status," Beukman explains, adding that suppliers who don't comply, "don't get onto the playing field".



The positive result of this is that all local assembly facilities and manufacturers of sub-components are operating to globally benchmarked quality standards.

“We are also under pressure to improve the quality standards of our local suppliers. Part of the analysis that we are required to feed back to Italy is the product specifications and quality accreditations of our local supply chain. We are sent recommendations from Italy on the component and material quality required, and we send samples to Italy for testing, approvals and ongoing quality monitoring,” he continues. While some variations might be tolerated, every component used in any system needs to be inline with global quality requirements.

“Bearings, for example, all have designated specifications, which we send to all local suppliers. But everything from the paint used on a housing to the steel for a base plate has to conform to quality standards. And this applies to all of our engineering sub-contractor too. On engineered components, for example, such as customised flanges, couplings, customised shafts, base plates and other assembly components, while these often need to be manufactured locally, we can only use ISO 9001-approved companies, which must also meet all the Bonfiglioli-specified quality requirements such as those for material specifications and machining tolerances,” Beukman relates, adding that quality has a flow-through effect that pushes everyone involved in the supply chain to “up their game”.

Localisation is key to reducing lead



Above: A Bonfiglioli 300-series planetary drive under test at Bonfiglioli’s ISO 9001: 2008 accredited Linbro Park assembly facility.

Left: An overland conveyor drive for the Kendal Power Station based on the Bonfiglioli HDO 130 bevel-helical gear reducer. Five of these were locally assembled in Bonfiglioli’s ISO 9001-accredited facility in Linbro Park.

Right: An HD-series gearbox housing being loaded onto Bonfiglioli’s precision press for assembly. According to Beukman, ISO accreditation offers “peace of mind to our Italian parents and to our local customers, who benefit from better reliability, longer life cycles and ultimately lower costs”.

times and meeting tight supply schedules. “And our Bonfiglioli parent has no qualms about supporting localisation. But our gearboxes are often critical plant components, so quality is paramount. Should we fail to meet the global standards for any product, then we could be forced to import. Because we now have local accreditation, though, along with full internal quality management support, Bonfiglioli Italy are comfortable enough to allow us to assemble the full product range, including complex drives and drive train systems, even those that we have not assembled locally before. This significantly reduces lead times for local clients.

“ISO accreditation offers peace of mind to our Italian parents and to our local customers, who benefit from better reliability, longer life cycles and ultimately lower costs. In Africa, downtime is a serious issue. Anywhere in Europe or here in Gauteng, a gearbox can be brought into a workshop for a quick inspection and



repair. But this can't be done so easily from remote places in Africa. Quality and the associated reliability therefore become key issues, and these need to be managed, from the design at the outset all the way through to onsite commissioning,” Beukman concludes. □

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Drag chain for mobile equipment lines

Powermite, a Division of Hudaco, has been the official southern African distributor of EKD Kolibri energy (drag) chain for over 30 years.

Powermite was established in the late '60's with the objective to serve the local market as a 'one stop' supplier of electrical crane materials and flexible cables. Since then the company has gone on to become a specialist supplier of a comprehensive range of industrial and mining cables, industrial and mining plugs and sockets, cable reeling equipment and energy supply systems such as Downshop lead systems and insulated conductor rails.

EKD is a German-based company with facilities in Germany, Bosnia and China (through a joint venture) and has 45 years' experience in the manufacture of world-class energy chains. "Powermite is an ISO 9001:2000 certified company and our portfolio includes only best-in-class products. The high quality EKD Kolibri range seamlessly complements our energy supply systems offering," says Powermite director, Donovan Marks. "Together with EKD, we have a combined knowledge of over 50 years of drag chain application within industry."

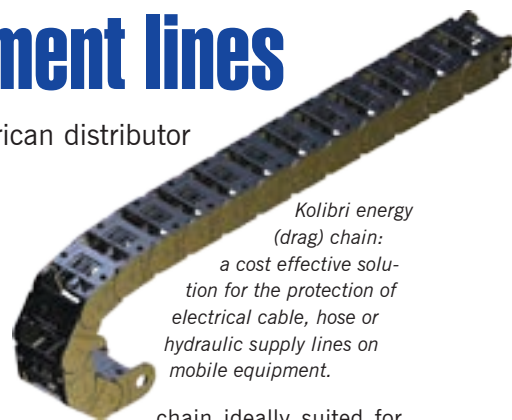
Energy chain ensures a neat, hassle-free and cost effective solution to mobile equipment, preventing snags and premature breakdowns. As a result it is widely used within many industries such as ports, harbours and industrial and water treatment plants that require the protec-

tion of cable, hose or hydraulic supply lines on a fixed plane over a required distance at a fixed or variable speed.

The comprehensive EKD energy chain range from Powermite includes galvanised steel, stainless steel and carburised (hardened) steel as well as a plastic range that consists of self-extinguishing, ATEX, anti-static, steel-coated and bi-directional robotic chain. "Our product portfolio also extends to chains designed for ultra-long distances," adds Marks. "Known as the Marathon System, these chains use roller sets and are capable of maintaining speeds of up to 200 m/min."

There are three different types of EKD Kolibri available to the African market: the one part link or flap-open link range; various bending radii; and chain with separate end-connectors or where each link can be used as an end connector. While EKD Kolibri ranges from external sizes of 15 mm x 15 mm through to 65 mm x 225 mm, Marks says that the EKD PKK range can handle external sizes up to 100 mm x 340 mm. He adds that steel external sizes start from 50 mm high and 1 500 mm wide and a range of bending radii are available to accommodate larger cables.

A number of unique design features ensure numerous important cost saving benefits that make EKD Kolibri drag



Kolibri energy (drag) chain: a cost effective solution for the protection of electrical cable, hose or hydraulic supply lines on mobile equipment.

chain ideally suited for use across a wide range of applications (robotics, materials handling, etc.) and equipment (cranes, milling and boring machines). "The patented opening delivers superior rigid torsion behaviour and handling while the flap-open bars ensure easy access for on-site installation of hoses or cables," explains Marks.

The chain can cope with temperatures of between -20 °C and 100 °C for extended periods of time and is extremely wear resistant, which extends components life and keeps costs down by reducing the need for spares. Furthermore, minimal spare parts are required for plastic energy chains as they are all equipped with integrated connectors. Marks points out that the chain normally requires very little maintenance.

"But we have the necessary infrastructure to carry spares for the entire range at our branches in Cape Town, Durban, Witbank, Richards Bay and Rustenburg as well as on the Johannesburg East Rand and in the Carletonville mining area. □

Engineering housing and sealing solutions

Weir Minerals, committed to delivering end-to-end, market-leading products and services to customers operating within the global mining and minerals processing industry and power sector, relentlessly explores ways to minimise operational costs and maximise productivity.

Weir Minerals approached Bearing Services Alrode to find a solution to high costs and long delivery times on the housing and seals on their ash crusher unit. With access to SKF's extensive global pool of knowledge and expertise, Bearing Services Alrode consulted SKF South Africa for an engineering solution.

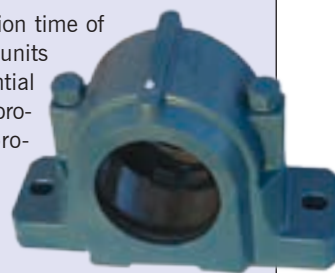
"We maintain a close partnership with our authorised distributors because they are our route to market, taking our core

technology product and service solutions to the customers' doorsteps," says Ian Cillié, managing director of SKF South Africa. "When Bearing Services Alrode presented us with Weir Minerals' request, we scrutinised the customers' requirements and presented a complete solution that included customisation, redesigning and project management. In short, we offered a total solution that delivered exactly what our customer wanted – reduction in cost and delivery for improved productivity."

"Our solution," explains Cillié, "included a custom-designed sealing arrangement for the ash crusher in a 300 x 300 x 181 mm bearing housing. We also shortened our delivery time, which enabled Weir Minerals to place the housing into commissioning to meet its project schedule. In addition,

quicker installation time of quality bearing units lead to a substantial improvement in production. This project has enabled us to share our engineering knowledge with both our authorised distributor and our customer," adds Cillié, adding, "it has also strengthened the five-year-old customer relationship".

The success of SKF's solution has secured a second order for the SSN 524 housing and seals from Weir Minerals. "We are now in the fortunate position to have a visible footprint in Weir Minerals' projects and activities that enables us to understand the customer's exact requirements for the delivery of optimum solutions," concludes Cillié. □



Moving airport baggage handling into the future

The demands on modern airport baggage handling conveying systems are becoming more complex, as the number of passengers and cargo per flight increase, while equipment space subsequently decreases. SEW-Eurodrive's compact and highly productive mechatronic drive system, MoviGear is the ideal solution specifically designed for conveyor applications.

SEW-Eurodrive's Mechatronics engineering manager, Norman Maleka, says that

MoviGear has been specifically designed to meet the demands of modern conveying systems. "Its design combines the permanent-field synchronous motor, gear unit and electronics into a single housing, meaning that the drive unit can be easily integrated into any conveyor system."

MoviGear optimises the efficiency of baggage conveyors that run continuously and support varying loads by handling up to 400% overload for five seconds and 200% overload for five minutes.

This means that a smaller motor sized for continuous running torque can be used instead of an oversized motor. The result is an increase in the motor power factor, a decrease in power required to drive the system, and associated energy savings of 20 to 30% during operation.

This is reflected in MoviGear's internationally recognised super premium efficiency Class IE4 rating. Energy efficiency is further enhanced by MoviGear's integration and co-ordination of its drive components that leads to an extended and reliable service life.

"Not only does this increase the degree of system availability, but it also helps to reduce operating costs of the baggage handling system. This is a huge advantage in a system equipped with several kilometres of belt conveyors," adds Maleka.

Proven success at Gatwick International Airport

This drive technology has for years played a vital role in ensuring high capacity yet cost effective logistics processes at a host of international airports, such as Frankfurt, Paris, Hong Kong and Sydney.

In the most recent case, London Gatwick Airport launched a £1-billion investment programme to accommodate the ever-increasing number of passengers and raise its passenger capacity to 24 million per year.

"The reliability of the baggage handling system was the main focus," says Maleka, "with other key criteria being energy saving, reduction of installation, start-up and maintenance costs, and a small number of variants. Gatwick Airport's operator therefore recognised that MoviGear was the only choice for the job."

MoviGear has only four variants, allowing for the development and design of standard handling systems with pre-fabricated and tested standard modules.

The variants include; Binary for stand-alone solutions; As-Interface for easy communication connection; SBus for functional integration of the drive system; and Single Line Network Installation (SNI) for simplified installation.

"Gatwick chose to implement MoviGear SNI as the variant best suited to baggage handling belt conveyors, since it is able to function as a group drive synchronising operation and features soft and defined start-up behaviour," explains Maleka. "It also met the criteria for reducing implementation and system costs through its limited number of components and low-effort installation."

Moreover, the drive is an intelligent device with its own control concept. Its high-quality networking features help to reduce start-up time and support monitoring and maintenance tasks. Drive tasks can also be solved quickly and easily using the corresponding application software.

SEW-Eurodrive's innovative drive technology now forms part of Gatwick's modernised north and south terminals with 300 MoviGear drive units ensuring



Movigear optimises the efficiency of baggage conveyors that run continuously and support varying loads by handling up to 400% overload for five seconds.



MoviGear combines a permanent-field synchronous motor, gear unit and electronics into a single housing, making it easy to integrate into a conveyor drive system.

trouble-free operation of the baggage handling system. According to Maleka, going forward, that number will be increased to 2 000 units.

Technical support

With 14 000 employees across 45 countries, SEW-Eurodrive's after sales and technical support is guaranteed to follow up every installation. "Service assistance and backup is an important focus for us, and a major contributing factor when customers choose SEW-Eurodrive," notes Maleka.

In terms of support, SEW-Eurodrive offers commissioning as well as service and repairs. "This is in addition to full project planning advice from our dedicated engineers, who assist clients with complete drive packages, custom designed solutions and training in our advanced training centres. Ultimately, SEW-Eurodrive ensures that downtime is kept to a minimum," Maleka concludes. □

Making a splash in the Western Cape

The aeration process at the Stellenbosch municipal water treatment plant in the Western Cape has been dramatically improved after ten modular compact (MC) industrial gear (IG) units supplied by leading drive specialist SEW-Eurodrive were installed by water project specialist, Inenzo Water. The MC units can handle from 6.0 to 65 kNm of torque and can be universally mounted.

