

# MechChem

AUGUST 2017

# AFRICA

CROWN  
PUBLICATIONS

## Gruppo Aturia comes to Africa



APE Pumps: leaders in pump innovation



### This month:

Remedying problems in reverse osmosis processes

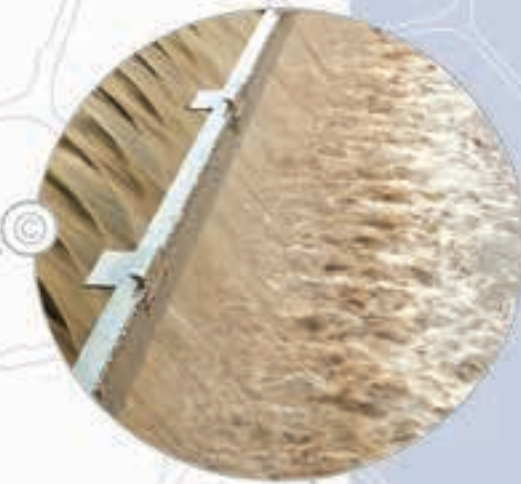
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# Wastewater: the new resource

Peter Middleton

COMMENT



Most of us remember learning about the water cycle in primary school, which morphed into the hydrosphere in our secondary years. In terms of recyclability, water is fantastic. But haven't we been lazily allowing nature to do too much of our water purification work?

For human survival, we need clean (potable) drinking water. For agricultural crops and domestic livestock we have to have fresh water for irrigation and watering purposes, which need not be quite as potable. For our ongoing health, we use water for washing and flushing toilets, while industry consumes water for cooling and processing in a host of different ways. Clean potable water from our purest springs or our most advanced purification plants quickly becomes contaminated, polluted and even poisoned.

Fortunately, as pointed out by Veolia's Chris Braybrooke in this issue, all wastewater, no matter how contaminated, can be recovered and treated to any level of purity.

Water scarcity, recently in sharp focus across South Africa and still an acute problem in the Western Cape, is now of global concern. Water resources are becoming scarcer and, therefore, the reuse of wastewater, which we have recklessly regarded as a problem to be moved elsewhere, is becoming more and more attractive.

Not only is the water valuable, but also contaminants such as the organic matter, nitrates and phosphates in sewage can be recovered for fertilisers and, for minewater, many of the dissolved metals can be beneficiated.

In a 2016 study focused on the reuse of organic matter and phosphorus from Amsterdam's wastewater system – *Wastewater as a resource: Strategies to recover resources from Amsterdam's wastewater* – authors Van der Hoek, De Fooij and Strucker show the water flows in Amsterdam's system. For 2013, Waternet produced 57.2-million m<sup>3</sup> of drinking water for distribution in Amsterdam. Only about 2.5% of the water is 'lost', while the remaining 97.5% is combined with storm water and infiltrated ground water and transported via sewers to wastewater treatment plants (WWTPs).

While this paper focuses on the recovery of phosphates by producing struvite (magnesium ammonium phosphate or NH<sub>4</sub>MgPO), the biggest WWTP of Amsterdam produces: 11 300 Nm<sup>3</sup> of biogas; 22.7 MWh of electricity from incinerated solid waste; 55 GJ of direct boiler heating from the residual heat of incineration; along with a total of 74.9-million m<sup>3</sup> of treated water, which is returned into the

region's natural surface water resources.

We retain a notion that the water will be purer if the environment has some role.

There is a shining example of wastewater recycling closer to home, however, in Windhoek. The Goreangab Reclamation Plant, originally constructed back in 1968, is one of the few direct potable reuse plants in the world. From Windhoek wastewater, the plant produces 21 000 m<sup>3</sup>/day of potable water, which is returned directly back into the municipal drinking water network. None of the purified water is discharged into the river systems.

While the costs of such networks is high, in water stressed areas where desalination might be the only other reliable water option, does it not make sense to contain the water for as long as possible in a closed loop system?

In our Innovative feature for this month, Multotec's Carien Spagnuolo tells of an industrial closed loop water treatment solution being used in the Middle East to maximise water reuse at an antimony roaster. This multi-technology treatment system for the scrubber and cooling tower blowdown water, which is contaminated with toxic antimony and arsenic, embeds all of the elements of an ideal solution for our mine wastewater and acid mine drainage (AMD) water treatment problems.

The first step involves traditional precipitation and clarification – dosing with ferric chloride to produce a metal sludge in a settling tank. AMD dosing with lime is widely practised in South Africa for AMD treatment. This neutralises the acidity and removes the dangerous heavy metals, but it leaves the discharge water highly salinic.

In the second step at this treatment plant, the DeSALx<sup>®</sup> process, which is built around a continuous ion exchange (CIF<sup>®</sup>), technology is being used to extract the multivalent salt ions – typically (SO<sub>4</sub>)<sup>2-</sup> and Ca<sup>2+</sup>.

This leaves only the monovalent ions such as Na<sup>+</sup>, K<sup>+</sup> and Cl<sup>-</sup> and some sulphite ions, all of which are highly soluble, for removal by a reverse osmosis plant in the final treatment step. The net result is a water recovery rate greater than 90%, compared to 60 to 70% if only desalinating using reverse osmosis.

Is it not time to start thinking of all wastewater, including sewage and AMD, as valuable water resources? Potable and industrial quality water can be produced using a variety of high recovery technologies and contaminants can be removed for safe discarding or reclamation, leaving our natural river systems healthy and available for agricultural and other uses. □

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# Pump leader Gruppo Aturia

APE Pumps' global holding company, WPIL, acquired the Italian pump company, Gruppo Aturia along with all of its brands during the second half of 2015. Richard Harper of APE Pumps introduces the resulting new offerings and highlights their niche application.

**W**PIL of India, the holding company of PSV South Africa and its pump manufacturing businesses, APE Pumps and Mather+Platt, purchased the global assets of Gruppo Aturia back in June 2015, bringing local access to five leading companies in the pumping field.

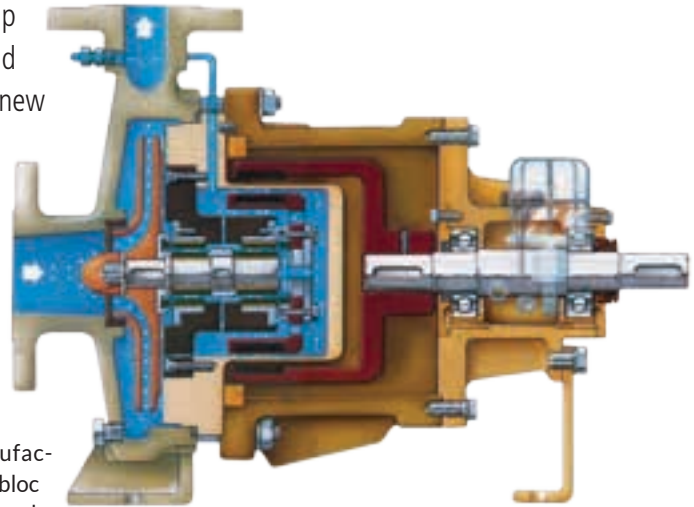
Aturia began to operate in the centrifugal pump sector in 1927 and soon became a leader in submersible electric pumps. The name is taken from the ancient fossils of the Aturia sea snail: "because water, essential for the development of any form of life, has always been its natural element and because its central spiral recalls the impeller of a pump. That's why we chose it as our trademark," notes Harper.

The Aturia submersible motor was patented in 1946 and in 1960, the company extended its reach to countries in the Mediterranean,

America and Asia. "Over time, Aturia acquired four top Italian companies: Rotos and Marelli in 1990, Audoli & Bertola in 2003 and Aris Chiappa in 2009," Harper tells *MechChem Africa*.

Rotos was originally established in 1919 and manufactured electrical motors, monobloc pumps, multistage pumps and vertical spindle pumps. In 1962 it became part of the French Guinand group and established a centre for multistage pump development. Based on this experience, it started to produce pumps for the process industry (ISO 2858 and API 610) and in 2005 it began to produce Rotos magnetic drive pumps at its plant in Taglio di Po.

Now a global specialist in this technology, Gruppo Aturia's technically advanced Rotos



*Rotos hermetically sealed, magnetic drive pumps are available in 18 different designs with over 250 basic models.*

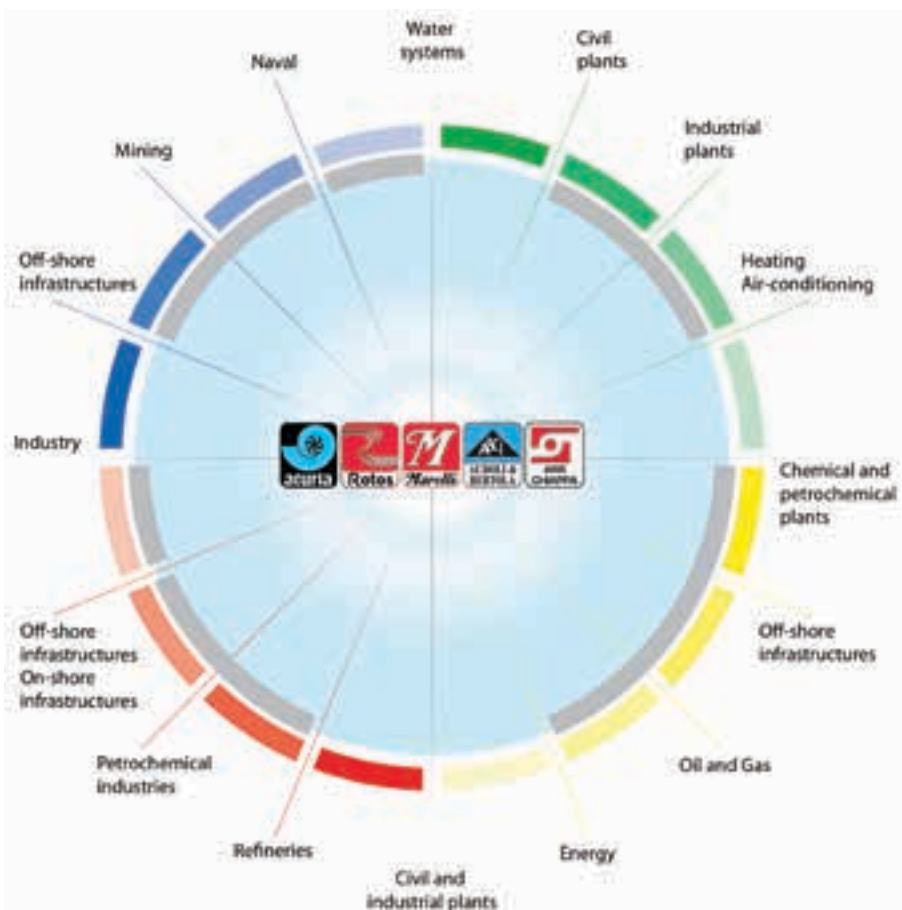
hermetically sealed, magnetic drive pumps are now available in 18 different designs with over 250 basic models. "These are particularly suited to the chemical and petrochemical industries and the vast pump range allows our engineering department to meet exact process requirements," adds Harper.

Marelli, acquired together with Rotos in 1990, was founded in 1891 to manufacture electrical motors and centrifugal pumps. Its acquisition extended Gruppo Aturia's range of products by including monobloc, split case and large-capacity pumps.

Audoli & Bertola started producing vertical pumps in 1890 and over the years it strengthened its presence in the market in terms of applications for heavy industry – steel plant cooling systems, power plants and the marine sector. Gruppo Aturia acquired Audoli & Bertola in 2003, improving its presence in the industrial sector. Its office in Turin is currently a centre of excellence for fire-fighting systems (NFPA20, FM).

G. Chiappa Fonderie was established in Turin in 1921 as a steel plant and started to manufacture bronze, aluminium and cast iron castings. In 1940 it began to produce vertical pumps. For over 40 years, in partnership with the world's top gas turbine manufacturers, it has been developing pumps specifically designed for lubrication services.

In order to acquire greater expertise and experience for particularly demanding applications such as those in the chemical, petrochemical and nuclear sector, Gruppo Aturia also acquired Gruppo Rüttschi in 2006, the world-class supplier of canned motor pumps, magnetic drive pumps and mechanically sealed pumps that have dominated the nuclear sector for over 50 years.

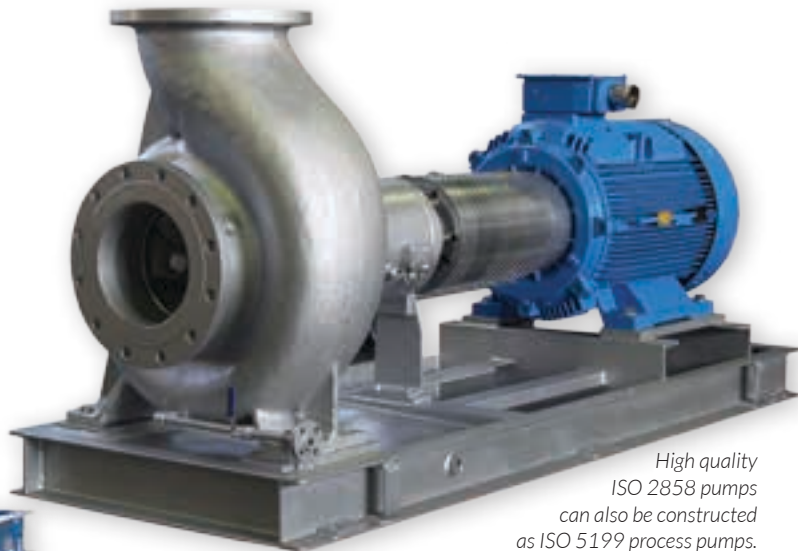


*Gruppo Aturia now consists of five niche brands – Aturia, Rotos, Marelli Audoli & Bertola; and Aris Chiappa – which together offer a vast range of solutions for surface, submersible, process and fire fighting applications.*

# comes to Africa



A Gruppo Aturia API 610 process pump.



High quality ISO 2858 pumps can also be constructed as ISO 5199 process pumps.

Today, Gruppo Aturia's vast product range is split into four broad areas:

- Submersible applications:** Originally designed to lift water from wells, submersible electric pumps have replaced vertical axis pumps in many applications. By using diversified materials such as bronze, stainless steel and duplex stainless, these pumps are now successfully used for heavy-duty applications that require high reliability, such as the off-shore industry, mine dewatering and in the shipping sectors. Using submersible pumps in special vertical or horizontal cylindrical tanks allows higher design pressures with smaller footprints and lower operating noise compared with traditional surface solutions. More than 500 types of pump sets are available to offer hydraulic features that best match operating requirements and, in recent years, Aturia has introduced submersibles suitable for pumping hot water.
- Surface applications:** Gruppo Aturia's monobloc pumps are used in the civil sector for water supply, heating and air-conditioning purposes. The company also offers single-stage and split-case pumps for water pumping systems, fire-fighting service and for use in the clean-water industry when large capacities and limited heads are required. As well as for water pump stations, multistage pumps are also used for artificial snowing, reverse osmosis and for more sophisticated services such as delivering boiler feed water to power stations. In addition, vertical turbine pumps are used in recirculation systems for industrial water, power plants, steel mills, in drainage systems and at fish farms.
- Process applications:** Thanks to the

wealth of experience acquired with the Guinard Group, Rotos operates in sectors involving extremely heavy-duty service where high-tech pumps compliant with international standards are required. These pumps are manufactured in compliance with the API 610, ISO 2858 and ISO 5199 standards. They find their natural homes in chemical and petrochemical plants, as well as in oil refineries. API 685 and ISO 2858 magnetic drive pumps are used for applications that require top reliability and safety: pumping toxic or flammable chemical products, for example. Liquefied gases and volatile liquids can be conveyed with 'barrel' process pumps and Rotos pumps are ideal for meeting special application needs such as geothermics, reverse osmosis, desalination, offshore and cryogenic fluids.

- Fire-fighting applications:** With its Audoli & Bertola Division, Gruppo Aturia operates in the fire-fighting field by supplying pumping units that comply with European (EN 12845 and EN 12259-12) and US Standards (NFPA 20). Audoli & Bertola's technical expertise allows it to easily operate in civil and industrial sectors and comply with the strictest specifications required by refineries, petrochemical industries, offshore platforms and in-shore facilities. Audoli & Bertola has also developed a range of products for explosive risk areas: many products have been made with diesel and gas engines, suitable to operate in EExd II B or C Atex areas. In addition, Gruppo Aturia can supply an extensive range of centrifugal pumps for fire-fighting services with vertical and horizontal designs.

"Thanks to integrated design systems, 3D models and FEM analysis, Gruppo Aturia offers state-of-the-art products," Harper says. The product cycle starts at the design stage where, thanks to many years of experience

and a database with over 1 000 hydraulic solutions, Gruppo Aturia is able to develop pumps for special fluids, with power values up to 1 000 kW, pressure ratings of up to 150 bar and temperatures up to 500 °C.

From a manufacturing perspective, Gruppo Aturia has three specialised facilities: Gessate (MI), which is the group headquarters; Taglio di Po (RO) for Magnetic Drive Pumps; and Turin for firefighting pumping systems. "We recently achieved the important objective of fitting every manufacturing facility with a modern testing room. In our plants in Gessate and S. Mauro Torinese, we can test pumps with powers of up to 650 kW, capacities up to 8 000 m<sup>3</sup>/h and pressure values up to 120 bar, while our plant in Taglio di Po has been designed for sealless pumps intended for use in the chemical sector," Harper adds.