One of the initial and most critical stages of water treatment is to aerate large volumes of water in treatment plants. Aeration is the process whereby water is enriched with oxygen through a continuous rotation and churning process. This enables the release of harmful gases from the water, kills harmful bacteria and hastens the breakdown of organic matter.

Aeration is usually achieved by rotating a large propeller through the water volume, thereby mixing air into the water. This propeller is exposed to huge radial and axial forces, and if the drive gear is incorrectly installed, it can lead to failure and damage

to the propeller and the gearbox driving it.

SEW-Eurodrive Cape Town branch manager, Byron Griffiths, says the company's extended bearing distance (EBD) configuration and drywell bearing housing "is ideally-suited for the aeration process".

"It allows for much higher radial and axial forces to be absorbed by the gearbox, while the drywell bearing housing ensures no oil can leak into the sensitive water treatment process."

Inenzo Water projects manager, Chris Erasmus, explains: "In our industry, we must ensure that we offer clients top solutions at competitive prices. Over the years, we have found that the pricing, quality and service offered by SEW-Eurodrive played a decisive role in our procurement for this project."

Griffiths says that SEW-Eurodrive has extensive application knowledge with regards to gearboxes driving aeration equipment. "By listening to the client's requirement and understanding the unique problems faced on this project, the com-

pany was able to marry its own extensive product range and knowledge with the expectations of the client."

SEW-Eurodrive strives to ensure that every application requirement is fully understood and that each product delivered meets with the high standard of service and quality that its clients have come to expect over the decades. Griffiths reveals that the SEW-Eurodrive compact range of IG units is becoming increasingly popular in South Africa.

One of the key advantages in selecting the MC series of IG units is that they are assembled by SEW-Eurodrive in Nelspruit. Griffiths points out that local assembly cuts down on international shipping costs, which results in savings for the client.

"The units can also be produced faster, which reduces lead times. Availability of spares and turnaround time on repairs is also minimised to further ensure high levels of availability. Due to SEW-Eurodrive having the expertise to assemble these units in South Africa, some degree of customising and order flexibility can also be offered to the client too," he concludes. □

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1 000th TPKL fluid coupling shipped



Voith Turbo's vice president of the Mining & Metal Division, Grant Robinson.

Drive systems specialist, Voith, has celebrated the manufacture of its 1 000th TPKL fluid coupling, which is currently being shipped to China for use on a 6.4 MW underground belt conveyor drive at a coal mine. The 3 160 m long belt conveyor is designed for demanding workloads and will transport coal uphill at a 14° angle. It is driven by four 1 600 kW motors to cater for planned throughput of 4 000 t/hour.

German-based Voith began production of the TPKL range in 1997 for demanding belt conveyor applications in mining. The coupling provides excellent torque limitation for a smooth start-up of the belt conveyor, while allowing active load sharing with multi-motor drives. Given its rugged design and proven performance, the TPKL fluid coupling is ideally suited to the harsh African mining sector.

"The TPKL is rich in benefits that ultimately speak to the key business drivers of any major operation and this is where Voith delivers exceptional value," says Grant Robinson – Voith vice-president for EMEA Division – Mining and Metals southern Africa.

"These business drivers include measures such as safety, availability, reliability, production rates and reduced

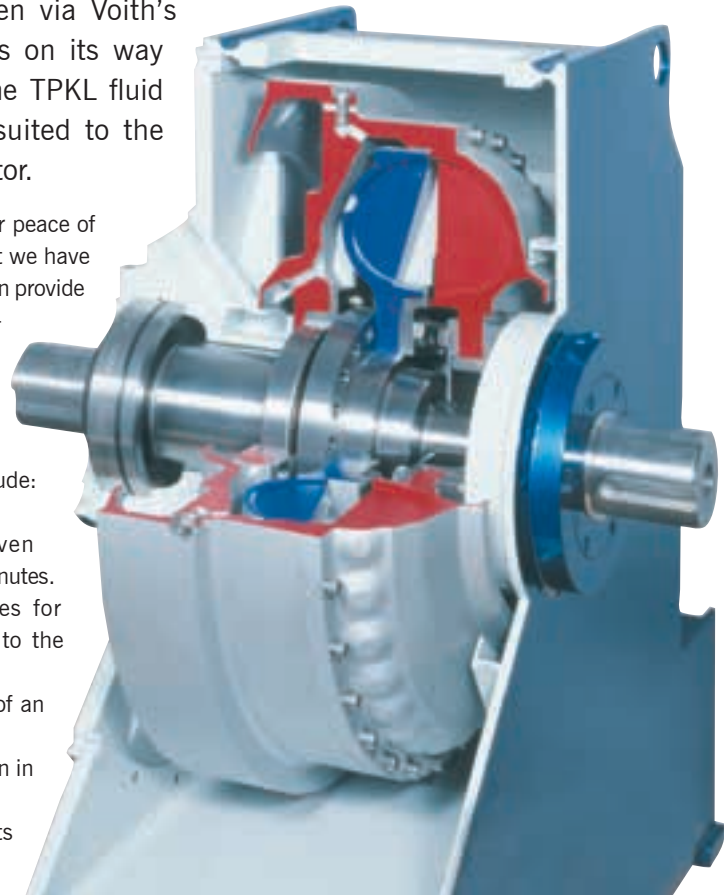
A 6.4 MW belt conveyor – driven via Voith's 1 000th TPKL fluid coupling – is on its way to a Chinese coal mine. The TPKL fluid coupling is also ideally suited to the harsh African mining sector.

total cost of operation. Further peace of mind comes from the fact that we have a qualified service team that can provide on-site support to our customers around the clock," adds Robinson.

Benefits that the TPKL fluid coupling range offers to the African mining sector include:

- Load-free motor run-up.
- Smooth start-up of driven machines – up to several minutes.
- Shorter periodic distances for subsequent starts thanks to the standstill re-cooling.
- Protects the drive in case of an overload.
- Dampens torsional vibration in the drive.
- Protects system components – increasing service life.
- Robust and unsusceptible to environmental influences.
- Wear-free power transmission reduces maintenance and repairs.
- Automatic load sharing in multi-motor drives protects against motor overload.
- Sequential start-up of the motors reduces the load on the supply circuit.

Robinson explains that the fill-controlled fluid coupling regulates drive acceleration gently, which protects the belt, prevents downtime and increases the service life



The TPKL fill-controlled fluid coupling regulates drive acceleration and torque on the running belt, which protects the belt, prevents downtime and increases the service life of the system.

of the system. This is a major benefit in Africa, where projects are remotely-located and workers are often under-skilled.

Voith Turbo, a Group Division of Voith GmbH, is a specialist for intelligent drive solutions. Customers from highly diverse industries such as oil and gas, energy, mining and metal processing, mechanical engineering, ship technology, rail and commercial vehicles rely on advanced technologies from Voith Turbo. □



The DaTong coal mine in China, destination for Voith's 1 000th TPKL fluid coupling.

PLM deployment — the impacts of cultural change

This white paper, by Hermann Paetzold: Product Lifecycle Management (PLM) systems manager for Autoneum & Found, was the basis of a focus group session ‘PLM Deployment: Success vs. Transformation’ hosted by the author at Product Innovation (PI) Düsseldorf on February 24 and 25, 2015.

When deploying PLM, many organisations are unaware of the impact it can have on company culture; if the full scope of the change is not understood, the organisation tries to maintain existing process definition and as such, use PLM like one of their existing tools. This results in frustration for users – ‘the PLM system is not user friendly’ – and managers – ‘the PLM system is just an additional cost with no ROI and it reduces productivity’. This phenomenon is well known in the study of psychology: humans try to solve their issues using existing schemes (assimilation), because it is quite difficult for them to apply new schemes (accommodation).

Conference speakers tend to focus on the successes of their PLM deployments and tend to leave out the behind-the-scenes frustrations and struggles of all the stakeholders:

- The end users perceive the introduction of a PLM system as a disruption; it disrupts their daily efforts to solve issues instead of being a more efficient tool.
- The C-level/senior-level sponsors are convinced that PLM will provide benefits to the business and a short-term ROI, but during its introduction, they see a system that gets more expensive due to requested improvements and actually impedes existing work progress.
- The core PLM team find themselves sandwiched between a frustrated C-suite and an end user community resisting the change and therefore refusing to follow the defined new practice.
- Software vendors face complaints about missing user friendliness targets without getting clear requirements for improvement.
- PLM consultants become overloaded with requests to improve the PLM system by implementing configura-

tions that result in higher complexity, but at the same time they get complaints about a PLM system that is too complex.

- PLM trainees, having been assigned the task of introducing end users to the PLM system features, are confronted with unanticipated questions about how to execute a specific task with the system and are unable to answer these questions.

To better explain the reasoning behind PLM issues, metaphors can be used that better communicate complex concepts. In the context of money, for example we often use the familiar nature of water and talk about ‘cash flows’ or ‘income streams’. In a similar way, to explain changing from legacy data systems to a PLM system we could use a metaphor of changing from a car to a bicycle.



Figure 1: Changing the tool requires changing the processes: from a current practice to an unknown new practice.

You might ask why a bicycle? After all, PLM vendors offer tools that might better resemble a helicopter metaphor, in that you can get solutions for everything. But a bicycle is, in fact, a better metaphor for reasons outlined below.

The metaphors in this instance, involves describing how to travel from home to the office and back. The scenario is as follows:

- **Target:** You want to have more time with your family.
- **Analysis:** You need a lot of time to get from home to the office and vice versa.
- **Reason:** Daily traffic jams.

- **Tendency:** Traffic volumes are ever-increasing.
- **Strategy:** Change to a vehicle that is not impacted by said traffic jams, say a helicopter or a bicycle.
- **Measurable target:** Reduce the transit time needed by a factor of two without exceeding current cost.

A helicopter is not generally affordable, thus the options are narrowed down to the bicycle. But in choosing the bicycle schema, the impacts of the change need to be assessed. The change involves much more than buying a bike, but adapted clothing, weather considerations, rain protection, short cuts, fitness and other factors also have to be adapted.



Figure 2: Changing the tool requires changing the processes: in changing a transport vehicle from a car to a bicycle, the impact of the change includes adapted clothing, weather considerations, rain protection, short cuts, fitness and other factors.

Introducing a PLM system into an organisation is similar: the organisation develops targets, executes a gap analysis, develops a strategy for the change, and sets measurable targets to ensure the intended targets are reached.

But organisations are often not aware of the impacts of the change because suitable schemes and a specific set of processes are not known. The result is an underestimation of the impact, and/or even worse, the assumption that the current schemes are sufficient for the running of a PLM system. Using the bicycle metaphor image being unaware of the impacts travelling by bike, one assumes that the bike is chosen based on personal specifications such as gear ratios and weight, and then used as if it were a car. Very quickly you would begin to encounter a number of inconvenient issues that would detract from the benefits – if it rains, for example, you will arrive at the office wet.

How can the use of existing schemes be avoided when introducing a new tool?

As a first step, any organisation introducing or redesigning end-to-end product

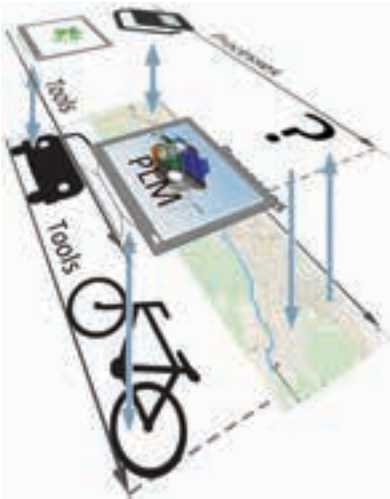


Figure 3: In mapping the PLM concept to the vehicle concept, users can begin to perceive consequences of a specific strategy and the requirements for significant process changes.

lifecycle management has to understand that the new way of working, the future state, requires, at the very least, the questioning of current schemes in terms of the validity of supporting procedures and job descriptions.

To prevent falling back into the historic schemes, there must be a clear, strongly supported decision for the design of new schemes, which shows clear benefits over the existing ones.

Before project setup, a core team is tasked with the understanding of the PLM methodology, familiarisation with the use of a PLM system and the designing of a new practice for end-to-end product lifecycle management in the organisation with the widest solution scope possible.

With the new design and a clear PLM vision, a project can be set up, a tool selected and a plan established to guide the organisation through the cultural change.

Setting up a cross-functional team

The core functional PLM team is a multi-disciplinary team and consists of nominated representatives from all departments that are impacted by the design of the end-to-end product lifecycle management process. Each functional member must have enough authority and the right level of management sponsorship to represent his department and to be able to align all stakeholders of his department. Senior management selects the team members, provides support, and acts as their escalation partner. Senior management must set objectives and consistently monitor progress of the expected deliverables.

The team members must have enough time to carry out their responsibilities. The organisation will, inevitably, resist because involved departments are losing very qualified members hence putting added pressure on daily performance for a significant amount of time.

The team, therefore, must have the skills to communicate with and promote collaboration amongst the different parties, including C-level managers and users in their own and other departments who will be using the system in a daily basis in the future.

Each member of the team is the voice of his department. Targets are understood to be optimised procedures supporting the strategy demands and ensuring a more immediate ROI. This requires an intimate understanding of how people, processes and tools are integrated. To bring the new practice to life each member of the team needs to be passionate about user experience and able to communicate needs and describe requirements.

Members need to be knowledgeable about their department's own objectives and procedures, well respected in their departments and recognised as having an ability to collaborate around common, organisation-wide objectives. Representatives must be comfortable working with a cross-functional, self-organising team and need to be committed to the development objectives

Understanding the PLM methodology and system

The core PLM team begins by benchmarking their organisation against similar businesses to understand and document how to transition to PLM, how PLM is currently used and how to measure performance based on pre- and post-PLM metrics. It should also evaluate the 'state-of-the-art' from sources including blogs, conference proceedings, books and PLM experts in the field to understand analysis, opinions, and recommendations.

The team then envisions how its organisation could work with a PLM system, analysing findings to get high-level insights, converting these insights into design principles and then brainstorming concepts within the widest solution space permitted by these design principles – all while gaining inspiration from metaphors and visualisation concepts.

The team explores different design patterns to understand the extent de-

partments will be impacted and the consequences of supporting procedures and job descriptions. It is helpful in this regard to have state of the art PLM design patterns as open knowledge for guidance.

Envisioning the prototype user

The goal of the team is to understand end users and their interactions during day-to-day work. It tries to understand how individual people work in their current practice, documenting their activities and interactions with objects and the environment to extract the most valuable insights. Findings are then discussed with users and feedback and validation are collected.

In designing new practice, prototype users are envisioned and the problems the PLM system will help them solve are imagined, without the constraint of current job descriptions and departmental habits. These will explicitly not attempt to make department heads happy nor act on all the wishes users have. If they did either, they would end up with a design that suits no one.

Focusing on essence

There is always a risk of over-designing. Take for example an organisation that has every intention of globalising its production. The team may design the product data structure taking this business strategy into account, but may not realise it in the first implementation stage. Instead, the team will try to reduce complexity wherever possible and, in clustering and synthesising concepts into coherent systems, generate road maps with due consideration to the capabilities necessary to achieve these strategies and designs in a step-by-step manner, without losing sight of the intended end goal. A prototype allows testing of details, feasibility, viability, and technical specifications.

Setting up the project and a communication plan

At the end of this prototyping process, the project is set up by allocating resources, constructing budgets and schedules, hiring teams, and creating plans for pilots and launches. This is the time to determine software platforms and partners key to the project's success.

Part of the project setup is a detailed communication concept. People do not resist changes because they are not willing or lazy, but because they wish to maintain stability in a system of

highly complex interactions. The communication must therefore ensure that members of the organisation understand the change, see the benefits to the whole organisation, to themselves directly and enable stakeholders to feel safe while moving to the new practices.

The communication concept describes how these targets will be accomplished and summarises the content of the required communication in introducing or redesigning end-to-end product lifecycle management:

- It describes the added value of the change to the organisation in clear and precise terms.
- It contains chapters about benefits, li-

abilities, and drawbacks of the change for each stakeholder and explains how any drawback for a stakeholder benefits the organisation and, consequently, the stakeholder, as he or she is part of the organisation.

- It lists the communication events planned in terms of target groups, content, goals, channels, and the required preparation effort.
- Communication is key to get the buy in of all stakeholders.

Leading the change

At this point, the cross-functional team guides the organisation through the transformation from current to new prac-

tices, to a country flowing with milk and honey. Each member of the team guides his department in collaboration with the other team members ensuring a best fit for business strategy and end user needs.

Summary

To overcome the frustration of end-user and management resistance, a thing observed in many organisations when introducing end-to-end PLM, it is critical that the organisation invents, based on clear, strongly supported decisions, a new practice model that has clear benefits over current practice. A multi-disciplinary, cross functional PLM team designs the new practice with the widest solution scope allowable, without the constraints of current job descriptions and departmental habits. By doing so, the organisation can achieve more immediate ROI better support for end-users solving real day-to-day problems.

The core PLM team must be aware of a natural resistance to change, but it knows that colleagues will follow as soon as they understand the how better collaboration benefits the organisation.

Acknowledgements

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Designing the future pump:

3D technology allows 100% accuracy

Amandla Pumps, established in 2002, has a wide range of products manufactured in South Africa, which are specifically designed to meet difficult pumping needs and offer relevant solutions to the mining, sewage and power generation industries. The company's research and development team draws inspiration from market requirements and develops products to supersede these needs, with technologically advanced pumping technologies not seen in current market pump offerings.

Amandla Pumps recently gave its SVA55 pump a 'facelift' to create the SVA55R model. These pumps are used in various applications to transport slurry-type product with solids. Typical applications range from underground mine applications including fiery mines (in flameproof construction), raw sewage applications, and the transportation of paper pulp, to general industrial slurry pumping. Re-engineering of the pump included:

- Adding an expeller and vent holes around the mechanical seal to prolong the life of the seal.
- Increasing the outside surface area to provide better cooling.
- Minimising the wall section to dissipate heat faster to the product being pumped.
- Changing part materials of the wet-end to give longer life of wearing components.

In addition: the pump's components were improved to reduce overall weight and size of each unit by as much as possible; the cast parts were designed with minimal machining to reduce production times; and, to ensure that when the unit is lifted it remains horizontal, the lifting eye bolt was positioned after calculating the centre of gravity of the computer-generated digital model.

To do all this, Amandla Pumps used Autodesk's Product Design Suite Ultimate 2014.

"To give an indication of how accurate this software simulation is, the calculated weight of the model was 155 kg, and in the end the actual weight was 154 kg. It is fantastic to know that the data we generate with this software is so reliable," says Gary Parker, CEO of Amandla Pumps.

With the reduction of casting weight and machining times, the production costs were reduced, which meant that Amandla Pumps was able to offer their clients the improved model at the same price as the original model.

The components are produced using sand castings for cast parts, which are then machine manufactured into the final components. All the patterns to make the castings were designed in Autodesk Inventor and AutoCAD Mechanical. These solid models were exported to Edgcam to generate CNC programs for machining.

The patterns were cut on CNC machining centres, complete with step joints to ensure decent mould location. The pattern material was an epoxy resin with good wear and water resistance and machinability. The wiring in the junction box was laid out in Autodesk Inventor to ensure good working space around the components, which is helpful when it gets to the assembly process.

The solution

The use of Autodesk software afforded Amandla Pumps the opportunity to stay ahead of competitors by reducing production costs rather than increasing market prices. At the same time other improvements were also incorporated into the design to create a superior product to its predecessor.

The time of development and accuracy of the final product have also significantly improved. The use of Inventor has reduced the CAD time by at least 60%. The change from manually made patterns to CNC machined patterns from solid models has also reduced the pattern making time by about 70%. The accuracy of working from a solid model



The final design of Amandla Pumps' SVA55R (Image courtesy of Amandla Pumps).

ensures that the patterns of the components are 100% accurate compared to the drawing. This also eliminated the need to rework 'handmade' patterns that might have embedded human errors and inaccuracies relative to the design.

The focus of the project was to work with world-class methods and standards to achieve high quality production processes to manufacture the product. The main difference with this project is that it was done with the use of as much technology as possible. This included the 3D solid modelling of the product, the design and manufacture of the patterns on CNC machining centres and the machining of castings using CNC machinery.

The result

The challenges were to enhance the unit's performance as much as possible while, and at the same time, designing a product pleasing to the eye with better functionality. Reviewing and optimising the design achieved these goals, repeating the optimisation process until all challenges were overcome. The hydraulic end was also challenging, with some development trials required to tweak the impeller design.

Amandla Pumps has already identified another area for improvement and has purchased the first Autodesk Simulation CFD Package in the country for the design and development process. □

Sasol's ultramodern future space in Sandton

With the help of Autodesk Revit and Autodesk Navisworks, Sasol, one of the world's leading integrated energy and chemicals companies, is designing and building its new corporate office on Katherine Street in Sandton – linking the look to the logo.



The new Sasol building, based on its logo, encapsulates the central sphere, which denotes stability, while six rotating spheres represent the 'business units'. The whole design suggests a force greater than the sum of its parts – strength through synergy.

The vision for Sasol's new building in Sandton was to somehow link the look of the new building to Sasol's logo. The logo, which encapsulates the company's values, comprises a central sphere, which denotes stability, while six rotating spheres representing the 'business units' suggest a force greater than the sum of its parts – strength through synergy.

Paragon Architects took up the challenge to make this logo a visual component of the design.

To make the logo come to life, Paragon Architects studied the distilled essence closely to interpret it into built form. Sasol's company structure was used as the departure point for the conceptual design of the building. The concept was initially set up as a straight line linking the various units. However this was seen spatially as too constrictive and so the form evolved into something more serpentine, which in turn generated a

more humanist space and was more easily accommodated in the available space on site.

A central core of work activities ties the building together and the various areas are linked by a series of bridges. The major challenge was the site on which this building will stand – a curving edge of Katherine Street. The architects had to ensure this 10-story building, that will serve as offices for up to 7 000 people and span almost 70 000 m², could be accommodated and well connected both vertically and horizontally.

It was important for Paragon to push boundaries in this design, which is characterised by light volumes externally and two dramatic skylights (articulated with acoustic baffles) internally. These elements create a feeling of airy spaces and allow as much natural light into the structure as possible.

The concept of open, transparent and remote workspaces is extended to

embody the values of Sasol to include restaurants, canteens, art galleries, coffee shops and a Sasol One Stop Shop.

The result is an external façade of reflective performance glass, which has a high light transmission level and maximises visibility out of the building whilst maintaining a high comfort level.

There are over 2 000 panels of floor-to-ceiling unitised double glazed panels of vision glass and spandrels. The shapes and glass variations are encapsulated in each panel.

The spandrels are a bespoke textured custom glazed unit, fired at 680 °C with a silver backing, insulation and an aluminium panel; the glass is Safety Shield Imagin Krizet with Ipsol chrome coating. This glass has not been used in South Africa before and this project seeks to exploit its properties to its best advantage.

In addition to glass performance, the building volumes have impacted on the design. Where sections of the building cast shadows onto itself, the size of the spandrels reduce to allow more light through. Façade patterning has generated an environmental analysis and heat gain to reduce energy consumption and maximise user comfort levels.

Externally the park-like staff facilities include courtyards and braai and yoga facilities with water-wise planted areas. Sasol is very committed to supporting birdlife in South Africa and this will be accommodated by providing an indigenous environment for birds. The landscaping has been designed to shade the façade, where heat gain is higher. On lower levels planting gets thicker.

"Considering the complexity of this building, BIM technology and Revit modelling, have contributed towards streamlining the co-ordination process and allowed all 15 consultants to interact with one 3D model. This has not only made it easier to work together, but we have also avoided wasting time and building materials," says Tershia Habbitts, project architect from Paragon. The team at Paragon Architects is steaming ahead on Autodesk Revit and Autodesk Navisworks. This is proving to be extremely successful with the co-ordination between consultants."

The project is scheduled for completion in 2016. □

A collaboration to make buildings more energy efficient

Schneider Electric, a global specialist in energy management and Autodesk Inc, a world leader in 3D design, engineering and entertainment software and services, have announced the signature of a memorandum of understanding (MoU). According to this agreement, Schneider Electric and Autodesk plan to collaborate to enhance current practices for building lifecycle management based on building information modelling (BIM).

As part of the collaboration, the two companies are exploring ways to complement each other's strengths to make buildings more energy efficient from the design and construction through operation and end-of-life phases. The collaboration may include new solutions and services in the areas of energy management, building automation and control, and workspace management.

The joint efforts look to combine Schneider Electric's expertise in electrical distribution, energy and building management solutions with Autodesk's portfolio of BIM-based design and construction software such as Autodesk Revit and Autodesk BIM 360.