Along with periodic tests on the performance of standard products, these testing rooms are also used for customer acceptance and/or certifying body tests.

Gruppo Aturia's commitment to continuously improve quality has been acknowledged by the Lloyd's Register Group with ISO 9001: 2008 Quality Management System certification.

"Quality is guaranteed through the company's 'Total Control' initiative for all manufactured components. Pump performance is checked in the testing room. Gruppo Aturia has set up a metrological lab to test parts with a coordinate-measuring machine and traditional instruments calibrated with latest-generation software.

"A wide range of NC machines allows operators to easily achieve the precision requested to process the components; the online management of project and design specifications ensures the latest updated information is readily available; and the IT management system and the collection of processing data also allows for products to be traced at every stage of the manufacturing process," Harper concludes. □

# Winners of the 2016/2017 NSTF-South32 Awards

The NSTF-South32 Awards were held at a prestigious Gala Dinner in Gauteng on Thursday, 29 June 2017. It was the 19<sup>th</sup> celebration of this flagship project of the National Science and Technology Forum (NSTF).

**T**he NSTF is the most representative multi-stakeholder non-profit forum in South Africa promoting SET, including mathematics and innovation, through collaborative effort. The NSTF-South32 Awards showcase the research and development capacity of our nation. The excellence of the winners to SET and innovation bring hope for the advancement of our country and the social upliftment of all people in South Africa.

Outstanding contributions to science, engineering and technology (SET) and innovation

were awarded and celebrated in the following broad areas under 13 distinct categories: Scientific research; Management and related activities; Capacity building in engineering and research; Environmental sustainability; Water research and innovation (new award); Data management and stewardship (new award); Research leading to innovation; Science communication; Technology transfer, as well as education and training; and Sustainable tourism for development (special theme award in recognition of the 2017 International Year of Sustainable Tourism for Development

(#IY2017) declared by the United Nations).

The national NSTF-South32 Awards are the largest SET and innovation awards in South Africa. They are known as the 'Science Oscars' and were the first science awards in the country. The focus is on spreading information about SET to the public, which includes the year-long engagement programme with students and learners called the 'Share 'n Dare' Programme. The NSTF Brilliants Programme recognises the top matric achievers in mathematics and physical science and exposes them to the SET network for future careers and motivation. These youth programmes are sponsored by the Carl & Emily Fuchs Foundation.

The awards were presented by the Honourable Minister of Science and Technology, Naledi Pandor, who is also the event's patron. The winners were awarded with state-of-the-art trophies, manufactured through additive manufacturing (industrial 3D laser printing) with advanced materials (titanium). □

Category	Winners
Achievement over a lifetime by an individual.	Prof Nicolas Beukes, Director: Department of Science and Technology (DST).
TW Kambule-NSTF Awards for research and its outputs.	Prof Nancy Refilwe Phaswana-Mafuya, Principal Investigator for South African Study on global AGEing and adult health and Prof Aletta Schutte – Unit Director: Hypertension and Cardiovascular Disease, South African Medical Research Council.
TW Kambule-NSTF Awards for Emerging researchers.	Prof John Ataguba, Associate Professor of the Health Economics Unit at the University of Cape Town (UCT) and Dr Robyn Pickering – Lecturer: Department of Geological Sciences, UCT.
Management and related SET activities by an individual over the last 5-10 years.	Prof João Rodrigues, Professor of Theoretical Physics and Head of the School of Physics at the University of the Witwatersrand (Wits).
Eskom-sponsored Engineering capacity development award.	Prof Diane Hildebrandt, Professor of Chemical Engineering at Unisa and Prof Ochieng Aoyi, Professor and Head of Chemical Engineering at Vaal University of Technology.
Research Capacity Development award other than Engineering.	Prof Colleen Downs, Professor and SARChI Chair of Ecosystem Health and Biodiversity for the University of KwaZulu-Natal.
NSTF-GreenMatter Award towards achieving biodiversity conservation, environmental sustainability and a greener economy.	Prof George Ekama, Professor of Water Quality Engineering, UCT.
NSTF-Water Research Commission Award towards achieving sustainable water management, knowledge generation and solutions.	Prof Bhekie Mamba, Executive Dean and Director of Nanotechnology and Water Sustainability at Unisa.
Data for Research Award.	DataFirst Director, Martin Wittenberg of UCT.
Research leading to innovation award.	Prof Eugene Cloete, Vice-Rector of Stellenbosch University for his teabag water filter invention, Rotoscope, and other projects.
Research leading to innovation – Small, medium or micro enterprise by a team or individual.	CenGen's (Pty) Ltd, director and owner, Dr Renée Prins.
Communication for outreach and creating awareness by a team or an individual.	The DST/NRF Centre of Excellence in Strong Materials (CoE-SM) team: Prof Lesley Cornish; Prof Alex Quandt; Prof Deena Naidoo; and Mr Casey Sparkes.
Non-Governmental Organisation (NGO) award for working towards technology transfer and education and training.	Mobile Agri Skills Development and Training NPC – Executive Director, Ms Lynette Bezuidenhout.
Special Annual Theme Award for Sustainable Tourism.	Prof Melville Saayman, Director of Tourism Research in Economic Environments and Society Unit, NWU.



# A Women's day celebration of SAICHe IChemE ladies

**Maggie Chetty** is the current Vice-Chair of the SAICHe KZN Branch and a member of the SAICHe National Council (from 2017). She is currently the HOD of Chemical Engineering at Durban University of Technology. She helps on various projects such as reviewer and judge for the SAICHe Research Day, organising committee ICCT/SAICHe 2014 Conference, participant of the Industry Captains' and KZN Chemical Engineering Forums.

**Lizelle van Dyk** graduated with a PhD in Chemical Engineering (University of Stellenbosch) and is currently an Associate Professor at the University of the Witwatersrand (Wits). Lizelle joined SAICHe Gauteng Branch Committee in 2005. She joined council as the honorary treasurer in 2012, and in 2017 she became vice-president of SAICHe IChemE.

**Bronwynne Ferreira** studied at Wits University where she also completed her Master's degree. Bronwynne has been employed by Anglo American for 20 years now and is currently the Principal - PMR (Precious Metal Refinery) support. Bronwynne has been on the SAICHe council for over a decade and her primary role is evaluating the applications for CPD accreditation.

**Michelle Low** is a lecturer of Chemical Engineering at Wits University. She joined SAICHe Gauteng as a student representative in 2009. In 2011 she was co-opted onto SAICHe Council where she contributes to the social media and magazine posts. Michelle is also involved with Engineers Without Borders-South Africa (EWB-SA).

## Member Group: Gauteng

**Danielle Bearman** has a focus in precious metal recovery and manufacturing. Part of her branch responsibilities include running events. She encourages you to email the Gauteng Branch: saiche-gauteng@google-groups.com if you want to get involved.

**Zita Harber** is a chemical engineer with a background in mining, academia, process design and business development. She currently works as an energy demand-modelling specialist at the Department of Energy. She is part of the public relations team.

**Linda Jewell** is currently Chair of the Department of Civil and Chemical Engineering and Professor at the University of South Africa (Unisa). Linda serves as the treasurer for the Gauteng branch.

**Nirvana Rampersad** is a registered Professional Engineer and she serves as an IChemE contact on the branch committee. She is a certified PMP with an MBA. She has extensive experience in commercial and construction aspects of project management, mineral processing, commercial, and marketing and business strategic analysis.

## Member Group: KwaZulu-Natal

**Nokuthula Danisa** is a process engineer at Sapref and is currently vice-secretary for the KZN branch, and **Bavelile Hlongwa** is a production engineer at Sapref and is the treasurer for the KZN branch.

## Member Group: Western Cape

**Ashleen Marshall** has been a lecturer in Chemical Engineering at the Cape Peninsula University of Technology and is also the Curriculum Officer. Her area of research is biosorption heavy metal removal and bio-diesel production from seaweed. She serves as treasurer on the WC branch.

**Adri Uys** is a chemical engineering graduate and part-time MSc student from the University of Cape Town. She works for Irvin & Johnson Ltd and is the post-graduate student representative on the branch committee. She provides students opportunities in industry.

## SAICHe IChemE office managers

**Femmy le Roux** has been working for SAICHe since 2002. She is in charge of the SAICHe IChemE office and is involved in everything in the office, from CPD to finance. She arranges and minutes the EXCO, Council meetings and AGMs. Femmy is married and the mother of two boys, who love to go 4x4 trailing.

**Denyse Heyerdahl** has been the Membership Administration person for



Adri Uys



Zita Harber



Ashleen Marshall



Bronwynne Ferreira



Lizelle van Dyk



Michelle Low

Some of the women at the heart of SAICHe IChemE.

SAICHe IChemE since July 2013 and assists Femmy in the office. The tasks include telephone calls, member profiles, issuing of certificates, letters and CPD applications for members. She is a mother of two and has nine grandchildren. □

## SAICHe IChemE



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## Food industry evening: WorleyParsons Melrose Arch, August 30

So what does a Chemical Engineer know about bread, milk and cheese? This and other tasty subjects will be discussed at the next SAICHe Gauteng event. The event focuses on the application of chemical engineering

in the food industry and is being held in association with the South Africa Association for Food Science and Technology. Ticket costs: R60 for members of SAICHe IChemE; R90 for non-members and R30 for students.



# Why an OEM's support solutions are so effective

According to some, maintenance is a skill in its own right that requires a disciplined and coordinated programme to ensure that the necessary systems are implemented. When first starting a job, OEM FLSmidth places primary importance on critically assessing the existing programme before establishing a productivity partner model for its customers. Wilhelm van Wyk, FLSmidth's manager for operation and maintenance for southern Africa, explains.

**W**ith growing pressure on the mining sector to get optimal service life from equipment while incurring minimal downtime, many mines are looking to the original equipment manufacturer (OEM) to take charge of their maintenance headaches.

"Many maintenance systems grow over time into a paper exercise with either too few, incorrect or too many maintenance tasks. Inspections and maintenance tasks are often added over the years, not all of which are necessary, appropriate or even relevant, placing an unnecessary burden on the maintenance staff," says Van Wyk.

"When some maintenance tasks are not executed, or are improperly executed, this leads to the programme not actually fulfilling its requirements. This is the reason why, when FLSmidth starts a new contract, the critical review and revision of the existing maintenance system is one of the first activities to be done," he says.

Maintenance, says van Wyk, is a skill on its own: it requires a disciplined and co-ordinated programme to ensure that all necessary maintenance is implemented.

"An OEM such as FLSmidth also has in-depth engineering capability," he says. "The very nature of our business is that we en-

gineer and manufacture capital equipment for the mining sector, so we have the highest possible level of engineering knowledge about the products. This is a major advantage for the end-user in terms of optimising production, maintenance and support."

Focused on a productivity partner model for customers, the FLSmidth operating philosophy is to have on-site teams with access to global specialists, because local representation is vital to the success of any ongoing support and maintenance programme.

"One of our major differentiators is to ensure that there is a network of specialists that can assist and support customer operations whenever necessary," he says.

Among the challenges faced during the economic downturn – when a plant needs to reduce costs – is that maintenance budgets are often the first to be slashed. This pursuit of short-term savings, he says, is "foolhardy" as the long-term health of an operation can be severely jeopardised, affecting production and quickly reversing any of the achieved savings.

In this context, a major advantage of appointing an external contractor – and specifically an OEM – is that the commitment to quality maintenance is enshrined in a contractual relationship, with service agreement levels to manage these activities.

"This means that performance targets, which have been pre-set between the mine and the contractor, must be met on an ongoing basis," says Van Wyk. "This creates a relationship which is actually far more beneficial to the mine: the contractor has to meet certain parameters monthly, so it is not that easy for individuals on a plant to cut corners in maintaining equipment."

He emphasises that the contractor's focus is on the maintenance of equipment and this comprises his main business. The engagement process usually starts with an in-depth assessment or 'plant health audit' to assess the status of the plant – including an on-site physical inspection of the equipment, the inventory and spares. Typically, contracts in a brownfields environment start because the customer is not obtaining the required availabilities owing to poor or inefficient maintenance. It is also often found that repairs or ancillary equipment (added after plant commissioning) is not suitable for the application, leading to inefficiencies in the plant's functioning.

The assessment, focused on critical path equipment, takes the outage or shutdown programme into account and aligns the typical required, initial upgrade of the plant, with this. "It may also be necessary to upgrade or refurbish equipment so it can be returned to



Replacing a stacker slew bearing.



Lifting of a mill head and trunnion.



OEM standards, as there is no point in maintaining equipment that is not fit for purpose.”

“FLSmidth generally utilises the existing plant maintenance system to ensure that the data is recorded and tracked for future reference,” he says.

This clearly raises the issue of cost, so the maintenance intervention can be conducted on a phased approach to accommodate the available budget. Here it is important to focus on critical path equipment and to prioritise the work in the interests of optimal production; there may also be a need to ‘nurse’ equipment until funds are available for full refurbishment.

He highlights that maintenance programmes are structured with the requirements of each customer in mind; while some choose a fixed monthly cost, others opt for a rate-per-ton contract.

“Fixed price contracts with bonus and penalty clauses are often favoured, as this fosters a sound working relationship based on strong incentives,” he says.

The contractor or OEM is also in a good position to control the inventory – especially critical parts – necessary for effective maintenance; many plant health audits find that on-site inventory includes redundant or incorrect parts, which are just wasted capital and can delay efficient maintenance.

He points out that when centralised buying departments focus on cost alone, it is likely that inexperienced buying personnel will often procure parts that are sub-standard or not fit for purpose; this leads to higher levels of wear and more frequent replacement, adding to a plant’s operating costs.

Technical training is vital to underpin good maintenance programmes, and FLSmidth has specific courses to ensure that its teams – including qualified artisans – gain product specific experience and achieve optimal outcomes in maintenance programmes. This is a further benefit when dealing with the OEM.



Replacing a head chute cover.

“For instance, when equipment fails or a plant is not working optimally, it is not always as simple as blaming an individual piece of

machinery,” says Van Wyk. “Skilled and experienced OEM staff can assess the entire plant before concluding.”

The maintenance crews also have full-time support from FLSmidth field services, as well as the FLSmidth Supercenter in Delmas, Mpumalanga. This enables the deployment of specialist resources and experience. This centre is even able to manufacture parts when required, to the high quality demanded by OEM standards.

Always at the cutting edge of technology, FLSmidth can also remotely monitor a plant from an off-site central control room, with highly skilled personnel providing the support.

“This is already being successfully conducted in FLSmidth’s Cement Division,” he says. “However, it is essential that the plant be equipped with appropriate monitoring and control instrumentation, which on its own is a major advantage on critical pieces of equipment.” □



An FLSmidth F900 HPGR unit during installation.



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# Asset management and ISO 55000

Asset Management is a rapidly developing field, with more and more companies placing it amongst the top three strategic initiatives for driving a step change in bottom line profit. "Ensure the resources used will enable this strategic value driver," says Pragma Africa's Johannes Coetzee.

According to Johannes Coetzee, Executive at Pragma Africa, some organisations often chase ISO 55000 certification just for the sake of marketing prestige or to comply with their clients' requirements. It is easy to mistake ISO certification as the end goal, instead of seeing it as a milestone midway on the Asset Management (AM) roadmap to sustainable bottom-line added value.

In line with this, there is currently a concerning trend where a few consulting ventures offer "ISO 55000 Certification" without the needed accreditation or by using assessors that do not have a proven AM track record. This is one of the topics currently under focus in AM circles such as the Southern African Asset Management Association (SAAMA) and the Global Forum on Maintenance and Asset Management (GFMAM).

To be clear, it needs to be stated that ISO 55000 refers to ISO 55000: 2014 and provides an overview of asset management, its principles and terminology, and the expected benefits from adopting asset management. The ISO 55000 series comprises three standards. ISO 55000 provides an overview of AM and the standard terms and definitions, while ISO 55001 is the requirements specification for an integrated, effective management system for asset management. ISO 55002 guides the implementation of such a management system with practical examples.

In 2015 the SABS adopted ISO 55000 as a national standard (SANS 55000: 2015), but it is important to note that SANAS (South African National Accreditation System) is still busy developing the accreditation programme for SANS 55000 and, as such, cannot yet accredit a South Africa-based assessing entity, known as a certification body.

In short, companies need to verify that the entity assessing them for ISO 55000 certification has the proper accreditation. Otherwise, the certificate will have no standing. It is, however, possible for a certification body that is accredited abroad to certify a South African based company, but this usually proves to be a costly exercise. Currently, SAAMA is working closely with SANAS to get to a point where South African certification bodies will be accredited against SANS 55000 to certify companies against the standard.

Secondly, before embarking on the certification process, one should consider the

individual running the assessment to obtain certification. It is possible for an assessor to certify against ISO 55000 even if he or she is not an AM expert, but has the needed ISO assessment credentials. This means that the true value that can be derived from AM is not necessarily tested, but rather the compliance against the systems implied by the standard.