Today, buildings consume about 40% of

global energy, 25% of global water, 40% of global resources and they emit about one third of GHG emissions. Residential and commercial buildings consume about 60% of the world's electricity. Yet, buildings also offer the greatest potential for achieving significant GHG emission reductions. The shift toward digital BIM processes is part of the solution to more energy efficient homes and buildings by delivering greater agility and long-term sustainability.

BIM is a process that begins with the creation of an intelligent 3D model to capture, explore, and maintain building data associated with planning, design, construction, and operations. The information in the model remains coordinated and consistent throughout the project and supports simulation, analysis, and collaboration for better decision-making.

"The journey to sustainable high performance buildings starts with taking a comprehensive holistic view of a building life cycle, from design, construction, and operation including adaptation to the ever changing needs of businesses and organizations," says Jean-Luc Meyer, senior vice-president, Strategy and Innovation,

Schneider Electric. "Today's announcement builds on decades of Schneider Electric's integrated approach to building management that can reduce energy, reduce capital expenditures, decrease operating expenditures and improve overall business performance. We see a huge potential in digitising buildings' project life cycle. We believe that the cooperation with Autodesk will help drive a deep and long-term transformation in the construction industry, providing greater value to each user and contributing to solve the energy challenge."

"Autodesk has been an active proponent of sustainable building design and construction for years, in part by equipping our customers with BIM tools to do rapid and meaningful energy analysis. The operation and maintenance phase of the building presents a huge opportunity to drive greater energy efficiency over the long-term for building owners, and we're thrilled to be teaming with Schneider Electric to explore how we bring new solutions to market that connect energy efficiency throughout the entire building lifecycle," said Amar Hanspal, Autodesk senior vice-president, Information Modelling & Platform Group. □



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Hydraulic pump and motor

Prior to his visit to Brevini Fluid Power in Italy, *MechTech* talks to Axiom Hydraulics' Neil Simpson (left) about the company's use of SAM Hydraulics' pumps and motors in custom-designed solutions for the local market.

At the time of writing, Axiom's Eugene Tondolo, current president of the South African Fluid Power Association (SAFPA) and Neil Simpson, the company's MD, were about to set off for Italy on a one-week visit to the Brevini Group, the OEM for the SAM Hydraulik product range. Founded in the 60s by the Brevini brothers in Reggio Emilia in Northern Italy, Brevini is now a multinational corporation that owns Brevini Power Transmission, Brevini Fluid Power and Brevini Gear Systems. The Fluid Power business, alone, directly employs 2 500 people in 13 establishments spread across Italy, Germany, China and the USA.

The SAM Hydraulik brand was established in Reggio Emilia in 1974 as a specialist in the hydraulic transmission sector. The SAM product line is spearheaded by its fixed and variable displacement medium and high pressure axial piston pumps and motors, for both closed- and open-loop circuit applications, along with its range of low speed high torque orbital motors of the Gerotor type.

"But Brevini Fluid Power also produces a wide range of proportional directional control valves for mobile applications such as: cranes; concrete pumps; drilling machines; shipbuilding

and forestry machinery. We will also be spending some time learning about its new products, a slow speed hydraulic motor, which is locally distributed by one of our sister companies, Hydraulic Tools in Cape Town, and a new hydrostatic steering system," Simpson tells *MechTech*.

"The new low speed motor is doing rather well," Simpson continues, "so we would like to learn more about it." Axiom Hydraulics used to market the original HPI Nichols Gerotor for low speed applications, before the global take over of that company by Parker. "We currently don't really have an equivalent in our range at Axiom, but we are happy to continue to source the Brevini equivalent through Hydraulic Tools, which also has a distributor up in Johannesburg called Delflow," he says.

"In South Africa, these are widely used on agricultural vehicles carrying granulated animal feed, for example. Several low speed orbital motors are used in series to drive the screw conveyors to discharge exact amounts of feedstock," Simpson explains. "You might also have seen a maize harvester taking the tips off the cobs. Usually, travelling next to the harvester is a truck that is loaded directly from the moving harvester. Low speed SAM Hydraulik motors are ideal for use in driving the screw conveyor loading these trucks," he adds.

Brevini also makes hydrostatic steering systems, "which we may be interested in". Widely used on off-road

SAM Hydraulik S6CV series variable displacement, axial piston pumps have a swash plate design and are ideal for closed circuit hydrostatic power transmission and high-pressure applications. S6CV series pumps are available for flows up to 128 cm³/rev and with several control options.



A Peake Mk3a dual-tank crop sprayer manufactured by Peake Equipment near Brits in South Africa. As well as incorporating hydrostatic steering for two- and four-wheeled steering, these machines use Black Bruin hydraulic wheel motors to deliver torque to all four wheels. A diesel engine drives the SAM Hydraulik pump to power the hydraulic circuits and SUN Hydraulics cartridge valves in a manifold block supplied by Axiom Hydraulics are used for control.

vehicles, these steering unit sit underneath the vehicle's steering wheel. As the wheel is turned, this unit pumps exact quantities of oil to the hydraulic cylinders connected to the wheels. "This is a very practical and common way of steering off road vehicles for agriculture and construction. We use this system on off-road agricultural vehicles with four-wheel steering. When travelling on roads, these vehicles only require two-wheel steering, so using hydraulics offers a simple way of switching between four-wheel and two-wheel steering systems.

"SAM's hydrostatic steering units are servo units, meaning an error-correction signal is used to control the exact mechanical positions of the steering cylinders. A small mechanical input from the steering wheel is translated into a powerful proportional output steering position. And the drive and the feedback are all hydraulic. A defined quantity of oil in the cylinder governs the exact position of the wheels," Simpson explains.

solutions



back into the pump. The output shaft is, therefore, always 'in gear'. If the vehicle starts to run away, the motor tries to feed more oil back to the pump, but it cannot, because its supply is limited to that coming from the pump. So the acceleration is immediately arrested," he explains, adding "the hydraulic circuits become quite complicated on these systems, but this is what we at Axiom are good at – developing drives of all descriptions for vehicles and mobile equipment using variable displacement pump and motor combinations."

Citing cement mixer trucks, he says that variable speed hydraulic systems allow the cement to be turned over at "very low rpm" while transporting cement. "Then, when the truck gets to site, the rotation direction is reversed and the speed is driven up to allow the cement to be pumped out via an Archimedes screw arrangement," he says.

"For us at Axiom, the SAM Hydraulic piston pumps and motors, in various combinations, are at the heart of Axiom hydraulic systems. And there are quite a variety of them. Some are fixed displacement pumps and motors, which produce a directly proportional relationship between the rate of flow of oil pumped and the number of revolutions per minute (rpm) of the motor. And they are specified to reflect this. A 125 cc pump unit, for example, displaces 125 cc of oil per revolution, so pumping oil at 125 cc per second gives a rotational speed of 60 rpm. On a fixed displacement pump, while flow control valves can be used to vary the speed of hydraulic motors by 'dumping' some fluid to the sump through a relief valve – an inefficient process that generates heat – the speed of a fixed displacement pump and motor combination can generally only be varied by changing the rotational speed of the diesel engine or electric motor driving the pump. So, where variable speeds are required, fixed displacement pumps are generally unsuitable," Simpson advises.

Variable displacement units, however, with closed loop speed control, are ideal for applications where variable speed control is required. "On a closed loop system, discharge oil from the motor is fed

Also: "through the joystick, the variable speed hydraulic drives controlling the bucket of a tower crane allow the



The SAM SH7V series is a family of variable displacement motors with a bent axis piston design for operation in both open and closed hydraulic circuits. The design incorporates the lens shape valve plate and motors can provide up to 430 bar continuous and 480 bar peak performance.

operator the very fine control needed to accurately and safely position loads on a construction site," Simpson relates.

While Axiom has standardised on the use of SAM Hydraulic pumps, "we combine these pumps with Black Bruin motors for heavy duty slow speed applications or with SAM Hydraulik mo-



The SH11C series motors are bent axis, axial piston hydraulic units with fixed displacement for operation in open and closed circuits. Pressure up to 430 bar and speeds up to 5 000 rpm are possible.

tors for higher speed applications. The Black Bruin motors typically operates at speeds of up to 400 rpm, while SAM motors, at lower torque, can be driven at 2 500 rpm," he says.

And SAM low speed orbital motors? "These are lighter duty motors for low speed, low torque applications such as winches, crane drives, excavator systems and small mixers," Simpson responds.

Linking SAM Hydraulic pumps with the actuators – motors or cylinders – under control, Axiom designs turnkey hydraulic control circuits based on the use of manifold blocks and Sun Hydraulics cartridge valves. "We have the design capability to quickly design turnkey hydraulic system or to modify existing systems – and we machine our own manifold blocks for each design," reveals Simpson. "These are then populated with Sun cartridge valves," he adds.

"This combination has been very good for us and, while our new business has been affected by the mining downturn, we are seeing increased sales of complete units for spares. This tells us that people are using this opportunity to prepare for the next upturn. In addition, we are seeing growth in mobile applications, mostly for diesel-driven units," Simpson informs MechTech.

To cater for current and future demand, Axiom Hydraulics is looking for new premises to double the size of the existing machine shop, from around 2 000 m² to 4 000 m². "We are currently looking to move into a new factory later this year, most probably in Wadeville. So when the turnaround comes, we will also be ready," he concludes. □



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Upgraded R-series compressors

deliver enhanced value

December 2014 heralded in a new era for industrial technologies company Ingersoll Rand, when it ushered in two new series in its range of R-Series compressors. The fixed and variable speed R-Series 5-11 kW rotary screw compressor and the R-Series 30-37 kW contact-cooled rotary screw air compressor bring modernisation and improvements to the company's compressed air solutions, providing enhanced value.

The R-Series' vertically stacked compact design translates into a 20% footprint reduction. This, and reduced sound levels – as little as 69 dB – make the series ideal for use in the commercial sector where space is restricted or ambient sound levels are important. Both series are available with a Total Air System (TAS) option, which comprises complete compressor, cooler and dryer systems with integrated controls, water separators, drain ports, filter and receiver tanks.

R-Series 5-11 kW rotary screw compressor

This affordable compressor has extended the R-Series family into the commercial machine range – its compact design and new features means it fits virtually any application environment. A leak-free, next-generation air-end, improved seals and reduced number of components are among the innovations that continue to extend Ingersoll Rand's legacy of reliability.

The range comprises three models with two variations each, the R5.5i and R5.5i TAS; the R7.5i and R7.5i TAS; and the R11i and R11i TAS, with the TAS variation delivering ISO Class 1-5-1 quality air measured in accordance with ISO 8573-1:2001. A convenient and programmable interface is standard using Ingersoll Rand Xe Series controllers, which deliver increased control functionality through an intuitive user interface and large navigation buttons for both fixed and variable speed drives.

A common platform accommodates fixed and variable speed drives in the same footprint and the plug-in Danfoss drive eliminates overheating and related component failures. An improved cooler design minimises thermal expansion effects and, as far as energy efficiency

is concerned, the IE3 energy-efficient fixed and variable speed motors support continuous operation at up to 46 °C.

R-Series 30-37 kW contact-cooled rotary screw compressor

Comprising two models and two variations of each model – the R30i and R30i TAS; and the R37i and R37i TAS, this range of rotary screw compressors integrates advanced features, including Ingersoll Rand's V-Shield™ technology, independent cooling systems and the new Xe-Series controller.

V-Shield™ technology is used to virtually eliminate leaks and improve reliability by reducing the leak path and the number of connections by up to 15%. It ensures all critical fittings are secured with O-ring face seals in an almost-distortion-free manner. The high-tech Xe-Series controller for fixed speed drives (Xe 50) and variable speed drives (Xe 70) feature an easy-to-use interface with a high-resolution colour display, satisfying all around requirements for compressor-orientated businesses.

"These are only some of the technological improvements to this range," says



Encased for additional protection, the R-Series' reduced (69 dB) sound levels make it ideal for use in the commercial sector where ambient sound levels are important.

Rob Hall, Ingersoll Rand, country leader – South Africa. "We also provide a fully integrated sensor and control system to monitor differential pressure and warn users when the air, coolant and separation filtration elements are close to the end of their lives." A brand new thermal valve that maintains a constant oil temperature to keep water from condensing in low flow and low ambient conditions is also used in the compressors; and a highly efficient and stable gear driven system increases compressor service life.

"All our products and solutions, right across our diverse ranges, are designed and built to enhance our customers' energy efficiency, productivity and ultimately their operations," Hall concludes.