It is important to note that although ISO 55000 is not merely focused on the management system, many companies reduce it to a systems approach and even an Enterprise Asset Management software approach. The software a company uses is an enabler and most definitely not the complete solution. Many companies end up going through a very rigorous software selection process, or maybe even various iterations of this process, but spend far less time on maintaining the needed skills, business processes and discipline to generate the actual value from AM, while using the Enterprise Asset Management software as a support tool. As a result, the software often gets blamed when the true problem lies in the way that the company runs its business and, in particular, the human effect on the value add process.

In order to understand the value of AM, it is probably prudent to refer to a document published by GFMAM called 'The value of Asset Management to an organisation'. This

document describes the benefit of AM as enabling organisations to realise value from the use of assets in the achievement of their organisational objectives. What constitutes value will depend on these objectives, the nature and purpose of the organisation, and the needs and expectations of its stakeholders. AM is important to organisations because effective control and governance of assets is essential to achieve the desired balance of performance, cost and risk. The potential for value creation is thus linked to the AM maturity of the organisation and hence the link to ISO 55000 certification.

In general, any strategy, system, process, asset or another element of asset management that affects performance, cost and risk can create value. Value enablers support these value drivers and distinguishing them from one another can assist an organisation to prioritise and focus on the correct areas. The key is to achieve the optimum balance between performance, cost and risk in pursuit of achieving the organisational objectives. It is important to note that 'balance' must also be seen in the context of time, where short and long-term objectives might differ and thus have an effect on the required 'balance'. □



ISO 55000 can be an enabler of manufacturing transformation.

# Africa's largest crankshaft polisher

With the installation and commissioning of the largest crankshaft polishing machine in Africa, leading diesel engine component remanufacturer Metric Automotive Engineering is once again ahead of the curve.

**T**his custom-engineered, one-of-a-kind machine is capable of accommodating crankshafts with lengths of over six metres," says Andrew Yorke, operations director at Metric Automotive Engineering. "It represents our philosophy of investing in the latest bespoke and best practice technology, so that we can offer our customers around Africa a world-class standard of service."

Yorke says that while crankshafts have traditionally been ground and then polished on grinding machines, this is certainly not the ideal solution. "Polishing debris contaminates the crank grinding machine and this can lead to accelerated wear on critical areas of the machine," he says. "Moreover, not all crankshafts need to be both ground and polished; some only need polishing, and doing this on a grinding machine is not the best use of this asset."

Metric Automotive Engineering's dedicated polishing machine will significantly raise the company's productivity, enabling even more rapid turnarounds on those crankshafts that require only polishing and not grinding.

"We will also employ this machine to polish camshafts after the re-profiling of the component, or if the journals and lobes only require a polish and not a re-profile," says Yorke. "Polishing of these components after

grinding is vital, as it removes grinding burrs and ensures that the surface finish is ideally matched to the requirements of the bearing materials they run on."

He emphasises that, in the case of crankshafts and camshafts, there are journals, which run on the bearings and lobes, which have roller followers carrying high loads. These require the best possible surface finish in order to prevent roller skidding or seizure.

"By polishing these journals and lobes to the correct surface finish, we can return them to OEM specification or better," he says. "In turn, this leads to improved component performance and longer engine life."

Metric Automotive remanufactures heavy diesel engine components for a range of different end-user industries and has developed a long and impressive track record over almost 50 years. It has generated its extensive capabilities by staying abreast of the latest global developments in diesel engine technology. To ensure the highest standards and expertise, it also maintains close affiliations to the leading diesel engine OEMs.

Repairing and remanufacturing modern



Metric Automotive Engineering's custom engineered, one-of-a-kind crankshaft polishing machine is capable of accommodating crankshafts with lengths of over six metres.



Metric Automotive remanufactures heavy diesel engine components for a range of different end-user industries and has developed a long and impressive track record over almost 50 years.

diesel engine components to their original OEM specification is an exacting science, says Yorke. "It requires long-term development of expert skills and ongoing investment in specialised equipment such as this state-of-the-art polishing unit," he concludes. □

## Chevron refinery gets high pressure clean

Chevron's refinery in Milnerton, Cape Town, underwent its annual shutdown recently, during which high-pressure industrial cleaning of the plant and equipment was conducted using equipment from South Africa's leading water jetting solutions company, Total Blasting.

Total Blasting director, Bradley Storer, remarks, "Our client, who was commissioned to oversee the industrial cleaning of the Chevron refinery plant and equipment, needed reliable rental pumps for the job, because the bandwidth of their own equipment would not suffice for the scope of such a project."

Equipment supplied to the project by Total Blasting to clean heat exchangers, pipe lines and process tanks included their T3 and T4 Series units, working at 1 000 bar at 50

to 100 l/min and 2 800 bar at 19 l/min, respectively.

Both T3 and T4 Series units are suitable for demanding applications and for single or twin-gun operation. Most common applications include cleaning, descaling, coating removal, pipe cleaning, marine growth removal, floor cleaning and heat exchanger cleaning.

"Of paramount importance for a project of this size and measure is both the supply and quality of equipment, which in this case, included high pressure pumps and associated tooling. It is essential that all of the equipment supplied runs without any breakdown to ensure maximum uptime during a short maintenance window," says Storer, adding, "At Total Blasting, we ensure the highest possible rates of uptime by sup-



Total Blasting's T3 and T4 Series units.

plying the best and most suitable equipment we have, along with excellent technical support to back it.

"We look forward to a repeat partnership in the near future, when our rental fleet and technical team will be commissioned to support both the Sasol Secunda and Natref refinery shutdowns later this year," he concludes. □



# Precision balancing of rotors

As the operator of the largest independent high speed dynamic balancing machine in sub-Saharan Africa, Marthinusen & Coutts, a division of ACTOM, has an in-depth understanding of the importance of precision-balancing rotating machines.

**M**ike Chamberlain, marketing and commercial executive at this leading local repairer of rotating electrical and mechanical equipment, points out how critical it is to ensure the highest degree of accuracy when balancing rotating machines as this will minimise vibration levels thereby increasing reliability and reducing maintenance costs.

The 32 t Schenck HM7 U/S balancing machine, located at Marthinusen & Coutts' 9 500 m<sup>2</sup> high-tech workshop in Cleveland, Johannesburg, is in constant use. "Our customers, which include major local and international OEMs, benefit significantly through access to an independent balancing service offering with this level of capacity and quality."

The HM7 U/S balancing machine has a measuring range between 100 and 5 000 rpm. It is 9.0 m long, has a journal size of 400 mm and a swing of 2.4 m. The machine is fitted with a CAB 920 H computer measuring system with advanced functionality.

"This state-of-the-art technology makes changeovers to new rotor types quick and straightforward, and the machine is capable of balancing larger high-speed rotors dynamically at full operating speed," Chamberlain says. He adds that, on occasion, and depending on the design of the rotor and the individual customer requirement, balancing can be done at 10% over-speed or more if required.

In-house balancing of rotors not only speeds up the process; it also reduces the cost and the turnaround time of repairs. The machine is also available to external customers on a first-come-first-served request.

Marthinusen & Coutts also performs on site

vibration and dynamic balancing with its recently acquired Bently Nevada ADRE 408 portable vibration and balancing system. Chamberlain says that the balancing is in line with international best practice with industry standard balancing certificates being issued for each completed rotor. □

*Marthinusen & Coutts operates the largest independent high-speed dynamic balancing machine in sub-Saharan Africa.*



The 32 t Schenck HM7 U/S balancing machine, at Marthinusen & Coutts' 9 500 m<sup>2</sup> workshop.

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# Engineering and refurbishment

With a reputation for quality and flexibility, Parnis Manufacturing's roots and expertise go back over 40 years in the mining and energy sector. Today, the company continues to take its capability in machining, refurbishment and niche fabrication to new heights, and into new sectors.

According to Gary Colegate, general manager of Parnis Manufacturing, customers are more than ever in search of well-experienced partners with both technical capacity and responsiveness to help them implement demanding projects.

"Difficult market conditions in recent years – especially in the mining sector where we have long been very active – have raised the importance of quality refurbishment as a strategy to contain costs, whether in existing or greenfield projects," says Colegate. "This looks unlikely to change in the near future, with the situation being further aggravated by the uncertainty regarding the new Mining Charter and its requirements, even though this has been put on hold."

The company has decades of experience in equipment such as mine winders and their components, boiler components, fans and fan casings, mill heads and sheave wheels, to mention but a few.

"Our large vertical boring machine puts us at an advantage over most of our competitors and allows us to tackle a wide range of engineering projects, where we can assure customers of as-new results," he says.

## Strong technical capability

Vertical boring capacity at Parnis extends to a table size of 4.5 m, a turning diameter of 5.3 m and a turning height of 3.2 m, with a maximum load of up to 50 t. Other equipment includes horizontal borers with capacity up to 5.5 m longitudinal travel by 2.5 m high, milling machines with 4.5 m longitudinal travel and a height 1.8 m and an overhead crane lifting capacity of 50 t using a tandem lift.

"We recently delivered a completely refurbished mine winder to a privately owned gold mine in Zimbabwe," he says. "The equipment – which dates back to the early 1950s – was used for decades on a South African gold mining operation. It was then purchased for use in Zimbabwe and needed to be returned to a high operational standard."

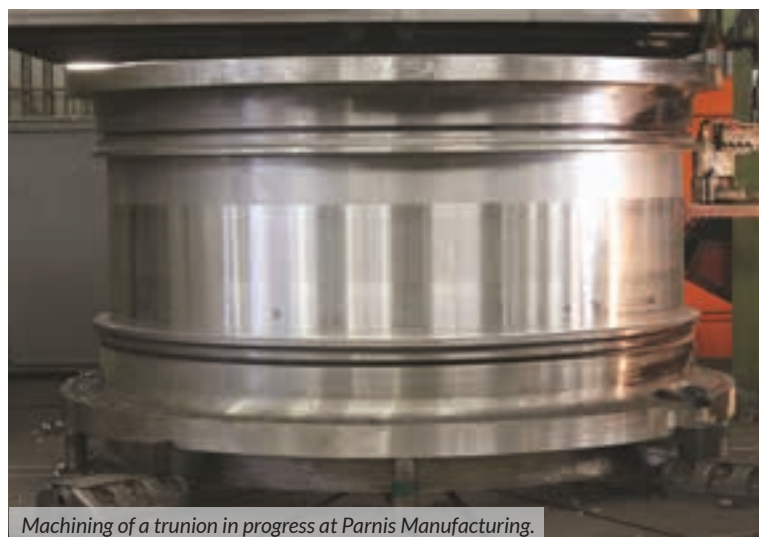
The work on the winder for the Zimbabwean mine included stripping down, cleaning and building up of worn areas and extensive machining, which was all done on the strength of comprehensive dimensional reports and in close consultation with the customer, who contributed its own mine winder

experience in guiding the refurbishment process. The machining of the main winder shaft, for instance, required the customisation of all the related components in line with new size requirements; items such as white-metal bearings and seals then had to be procured according to the exacting tolerances of the reconditioned shaft.

"The customer expects the refurbished equipment to function as new, so our artisans and technicians had to be at the top of their game to get the most out of our reconditioning facility," he says. "Where possible, we also work closely with OEMs to ensure that



A double drum winder ready for dispatch to site from Parnis Manufacturing's medium to heavy facility in Tulisa Park, Johannesburg.



Machining of a trunion in progress at Parnis Manufacturing.

the right quality procedures are followed to achieve the best quality result."

Colegate emphasises that the refurbishment option is not only an important cost saving strategy in the current economic climate, but it is also usually much quicker than ordering new equipment.

## Demand for E-houses

In addition to its base-load engagement with the mining sector, Parnis Manufacturing has also made great strides into the energy sector.

"We have diversified into a number of fields, thanks to the entrepreneurial approach of our founder and CEO Mario Guerini," says Colegate. "An important area of expansion has been into the design, fabrication and assembly of mobile, modular E-houses – fully equipped electrical substations."

From its 18 000 m<sup>2</sup> facility south of Johannesburg, including over 8 000 m<sup>2</sup> of

workshop space, Parnis manufactures these E-houses in collaboration with OEMs to provide optimal customised solutions. The units offer a range of advantages for customers setting up or expanding their operations, especially in areas where infrastructure is lacking.

"The E-house concept saves costs, space and time when compared to traditional methods of building sub-stations," says Colegate.

"The manufacture of the units under one roof at our facility has a number of benefits as the environment is controlled, unlike working on an open site at the mercy of weather conditions and other environmental factors," he says. "The quality control and testing we can apply ensures that these modules are quick to install on site and provide durable and insulated protection for electrical equipment."

Mobile units can be mounted on skids so they can be moved as per site requirements.



# expertise for African growth



Hoist and drag drums in the Parnis Manufacturing facility.



Refurbishment work typically includes stripping down and cleaning, weld build up of worn areas followed by extensive machining.



A completed E-House destined for Madagascar.

## BEE compliant

Currently a Level 3 B-BBEE value-adding contributor, Parnis Manufacturing is targeting a Level 2 position in terms of the new Codes of Good Practice, which will provide the opportunity to earn business from other parastatals.

He highlights the growth opportunities that exist through parastatals, as well as in the mining sector, which now faces increasing compliance demands from the new codes.

"Growth into Africa is also important, and we collaborate with OEMs who have extensive reach into other African countries. Many of the E-houses that we build are destined for locations throughout the continent," he says. "Our presence alongside our OEM partners attracts a certain amount of attention, and we gain a growing number of enquiries from these new markets as we break new ground there," Colgate concludes. □



Refurbished hoist and drag drums ready for dispatch to the customer.

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# Collaboration benefits vibratory screen machine operators



A collaborative relationship between OEMs, panel suppliers and their shared customers on mines is advised by Kwatani's CEO, Kenny Mayhew-Ridgers, so that end-users get what they are looking for: screening operations that run optimally.

Changing the type and specifications of screen panels on a vibratory screen is a common strategy to accommodate changing material or conditions, but it should ideally be done in consultation with the original equipment manufacturer (OEM) of the screening machine.

This is according to Derrick Alston, executive director of leading screen OEM Kwatani (previously known as Joest), who says that panel specifications need to be carefully integrated with the structural and mechanical features of the screening machine.

"All vibratory screens are designed for a certain weight and performance of screen panel," continues Alston. "When panel types are changed without careful consideration, there is a danger that the machine could be run in a manner for which it was not intended."

Kwatani's chief operating officer, Kenny Mayhew-Ridgers, reports that the company's service engineers sometimes find that the panels replacing the originals are much heavier, changing the dynamics of the machine.

"This can undermine performance in the long run, and lead to more maintenance stop-pages," says Mayhew-Ridgers. "It may also reduce the life of the machine, or raise the cost of refurbishing it. The damage caused can even extend beyond the machine, to the building in which it is housed, if not identified and rectified quickly."

Alston points out that these kinds of issues are often blamed on the OEM, although the source of the problem is not always clear at first.

"The mine usually calls the OEM to ask why the machine is underperforming, while the root cause may not, in fact, be the machine design," he says. "It is, of course, part of the process engineer's job to look for better efficiencies in the plant, so they may want to try different panels to improve performance. Just keep us in the loop, we ask – and we can help save any unnecessary expenditure due to unintended effects."

Mayhew-Ridgers emphasises the value and knowledge that panel suppliers usually bring to the screening process. "A great deal of research and development is carried out by the larger panel suppliers, and this makes for better efficiencies and productivity at mine level," he says. "We therefore encour-

age a collaborative relationship between OEMs, panel suppliers and our shared customers on the mines."

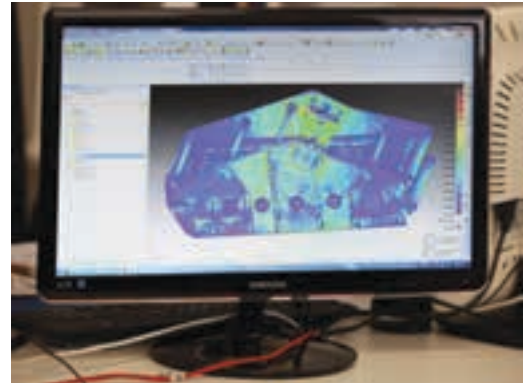
By working together, he says, OEMs and suppliers can ensure that the end-users get what they are looking for, so that mines' screening operations run optimally.

"In fact, the collaboration can often be facilitated by the mine, which can emphasise that each player needs to focus not only on supplying their own products and services, but also on the broader demands of the mine's process operations," he says.

"The customer can arrange regular meetings together with their screen OEMs and panel suppliers, to find the best options for improvements."

Alston highlights that certain screening applications are quite difficult, requiring constant attention and continuous improvement to give the mine the throughput and results it demands.

"Especially under these conditions, both the machine and the panels must be closely scrutinised over time, and the necessary changes can be made by both the OEM and the panel supplier," he says. "The customer is important to both the machine OEM and



*Kwatani's in-house design and engineering expertise gives it unique insight into the technical issues of aligning the right panels with its fit-for-purpose screens.*

panel provider, so it makes sense that there is better communication and co-operation between them."

This collaboration is already being achieved by Kwatani and its partners in the field, says Mayhew-Ridgers, and the result is a win-win for all parties. "We work closely with panel suppliers in certain areas, where our respective service technicians often travel to a site together to inspect machinery," he says. This allows a full inspection to be done, considering both the condition of the panels and the screening machine itself, so that concerns can be identified and resolved quickly. □



*Kwatani's technicians are fully competent when it comes to measuring machine performance on-site.*

# Cleaning the mining industry

The mining industry has very specific cleaning challenges and any equipment used within a mine must comply with occupational health and safety requirements. The good news for the industry is that there is now a new generation of Nilfisk technology that is fit for this purpose.

**G**avin Herold, general manager for Africa and the Middle East for Nilfisk, one of the world's leading suppliers of cleaning equipment, says that: "when used properly, Nilfisk technology can improve cleanliness and safety

while lifting productivity and reducing costs." Key improvements in recent times have been increased power for vacuums and water sprays, greater mobility, more customisable options, improved ergonomics, reduced consumable use and far easier maintenance.

In underground workshops, wash bays and on machinery, there are very strict regulations on the type of equipment that can be used because of fumes, so there is now a bespoke range of electrically powered cleaning equipment that can deal with big or small spaces.

An example is the Electra stationary pressure washer unit that has a number of safety features, including a thermostatically controlled overheating safety device and a low water cut out feature. These units can be tailor-made and fitted with up to three hoses.

Powerful autoscrubbers and sweepers with high brush pressures are also available for underground use in workshops and in areas where there is serious potential for slip-

ping on accumulated dust. This is particularly relevant on the concrete platforms between levels where big machines load dump trucks. Highly robust and mobile hot water machines such as the Novastar are available for this cleaning task.

In some open cast mine workshops there are specialised sections to remove and clean engines, in which case the MH 5M or the Electra stationary unit will do the job depending on the size of machinery to be cleaned. Sweepers and autoscrubbers can be deployed as well.

Mines usually have their own labs for testing ore samples. In these environments, hazardous dust, spillages or very fine debris can cause issues. An industrial type vacuum cleaner such as the S2, S3, T40 or 3907 is required. These can run continuously and are ideally suited to fine debris.

Oil spillages and sizable debris can be cleaned using automatic scrubber dryers and these are available in a range of sizes from the SC530 to a SC1500, while sweepers, such as the BK900 can also be used or, for bigger areas such as warehouses, the SR1601 or the SW8000.

"Nilfisk cleaning equipment works faster, more safely and economically and, as a result, it lifts productivity and improves the workplace environment," concludes Herold. □






Key improvements have been increased power for vacuums and water sprays, greater mobility, more customisable options, improved ergonomics, reduced consumable use and easier maintenance.



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# Mining sector recovery on the horizon

Weir Minerals Africa is gearing up for an upturn in the mining sector that it believes will occur soon, says Gavin Dyer, Weir Minerals Africa's regional managing director for Africa and the Middle East.

“Signs of market improvement have been coming through in the company's order book since the end of last year,” says Dyer.

“We have been preparing our operations and distribution systems for this long-awaited upturn, in line with our ambitious growth plans,” says Dyer. “We aim to achieve at least double the growth rate of our markets, and our past success shows our ability to reach and exceed tough targets such as these. For instance, we aimed to double our business between 2010 and 2015, but achieved that goal in just three and a half years.”

Weir Minerals has built its strong reputation on the back of, in particular, a substantial installed base of Warman® slurry pumps. This, in turn, supports continued growth in its aftermarket supply and associated services to support these products. It is also making progress in gaining market share with non-slurry products and services.

Huge opportunity lies in the application of the new and improved materials and technologies that Weir has developed over the years, which can also improve the performance of the older technologies still being employed in customers' operations around the continent.

“With deep roots in the mining industry in Africa, we have a large installed base of products, particularly the older generation pumping technology,” says Dyer. “Our newer materials and technologies mean that customers have the opportunity to upgrade their existing equipment rather than replacing these with new units. Such upgrades are a cost-effective route to higher efficiencies and productivity improvements.”

Dyer emphasises that its technological advances and successful applications around the world allow Weir to implement these solutions for customers in Africa, introducing the latest materials and technologies almost anywhere on the continent.

“Where our customers are operating in remote mining locations, our value proposition based on the lowest total cost of ownership is especially important, giving them affordable solutions to optimise their processes so that there is less downtime for maintenance and related disruptions,” he continues.

Pushing the frontiers of innovation through its own research centre, Weir also partners with universities and leverages its own worldwide presence by collaborating between group companies in different

countries; high-level technical advances are continuously generated, and the results are shared globally.

Growth in Africa for Weir also means benefiting local economies through its philosophy of full participation in the markets it serves. This includes helping smaller suppliers to build capacity and spreading the benefits of economic development. In South Africa, for instance, Weir has identified a small foundry as an important sub-contracted supplier and has assisted in the installation of quality systems and technical advice.

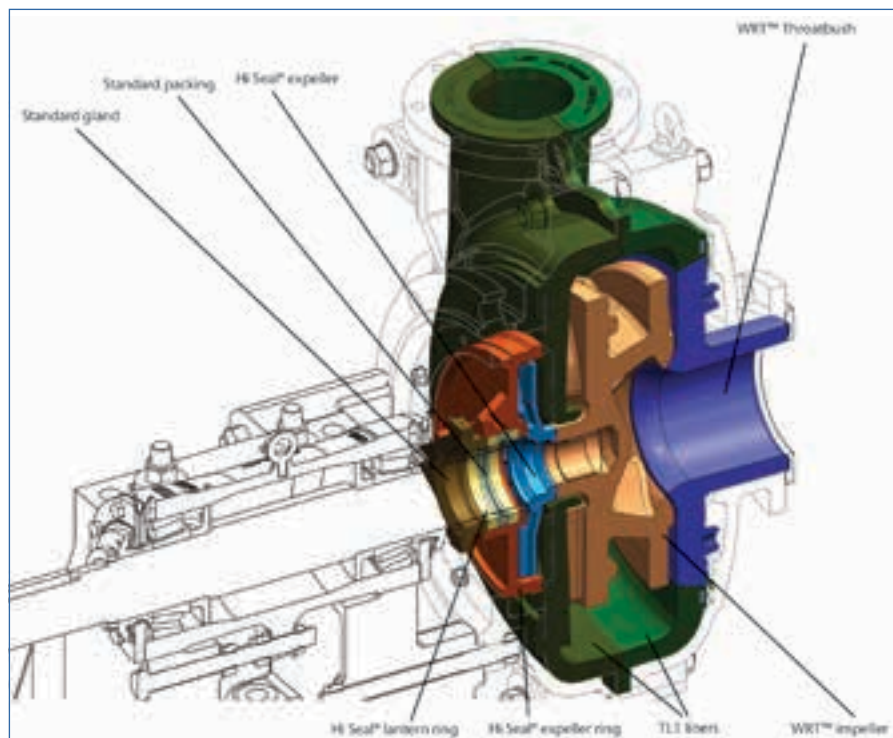
“Our presence across Africa creates opportunities for other local businesses as suppliers, and we employ staff from local communities,” says Dyer. “While we prefer trading directly with our customers, we also have strong relationships with agents and distributors in the region; we see value in being in close proximity with our customers, and so we expand our geographic presence wherever demand requires.”

This is also in line with Weir's strong commitment to Broad-Based Black Economic Empowerment Codes of Good Practice, with a special focus on skills development. Its work on this front led to the company recently earning the Steel and Engineering Industries Federation of Southern Africa (SEIFSA) award



Rajen Govender, HR Director for Weir Minerals Africa & Middle East, with the SEIFSA award for most transformed company of the year.

for excellence as the 'Most Transformed Company of the Year'. It also supports a range of social responsibility initiatives that develop science and maths skills – which in turn feeds into the talent pipeline. □



A sectional view of a Warman AH pump showing technology innovations such as the Hi-Seal expeller.



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**KANSAI  
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# TSA coatings overcome CUI problems

Corrosion under insulation, or CUI, is a common problem in many industries, including those in the petrochemical and power sectors. Evaluation of life-cycle savings has recently led to new, simple approaches to its prevention, such as the thermal sprayed aluminium (TSA) processes that form barrier coatings that are mechanically bonded to the substrate.

**C**orrosion under insulation (CUI) is difficult to find because of the insulation cover that masks the corrosion problem until it is too late. This is a problem shared by the refining, petrochemical, power, industrial, onshore and offshore industries.

The problem occurs on all carbon steels as well as on 300 series austenitic stainless steels. On carbon steels it manifests as generalised or localised wall loss, while on stainless pipes it often causes pitting and corrosion-induced stress corrosion cracking.

Though failure can occur in a broad band of temperatures, corrosion becomes a significant concern in steel at temperatures between 0 and 149 °C and is most severe at about 93 °C. Corrosion and corrosion-induced stress corrosion cracking rarely occur when operating temperatures are routinely above 149 °C.

Corrosion under insulation is caused by the ingress of water into the insulation, which traps the water like a sponge in contact with the metal surface. The water can come from rain water, leakage, deluge system water, wash water or sweating from temperature cycling or low temperature operations, such as refrigeration units.

It is also widely known that the results of CUI are costly. CUI can account for as much as 40 to 60% of a company's piping maintenance costs; result in repairs in the millions; and it leads to significant downtime. Most studies on the topic involve all forms of corrosion and their associated costs, without breaking down the costs of CUI.

A study completed in 2001 by a research team of corrosion specialists in the USA reported the direct cost of corrosion under insulation to be \$276-billion per year, with that number potentially doubling when indirect costs are also considered.

In recent years, the CUI prevention philosophy of many large petrochemical companies has been an inspection-free, maintenance-free concept. Insulated systems, particularly piping systems, are expected to have a service life of 25 to 30 years.

Evaluation of life-cycle savings has led to the consideration of new, simple approaches to preventing CUI, such as the application of a thermal spray coating of aluminium onto the piping prior to insulating it.

## Thermal sprayed aluminium

All thermal spraying processes rely on the same principle of heating a feedstock, accelerating it to a high velocity, and then allowing the particles to strike the substrate. The particles then deform and freeze onto the substrate. The coating is formed when millions of particles are deposited on top of one another. With thermal sprayed aluminium (TSA), these particles are bonded to the substrate mechanically.

The first step of any coating process is surface preparation. This is done by cleaning and white metal grit blasting the surface to be coated. Masking techniques may be adopted for components that only need specific areas coated. The second step is to atomise the aluminium, which is done by introducing the feedstock material into the heat source.

The heat source may be produced by either chemical reaction (combustion) or electrical power (twin-wire arc spray, for example). Next, the particles are accelerated to the substrate by the gas stream and deform on impact to make a coating. Finally, the coatings are inspected and assessed for

quality by either mechanical or microstructural evaluation.

The two common thermal spray techniques used to apply TSA to components are wire flame spray and twin-wire electric arc spray. Adhesion to the substrate is considered largely mechanical and is dependent on the work piece being very clean and suitably rough. Roughening is carried out by grit blasting to a white metal condition with a sharp, angular profile in the 50 to 100 µm range.

Flame and arc spraying require relatively low capital investment and are portable; they are often applied in open workshops and on site. Consumables used for TSA with these processes are more than 99% purity aluminium wires. □



Thermal sprayed aluminium (TSA) being applied to a footbridge using the flamespray process.



New and simple approaches to preventing CUI have recently emerged, such as the application of thermal spray coatings of aluminium onto the piping prior to insulating it.

# Cold zinc-rich coatings protect steel

Rust-Anode® and Rust-Anode Primers from BMG are made of ecologically green materials, have low VOCs and excellent resistance to corrosive environments. Marc Gravett, the business unit manager for seals at BMG, says their applications include cement factories, paper mills, pipelines, bridges and electricity pylons.

**B**MG's extensive range of sealing products includes Rust-Anode, a cold galvanisation system designed for rust prevention in diverse in-

dustries, particularly those with corrosive environments.

"Rust-Anode – a single component, cold zinc-rich coating that protects steel surfaces electro-chemically – is vastly different from anti-corrosion paints in terms of composition of the material and its protection methods," says Marc Gravett, business unit manager for seals at BMG. "Unlike conventional anti-rust paints, which eventually decompose and crack, Rust-Anode prevents rust formation and inhibits the spreading of pre-existing rust.

"Rust-Anode is preferred to the hot-dip galvanisation process for steel constructions in light profiles or thin plates because the hot-dip bath can deform light structures," adds Gravett.

Rust-Anode and Rust-Anode Primer, with high resistance to corrosion, abrasion and impact, can be used as a primer or as a duplex system with a compatible topcoat. This zinc grey material with a matt finish is applied directly onto a clean or rusted steel surface with a brush, roller, or any paint spraying technique.

A layer of iron hydroxide is formed between the Rust-Anode and the steel surface, acting as an oxidation inhibitor to prevent rust formation.

This ready-for-use product provides cathodic protection identical to hot dip galvanising, where the lifetime expectation is between ten and 50 years. The application of a compatible topcoat over Rust-Anode can increase this service life by approximately 2.5 times.

Rust-Anode, with scratch protection up to 4.0 mm deep, can be applied on top of a previous layer of this material and can also recharge the cathodic protection of old and worn hot-dip galvanisation, without having to dismantle the structure.

There is no requirement for chemical processes for surface preparation prior to application, but the steel should be brushed clean and contamination-free.

The Rust-Anode layer, with high plasticity, forms a perfect adhesion with the steel surface and follows the dilation and deformations of the basic metal, without cracking or peeling.

Rust-Anode and Rust-Anode Primers are non-toxic and non-flammable when dry. These ecologically green materials, with low VOCs, have excellent resistance to corrosive marine environments and are not affected by UV. The coatings can be applied in a Ph atmosphere range from 5.5 to 12.5 for resistance to acids and alkaline compounds. Other applications include cement factories, paper mills, the railways and military, pipelines, bridges and electricity pylons.

BMG supports this range with a technical advisory and back up service across sub-Saharan Africa. □



A before and after image of the BMG Rust-Anode cold galvanisation system, which was applied to galvanised sheeting to extend its life.

## Fast drying epoxy coating for industrial assets

Leading worldwide coatings manufacturer, Hempel, is introducing its new versatile high-build epoxy intermediate coating to help deliver longer service life for industrial assets. Hempaprime Multi 500, which is launching globally, gives faster drying times and shorter minimum overcoat intervals for the oil and gas, infrastructure and power generation sectors.

Specifically designed to be fast drying to optimise productivity by shortening the man hours needed for application, Hempaprime Multi 500 enables three coats to be applied in 20% less time than current products, without compromising on quality, strength, finish or the high-volume solids of the product.

As its name suggests, Hempaprime Multi 500 is a versatile coating that can be used as a direct-to-metal coating or on primed surfaces, and is suitable for primer, intermediate and topcoat application. It is also

ideal for minor repairs, offering customers simplicity with a single coating solution. This high-performance solution assures a long service life for heavy industrial applications, helping to minimise maintenance requirements.

According to Monica Li Aviram, segment group product manager, Infrastructure, at Hempel A/S, due to the unique robustness of Hempaprime Multi 500, its quick drying time, faster hardness development and improved cracking resistance, it is possible to move the coated steel or even build upon it faster, with a reduced risk of damaging the coating. This decreases the need for re-blasting and re-coating, saving time and money.

"In trials, Hempel's customers have been impressed with the product's ease of application, reduced over-coating time, smooth appearance of the dry surface, and the leveling of the intermediate surface over a range

of dry film thicknesses," she says.

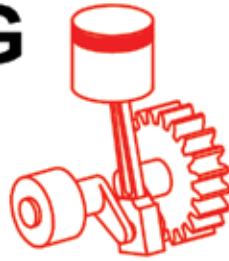
At a glance, Hempaprime Multi 500 offers:

- Faster drying for increased productivity – up to 20% reduction in production time – allowing application of up to three coats in a single shift.
- Easy application with no thinning required: optimised for easy spray, brush and roller application.
- High volume solids (up to 85%) and reduced VOCs, which makes it kinder to the environment and decreases workers' exposure.
- Improved crack and wrinkle resistance even at high dry film thickness (DFT).
- Certified to meet ISO 12944 C5-I and pre-qualified to NORSOK's M-501, Ed. 6, system 1.

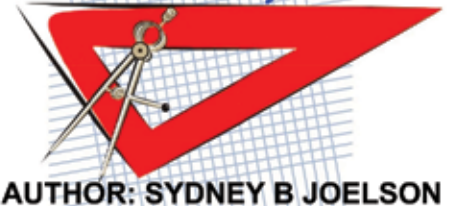
Hempel continues to invest heavily in R&D, forming value-adding partnerships with its customers, to develop unique products that are in demand and in need. □



# ENGINEERING DRAWING GUIDE



*For Students and  
Professional Engineers*



THIRD EDITION - REVISED ISBN 978-0-620-69126-0

AUTHOR: SYDNEY B JOELSON

## A Comprehensive Guide for Students and Professional Engineers

### OVERVIEW

This guide has been used (amongst other universities), by the faculty of engineering at the "University of Stellenbosch" for the past five years, for first year students. Likewise the "University of KwaZulu-Natal" has used it since its initial edition in 1996. It is not suggested that this guide replace any other technical drawing texts used at schools and colleges, however, it may complement or supplement the student's studies and their overall understanding of the fundamentals used in engineering drawing and design. In addition, it may also be helpful to apprentices in the engineering environment.

This guide was specifically designed for 1st year university students, especially those who were not exposed to technical drawing at school. It has also successfully assisted final year students at university with their research and project work.