Ingersoll Rand is a specialist in compressed air systems, power tools, fluid and materials handling equipment. Its products comprise complete air compressor systems, tools, ARO pumps, material handling systems and more. □

New compressed air and gas systems at ComVac 2015

For more than 140 years, Ingersoll Rand, a global leader in compressed air and gas systems and services, power tools, material handling and fluid management equipment has been at the forefront of innovation, playing a leading role in meeting customer's demand for compressed air and smart technologies.

At ComVac Hannover from April 13 to 17, the leading trade fair for compressed air and vacuum technology, Ingersoll Rand showcased new products as well as the complete solution of compressors, smart technologies, parts, accessories, services

and aftermarket support.

Visitors to the Ingersoll Rand stand learned about the company's legacy of innovation and commitment to excellence in a variety of industrial, manufacturing and air separation applications as they experience 'How Air Works'.

Ingersoll Rand also revealed how the acquisition of the assets of Cameron International Corporation's Centrifugal Compression division will contribute to the company's ability to provide solutions to customers in the air separation, process gas and highly specified engineered air markets. □

Pneumatic connection technology in 2015

Festo South Africa's business development manager, Russell Schwulst, discusses the current trends in fittings and tubing – from grey market products to energy savings that will help to maximise the efficiency of the production line – the good and the bad of recent trends.

“Connection technology plays a pivotal role in pneumatic factory automation. As with any other technology, it has evolved and adapted to become more functional and modular,” says Schwulst, before listing some of the trends – good and bad – that he has observed.

Grey market products

“In South Africa, we are seeing an influx of low cost fitting and tubing products,” he says. “Cheaper doesn't often mean better, however, and these grey market

products are having a detrimental impact on pneumatic systems due to leaks and shorter lifespans.”

He adds that since no production line can afford to be idle, quality materials need to be selected and utilised. “Fittings and tubing remain major components at the heart of events, and should be considered and treated with similar importance as any module or pneumatic component.”

Environment- and application-specific solutions

Schwulst says, “Factories have realised that not all tubing is created equally. As such, the suitability of tubing for use in a specific environment is largely dependent on the material. Characteristics, such as flexibility, temperature and media resistance, are all affected by the material used. This is why the proper tubing needs to be selected for the appropriate condition and application.”

He adds that an application that uses UV radiation, for example, will require different tubing to one that operates within an environment involving coolants. “Fortunately, since modularity and variety

are possible, individual solutions can be tailored to requirements.”

Standards and regulations

“Not only are businesses realising that fittings and tubing need to be specific to the environment and application, but industry standards, testing and regulations are also ensuring they remain top of mind,” explains Schwulst. “Apart from guaranteeing the correct material is being selected and utilised, there is a health and safety element, too. In a heat-intensive environment, for example, the incorrect fitting and tubing combination, or perhaps even the use of inferior product, could cause a pipe to burst or come lose resulting in an injury to an operator.”

Energy-saving

In the midst of the current national power crisis, energy saving is vital, he adds. “Load shedding is becoming inevitable and factories need to maximise the efficiency of the production line before the lights go out and the expensive generators kick in. Leakage and breaks have a negative impact on operational costs as well as energy-efficiency, because they slow down the rate of production,” he warns. “By using quality equipment in the correct application, a business can lower operational costs, and cause less strain on the already constricted power grids,” he says. □



How integration is changing the pneumatic valve market

Have you ever opened a product brochure and been overwhelmed by the sheer number of options? Choice is great, but past a certain point it leads to diminishing returns. When it comes to inline valves, there definitely exists too much of a good thing.

The good news for anyone who's ever been tempted to throw a brochure against a wall in frustration is that valve trends are moving towards consolidation without sacrificing functionality. As the technology has moved forward, we have seen greater integration of options. Instead of having to find the right match from multiple valve series for your application, all the features are now incorporated into one series.

This kind of thinking takes a page from car manufacturers. Instead of each car having its own specific part, certain components are common across a variety of vehicles. This

brings down production costs as manufacturers can produce a large volume of a few components rather than a small volume of many different parts. The end result is that the saucy car you have your eye on is much more affordable than it would've been otherwise.

Until now, customers looking for valves with specific features had to choose between numerous different series. Our own inline valves portfolio has included four distinct series: Tiger Classic, Tiger 2000, Midi and CPE.

The integration of valve functionality means that today we can offer a single series of inline valves that consolidates all of the benefits and options of the different series. The tough and robust VS Series streamlines everything you might need out of a valve into a single group. It includes features such as internal or external piloting, mechanical or pneumatic reset, manual or de-tenting

override and much more. In addition, the series covers all of the ATEX requirements and voltages you might need.

This consolidation offers a myriad of benefits to consumers. The obvious one is that the choice of valve has never been easier. Instead of needing to do research on what valve would suit your functionality best, customers can quickly find an all-in-one solution.

Manufacturers are able to take advantage of the benefits of mass production. A single series translates into a higher production volume, which brings production costs down. Customers can therefore enjoy these integrated valves at attractive prices.

It's a fantastic example of how to translate engineering expertise into something that reduces unnecessary complexity while increasing quality, efficiency and affordability. From now on, you'll barely have to break a sweat when searching for cost-effective, high performance valves. □

Compressor Technique expands vacuum solutions

Following hot on the heels of the extended vacuum solutions portfolio for rough and medium vacuum introduced during 2014, Atlas Copco Compressor Technique has introduced a new portfolio of pioneering vacuum products.

In addition to the new range of two-stage oil-sealed rotary vane vacuum pumps, Atlas Copco has also unveiled a new range of mechanical vacuum booster pumps, rotary piston pumps, liquid ring vacuum pumps as well as steam ejectors. This new portfolio supports the mining, cement, paper, refineries and food sectors as well as industries as diverse as aerospace, automotive, refrigeration, glass, bottling, canning and woodworking.

Atlas Copco's new GHS VSD+ Series is a highly efficient vacuum pump with a variable speed drive (VSD). Based on the well-known and durable plug-and-play design principles of Atlas Copco compressors, these vacuum pumps have been designed by vacuum engineers to deliver peak performance at operating pressures commonly found in industrial applications. "This innovative, intelligent vacuum pump represents a real leap forward in the vacuum industry," says Charl Ackerman, business line manager for Atlas Copco Compressor Technique's Industrial Air Division. "Our heavy investment in R&D has resulted in unparalleled world-class vacuum technology designed and engineered with features that deliver significantly higher efficiency and better performance against benchmarked oil-sealed and dry vane vacuum pumps."

Features and benefits of the GHS VSD+ Series include:

- Energy savings of around 50%: The state-of-the-art VSD and innovative motor design combination sets a new standard in efficiency and dramatically reduces lifecycle costs.
- Quiet operation: Noise levels are approximately half compared to similar technologies.
- Sustainable productivity due to built-in efficiency: The series conforms to the energy management and environmental requirements specified in ISO 50001 and ISO 14001, respectively.
- Reduced environmental impact: Due to ultra-high oil retention at all operat-



With over 10 000 units sold, the Atlas Copco GLS 250-500 Series of rotary piston pumps are the industry's most efficient, space-saving design.

ing pressures, from ultimate pressure to atmospheric pressure.

The GVD 0.7-28 Series of small two-stage oil-sealed rotary vane vacuum pumps deliver excellent ultimate vacuum pressure, high pumping efficiency and superior vapour handling capabilities with quiet operation. These pumps offer a reliable and stable proven performance that sets the industry standard for R&D and scientific pumping applications. All pumps and motors are approved to UL and CSA standards by an external testing house and feature a patented mode selector switch. "This means that one model is suitable for both high vacuum or high throughput applications," explains Ackerman.

The GVD 40-275 Series of two-stage oil sealed rotary vane vacuum pumps are renowned for their high ultimate vacuum, rapid pumping speeds, quiet operation and their ability to handle water vapour. These direct drive rotary vane pumps are inherently compact and vibration free – and the finger-proof fan and coupling housings offer excellent operator protection. A comprehensive range of accessories further expands the pump's suitability across a variety of vacuum applications.

ZRS 250-4200 mechanical booster pumps are based on the simple rotary lobe principle. "These remains the pre-



The GVD 40-275 Series two-stage oil sealed rotary vane vacuum pumps are renowned for their high ultimate vacuum, rapid pumping speeds, quiet operation and ability to handle water vapour.



The ZRS 250-4200 mechanical booster pumps are based on the simple rotary lobe principle.

ferred option for applications where high pumping speeds are required for pressures in the region of 0.01 to 50 mbar," states Ackerman. This pump must always be backed by another pump, which can deliver against a high-pressure differential to atmospheric pressure. Operating at relatively low pressures, the mechanical booster pump is not exposed to the same concentrations of corrosive process media as the back-up pump, which makes it highly reliable.

With over 10 000 units sold, the Atlas Copco GLS 250-500 Series of rotary piston pumps are the industry's most efficient, space-saving design. The GLS has been improved, upgraded and fine-tuned to deliver even better dependability and productivity, combined with minimal maintenance and process downtime. This is crucial in demanding applications such as the automotive or aerospace industry as well as their supply chains.

Atlas Copco liquid ring vacuum pumps are offered as standard packages in a number of configurations and are suitable for operation in once through, partial or total recirculation. The AW liquid ring vacuum pumps are available for both single- (AWS) and two-stage pumps (AWD) with capacities ranging from 200 to 37 500 m³/h and vacuum levels down to 30 mbar. □

Error-free field pressure tests on PVC pipelines

Field pressure testing of PVC pipelines has proven to be a contentious issue in South Africa, with consulting engineers and installers often having different interpretations of how testing should be conducted. DPI Plastics has developed a 'how-to' guide on field pressure testing to ensure that the integrity of a pipeline is not compromised as a result.



DPI Plastics technical and product manager, Renier Snyman.

Modern plastic pipes are manufactured under controlled conditions and the testing regime at the manufacturing facility includes hydrostatic pressure testing of pipes and joints. This ensures that they are capable of delivering on minimum performance requirements. When the pipe is laid on site, however, pipes are joined outside the control of the pipe manufacturer.

The field pressure test is therefore used to test the integrity of the pipe joints that were completed on site. This test is covered by the SANS 2001:DP2 – Medium pressure pipelines standard. DPI Plastics product manager Renier Snyman notes that although this standard attempts to lay down the rules thoroughly, it is often misinterpreted or misunderstood. "The most commonly misinterpreted test parameters are pressure, duration and length," he explains.

Snyman stresses that it is important to check the condition of test equipment, such as end caps, hoses and the pressure-testing machine prior to commencing the test. "If equipment leaks, the test will be compromised. Calibration of test equipment, especially pressure gauges, should be checked. Inaccurate pressure gauges will not only compromise the integrity of the test, but may lead to over-pressurisation and subsequent damage to the pipeline."

All pipes require large volumes of water to conduct a field pressure test, and Snyman advises that a check should be undertaken to ensure that there is sufficient water available on site prior to the commencement of the test. "What's more, any concrete work, such as thrust blocks, should be given sufficient time to reach full strength prior to testing, in order to preserve their integrity."

Temporary end caps fitted for testing purposes should be restrained against end load movement under pressure. "It is important to bear in mind that end load forces are high and restraints for end caps must be able to withstand these forces. For example, 500 mm class 12 PVC pipe subjected to 18 bar pressure generates an end load of approximately 18 tons directly onto the end caps."

According to Snyman, the pipes also have to be properly backfilled in order to keep them from rising up from the trench during testing. "It is important to keep the joints exposed, however, as it will make inspection for leaks much easier and quicker," he continues.

Determining test length

Pipelines can sometimes be several kilometres long, and it is therefore beneficial to test the pipeline in sections. "This method is more accurate and takes less time to inspect the joints. It also requires less water for each test, and is quicker to



fill the line. If a problem arises, it will also be noticed sooner and can be rectified before kilometres of pipeline are laid," Snyman points out.

Requirements for determining the test pressure

The reason for performing the pressure test is to establish that the pipeline does not leak. Test pressure is raised above the operating pressure of the pipeline to allow the pipeline to settle under that pressure and to highlight possible leaks that would otherwise only develop after some time under pressure. With this in mind, the following requirements for test pressure are set out in SANS 2001: DP 2.

First requirement: The test pressure must be 1.5 times the working pressure of the pipeline, up to a maximum of 10 bar. Above 10 bar, the test pressure must be the working pressure of the pipeline plus 5.0 bar. The requirement refers to the working pressure of the pipeline, i.e. the pressure the pipeline will operate under. It does not refer to the pressure class of the pipe.