The foundational roots/information used stems from, and was developed from, lecturing (N1-N6) technical engineering drawing and design for 8 years at a technical college. However, much of its contents is contributed to university colleagues and students.

The main purpose is to ensure adherence to the ISO Standards and Conventions; the universal engineering language used in industry. It has many illustrations, step by step examples and exercises with model answers, which are aligned to the mechanical engineering code of drafting practice.

### COMMENTS

"This book is the culmination of many years of teaching of, and first-hand experience with, the engineering drawing course which the author lectured at UKZN for 21 years. It provides a state-of-the-art textbook on the subject, including CADD, with several examples, exercises and explanations. It is recommended to all students who are studying the subject and to professional engineers who use drawing in their work."

***Dr Sarp Adali: Sugar Millers Professor of Engineering Design; Fellow of University of KwaZulu-Natal; Fellow of the South African Royal Society; Fellow of American Society of Mechanical Engineers.***

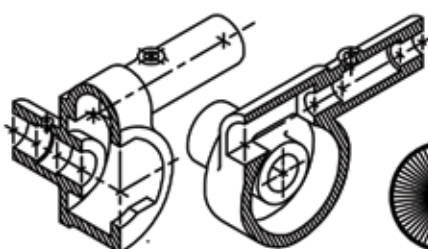
"The Engineering Drawing Guide authored by Mr Joelson has formed the basis for the first year drawing module at UKZN for many years. It is laid out in a logical and structured format. It is easy to read, understand and flows in a format that builds understanding in engineering drawing. This 'Guide' is highly recommended for tertiary education students that want a complete guide to modern day engineering drawing methods, principles and practices."

***Prof Glen Bright: James Fulton Professor in Mechanical Engineering; Academic Leader Discipline of Mechanical Engineering (UKZN); PhD, MSc, BSc, MBA.***

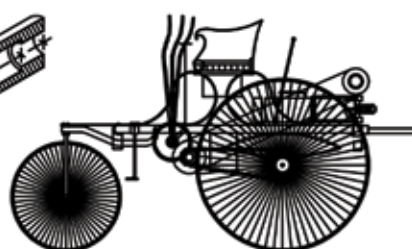
"The Engineering Drawing Guide is prescribed for students undertaking the capstone project for the Bachelor Degree in Mechanical Engineering Technology at the Durban University of Technology. The outcomes of the course require that students use best practice to produce engineering outputs that conform to established standards. As such the Engineering Drawing Guide provides very useful guidance in aiding students to produce professional engineering drawings according to the latest ISO code of practice. Besides providing information related to drawing outputs, the guide also contains other engineering data that will ensure that the book serves as a valuable reference in professional practice".

***David Jonson: PhD, Associate Professor, Department of Mechanical Engineering, Durban University of Technology (DUT)***

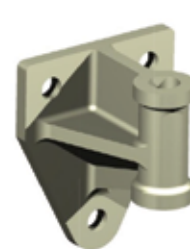
## PRACTICAL DRAWING APPLICATIONS FOR REAL DESIGN SITUATIONS



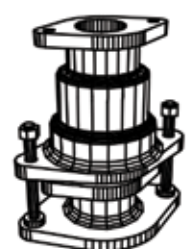
Isometric Sectional Views



2D Vector-Based Drafting



3D Solid and Surface Modelling



3D Wireframe Drafting



# The future of chiller technologies and efficiency

Carrier's AquaEdge 19DV centrifugal chiller – with Greenspeed intelligence and PUREtec low Global Warming Potential (GWP) refrigerant – was officially launched in December 2016 for the Asian markets and in January 2017 for emerging markets. Jaco Smal, AHJ Carrier's commercial sales director for the region, unravels some of this chiller's breakthrough technologies.

Carrier's most recent development, the AquaEdge 19DV centrifugal chiller with Greenspeed™ inverter technology, gives a moment-to-moment control to the compressor speed that matches the changing building load with precision and ensures that the chiller is always operating with optimal efficiency at either full or part load. The 19DV chiller, therefore, can achieve a part load efficiency of up to 11.8 IPLV under AHRI conditions, significantly cutting operating costs.

Adding to its green credentials, the chiller is designed to use Carrier's PUREtec range of low Global Warming Potential (GWP) refrigerants. These include PUREtec™ R-1233zd(E), which has an ultra low GWP of us over 1.0, is non-flammable and non-toxic solution and makes for a safe and environmentally sustainable HVAC product that is an efficient replacement for R123, as suggested by the US Environment Protection Agency (EPA).

"The AquaEdge 19DV is a 'breakthrough technology,'" says Smal. "It features advancements in refrigeration, mechanical design, aerodynamics and heat transfer, providing significant efficiency improvements in full- and part-load conditions that can lead to significant operational cost savings as well as minimised environmental impact," he adds.

"In particular, the all new advanced two-stage compressor was designed and optimised for refrigerant R-1233zd(E), which has

a GWP of 1.34 and an A1 safety classification as per ASHRAE standard 34. The compressor's low-speed direct drive back-to-back design significantly improves efficiency while balancing internal forces, enabling the use of energy-saving ceramic bearings that utilise the refrigerant already in the chiller as the lubricant. This refrigerant lubrication solves potential oil related failures and cuts down maintenance expenses," he continues.

Cutting-edge manufacturing technologies ensure that these ceramic bearings are the ideal solution for this kind of lubrication. The bearing used high-nitrogen steel with excellent toughness, a ceramic rolling element with a very smooth surface, and a glass fibre reinforced PEEK cage. This simple structure incorporated less hardware, meaning a more reliable operation throughout the operational lifespan of the chiller," Smal tells *MechChem Africa*.

Lastly, the intuitive touch screen user interface provides graphical trending and remote access capability and can be mounted on any corner of the machine. "Its simplicity, flexibility and performance make the AquaEdge 19DV very easy to own and operate," Smal assures.

## For a more sustainable environment

From a carbon footprint perspective of a building, 19DV chillers with PUREtec™ R-1233zd(E) offer very high refrigerating cycle efficiency, up to 5% higher than R-134a

systems. This is due to their outstanding thermodynamic properties. "In addition to using an excellent refrigerant, the falling film evaporator also means the 19DV chiller uses less refrigerant. Hence the 19DV is capable of significantly decreasing the energy consumption of a given application and thus reducing the CO<sub>2</sub> emissions related to electricity generated from coal-based sources," Smal explains.

Citing an example, he says that in a typical 2 400 t industrial project, the application of a Carrier AquaEdge 19DV Centrifugal Chiller will help the user to save up to 212 024 MWh of power over its 25-year lifecycle. This also results in a saving of 16 503 t of CO<sub>2</sub>-equivalent emissions.

Furthermore, the design of the 19DV EquiDrive compressors are based on advanced aerodynamic theories initially designed for use in jet engines to minimise noise generated by the aero components. On the 19DV, this has the effect of almost eliminating sound while operating the chiller, making it ideal for use in commercial or residential buildings.

From a footprint perspective, the system layout of the 19DV chillers and the crescent shape economiser is specifically designed to leverage the space between the evaporator and condenser, subsequently minimising the plant installation space needed. Comparing the 19DV to a conventional R-123 chiller, it saves up to 15% of plant installation space that can now be better used for business operations.

Equipped with a 10.4-inch, high-resolution, full-colour touch screen, the 19DV chillers are able to deliver comprehensible information in a very efficient and secure manner for the smooth running of daily activities and periodic maintenance. This is possible due to the intuitive menu, animated component level interface with timely running data, graphic trending, auto pushed alarm mail, smart password and more than 10 language choices. The chiller is compatible with Modbus, BACnet and LonWorks and the display can seamlessly connect with building automation systems or Carrier i-Vu control networks.

The market's response? "Very positive industry comments," Smal concludes. □



On show at the International AHR show in Las Vegas earlier this year, the new Carrier AquaEdge® 19DV water-cooled centrifugal chiller represents the future of chiller technologies and efficiency.



# Total refrigerant solutions for SA

Celebrating its 20<sup>th</sup> anniversary this year, A-Gas South Africa's is a global leader in the supply and lifecycle management of refrigerant and service gases to the heating, ventilation, air-conditioning and refrigeration (HVACR) industries. The company's primary focus in South Africa is providing total solutions to its diverse markets.

**A**-Gas South Africa is segmented into five business units, namely Refrigerants, Environmental Services, Industrial Special Products, Fire Protection and Performance Chemicals. "Through the wider A-Gas network, we see ourselves as being able to think globally and deliver locally. Our global knowledge and reach, combined with significant investment in bulk storage, equipment and cylinders, ensures we can deliver the latest technologies and products," says MD Johnny Scott.

The growing trend for environment-friendly products has resulted in A-Gas South Africa actively promoting 'cradle-to-grave' product stewardship. "We have a unique environmental service offering, whereby customers have the option to return unwanted and/or contaminated refrigerants to be recycled or destroyed," Scott continues.

This is a clear example of the company's commitment to ensuring that the local HVACR industry remains up-to-date with the latest trends and developments. In this regard, A-Gas South Africa remains at the forefront of technological development within the industry.

"We have the added benefit of sharing skills and experiences from more developed and advanced markets that the Group has established over the past 20-plus years. During this time, A-Gas has built up a respected brand both locally and globally, a brand associated with quality product and high levels of service," he adds.

A-Gas South Africa has also played a leading role in ensuring that the local HVACR industry meets the requirements within the regulatory framework established under the Montreal Protocol, an international treaty designed to protect the ozone layer by phas-

ing out the production of the substances responsible for ozone depletion.

The company was established in 1993 to introduce 'greener' alternatives to traditional CFCs (chlorofluorocarbons), A-Gas South Africa Commercial Director Chris Phillips points out. "We specialise in the supply of the latest environmentally acceptable refrigerants, in addition to developing world-class recovery and reclamation facilities," he says.

A-Gas South Africa is always cognisant of the latest international developments in the HVACR industry. For example, it hailed the signing of the Kigali Amendment on 15 October 2016 as a "historic international agreement" for the phasedown of commonly-used, high GWP (Global Warming Potential) refrigerants.

The Kigali Amendment includes: specific targets and timetables to replace HCFCs with more environment-friendly alternatives; provisions to prohibit or restrict countries that have ratified the protocol or its amendments from trading in controlled substances with states that are yet to ratify it; and an agreement by developed countries to help finance the transition of poor countries to alternative safer products.

In particular, African countries opted to phase down the chemicals faster than required, citing the grave threats the region faces due to climate change. "We have been able to meet our target of reducing our HCFC consumption by 10% in 2015, and are committed to ensuring we meet all of our targets," said South African Minister of Environmental Affairs, Bomo Edna Molewa.

The Kigali Amendment has divided the world's major economies into three groups, each with a target phase-down date. The most developed countries, including the US and the

A-Gas MD,  
Johnny Scott.



European Union, will reduce the production and consumption of HCFCs from 2019. Most of the world, including China, Brazil, and all of Africa, will freeze the use of HCFCs by 2024. A small group of the world's hottest countries, such as Bahrain, India, Iran, Iraq, Kuwait, Oman, Pakistan, Qatar, Saudi Arabia, and the UAE, only have to halt HFC production and use by 2028.

"We believe that the Kigali Amendment is overwhelmingly good news for our business, and will help strengthen and grow A-Gas across all of our regions, as well as bringing new and exciting business opportunities. Robust international environmental policies, together with the necessary level of enforcement, are key drivers in the success of A-Gas worldwide. With this latest announcement, we see this continuing to grow for many years to come," reveals A-Gas group commercial business development director, Ken Logan. □

*HFO-1234yf is a new class of refrigerant with a global warming potential (GWP) 335-times lower than R-134a and only four-times higher than CO<sub>2</sub>. It has similar cooling properties to R-134a, commonly used as an automotive refrigerant.*





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# Environmental Leader Awards and climate commitments

At the 2017 Environmental Awards earlier this year, Ingersoll Rand won a product award for its Next Generation R-Series line of compressors, while sustainability leader, Deborah Kalish, received an Energy Manager Today 50 award.

Ingersoll Rand®, a world leader in creating comfortable, sustainable and efficient environments, won an Environmental Leader Product Award for its Ingersoll Rand Next Generation R-Series line of compressors at the Environmental Leader Conference in Denver, Colorado on June 6, 2017. Deborah Kalish, programme manager for Ingersoll Rand, also received an Energy Manager Today 50 award at the conference.

The Environmental Leader Product and Project Awards recognize excellence in products/services and projects that provide companies with environmental, sustainability and energy management benefits: winners are awarded Top Product based on scores from a panel of judges with experience in environmental management.

"We are honoured to receive this award at the Environmental Leader Conference," said Kevin Kosobud, contact-cooled portfolio leader for Ingersoll Rand Compression Technologies and Services. "This technology helps our customers improve their energy efficiency and sustainability. It has been a great example of how, through a commitment to innovation and global teamwork, we are bringing leading edge efficiency technology to the market."

The Next Generation R-Series air compressors deliver enhanced performance

and reliability, lowering operational costs for those in need of general-purpose plant air in support of many manufacturing applications. All fixed-speed models are 16% more efficient compared to legacy products, while the efficiency of the company's variable speed options is up to 35% higher compared to the industry average.

In recognition of her sustainability efforts, Kalish also received an Energy Manager Today 50 award at the conference award ceremony. She leads sustainability efforts for new product development and serves as the programme manager for the company's Climate Commitment. Kalish received the award for her leadership in the development of improved energy management strategies that impact the company as well as the acceleration of the industry.

## Ingersoll Rand's climate commitment

Ingersoll Rand made a climate commitment to reduce greenhouse gas (GHG) emissions from its products and operations by 2030. The Ingersoll Rand Climate Commitment pledges to:

- Cut the GHG refrigerant footprint of its products by 50% by 2020 and incorporate

lower GWP alternatives across its portfolio by 2030.

- Invest US\$500-million in product-related research and development by 2020 to fund the long-term reduction of GHG emissions.
- Reduce company operations-related GHG emissions by 35% by 2020.

The company's climate commitment has supported the avoidance of approximately 6.7-million metric tons of CO<sub>2</sub>e globally, which is equivalent of avoiding annual CO<sub>2</sub> emissions from the energy used in more than 700 000 homes. By 2030, the company expects to reduce its carbon footprint by 50-million metric tons.

Ingersoll Rand advances quality of life by creating comfortable, sustainable and efficient environments. Its people and its family of brands, which include Club Car®, Ingersoll Rand®, Thermo King® and Trane®, work together to enhance the quality and comfort of air in: homes, building and transport environments; to protect food and perishables; and to increase industrial productivity and efficiency. □



Left: Deborah Kalish receives an Energy Manager Today 50 award for her sustainability leadership efforts. Right: Kevin Kosobud receives Ingersoll Rand's Environmental Leader Product Award for Ingersoll Rand's Next Generation R-Series compressors.

## Half of our electrical needs from alternative sources

A requirement of the South African National Standard Act 10400-XA 2, is that a maximum of 50% of a new building's water heating may come from an electrical resistance element. In other words, all new buildings must have half their electrical needs supplied by alternative energy sources.

What are the options? The best are a solar system, a gas water heater or a heat pump. When sized correctly, a solar system has the potential to generate hot water at virtually no cost, provided back-up electric elements are not needed.

Sunshine provides one eight-hour heating period every day and most hot water use

age occurs in the morning and in the evening. It is therefore advisable to double the size of the water tank when replacing a conventional geyser with a solar system, to ensure there is 24-hours' worth of water stored. Even so, the downside is that the water will be lukewarm or cold on some overcast days.

If you use a back-up heating supply (whether gas or electricity) to warm the water when solar power alone is not sufficient, running costs will rise. This cost works out to about the same as the annual average running cost of a heat pump system.

Heat pumps do use electricity to generate hot water, but 70% less is needed com-

pared to conventional electric geysers. And while some gas water heaters work without any mains electricity supply, compared with solar and heat-pump systems, gas has a relatively high running cost.

Taking running costs and availability of hot water into account, a heat pump looks like the best option, yet of the three options, it is the one with which South Africans are least familiar.

"A heat pump is a bit like a reverse-action air-conditioner," explains Mike Alton, co-founder of HydraTherm. "It transfers heat from the air around it to the water in its geyser. It requires roughly a third of the electricity used by a conventional geyser to heat the same amount of water," says Alton. □

# Remedying problems in reverse

Jens Lipnizki from the Membranes Liquid Purification Technologies business unit of LANXESS talks about keeping reverse osmosis water purification systems healthy and how to overcome some of the problems that inevitably occur when using this technology.

Reverse osmosis is a standard water treatment technology that has steadily gained increasing acceptance over the years. Handy design programmes, helpful literature and improved knowledge have led to this technology becoming much more commonplace. For example, reverse osmosis is no longer limited to use in industrial water treatment facilities, but also now has domestic applications such as for treating mains water.

Whatever the application, however, the fundamental problems that can be observed in membrane processes have not changed, namely: falling rejection rates; and reduction in performance due to reduced flow or higher pressure.

When such problems occur, the first question to be clarified is whether there have been any changes in water quality or temperature. To make it easier to localise problems, it is important to document basic parameters such as temperature, flow, pressure, yield and conductivity. In addition, it is also helpful to measure the pressure loss, preferably between the concentrate levels.

This data should be normalised, that is, expressed in relation to a standard situation so that it is possible to assess whether the

change in performance is due to the system or changed inflow parameters. Calculation tables for this purpose are provided by the membrane manufacturers free of charge.

Aside from this, it is vital to check that other facility components such as measuring equipment, antiscalant dispensing units and ion exchange systems are running smoothly.

If, after normalisation, the data deviates as tabulated below, then the reasons for the deviation should be investigated more closely.

- 20% higher salt passage – compared to 100% salt rejection.
- 10% reduction in flow.
- Greater than 20% pressure loss along a pressure pipe.

Frequently, small facilities only record a few measurement values, and these are generally not normalised. Where this is the case, the influence of temperature and variations in the salt load in the water should be taken into account. The rule of thumb here is that for each degree Celsius the temperature drops, flow is reduced by approximately 3.0%.

## Investigating the problem

It goes without saying that the investigation process depends on the problem observed. If the salt passage has increased, that is, the



At its Bitterfeld site in Germany, LANXESS produces membranes for water treatment under the brand name Lewabrane.

rejection percentage has worsened, this can indicate chemical or mechanical damage to the membrane or element. Reduced flow, on the other hand, is generally due to organic, biological or inorganic fouling. The table below provides an overview of the tendencies and potential reasons for a drop in performance.

It is difficult, however, to localise and then deal with the problematic point in the system.

## Increased flow and deterioration of salt rejection

When there is increased flow and a deterioration of salt rejection, the conductivity of the permeate in all pressure pipes is checked in case any of the values are significantly elevated. If any single pipe is conspicuous, the element can be identified using the 'central pipe testing method'. This involves passing a flexible hose into the central pipe of the coiling element to the end of the pressure pipe and then slowly pulling it back out, catching some of the permeate in the hose. This sample can then be tested for conductivity.

Should this suddenly rise at any point, the location of the leak can be identified based on the length of hose that has been pulled out.

The leak might either be due to damage to the element itself or to the interconnector between the elements.

If all the elements demonstrate significantly increased conductivity with higher flow,

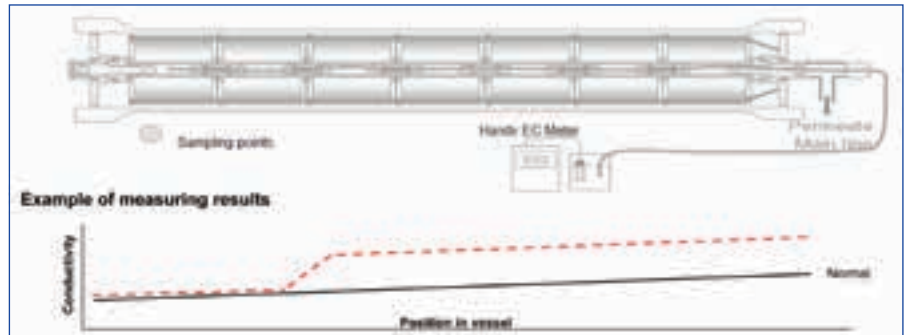
Changes			Observation
Flow Rate	Rejection	$\Delta p$	
↗	↘	→	Leak from element parts (o-ring, brine seal, center pipe)
↗	↘	→	Membrane leak (back pressure, abrasion)
↗	↘	→	Degradation of support membrane
↗	↘	↗	Scaling
↗	→	↗	Biofouling
↗	↘	↗	Particle Fouling
↗	→	→	Chemical Fouling (Adsorption)

↑ increase   ↓ decrease   → not change   ↗ ↘ ↙ ↕ main system

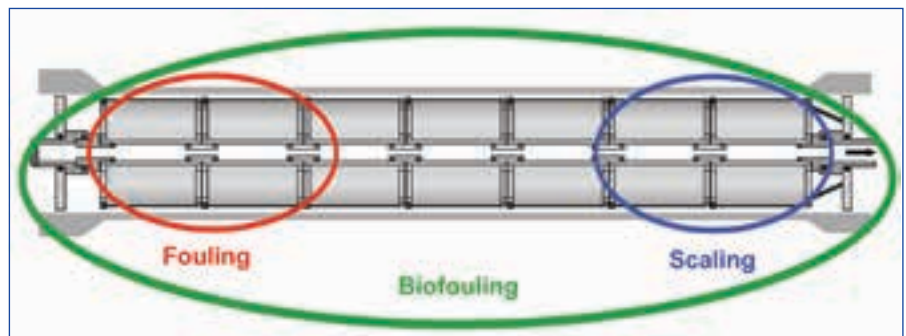
An overview of the tendencies and potential reasons for a drop in performance of a reverse osmosis water purification system.



# osmosis processes



The 'central pipe testing method' involves passing a flexible hose into the central pipe of the coiling element and then slowly pulling it back out to catch some of the permeate. The location of any leak can be determined by a sudden rise in conductivity of the permeate.



Organic fouling leads to blockages on the upstream side; higher salt load on the downstream side is likely to cause scaling; and biological fouling can spread throughout the entire system.

this could indicate permanent damage. This can be a result of oxidation agents such as chlorine, solvents that have dissolved some of the polymer membrane, or it can be caused by overpressure in the permeate, which causes delamination of the membrane.

The upstream elements are more likely to be affected by oxidation than the downstream ones. Delamination, on the other hand, is more likely to affect the downstream elements, since this is where permeate overpressure is likely to be highest. Final clarification in this case can only come through an element autopsy, as this kind of damage cannot be assessed from the outside.

Increased flow and reduced rejection are clear indicators of a leak in the system that has to be remedied. This can frequently only be achieved by replacing the elements or small parts such as O-rings and interconnectors.

## Reduced flow

If there is reduced flow, or if greater pressure is required, then there is likely to be soiling (fouling). Depending on how pronounced it is, this can also lead to a reduction in salt rejection. Fouling is often associated with increased pressure loss along the entire pressure pipe, as the flow channels become blocked.

While organic fouling primarily leads to blockages on the upstream side, the higher salt load on the downstream side is more likely to cause salt precipitation, inorganic fouling, or scaling. Biological fouling can

spread throughout the entire system and can therefore be found at various points.

It is generally possible to determine the nature of the fouling by opening the pressure pipe. A quick inspection is usually enough to find an organic blockage, white salt crystals or biomass.

Uninstalling and weighing the element will determine the degree of fouling. It must be drained for approximately 15 minutes before determining the weight. If, for example, an 8-inch element that normally weighs about 16 kg suddenly weighs more than 17 kg, this could be due to heavy fouling.

In most cases, cleaning the element in good time can restore performance. Alkaline cleaning should be used to clear organic or biological fouling, while complexing agents are used for inorganic fouling in acidic ranges.

## Summary

A significant increase in flow combined with a simultaneous reduction in rejection must always be assessed as critical, as it can be attributable to damaged elements or seals. It is generally necessary to replace the damaged parts.

Decreased flow is usually caused by fouling. In this case, it is essential to determine the degree and nature of the fouling so as to select the appropriate cleaning strategy.

If initial examination does not provide clear enough results, an element autopsy can be useful. This can be conducted at appropriate institutions and involves both a test of the element and a surface analysis.

Ultimately, however, it is important to test whether the cause of the drop in performance can be eliminated so as to ensure a stable process. □

## Reverse osmosis and LANXESS' Lewabrane membranes

Reverse osmosis is used to filter out undesirable substances from water, such as dissolved salts, pesticides, herbicides, viruses, bacteria and particulates. It is used for desalination of seawater, brackish water, and low-salinity industrial water. Among the most important applications for reverse osmosis membranes is the treatment of process water for power plants and the generation of ultrapure water in the microelectronics sector.

LANXESS' Lewabrane products are spirally wound, thin-film, composite reverse osmosis membranes. The product line includes elements for all the main reverse osmosis applications. □

# Water, wastewater and the circular economy

*MechChem Africa* visits the South African headquarters of Veolia Water Technologies South Africa in Modderfontein, Gauteng and talks to business development manager, Thabo Mogadima, and general manager for marketing, Chris Braybrooke, about seeing wastewater as a valuable resource.



Veolia can trace its history back to 1853 when Napoleon III realised that state-owned infrastructure in France was not being well looked after. By Imperial decree, he formed a water company named Compagnie Générale des Eaux (CGE), which obtained a concession to supply water to the public in Lyon – and CGE served that city for over a hundred years.

“We have over 160 years of experience in the operation and maintenance of water treatment plants,” says Braybrooke. “We know water,” he adds.

CGE became Vivendi in 1998, it spun-off its remaining water and waste companies into Vivendi Environnement in 2000 and in 2003 became Veolia Environnement.

In South Africa, Veolia Water Technologies South Africa traces its roots back to 1972 as Chematron Products, a privately owned company focused mostly on the food and beverage markets. “Chematron’s largest client was Coca-Cola and it built 80% of the water treatment plants throughout Africa that were used for manufacturing Coke,” Braybrooke recalls.

USFilters acquired Chematron just before being acquired by the Vivendi Group, and the combined local entity became Veolia Water Systems South Africa in 2004. “Then in 2005, Veolia acquired the Paarl-based water treatment division of the Weir Group, Weir Envig, which took the local Veolia entity up to 190 people,” he tells *MechChem Africa*.

“Following the local acquisition of Namibia’s ASE Holdings, developers of wastewater treatment technology that was well-suited to African conditions, our staff complement went up to 250 people. Today we are a

fully integrated company with over 500 people and operations in Modderfontein, Sebenza and Isando (Gauteng), Paarl (Western Cape) and north of our borders we have footprints in Namibia and Botswana,” he continues, adding that, to implement a water treatment solution, “we can select from over 350 different water and wastewater technologies.”

“When it comes to water, we take the circular economy approach. Traditionally the approach has been to treat, use and then dispose – but one of our mottos is ‘resourcing the world’. We do not simply focus on the treatment of water. We see wastewater as a valuable resource, which means we strive to keep that resource in-use for as long as possible to extract the maximum value from it. We do this by recovering and regenerating the water and its contaminants at the end of each cycle,” Braybrooke explains.

“Every form of water is treatable, no matter how contaminated it is, and we can demonstrate this through some of our installed value-adding solutions,” he assures.

At the Modderfontein head office, Veolia offers turnkey design and build services that start on a blank piece of paper. “We like to get involved at the feasibility study stage and, from there, we do the technical studies; design and build pilot plants where required; and then move on to full-scale plant implementation,” he notes.

Veolia’s Engineered Systems Division, located in Sebenza, is a platform for constructing modular water treatment plants that incorporate design and onsite manufacture.

Braybrooke continues, “and while most of our work is done for the South African market, these systems are being installed all over Africa.”

The turnaround time for modular water plants is very quick and Veolia has numerous sub-system designs that can be incorporated to meet exact specifications and needs. “We call these ‘plug-and-play’ treatment units because they are built, commissioned and tested before leaving our facility. Once onsite,



Having built the Durban Water Reclamation (DWR) works, Veolia won a 20-year maintenance and operation concession to look after this plant – which is now into its 17<sup>th</sup> year.

the commissioning time is weeks – not years,” he adds.

In addition to the plant design and equipment side of its business, Veolia Water Technologies SA’s Isando plant manufactures and supplies HYDREX™ water treatment chemicals and media needed for the long-term operation of plant. “We can offer the chemicals needed for any dosing and treatment application. This is what we mean by a ‘full service offering’. We are not simply focused on the initial plant contract, but we play a role in the operation and maintenance of water treatment plant and infrastructure at every level, for its complete lifecycle,” Braybrooke notes.

“Also being an environmental company, we apply green philosophies and we continuously seek to minimise environmental impact. The ‘true cost of water’ includes risks to clients and to the environment. By adopting holistic solutions for the full lifecycle of a water or wastewater treatment plant, we are able to mitigate these risks,” Braybrooke assures *MechChem Africa*.

## Technologies and success stories

Describing the general nature of all water treatment solutions, Mogadima says that there will always be some form of pre-treatment involved, starting with filtration and clarification. “We have a very good range of Hydrotech® Discfilters which are very efficient with low-maintenance requirements and small footprints,” he notes.

These can filter down to 10 µm and they are 100% self-cleaning – the plant does not have to be stopped to ‘backwash’ these filters.

“Once filtered, the water still contains suspended micro-particles that cause turbidity that are removed through a clarification





process,” he continues. Traditional clarifiers are circular settling tanks where flocculants are used to thicken the fines, which then settle to the bottom of the tank as sludge.

“Veolia’s proprietary Multiflo™ and Actiflo™ technologies enable all of the fine suspended solids to be very efficiently and rapidly removed,” Mogadima adds. “These are high-rate units that eliminate the need for a traditional clarifier entirely”.

The design of traditional settling-based clarifiers can give rise rates of about 2.0 m/hr. “Our Multiflo technology can achieve between 6.0 and 40 m/hr and Actiflo can reach up to 100 m/hr,” he notes.

How does it work? “We use micro-sand as ballast which binds with the micro floc for very fast settling times,” Mogadima explains. “This reduces hydraulic residence times and offers compact system footprints that are up to 50 times smaller than traditional clarifiers of similar capacities.”

With thousands of global references, Multiflo and/or Actiflo clarification technologies are ideal for treating drinking water and municipal wastewater; and industrial wastewater reclamation.

Depending on the water quality required, a few further ‘barriers’ may be required to achieve the required water quality. “To produce potable water for municipal use, we need to apply further disinfection by chemical dosing via ozone or UV-treatment.

“We also offer modern versions of traditional systems such as our Filtraflo™ gravity filters which use different layers of custom-designed media to achieve high-filtration rates. Veolia offers multiple solutions for each water treatment process which allows us to customise and optimise plants to best suit the specific flow rates, contamination levels and the end quality of the treated water,” he informs *MechChem Africa*.

Braybrooke adds: “With water scarcity becoming more of a problem, it is imperative

*Veolia’s proprietary Multiflo™ technology eliminates the need for a traditional clarifier. The design of traditional settling-based clarifiers can give rise rates of about 2.0 m/hr, while Multiflo technology can achieve between 6.0 and 40 m/hr.*



*Veolia’s Engineered Systems Division, located in Sebenza, is a platform for constructing modular water treatment plants that incorporate design and onsite manufacture.*



*One of Veolia’s mobile water treatment plants (WTPs).*

# QUALITY PURIFIES.



The efficient and sustainable treatment of water plays a decisive role in many industries, especially as zero liquid discharge is becoming the license to operate. As one of the world's leading manufacturers of products for the purification of water and other aqueous effluents, LANXESS has been providing innovative, cost-effective water treatment solutions for more than 80 years.

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X **Lewatit®** X **Lewabrane®** X **Bayoxide®** **LewaPlus®**

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Emerging Chemistry





**Above:** The Stellenbosch Membrane Bio Reactors (MBRs) under construction. MBRs are replacements for clarifiers and can remove suspended solids, pathogens and micro-organic impurities in a single step.

**Right:** For coastal areas throughout South Africa where water security is a key issue, Veolia establishes desalination plants, the biggest to date being the 15 M $\ell$ /day plant in Mossel Bay.

that municipalities and bulk water suppliers become aware of all of the technology options available. Generally, when new plants or upgrades are needed, utilities appoint the same consultants who tend to avoid adopting new and proven technologies. They tend to fall back on large, civil-based water treatment technologies that cannot recover water at nearly the same rates or efficiencies.

"In Stellenbosch and Belville in the Cape, we are using Membrane Bio Reactors (MBRs), for example, as replacements for clarifiers," Mogadima continues. "Here we plug-in membrane cassettes into a small tank instead of using a large cement pond. These cassettes can remove suspended solids, pathogens and micro-organic impurities at the same time to produce very pure water in a single step," he reveals.

They work similarly to Reverse Osmosis membranes but with larger pores. The water coming out of an MBR can be safely discharged or used for irrigation without further treatment, "and very few further processes are required to achieve potable quality water."

Describing a benchmark South African success, Braybrooke says that when Durban looked like it was running out of water back in 2000, Veolia was asked to look at industrial water reuse options for Mondi and Sapref plants. "The idea was to use this industrial water as an 'over the fence' supply for these industrial clients, which would free up 47 M $\ell$  per day from the municipal water system.

Having built the Durban Water Reclamation (DWR) works, Veolia won a 20-year maintenance and operation concession to look after this plant – which is now into its 17<sup>th</sup> year. "This was the first PPP in the



water sector and it shows what technology can do. Millions of rands have been saved over the years, which is fantastic for Veolia, Sapref, Mondi as well as for Durban residents and the municipality," he notes.

Mogadima also cites the Goreangab Water Reclamation plant in Windhoek, which takes water reclamation one step further. "This is a reclamation and direct-use wastewater plant. It takes in municipal wastewater and supplies potable water directly back to the municipality via a range of advanced treatment technologies.

"The approach is known as Direct Potable Reuse (DPR). Instead of treating wastewater for discharge into rivers and dams and then re-treating it at a separate water treatment plant, the water is circulated in a closed system. These systems are going to be increasingly important in Africa, particularly in water-stressed regions such as Namibia," he points out.

On the industrial wastewater side, Braybrooke describes a project completed for the Sasol Landlord project: "Here, we take water with concentrated salts and we treat it in different streams. At the highest-

quality level, we use the treated water as boiler feedwater, which has very high-purity specifications.

"Called 'Zero Liquid Discharge' (ZLD) this has two immediate advantages: it does not consume any of the potable water from the local community's supply; and no wastewater is discharged.