For example, a pipeline with an operating pressure of 16 bar should be tested at 21 bar (16 bar+5 bar). Snyman says that a mistake is often made by testing at 1.5 times operating pressure, regardless of whether the operating pressure is above 10 bar or not. "In this case, the difference between the correct pressure above and a 1.5 times operating pressure (24 bar) is 3.0 bar."

Second requirement: The test pressure



Above: Pipelines can sometimes be several kilometres long, it is therefore beneficial to test the pipeline in sections.

Left: All pipes require large volumes of water to conduct field pressure tests.

must be between 1.25 times and 1.5 times the operating pressure at any point in the pipeline. This requirement makes allowance for variation in the test pressure. Due to differences in static head in the test section, it allows the test pressure to vary between 1.25 and 1.5 times the operating pressure at any point along the test section.

Test procedure

Once the section of pipeline is ready for testing and the ends have been sealed and secured, Snyman explains that it is advisable to fill the line slowly, to ensure that air is not trapped during the filling procedure. "It is also preferable to fill the pipeline from the bottom to push air out at the top of the pipeline. A breather should also be left open at the top of the pipeline for air to escape."

If filling the pipeline from the highest point, Snyman advises allowing sufficient time for air to settle to the top before starting the test. "It is good practice to leave a filled pipeline for 12 hours for air to settle at the highest point – and the air must be removed before commencing the pressure test."

When determining the test pressure, it is important to consider the location of the pressure gauge on the pipeline. If the pressure gauge is at the highest point along the test section, one has to add the static head (vertical height difference in metres between the lowest and highest points) of the test section to the reading on the pressure gauge.

After pressurising the test section slowly, the stop ends and thrust blocks should be checked for movement. If movement is detected, the test must be immediately terminated for repairs to take place. Once the pipeline has reached test pressure, the joints must be inspected for leaks. If leaks are found, the pipeline should be de-pressurised, and leaks repaired before restarting the test.

"If there are no visible leaks and the pipeline has stood under test pressure for the required duration, close the isolation valve between the test equipment and the pipeline. After an hour has elapsed, restore the test pressure and measure the amount of water needed to do so in litres. SANS 2001: DP 2 contains equations, depending on the pipe material, to calculate the allowable amount of water, in litres, needed to restore test pressure in the pipeline," says Snyman.

As an example, if we consider a test section of 250 mm PVC-U Class 16 pipe, 500 m long. The equation for PVC pipes is as follows: $0.01 \times \text{OD (mm)} \times \text{test length (km)} \times \sqrt{\text{test pressure (MPa)}}$. Therefore $0.01 \times 250 \times 0.5 \times \sqrt{2.1} = 1.811$ litres. Snyman highlights that if more than 1.811 litres of water is needed to restore test pressure, the test failed and one should find the leak before retesting.

Test duration

Although SANS 2001: DP 2 is specific about the test duration, Snyman warns that the prescribed duration is not well-

known and often not adhered to. "I have come across pipelines that have been pressurised and left for 24 hours under pressure. Such practices not only defeat the objective of the field pressure test, but may also damage components in the pipeline."

He reveals that the test duration is three hours for pipes of nominal diameter of 400 mm and above, and between one and three hours for pipes of nominal diameter below 400 mm. During this time, the pressure inside the pipe should be maintained by means of a suitable pump.

Once the test duration has elapsed, an additional hour is needed to perform the allowable pressure drop test. If the pipeline fails the pressure test, the leak needs to be located, repaired and the test repeated. "All air must be bled out of the pipeline before repeating the test," says Snyman.

Conclusion

Anyone performing a field pressure test should inspect test equipment beforehand to ensure it is calibrated and leak free. When pressurising the pipeline, one should take into account the location of the pressure gauge and any static head that may add to the test pressure.

"It is very important to ensure that all air is removed from the pipeline before pressurisation and to pressurise the pipeline slowly. If the correct test procedure is followed, one can be assured of accurate test results and long service life from the pipeline," Snyman concludes. □



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Material engineering in practice:

Where have all the poppies gone?

In our quarterly column by members of the School of Chemical and Metallurgical Engineering from the University of the Witwatersrand, Tony Paterson talks about the importance of surface engineering.

Red poppies are the symbolic recognition of those who fell in the trench-warfare of the Great War (WW1). Why was this symbol chosen? Red poppies emerged and flooded the fields of Flanders and the Somme where, on both sides, 10 000 men died every day. Under heavy bombardment the front line moved back and forth, day after day. Gains, if any, were temporary. Human and animal losses were huge.

Nowadays there are few poppies on the fields of Flanders. Why did they come? Why did they go? The answer is found in chemistry. The powdered concrete and cordite from the shells, along with blood and bone, changed the chemistry of the topsoil on the land's surface. That is why the poppies flourished. Over time the chemistry has changed – the poppies have almost disappeared. Topsoil in itself is interesting as it represents a very thin skin, measurable in millimetres, on the earth's surface. It is on this thin layer of topsoil that we depend for agriculture and food.

Surface chemistry matters with engineering materials as well. Both aluminium and stainless steel depend on a thin skin of aluminium oxide and chrome oxide, respectively, to generate their well-known corrosion resistance. However, if the oxide is not protected or allowed to regenerate – by exposure to oxygen or an oxide environment – corrosion is possible in the presence of an electrolyte. Occluding oxygen in the presence of moisture is, therefore, unwise.

Whereas the 20th Century emphasised profitability as the main economic driver, the 21st Century has taken a broader view. Surface reactions invite this question: In a world of energy and material shortages, do we need a whole product to be made from one material to suit characteristics that we only need on the surface? The triple bottom line of people (social, society and quality of life), profit (economic, sustainability conditions) and planet (environmental impacts and aspects) introduces challenges of

decreasing the energy and material depletion footprint. Optimising material properties within the triple bottom line parameters may well require a different attitude towards material design. Surface engineering, to meet the needs of specific surface properties required, offers solutions.

Chemicals can be used to polish surfaces, etch surfaces and to mill surfaces. Chemicals combined with current can be used to modify surfaces by changing the local chemistry, anodising being one example. Each treatment offers different opportunities. Surface treatment is not limited to chemical treatment. Clearly surface coatings are a laminar approach to changing surface properties, where the body material is unsuited for technical or aesthetic reasons.

Chemical formulations are not the only way of altering surface properties. Surface engineering enables the development of many desirable characteristics suited to specific operating conditions. Heat treatment can alter characteristics; mechanical processes such as peening can be used; and better materials for the surface purpose can be overlaid onto a cost effective base. Knife makers use forging techniques to overlay material into layers that characterise the local need at any point, be that ductility, corrosion resistance, or a sharp edge.

The well-known Damascus steel is case in point. It was a type of steel used in Indian and Middle Eastern sword making, originally based on wootz steel, a steel developed in South India before the Common Era. These forged swords are characterised by distinctive patterns of banding and mottling reminiscent of flowing water. Such blades were reputed to be tough, resistant to shattering and capable of being honed to a sharp, resilient edge.

The original method of producing Damascus steel is not known. Because of differences in raw materials and manufacturing techniques, modern attempts to duplicate the metal have not been entirely successful. Despite this, several



Red poppies are the symbolic recognition of those who fell in the trench-warfare of the Great War (WW1). They emerged because the powdered concrete and cordite from the shells, along with blood and bone, changed the chemistry of the topsoil on the land's surface.

individuals in modern times have claimed that they have rediscovered the methods by which the original Damascus steel was produced. The reputation remains the aspirational zenith of the steelmakers art.

Back to today, an example of a laminar surface structure combined with the use of heat is found in the fabrication of car radiators. A bimetallic strip is used as the base material, with aluminium melting at 660 °C forming the core, which is overlaid with a pressure bonded thin film of zinc, which melts at 420 °C. A tube is mechanically formed to include an overlap. Once the radiator core is completed it is placed in a vacuum furnace where the zinc melts forming a permanent bond.

Drill and auger bits, earth moving equipment, crusher wear parts, rolls and dies and similar products require ductile materials with hard wear-resistant surfaces. Typically, a ductile body material is used alongside case hardened materials or surface layers with suitable properties. Whist easy to say, layering with suitable materials raises several challenges.

Wits hosts the DST/NRF Centre of excellence in strong materials. The usefulness of these exotic materials may, in some case, be restricted to surface qualities, in others to body qualities, and in some to specific local qualities. Modern material engineering seeks to achieve fitness for purpose most efficiently within the triple bottom line. It strives to use that material that suits the operational purpose point by point.

And future material engineering and design approaches are likely to be excitingly different. □

Trellex bed lining keeps trucks moving

Metso's innovative Trellex truck bed rubber lining protects trucks from wear, thus increasing operational hours and reducing maintenance costs. Now, Boliden's Aitik mine in northern Sweden has signed a three-year contract with Metso to deliver truck bed linings for a total of 15 haul trucks in the existing fleet of 30 trucks. This order represents the largest single order for truck bed linings ever for Metso.

Truck bed linings are used in the haul truck box to protect it and the entire truck structure from wear and damage while transporting rock from the mining pit. Metso's linings are specifically designed to absorb stress at every point of the truck work cycle, from loading to transport and on to dumping. The main benefit of Metso's lining for customers is the long wear life compared with a traditional steel lining, resulting in up to four times longer service

life and lower maintenance costs.

"During the past two years, we have evaluated Metso's truck bed lining through our existing life-cycle services contract for our truck models CAT 793 Flat, CAT 793 DS and CAT 795 Flat," says Magnus Fjellström, maintenance superintendent from Boliden Aitik. "We have appreciated the increased availability of our trucks. We also value the benefits from a health and safety perspective as our truck drivers prefer to drive the trucks equipped with Metso's lining due to their reduced noise level and vibration during operation," he adds.

Christer Brännström, VP Service Operational Hubs, Nordics, Metso, says, "To strengthen our cooperation, Metso and Aitik are working together to improve the Metso truck bed rubber lining even further. The results will confirm the advantages of our solution over steel linings."

The majority of the order was booked as a Q3 order in 2014, leaving the parts sales to be booked during the contract period.

The main advantages of Metso's Trellex truck bed lining include:

- Lower production costs; higher profits.
- Designed to absorb stress at every point of the truck work cycle, reducing the need for expensive unplanned maintenance and replacement of linings and other truck parts.
- The modular panel system is easier to handle than steel.
- Panels can be replaced individually rather than the entire lining, resulting in minimised downtime for maintenance.
- CE-certified integrated lifting system.
- Environmentally friendly and safety conscious.
- Reduces noise by 10-15 decibels, effectively cutting noise by 50%.
- Reduces vibration. The difference can be felt when sitting in the truck.

Metso is a leading process performance provider, with customers in the mining, oil and gas, and aggregates industries. Metso's cutting-edge services and solutions improve availability and reliability in minerals processing and flow control, providing sustainable process and profit improvements. □



Truck bed linings are used in the haul truck box to protect it and the entire truck structure from wear and damage while transporting rock from the mining pit.

Controlled curing for improved concrete appearance and durability

Control curing is an essential process in the manufacture of concrete products as it ensures an aesthetically pleasing and consistent appearance, while increasing overall durability and minimising cement usage.

Pan Mixers South Africa (PMSA) is the largest supplier of concrete brick, block and paving making machinery in Africa and the southern African distributor for German-based Kraft Curing Solutions, which specialises in the manufacture of customised thermal dynamic and accelerated concrete curing equipment for precast concrete production.

PMSA sales and marketing manager, Quintin Booysen, says the company directly imports a Kraft kit, which is assembled by PMSA-appointed subcontractors using local insulation and ducting materials.

The company's managing director,

Michael Kraft, says the company is "dedicated to making these products stronger, more durable and more aesthetically pleasing while saving the producers time and money".

"By making use of control curing, concrete products will result in less efflorescence and a brighter colour, which will also appear more consistent through secondary processing equipment. This method can result in a reduction of cement costs of up to 10% as well as a decrease in pigment content. Control curing also makes the concrete product more durable."

Kraft explains that, through the control curing process, the concrete becomes "more resistant to freeze and thaw forces", and has a higher resistance to abrasion and chloride penetration. "The corners and edges of the product will also be stronger, resulting in less chipping."

Through their partnership, PMSA and Kraft aim to provide the local market with high quality equipment that is complemented by a value-added and comprehensive service offering.

The two companies successfully hosted two concrete curing seminars in Cape Town and Johannesburg respectively in late 2014. Booysen says the seminars covered the principles of curing and the chemistry of concrete hardening as well as the difference between racking and curing systems.