"Many industries are now moving towards ZLD. They reuse their own water over and over, and produce only solid waste, using, for example, Veolia's evaporation crystallisation process which removes salt crystals in a preferred sequence that can then be reused," he explains.

"And while many of our large plants are moving this way, including ArcelorMittal and Columbus Stainless, the treatment processes involved are also becoming viable for small and medium users via our modular and containerised solutions, for example," Braybrooke comments.

With regard to mine wastewater, Veolia sees Acid Mine Drainage (AMD) as a large water resource rather than a waste disposal problem. Currently, treatment is mostly restricted to primary dosing. Lime is added

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and the sludge is settled out and stored. The 'neutralised' water is then discharged into the river systems.

"A new plant in Emalahleni, Mpumalanga (built by Aveng), however, is a full AMD treatment plant that takes in the contaminated water and produces potable water for the municipality. It uses membrane-based Reverse Osmosis (RO) processes to also desalinate the water. This is a necessary step to avoid increasing the salinity levels in the river systems where the water is discharged.

"The Central and Western basins of Gauteng, however, are crying out for an investment in full treatment plants that can reclaim AMD to potable or industrial water quality," he believes.

### Seawater desalination

"The recent drought in the Western Cape has highlighted water shortages and we are often asked if seawater desalination is the way to go. 'Yes and no', is our response," adds Braybrooke.

"In some coastal regions it has become the only option and, to date, we have built seven seawater desalination plants for coastal areas throughout South Africa – the biggest being a 15 Mℓ/day plant in Mossel Bay. Desalination is viable when water security is the key issue. It provides a guaranteed supply that is not dependent on rainfall or river flows, but it is more expensive – up to double the cost of freshwater solutions.

"But outside of these regions, our recommendation is to focus on existing plants: drive

down their costs, improve their reliability and their water recovery efficiency. This involves using newer technologies to better optimise the plants and reduce the costs-per-unit of water produced," he suggests.

"What we also say is that desalination should also be routinely used inland, for industrial water treatment and for AMD reclamation, for example," Braybrooke advises.

"Veolia has numerous technologies that can be used to convert older treatment plants to modern-day standards. Our lamella packs, alone, can double or triple the production rate of older treatment plants.

"With our Africa Initiative, we are re-aligning our offering to best suit this continent's needs. But we are also starting to export into Europe. To cope with this growth, we are moving into larger premises and re-organising the staff to service both South Africa and the broader African Initiative.

"Our recent B-BBEE partnership demonstrates our commitment to economic transformation and our willingness to align with government expectations. And our global parent company, Veolia, was awarded the



*The Sasol Landlord project is a zero liquid discharge (ZLD) plant, where water with concentrated salts is treated in different streams at the highest-quality level.*

2016 Water Company of the year Award by Global Water Intelligence.

"We have the credentials, the will and the technologies to make much better use of our valuable water resources," Braybrooke concludes. □

## Veolia signs landmark B-BBEE deal with Ceracure

On 26 July, Veolia Water Technologies South Africa (Veolia) officially unveiled its new strategic partnership with Ceracure (Pty) Ltd (Ceracure). This landmark shareholding agreement strengthens the company's compliance with new Broad-Based Black Economic Empowerment regulations as a high level contributor and demonstrates its continued commitment to local empowerment and transformation.

"Veolia was looking for a local development partner with strong project experience in the water treatment markets," explains Gunter Rencken, managing director of Veolia Water Technologies South Africa. "In Ceracure, with whom we've had a less formalised working partnership for about four years, Veolia has a hands-on, active B-BBEE partner with a thorough understanding of our core business and the water treatment market."

This close alignment in corporate vision lays the basis for a synergistic approach to increased business development in both

South Africa and Africa. "With this partnership in place, Veolia can confidently amplify business development avenues and enhance our project reach in the municipal and industrial markets," Rencken continues.

"In addition to demonstrating Veolia's seriousness to transformation and social development, it also means we'll be able to supply water treatment solutions encompassing a broader scope of works," explains Langa Nxumalo, managing director of Ceracure. "Together, we can advance our technical and business capabilities, offering a superior and integrated solution for water treatment projects. This 'one plus one equals three' strategy will allow better project execution in line with clients' requirements, all thanks to a good balance sheet and technical experience from Veolia."

The partnership will also see Veolia South Africa taking an active approach to expanding Ceracure's business capabilities. "We are assisting Ceracure with achieving a higher CIDB grading, and have planned for a

structured transfer of technology and skills from Veolia's water treatment expertise to Ceracure," Rencken explains.

Veolia's shareholding arrangement with Ceracure represents an important pillar of the company's new vision that is enhancing the water solutions specialist's delivery of highly efficient, low-footprint water treatment technologies in South Africa and Africa. Alongside the B-BBEE deal is a range of recent organisational and technological innovations that have streamlined the company's manufacturing, distribution and service networks across the region. Veolia South Africa is now positioned as a key technology and manufacturing hub for Veolia's new range of standard engineered products and systems as well the company's range of Hydrex™ speciality chemicals.

"We are excited to welcome Ceracure on board, and look forward to a fruitful synergy with them as we continue to tackle Africa's water treatment challenges," Rencken concludes. □

## Tracking industrial trends

# Light steel frame construction – has its time come?

In his Tracking industrial trends column this month, Gary i. Crawford of Mettle Strategic Creativity talks about our resistance to adopting innovation and the ‘no brainer’ light steel frame (LSF) construction technology.



**B**efore I was ‘conscripted’ into the world of engineering, I was a member of the brotherhood of psychologists. One of the advantages of that life was the plethora of theories to explain anything on earth. But, something I could never come to grips with was the aversion of many people to innovation.

Deciding to build a light steel frame (LSF) eco-house in the Hartbeespoort area, my wife and I visited many residential estates there, only to discover that virtually all had banned LSF building methods. Most claimed that LSF was not permitted on ‘aesthetic’ grounds. As always having believed that ‘aesthetics’ generally concerned the appreciation of beauty or good taste, or the guiding principle in matters of artistic beauty, I defended LSF on grounds of it being a sound, proven construction technology and pointed out to these guardians of estate architecture that LSF-built homes could even take on the guise of the Tuscan, Balinese, French Provençal abominations that are littering the beautiful African landscape.

I made no converts. Perhaps, my diplomatic skills need honing!

It got me thinking about nineteenth century American essayist Ralph Waldo Emerson who was credited with having said: “If a man can write a better book, preach a better sermon, or make a better mousetrap, the world will beat a path to his door”, a metaphor taken so literally that more than 4 400 mousetrap patents have been issued in the US, with thousands more being unsuccessful making the mousetrap the most frequently invented device in US history.

If only ‘twere it so easy.

Innovation is no guarantee of success. No matter how incredible your product innovation, you have to sell it. Most advertising professionals will agree with Jack Trout and Al Ries who said in their best-selling book, ‘Positioning: The Battle for Your Mind:’ “To be successful today, you must touch base with reality. And the only reality that counts is what’s already in the prospect’s mind.’

That’s why only about 14% of the world population belongs to the so-called ‘early adopters’ minority group.

In his Diffusions of Innovations theory, Everett Rogers, a professor of communications studies, sought to explain how, why

and at what rate new ideas and technology spread. Early adopters are, after innovators, first to try new ideas, processes, goods and services. Early adopters generally rely on their own intuition and vision, choose carefully and have above-average education level. For any new product to be successful, it must attract innovators and early adopters, so that its acceptance or ‘diffusion’ moves on to ‘early majority’, ‘late majority’, and then on to ‘laggards’.

This helps me understand why ‘no brainer’ great concepts often meet an uphill battle to gain acceptance, and the world of construction provides many examples of products and processes whose ‘time has come’.

The first bricks were made in Jericho as long ago as 8 000 BC. The people there discovered they could make simple bricks by leaving clay mud to dry in the sun.

Then the Egyptians invented mortar, using gypsum as a base and the Romans developed the concept further, using a mixture of lime, water and sand.

Despite giant leaps in technology and quantum advances in materials, with the exception of the widespread use of cast concrete in commercial buildings and high-rise structures, bricks and mortar continue to hold their own with architects and builders adhering to construction methods definitely beyond their sell by date.

What are the modern alternatives? What are their benefits? Ours is a world where technological innovation is reshaping old business models and approaches. Many factors are driving a change in attitude towards how we should build: social, political, economical and environmental forces; as well as technology and the growing scarcity and expense of skilled labour.

Newer construction methods must offer improved quality, speed of construction, design flexibility and environmental performance in order to be financially attractive alternatives to slower, resource-heavy traditional methods of construction, such as bricks and mortar, concrete and hot-rolled steel.



Construction is well suited to 3D printing as much of the information necessary to create a building will exist in CAD as a result of the design process.





Advanced construction technologies available today include: 3D printing; building information modelling (BIM); advanced cladding materials and systems; computer aided design and computer aided manufacturing (CAD/CAM); and modern methods of construction such as modular construction, offsite manufacturing, prefabrication and preassembly, amongst others.

To my mind, the three most promising methods to bring about faster construction of better quality, environmentally correct buildings are: 3D printing; composite panel manufacture and use; and light steel frame (LSF) construction.

3D printing can now be used to create construction components or to 'print' entire buildings. Construction is well suited to 3D printing as much of the information necessary to create an item will exist as a result of the design process, and the industry is already well experienced in computer-aided manufacturing. It may allow faster and more accurate construction of complex or bespoke items as well as lowering labour costs.

Bearing in mind human reaction to innovation, however, it may be a long time coming before we see printed family residences.

Composite panels, consisting of a core of expanded polystyrene (EPS) or other insulating materials sandwiched between mild steel sheets, have been used for years in the construction of cold rooms. Now, using pre-painted Chromadek sheet as the facing material, the latest panels provide finished wall surfaces that are far superior to most painted finishes.

Industry leaders, such as Panelman Engineering of Rosslyn, manufacture panels with fillers appropriate for end-use. In joining the composite components together, adhesive is applied and a pressure of 1 000 kg/m<sup>2</sup> results in a finished product with no delaminating problems.

The downside is that I've yet to see a completed composite panel building finished to residential design standards. The many I have seen all look like large cold rooms or site offices.

In some other countries – China and the US, for example – modular or off-site manufactured homes cannot be told apart from traditionally constructed houses.

There are other technologically up to date construction methods offering integrity of finished product. The insulated concrete formwork (ICF) system uses polystyrene moulds or forms, into which ready-mix concrete is poured, forming the structure of the house. Both sides are then plastered to finish the wall.



*Light steel frame (LSF) building is a cost-effective construction method, with savings emanating mainly from time savings to completion, less rework, reduced logistical costs and a drastic reduction of rubble on sites.*

In common with most of the new build systems, ICF is fast to build and requires less in the way of traditional building skills. The finished product also offers fantastic insulation.

But of all the technologically advanced building methods, light steel frame (LSF) construction has the best chance of widespread acceptance.

Light steel frame buildings appear no different to conventionally built structures, except that the quality of the finishes is typically better. It is a cost-effective building method, with financial savings emanating mainly from significant time savings to complete building projects, less rework, reduced logistical costs, and a drastic reduction of rubble on building sites when compared with the brick-and-mortar alternative.

Light steel frame building is significantly more energy-efficient than heavy construction method, both with regard to 'embodied energy' of the materials and components, as well as 'operational energy' relating to heating and cooling of the building over its design life.

Its major advantage in terms of acceptance is that it complies with a South African National Standard: SANS 517:2013 – Light Steel Frame Building.

After discussions in 2006 with potential major materials suppliers, the Southern African Institute of Steel Construction formed an association: the Southern African Light Steel Frame Building Association (SASFA) in order to develop a coherent industry. A draft building code was compiled, followed by a comprehensive building standard, referred to as the SASFA Building Code. Based on this, the SABS provided an official national standard.

The sustainability of LSF is essentially based on three criteria: social acceptability, affordability and energy

efficiency. John Barnard of SASFA claims that LSF building for low-rise structures rates highly on all of the sustainability considerations:

- The buildings appear no different to conventionally built structures, except that the quality of finishes is better.
- It is a cost-effective building method, due to significant timesavings to complete building projects, less rework and reduced logistical costs.
- A light steel frame building is significantly more energy efficient than heavy construction methods.

LSF buildings comply to the insulation requirements pertaining to each climatic zone in South Africa and, according to SANS 204, they have been found to offer at least a 10% saving in electricity used for heating and cooling when compared with a brick building.

In a nutshell, LSF offers: speed of construction; reduced need for highly skilled labour; versatility of design; faster return on investment; better environmental footprints; off-site manufacture and associated better quality; healthier buildings; non-combustibility of steel; and better consistency of the steel properties – steel does not have a weak direction and is not reliant on water-cement ratios for strength.

Virtually non-existent in 2007, LSF construction has now grown to around 400 000 m<sup>2</sup> per year. Apart from needing 'the approval' of homeowners, developers, architects and builders, as an alternative to bricks and mortar, the technology is a 'no brainer'.

I guess we'll have to wait for the early adopters, early majority, late majority, and the laggards before we will be able to see LSF homes being built on every corner.

I'm not waiting, though. Come and see me in my new, eco-conscious LSF home in a few months time. □

## Service teams reduce conveyor downtime

With a network of seven strategically located service branches and over 270 service technicians, ContiTech South Africa provides at-the-mine services that lower downtime for southern Africa's conveyor belting operations. This team of service technicians, one of the largest in South Africa, is trained exclusively by ContiTech's international specialists.

Training is conducted to the company's Global Standards of Conveyor Belting Excellence and Safety – ensuring world-leading conveyor belt services in the shortest timeframe possible. The South African service teams are often contracted to oversee conveyor belt services at critical mining operations in the Middle East and in North and South America.

“By positioning our branches at southern Africa's major mining and industrial operations, we're able to support our range of premium conveyor belts with equally high-quality services,” says Craig Rouhana, sales and marketing director of the conveyor belt group, ContiTech South Africa. “In addition, by having a 270 member-strong team, we can combine equipment resources and the required manpower to any of our clients facing critical breakdowns, with two or more service

branch teams often working simultaneously to get client operations running as quickly as possible.

“It's not just about getting hands on the job,” continues Rouhana. “It's about having a team of highly skilled professionals who are trained to the highest standards.” To this end, all service technicians receive local and onsite training from ContiTech's head operations in Germany to ensure the highest-quality workmanship, which exceeds local SABS conveyor belting standards.

Conveyor belting services include belt repair, splicing, pulling, winding and disposal as well as services to belt operation structures such as pulleys, idlers and

frames. ContiTech is only one of a few companies that can guarantee a splice that can last the service life of the belt, a huge benefit when compared to the industry standard one-year warranty.

“We're able to offer this as a direct result of the global R&D of Continental AG that ensures the world's strongest adhesion to a belt's rubber components, creating a seamless belt and considerably stronger splices that utilise the original belting material,” explains Rouhana.

ContiTech service branches hold stock of service materials and of popular conveyor belt types to service clients quickly in the case of belt failure. The branches are also regularly externally audited to ensure compliance to ContiTech's global standards. [www.contitech.co.za](http://www.contitech.co.za)

## Atlas Copco launches Power Technique

Atlas Copco's Power Technique business area has been created from the current Construction Technique business area to better reflect the product applications and industries served.

The Power Technique name derives from power being the key term that customers identify with when it comes to the core product portfolio: air, power (including light) and flow. The business area serves multiple customer segments including construction, industrial, oil and gas, and petrochemicals.

“Construction customers will always be close to our core,” says Philip Herselman, general manager, Power Technique (previously Construction Technique). “However, we serve customers in many segments, and the Power Technique name better reflects this and our offering.”

The business area will continue its focus on service through the Power Technique Service and Specialty Rental divisions. The Construction Tools division

will dissolve into Portable Energy during the second half of 2017 and, from 2018, Construction Tools will no longer be an operating division.

During quarter 4 of 2017, the Portable Energy division will evolve into two focused divisions: Portable Air – with portable compressors, construction tools and compaction and concrete products – and Power and Flow, consisting of generators, light towers and pumps. More details will be communicated in the near future.

[www.atlascopco.co.za](http://www.atlascopco.co.za)



World-leading conveyor belt splicing: ContiTech is only one of a few companies that guarantees a splice that can last the service life of the belt.



The XAS 88 compressor from Power Technique's Portable Air division.

## Magnetic gripper for reliable, vacuum-free handling

SMC has added to its gripper range with the launch of the MHM-X6400, which uses a magnet for the handling of steel plate, without the need for vacuum. Ideal for workpieces with uneven or irregular surfaces or featuring holes, this magnetic gripper provides reliable and safe handling at reduced cycle times for improved productivity. It's also ideal for many and varied sheet metal handling applications including robotic handling systems.

In developing this product, SMC has looked to improve its handling flexibility by using magnetic grippers where vacuum was never an option due to the inherent limitations of a vacuum system. With a holding force of up to 120 N, the MHM-X6400 continues to hold a workpiece even when air supply is lost completely or pressure drops

are experienced, offering peace of mind when it comes to reliable and safe movement of workpieces. Furthermore, with a residual holding force of only 0.3 N or less, cycle times are reduced and productivity output is improved.