"Another feature was a presentation on the curing solutions for pre-stress elements, structural precast and panels, and pipe and associated water management precast. The southern African market is ready for this evolution in precast concrete manufacture, and we are prepared to support them with value-added initiatives such as this," he concludes. □

Crash tested modular guardrail system reduces vehicle fatalities

Easy-Rail, a quality modular guardrail system now being manufactured in South Africa, has received attention from the South African National Roads Agency (SANRAL) and the South African Road Federation (SARF). "The Easy-Rail guardrail system is tested to EN 1317-2. It is a modular system that allows for the most cost efficient solution for various applications," says Elaine van Rooyen, marketing manager at Andrew Mentis.

Easy-Rail, a crash-tested guardrail system representing the latest European safety and quality standards, is being manufactured in South Africa by Andrew Mentis, under license from Volkmann & Rossbach of Germany. Andrew Mentis has teamed up with Road Furnishing Services (RFS) to ensure that the guardrail system is installed according to specification.

It provides maximum safety at minimal weight as well as being simple and fast to install. All Easy-Rail modules connect to each other without any transitional construction required, so that the containment level and working width can be adjusted accordingly for a specific application. The guardrail beam is attached to the posts by a single screw in order to minimise the installation effort.

In addition to Easy-Rail, Andrew Mentis also manufactures and distributes its own

Mentrail guardrail. "Guardrails prevent vehicles from leaving the roadway and striking a hazard by containing and redirecting the vehicle. The specific design of Andrew Mentis' Mentrail guardrail, with a W-shaped profile, allows it to be used in a variety of roadside situations," explains Elaine van Rooyen, marketing manager at Andrew Mentis.

An independent survey in the US indicates that not only can guardrails reduce the vehicle accident rate by about 30%, but that when accidents do occur the number of fatalities and injuries are reduced by between 45% to 50% respectively.

Mentrail guardrails are manufactured using specialised machinery at Andrew Mentis' facility in Elandsfontein in 2.6 mm thick steel to standard 3.81 m lengths, according to SANS 1350-1982 specifications. The Mentrail guardrail has a tensile strength of 445 MPa and yield strength of

310 MPa for effective impact absorption. The guardrails are easy to install without further tension or stretching, and do not require any special tools.

Available in either galvanised or uncoated lengths, the guardrails have a buried end for the start and terminate in an end wing. In terms of double rows of guardrails, a bullnose end wing is used for termination. The performance of the guardrail is enhanced by joints that absorb normal expansion and contraction forces so that the posts remain aligned correctly. Concave and convex rails are also available to cater for bends and turns. □



Andrew Mentis has teamed up with Road Furnishing Services (RFS) to ensure that the Easy-Rail guardrail system is installed according to specification.

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MAN SA's carbon-neutral Pinetown assembly plant

At a launch event held at MAN Truck & Bus South Africa's assembly plant in Durban on March 17, 2015, the company announced the conversion of its Pinetown assembly plant to solar power. "One of the biggest challenges facing the economy right now is the reliable supply of energy by Eskom and it is great to see that some 53 years after MAN started in South Africa, we have made this significant step towards attaining a degree of self-reliance in terms of energy supply," says managing director, Geoff du Plessis.

MAN Truck & Bus South Africa has officially announced the conversion of its Pinetown assembly plant to solar power. The complete truck and bus-chassis assembly plant is now capable of operating entirely off solar energy and is not only the first 100% carbon-neutral truck production site in Africa, but also within MAN's global production network.

According to Heiko Kayser, head of production at the assembly plant, "installation of the solar, or photovoltaic system, commenced in August 2014 and was completed in less than six months. The project forms part of MAN's global climate strategy to reduce carbon emissions at its production sites in Europe, Africa, Asia and South America by 25% by 2020."

The MAN Climate Strategy vision commit the organisation to: 'reduce CO₂ emissions at MAN sites by improving energy efficiency, using renewable energy sources (solar, wind, geothermal),

generating energy using combined heat and power (CHP) plants, and through integrated energy-management technology and organization.'

Geoff du Plessis, managing director of MAN Truck & Bus in South Africa, confirms that this investment is not only a significant step in terms of our environmental commitment, but it also shows our long-term commitment to the region and its future. "Our products and services are all aimed to minimise their carbon footprint, and it is great to see that even our assembly plant contributes in this regard," says du Plessis.

With its abundant sunshine, Pinetown is a prime location to implement solar energy solutions and Kayser and his team procured expertise from KwaZulu-Natal to design and install the new photovoltaic (PV) system.

"Prior to rolling out the PV project, we refurbished our entire roofing system at a cost of over R5-million to not only efficiently accommodate the solar panels,

Above: Landmark events for 2014, according to Du Plessis included "the handover of 215 TGS units to Barloworld and 60 TGS units to Imperial Cargo". **Left:** MAN's Pinetown plant has 6 300 m² of PV panels installed on its roofing for a 580 kW system capable of generating approximately 810 000 kWh of power per annum – surplus to current plant consumption.

but also to install skylights and thermal insulation material to reduce demand for electric lighting and to make our buildings cooler for our operators," explains Kayser.

Of the 10 000 m² of roofing covering all the buildings at MAN's Pinetown plant, 6 300 m² have been utilised to accommodate the PV installation. The 580 kW system is capable of generating approximately 810 000 kWh of power per annum, providing a surplus of energy that can be supplied to the metropolitan (eThekweni) grid.

Alan Swart, managing director of Solaray, the company responsible for designing the R10-million PV system for MAN Pinetown says, "We sourced state-of-the-art equipment, including inverters and solar panels from Europe – which are able to generate power even in cloudy conditions – as well as mounting equipment from China. The PV system is currently grid-tied but is capable of becoming either semi-grid tied or a completely off-grid system with the inclusion of a genset or battery system respectively."

The PV system is linked to a web-based monitoring system that reports daily power consumption as well as electricity costs and CO₂ savings. Furthermore, the online reporting software also delivers exception reports, enabling Solaray, located just two kilometres away from



MAN Truck & Bus South Africa's state-of-the-art Pinetown chassis assembly plant.



The MAN assembly plant has also installed a wash bay with a water recycling system, which includes an oil-water separator. The system captures rainwater from the roof for use to clean vehicles and to test truck cabs off the assembly line for leaks.

MAN Pinetown, to rectify PV system issues swiftly. Solaray is also contracted to clean the solar panels every three months to ensure optimum efficiency.

"With occupational safety being a primary consideration for MAN, contracting an experienced PV system installation company was essential. We were fortunate that Solaray contracted the services of Renen Renewable Energy Solutions (Renen) for the installation. Their efficiency allowed us to maintain 100% our production targets, while recording zero safety incidents as a result of the installation," says Lynette Kühn, SHEQ manager at MAN Pinetown, who also project-managed the solar conversion process.

KZN-based Renen has installed three of the province's largest PV systems, including a one-megawatt system at a leading carpet factory. "Our experience in converting large buildings to solar energy made us a perfect choice for MAN and despite the fact that the MAN Pinetown project required us to install on several different rooftops, each presenting its own set of challenges, we were able to complete the installation safely and to design specifications, thanks to quality input from both MAN and Solaray," explains Renen's Luke Dillon.

In addition to the PV system, the MAN assembly plant has also installed a wash bay with a water recycling system, which includes an oil-water separator. The system captures rainwater from the roof which is stored in tanks alongside the wash bay and is used to not only clean vehicles but also to test truck cabs for any leaks as they roll off the assembly line.

Employing 160 personnel, MAN's Pinetown Assembly Plant is spearheading the corporation's climate change strategy with tangible benefits for all its stakeholders. According to Ncamsile Mbatha, SHEQ officer at MAN Pinetown assembly plant, "the fact that we are now using renewable energy means we are reducing pollution and our carbon footprint, which is not only healthier for our people and our environment but it also helps reduce our production costs."

For Kühn, "both the PV installation and the water recycling system demonstrate MAN's commitment to corporate social responsibility and environmental protection. MAN Pinetown, being a CO₂-neutral assembly plant and using water more responsibly, is setting a new benchmark for sustainability in the automotive industry in Africa."

Apart from the environmental and social benefits MAN Pinetown's green building will generate, "impressive financial advantages will be realised," says Kayser. "We have calculated that our energy cost-savings for 2015 will be in the region of R1-million with a CO₂ saving of 860 t/a – and these savings accumulate in subsequent years," he adds. These calculations put the pay back period on the investment to less than 10 years, significantly less if electricity price projections follow the currently expected trend.

With MAN truck and bus derivatives currently setting new fuel-efficiency benchmarks in the South African commercial transport sector, MD, Geoff du Plessis, regards the new carbon-neutral status of its main assembly plant as a powerful platform from which to gain

ground in a domestic market that is not only consolidating via corporate mergers, but is also moving rapidly towards best-practice procurement policies, where environmental responsibility on the part of suppliers is a primary purchasing criterion.

"All of us at MAN Truck & Bus South Africa can be very proud of everyone working at our Pinetown assembly plant for sustaining their production output while this extensive conversion process was underway. To be the first heavy commercial vehicle assembly plant in Africa to become fully carbon-neutral, with a surplus supply of electricity to give back to the community, will give us a distinct competitive advantage in what is a very competitive industry. To become the first CO₂-neutral plant in the MAN global production network is certainly an inspiration and an example to all our international colleagues of what can be achieved with commitment, passion and teamwork. Congratulations to Heiko, Lynette and their Green Team members," Du Plessis concludes. □

Vulkan fluid and engineered flexible couplings

BMG has been appointed distributors in Southern Africa for the Vulkan Drive Tech products range, which includes couplings and braking systems. "With the introduction of Vulkan's fluid and engineered flexible couplings, BMG's coupling offering is now complete," says Carlo Beukes, BMG's power transmission product manager. "BMG, which now carries a vast stockholding of standard Vulkan couplings, also has access to the complete range of Vulkan braking systems.

"With Vulkan's compact fluid coupling design, it is possible to replace existing applications, without the need for any modifications to the existing layout, therefore ensuring ease of replacement and reduced project costs."

Important components for BMG in the Vulkan range are Flexomax GBN maintenance-free couplings, with a maximum torque of 1 288 kNm and shaft diameters up to 600 mm. These torsional flexible couplings are equipped with specially designed elastic elements, which work in compression, allowing for maximum torque transfer, heat dissipation and product longevity.

This series is designed for applications that include low speed shafts of machinery driven by electric motors

– even in harsh environments – and is available with customisable options to meet the requirements of restricted applications. These compact couplings allow for compensating axial, radial and angular misalignments and also protect the drivetrain from shock loads.

The modular design enables the integration of brake discs, pulleys, shear devices and spacer shafts within the coupling. Radial removability of the coupling elements is possible, without having to move the connected machinery.

Vulkan has followed its technology trends for VFD (variable frequency drives) and VSD (variable speed drives) with the design of its coupling range, which now includes Flexomax GSN and GSND couplings.

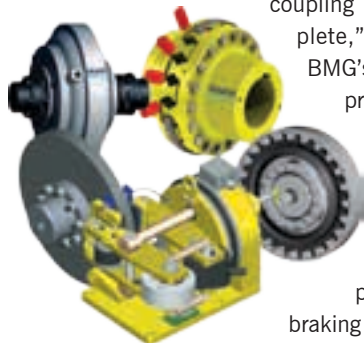
These backlash free couplings, which have been specifically designed for VFD high speed input shafts, offer multiple

configurations to ensure coupling types meet all requirements.

Flexible Flexomax GSND couplings have design features that eliminate the need for lubrication and allow radial removal of elements, without moving machinery. Furthermore, the design incorporates air circulation slits to allow for a cooler element and thus a longer coupling life.

Vulkan's vast range of highly engineered fixed speed and variable speed fluid couplings has been designed for reliable functionality and is optimised around specific application requirements.

For more demanding applications, Vulkan shaft-to-shaft solenoid-activated PSV-SP variable speed drain type fluid couplings are recommended. These couplings allow for larger heat dissipation in aggressive climate conditions. The simple operating design reduces maintenance requirements. www.bmgworld.net



BMG has been appointed distributors in Southern Africa for the Vulkan Drive Tech products range, which includes couplings and braking systems.

Taking customer service to the top

Bearings International's recent investment in two new hi-reach forklifts extends and streamlines the company's warehouse capabilities for enhanced service delivery to customers.

The 5 000 m² warehouse at the company's Boksburg headquarters makes use of a drive-through pallet racking system. "Our current forklift fleet had difficulties in reaching the top shelves which, at a height of 13 m, is one of the highest racking systems in the country," explains warehouse manager, Denis de Kock.



Bearings International's new forklifts have a higher load capacity of 2.0 t and a reach of 13 m.

"In addition to reaching top racks quickly, safely and easily, the new forklifts also have a higher load capacity of 2.0 t. This enables us to pick product and stock quicker and to handle more weight per pick. We are, therefore, expecting our turnaround times to improve even further," De Kock says, adding that the company's forklift operators have been given specialised training to ensure optimum and safe operation of the machines.

"As a customer-orientated company, our customers are our partners," says managing director, Robin Briggs.

www.bearings.co.za

Chicago Pneumatic adds Titan bolting solutions offering

Following its recent acquisition, Titan Technologies' bolting solutions has been added to Chicago Pneumatic Tools product portfolio of high quality power tools. The integration means that Chicago Pneumatic Tools now has a more complete offering, and is able to respond to all customers' requirements for industrial bolting tools.

Titan's products include powerful hydraulic torque wrenches, pumps and accessories for bolting applications in the oil and gas, petrochemical, wind energy, power generation, mining and construction industries. Very high load bolting is used when traditional assembly solutions are not sufficient to ensure joint integrity or joint access, for example on oil rigs, in wind farms, ship building and for bridges. The Titan range complements

Chicago Pneumatic Tools existing portfolio of high performance and durable tools.

"There are many synergies between the Titan and Chicago Pneumatic Tools brands, and we are excited to include them as part of our portfolio," says Luis Clement, Chicago Pneumatic Tools' vice president. "Titan's distribution network is incredibly knowledgeable in energy markets and the brand is recognized for its high quality products. Titan also has a strong network of specialised distributors, which will allow Chicago Pneumatic Tools to enter new growing markets. This network of distributors and their customers will now also benefit from Chicago Pneumatic Tools' highly efficient global operations and logistics."

www.cp.com

Drive solutions with motorised torque arms – MTAs

The Dodge brand has been synonymous with the best the industry has to offer for more than 125 years, according to Bearings International's bearings manager, Ross Trevelyan. "This tried-and-tested product offers a host of important cost saving benefits and enjoys wide acceptance within our local market," he says.

The Dodge MTA mechanical drive range provides a heavy-duty solution for any bulk materials handling application that requires a shaft-mounted reducer. They are predominantly used in the quarrying and aggregate sectors but are equally at home in the coal, iron-ore, wood and sugar industries. "The fact that the Dodge MTA units enable any brand of IEC B5 flange motor to be used with the reducers adds to the product's popularity. We noted a steady increase in demand for the units over the past two years and in September 2014 the MTA range was extended from the initially available 2, 4 and 6 sizes, to also include sizes 3, 5, 7 and 8. This has enabled us to offer customers the complete MTA mechanical drive range from 1.5 kW to 75 kW, based on output speed and a service factor of 1.4," Trevelyan reveals.

The Dodge range includes the traditional torque arm branded series (the belt driven Dodge Torque-Arm II shaft-mounted reducers) and the motorised MTA unit. The torque arm units, originally invented in 1946 and developed over time, are shaft mounted gear products and belt-driven, with MTA motorised versions also available. A key feature on both units is the exclusive, twin-tapered bushing. "This provides a sturdy, concentric grip



Dodge motorised torque arm units (MTAs) are used in industries where a shaft-mounted reducer is required particularly in the quarrying and aggregate sectors.

on the driven shaft on both sides of the reducer, which eliminates the excessive wobble and fretting corrosion normally associated with single-bushed shaft-mounted reducers," explains Trevelyan.

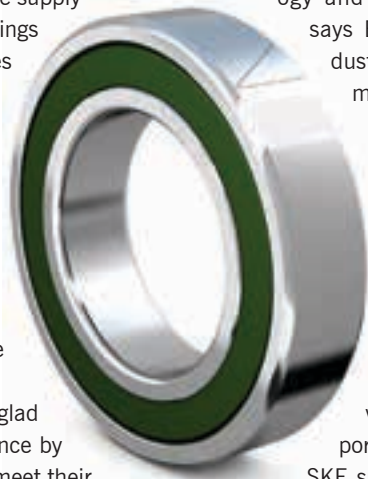
Dodge's bushings are fully split to completely grip the driven shaft and according to Trevelyan, fitment and removal of the bushings are simple processes. Dodge's bushings are manufactured from ductile iron for shock resistance. The units are equipped with taper roller bearings providing an average minimum bearing life span of 25 000 hours which is compliant with the American Gear Manufacturers Association standards.

"Dodge MTAs offer solutions for all industries and we have invested in substantial stock to service the local market's diverse applications," concludes Trevelyan. www.bearings.co.za

Super precision bearings for the woodworking segment

SKF has signed a one-year contract with Italian HSD SpA for the supply of super precision bearings for the electro-spindles used in the woodworking segment. "This order is of significant importance because it gives us an opportunity to increase our market share in the woodworking segment in which we see a large potential.

"Also, we are very glad to gain HSD's confidence by showing that we can meet their



high expectations on quality, technology and future development," says Ezio Miglietta, SKF industrial market, sales and marketing.

HSD SpA is a leading global supplier of electro-spindles for milling, drilling and edge banding in wood, aluminium and plastic, where high speed capability, reduced friction, low noise and vibration levels are important requirements. The SKF super precision bearings

The vertical turbine slurry pump – VTSP

Weir Minerals Floway Pumps' patented VTSP addresses the market need for a longer lasting, abrasive-solids handling vertical turbine pump. Following several years of design innovation, research and testing, the VTSP has been demonstrated to last four times longer in solids handling services when compared and tested with the Floway® vertical turbine pump bearing assembly.

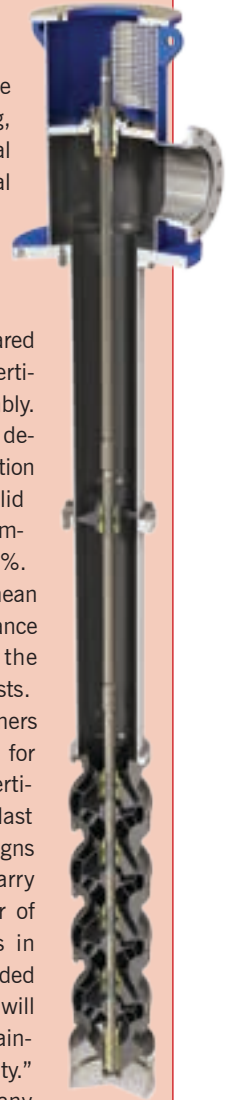
The patented VTSP bearing design allows for continuous operation in services with a maximum solid content of 10% by weight and temporary excursions of up to 20%. This design results in a longer mean time between required maintenance and an overall reduction in the customer's total operational costs.

"We listened to our customers when they expressed the need for an abrasive-solids handling vertical turbine pump which would last longer than the available designs in the market today," says Barry Cockerham, managing director of Weir Minerals Floway Pumps in Fresno, California. "We responded with the VTSP, which we believe will provide extended life while maintaining the highest product quality."

"Wear life is critical in many pump applications and the existing technology was not producing acceptable results", adds Daniel Boldt, product engineering manager at Weir Minerals Floway Pumps. "Due to the demanding nature of abrasive services, design innovation was required to realise a significant improvement in wear life. After extensive design work and both in-house and field testing, the new VTSP product line demonstrates a notable advantage over traditional vertical turbine designs."

Weir Minerals Floway Pumps has supplied pumps and processing products for the Minerals industry for over 80 years. "We are dedicated to engineering, manufacturing and servicing high quality, long lasting products such as the VTSP," Cockerham concludes.

www.weirminerals.com



enable all these requirements to be met.

The contract includes four sizes of sealed super-precision hybrid bearings, which will be produced in SKF's factory in Torino, Italy. www.skf.com

Metallic grass coating for efficient steam production

Researchers at Drexel University have developed a metallic nano coating derived from a virus of the tobacco plant that could lead to more efficient steam production, improving the performance of steam turbines, air conditioning and electronics cooling systems.

Water's transition from liquid to gas has plenty of applications beyond the kitchen: water treatment plants; heating and air conditioning systems; and the steam turbines that we use to produce electricity are all heavily dependent on this process. Making this transition even slightly more efficient could have a big impact on energy efficiency.

The breakthrough comes from an unexpected source – a virus common to tobacco plants. The tobacco mosaic virus was the very first virus to be identified, back in 1930, and has been studied in detail since then. It's a simple organism that consists of a single strand of RNA surrounded by a dense network of coating proteins. Today, scientists think that this layout is ideal for building self-assembling nanostructures.

Matthew McCarthy and his team at Drexel University are using the virus to create a special coating that uses capillary forces to distribute water evenly across a surface. When used to coat

the surface that separates a heat source from the liquid being heated, the scientists found that this coating helps boil the liquid more than three times more effectively.

As water (or any other liquid) starts to boil, there comes a point where bubbles of vapour form and stick to the surface that separates the liquid from the heat source. This point, known as the 'critical heat flux', is problematic because these air bubbles prevent local heating of the liquid, overheating the surface instead.

To work around the issue, McCarthy's team used a mutation of the tobacco mosaic virus that features molecular 'hooks'. These hooks let the virus attach to nearly any surface, be it stainless steel, aluminium, copper, gold, silicon or a polymer. The virus is then coated with a thin layer of metal to form a solid structure that the researchers called 'metallic grass'.

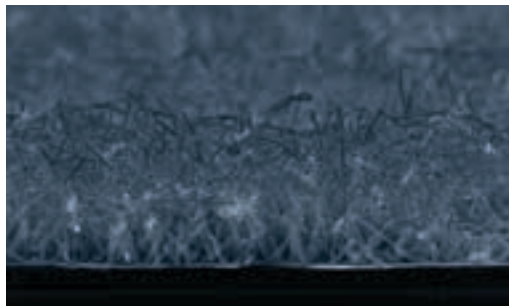
When liquid comes in contact with this surface, it quickly sticks and spreads due to capillary forces, making it harder for the surface to dry out even while boiling. When air bubbles do form on the surface, they also tend to leave faster, for a much greater heating efficiency.

In the team's preliminary results, applying the metallic grass coating to the boiling surface showed a 240% increase

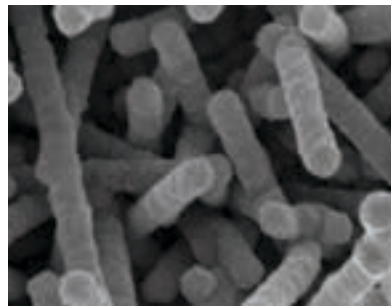
in critical heat flux, meaning that much more heat can be transferred from the heat source to the liquid before bubbles start sticking to the boiling surface.

"Phase-change heat transfer plays an important role in everything from power generation to water purification, HVAC and electronics cooling," says McCarthy. "Increasing performance of these systems would translate into significant improvements in the way we produce, consume and conserve our energy and water resources."

McCarthy's team will now look at the performance of dozens of different surface configurations, changing both the spacing of the nanostructures and the shape and the coating metal, so as to find ways of improving the performance of the coating even further. □



A 'metallic grass' nano coating derived from a virus of the tobacco plant has been found to significantly improve heat transfer at the phase-change point, where gas bubbles start to form on the heating surface.



The virus used is a simple organism that consists of a single strand of RNA surrounded by a dense network of coating proteins.

Industry diary

May 2015

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Index to advertisers

Afrox	32
Axiom Hydraulics	2
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Bonfiglioli	12
EMS	IFC
Festo	35
Hansen Industrial Gearboxes	IBC
Hytec Holdings	20
Lincoln Electric	26
SASSDA	15
SEW Eurodrive	16
Voith	23

Inaugural Metals and Engineering Indaba 2015

The Southern African Metals and Engineering Indaba (MEIndaba 2015), hosted by the Steel and Engineering Industries Federation of Southern Africa (SEIFSA), will be held at Emperors Palace, Ekurhuleni, Gauteng from May 28-29, 2015. The event, the first of its kind in the sector and will be graced by high profile business, government and civil society leaders.

Setting the tone is the first plenary ses-

sion, entitled: 'Does Manufacturing Have a Future in Southern Africa?' with contributions from Trade and Industry minister, Rob Davies; ArcelorMittal CEO, Paul O'Flaherty; deputy chairman of the South African Institute of International Affairs (SAIIA), Moeletsi Mbeki; the Democratic Alliance's Gordin Hill-Lewis; and Bobby Godsell, chairman of Business Leadership South Africa.

meindaba.co.za

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