Product manager of SMC Pneumatics, Brian Abbott, explains that the MHM-X6400 fills a void and satisfies a need that vacuum could previously not accommodate. “The initial feedback has been really positive thanks to its clever design that offers flexibility, cost savings, reliability and, most of all, system safety.

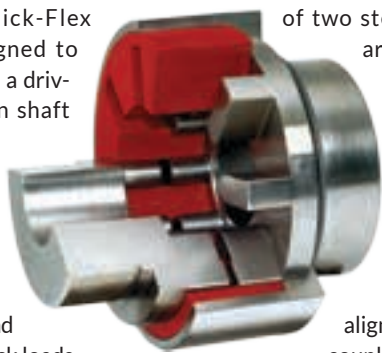
“Made from fluororubber, the bumper also prevents the workpiece from slipping and damaging during operations, improving safety,” concludes Abbott. [www.smc-pneumatics.co.za](http://www.smc-pneumatics.co.za)





## Flexible couplings offer multiple advantages

BMG's Timken Quick-Flex couplings are designed to transmit torque from a driving shaft to a driven shaft and to accommodate shaft misalignment within the drive. These maintenance-free couplings also dampen vibration and torque fluctuations and smooth torsional shock loads.



of two steel coupling hubs that are attached to the drive and driven shaft. A urethane element wraps around the two hubs and provides an effective drive mechanism. Once the two coupling hubs, insert and cover have been installed and aligned for the first time, the coupling hubs do not need to be moved again for the life of the equipment.

"An advantage of Quick-Flex drive couplings over conventional units is direct replacement with virtually all comparably sized couplings. Quick-Flex couplings require no lubrication and are also easy to install and maintain," states Carlo Beukes, general manager, power transmission, BMG. "Due to the high torque capacity of this range, the selected QF solution is often smaller than the replaced coupling. This leads to a major weight saving on the drive and reduces stress on other components. These couplings are ideal for heavy start-ups of shock loads because they have an impact load capacity greater than 200% of the maximum torque rating."

Unlike a standard jaw-type or gear coupling, there is no metal-to-metal contact between the hubs. This prevents any possible damage to the ironware during an element failure. The urethane insert can be easily changed without moving the hubs or shafts and no re-alignment of components is necessary.

The flexibility of this design makes these couplings suitable for many applications – from high speed/low torque/excessive vibration drives, to a low speed/high torque application. These couplings accept angular misalignment up to 2.0° and parallel shaft displacement up to 1.0 mm.

Timken Quick-Flex couplings consist

[www.bmgworld.net](http://www.bmgworld.net)

## New low-profile bulk solids discharger

A new Flexicon BULK-OUT™ low-profile discharger positions Intermediate Bulk Containers (IBCs) weighing up to 1 450 kg in the frame using an electric hoist and trolley, discharges bulk solid materials into a surge hopper and conveys the material to a downstream process: dust-free.

Lifting arms fitted with four eye hooks connect to the mobile IBC frame, which is equipped with four inverted cradle cups that mate with corresponding posts on the discharger frame for precise positioning of the IBC outlet.

When lowered into position, the ta-

pered outlet of the IBC's butterfly discharge valve mates with a gasketed receiving ring on the lid of a surge hopper, allowing opening of the valve and discharging of material with no dust generation.

The surge hopper is available with an integral flexible screw conveyor, tubular cable conveyor or pneumatic conveying system, which is also produced by Flexicon.

The purpose-built stainless steel IBC hopper frame measures 914 mm square by 965 mm high and includes two swivel and two rigid castors with brakes. Quick-release clamps secure the hinged hopper lid during transport and discharge of material.

A port on the lid of the surge hopper is vented to a BAG-VAC™ dust collector that puts the sealed system under negative pressure, preventing displaced air and dust from entering the plant atmosphere.

All material contact surfaces of the system are of stainless steel except for the flexible screw conveyor's polymer outer tube.

[www.flexicon.co.za](http://www.flexicon.co.za)



The new Flexicon BULK-OUT™ low-profile discharger.

## New Cape Town branch manager



SEW-Eurodrive announced earlier in the year that Jason Jackson has been appointed branch manager in Cape Town. Jackson will continue to grow the drive and automation specialist's presence in the Western Cape.

From fisheries to mining, wineries, bottling, fruit, and wastewater treatment works, the Western Cape region continues to be an important focus for SEW-EURODRIVE. With a 1 000 m<sup>2</sup> office space, a 2 500 m<sup>2</sup> of workshop-floor space and 29 staff, the branch assembles all of the company's small geared units, servo motors, and MOVIGEAR® products for distribution countrywide.

"Some of our most popular products in the Western Cape are our smaller gear units and servo motors for precision applications, in addition to MOVIGEAR products for bottling plants. Automation is a growing trend that will only get bigger due to the increasing demand for more efficient machines and plants to avoid human influence and error," Jackson comments.

Jackson's new role comprises the day-to-day running of the branch, assisting the sales force and operations, and optimising the production line and delivery times to boost output, as well as rearranging the sales areas to avoid any cross-pollination and to streamline specific product ranges into required areas.

[www.seweurodrive.com](http://www.seweurodrive.com)

## Electric cartridge pump for bearing lubrication



SKF has announced the introduction of the Electric Cartridge Pump ECP. Developed to lubricate bearings and linear guides in small machines, this reliable pump includes an integrated pressure-relief valve that enables its use in single-line lubrication systems such as SKF MonoFlex.

SKF's ECP is a cost-effective and simple-to-operate lubrication solution, packaged in a modern, space-saving design. Utilising easy to exchange 380 ml cartridges, it is compatible with both oil and fluid greases.

This electrically driven piston pump uses 24 V dc and is controlled by an external programmable logic controller (PLC) for convenience. In addition, this cartridge pump is capable of manually activating a lubrication cycle and can be used with an optional, integrated level switch to monitor the fill level of the cartridge.

[www.skf.com](http://www.skf.com)



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## Cable manufacturer recognised for automation range

Automation cable systems are specially designed for optimal performance on sophisticated automation equipment. They are therefore unique in that they require precision manufacture that not only ensures the total integrity of information relayed and current transported, the cables also need to be durable and reliable to handle the high mechanical stress and repetitive movements often associated with automated processes.

In South Africa, there is an increased move towards automation as stricter standards require ever-tighter tolerances, while the market place requires higher volumes and keener pricing. It is therefore essential that cabling systems, which are effectively the lifeblood of any automation project, are of the highest quality and fit-for-purpose.

Helukabel South Africa's sales manager, Hardus van Dyk, says automation is becoming commonplace in manufacturing, be it packaging, food and beverage processing, automotive, pharmaceuticals and a host of other production systems.

"Our high-quality cables and cable accessories (eg, cable tracks, glands and connectors), guarantee durable and reliable systems that can handle the high mechanical stress and repetitive, automated movements. Pre-assembled servo, motor and feedback cables are also available for the world's leading drive system manufacturers and these offer an economical alternative to track cables.

[www.helukabel.com/za](http://www.helukabel.com/za)



*Helukabel's high-quality cables and cable accessories guarantee durable and reliable automation systems.*

## New Hytec branch manager for Richards Bay

Herman Venter has been appointed as the new branch manager for Hytec in Richards Bay. Venter, who is no stranger to the Hytec Group, will be responsible for managing external sales and assets as well as managing internal personnel at the branch.

Venter has long been committed to growing the Hytec Group in Africa with his six years' experience as a technical sales representative at the Richards Bay branch. Prior to that, Venter honed his internal relations skills with over a decade of experience as a labour broker in the region.

"With 15 years of experience in the shipping and labour industry, Herman brings great value and insight for our Richards Bay Team," says Robbie Login, KZN area manager, Hytec. "This, paired with his approachable nature and open-door policy, will certainly see him succeed in his new role and, more importantly, help his ten-member team succeed in their roles."

Hytec is the hydraulic specialist company within the Hytec Group, specialising in the single-source supply of hydraulic components and turnkey hydraulic systems.

[www.hytecgroupp.co.za](http://www.hytecgroupp.co.za)



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# DeSALx<sup>®</sup>: the enabler for high water recovery

MechChem Africa's Peter Middleton talks to Multotec process engineer Carien Spagnuolo about the first commercial installation in Africa of the continuous ion exchange desalination solution, DeSALx<sup>®</sup>, which Multotec is introducing to the region as the local partner for Australia-based Clean TeQ Water.

Following the introduction of continuous ionic filtration (CIF)<sup>®</sup> and its dual stage big brother for desalination, DeSALx<sup>®</sup>, Multotec, Clean TeQ's regional partner for Africa is currently installing its first commercial water treatment plant to use this technology.

"This is good news. We are now busy implementing our first-ever wastewater treatment plant to use the DeSALx ion exchange water purification process," says Spagnuolo. "In conjunction with other water treatment technologies, this project will apply continuous ion exchange technology at an antimony roaster in the Middle East. Both the complexity of the treatment requirements and the harsh environment offer a rigorous testing opportunity for our technology," says Spagnuolo.

"Antimony is a very interesting mineral. It has long been used for the lead antimony plates in lead-acid batteries and to improve the properties of lead-tin alloys, but it is increasingly critical for the manufacturing of modern micro-electronic components," she tells *MechChem Africa*.

Antimony (Sb) is an

element that is mined as a sulphide called stibnite ( $Sb_2S_3$ ). Antimony roasting involves reducing this sulphide to produce metallic antimony, a process that also produces dangerous off gases that have to be scrubbed to prevent them from polluting the atmosphere.

"This project involves cleaning the wastewater from the scrubbers and the cooling tower blowdown. For the towers, because the cooling water is recycled, it becomes increasingly concentrated with dissolved salts. The DeSALx process has been widely used for purifying blowdown water, by taking the bleed off and removing the dissolved salts so that the water can continue to be used for efficient cooling," Spagnuolo explains.

"The most important use for this treatment plant is to treat the scrubber wastewater, which is contaminated with antimony and arsenic, which are both heavy metals, as well as calcium ions, sulphates and sulphites," she adds.

"The most important use for this treatment plant is to treat the scrubber wastewater, which is contaminated with antimony and arsenic, which are both heavy metals, as well as calcium ions, sulphates and sulphites," she adds.



bing with water. The wastewater produced is saturated with calcium ( $Ca^{2+}$ ) and sulphate ( $SO_4^{2-}$ ) ions. In addition to this, the scrubber wastewater for antimony roasters has dangerous antimony and arsenic contamination, which has to be removed and disposed of safely," she says.

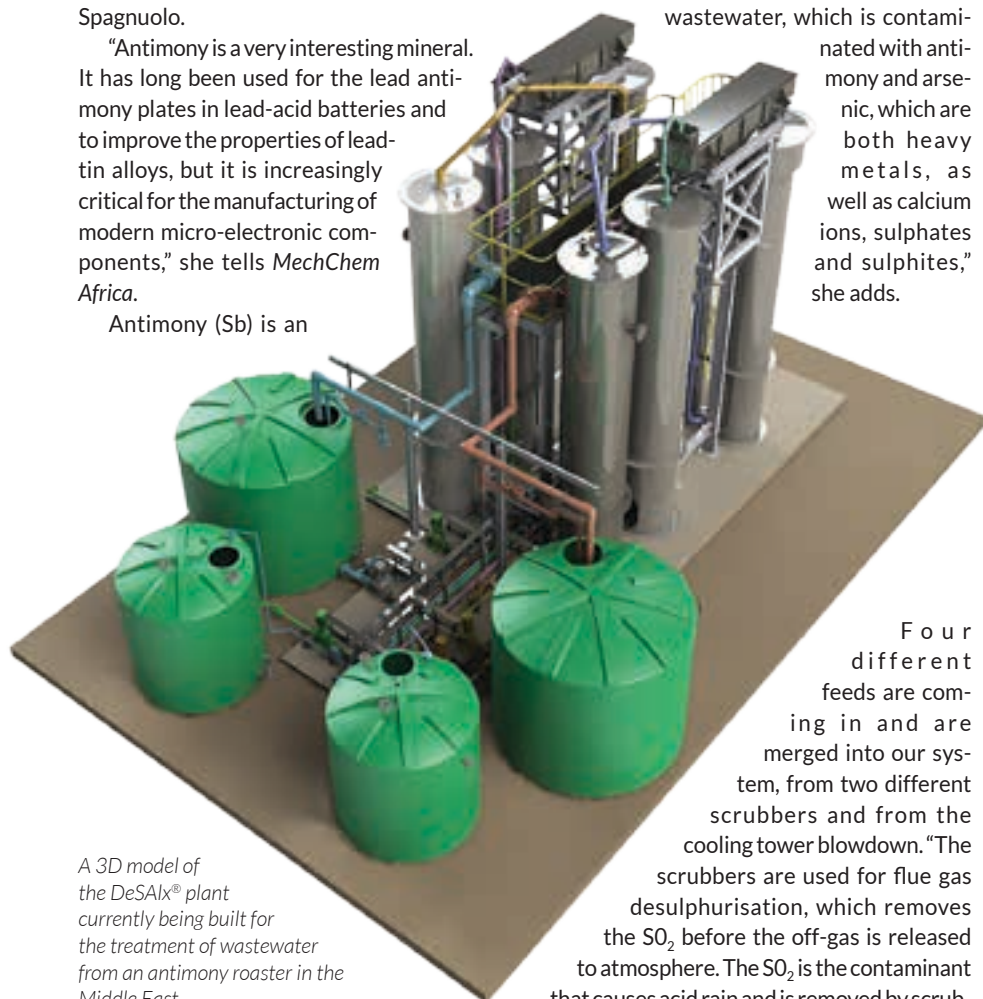
Multotec has taken the DeSALx technology and paired it with some conventional technologies and ended up with a highly efficient water recovery and desalination plant.

Describing the entire treatment process, she says that the first step involves traditional precipitation for the removal of the heavy metals – the antimony and the arsenic. "Essentially this is a ferric chloride dosing and clarification process that produces a metal sludge in a settling tank. But this is only the pre-treatment stage of the full process," she reassures.

The clarified water is then passed through the DeSALx plant as the second stage of a three-stage process: "DeSALx is a further pre-treatment stage. The DeSALx plant acts as a high efficiency removal step that enables very high water recovery from the RO plant.

"Water in the Middle East is expensive, so it is worth treating wastewater at very high efficiency. All of the wastewater on the site is cleaned and reused at high water recoveries with minimal waste production," she explains. This is the key message for our technology. It really enables very high water recovery when paired with conventional technologies such as reverse osmosis treatment plants," she adds.

The DeSALx plant is designed to remove all of the 'larger' ions, that is, those that are multivalent. "Reverse osmosis works by concentrating up the salts on one side of a membrane wall, enabling only 'fresh' water to pass to the outlet side. If a wastewater stream contains high sulphate ( $SO_4^{2-}$ ) and calcium ion ( $Ca^{2+}$ ) concentrations, for example, the RO process is limited in terms of efficiency because of the poor solubility of these multivalent ions. It is only possible to concentrate up to 70% or so



A 3D model of the DeSALx<sup>®</sup> plant currently being built for the treatment of wastewater from an antimony roaster in the Middle East.

Four different feeds are coming in and are merged into our system, from two different scrubbers and from the cooling tower blowdown. "The scrubbers are used for flue gas desulphurisation, which removes the  $SO_2$  before the off-gas is released to atmosphere. The  $SO_2$  is the contaminant that causes acid rain and is removed by scrub-



before these ions start to come out of solution and scale up the membrane.

"By removing these ions in advance of RO, only the monovalent ions, such as sodium (Na+) potassium (K+), chlorides and some sulphite ions which are all highly soluble, have to be separated by the membrane, which allows much higher salt concentrations on the removal side and therefore less untreated water discharged with the waste concentrate," Spagnuolo informs *MechChem Africa*.

How high is the high recovery rate? "Greater than 90%," she responds. "Without the DeSALx

stage, we can only recover around 60 to 70% of the water coming from a clarifier into an RO plant. By passing only monovalent ions through the RO plant, the waste stream can be concentrated up higher without scaling occurring, enabling more of the desalinated water to pass through the membrane," she explains.

"And this high recovery rate is the principal objective of this project," she says, adding that the plant is currently being delivered and installed and will be commissioned before the end of 2017. "The treatment capacity is at 12 m<sup>3</sup>/hour, which is relatively small for a minerals processing operation, but the complex wastewater and the high recovery rates make this a benchmark plant for us."

The brine concentrate from the RO, which is mostly sodium chloride with some sodium sulphite, has to be discarded safely. "We also



*Multotec's small-scale polypropylene-clad filter press can operate in highly acidic environments, is easily operated and requires no electrical connections. It is used to produce a dry cake for ease of waste handling.*

produce gypsum, but because it is contaminated with arsenic, it cannot be used. All of these are regarded as toxic wastes that have to be safely discarded," Spagnuolo says.

"We also take the sludge from the precipitator and pass it through one of our filter presses. This enables us to produce a dry cake, which is easier to dispose of, while the water pressed out is passed back into the waste stream for recovery," she continues.

"The wastewater treatment approach used at this antimony roaster is also ideal for high recovery treatment of acid mine drainage (AMD)," she suggests. "If we go to the source of AMD, and desalinate the neutralised minewater using DeSALx followed by reverse osmosis, or vice versa, we can treat and recover water to industrial and/or potable standards very easily," she concludes. □

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## How continuous ionic filtration works

Ion exchange resins, consisting of polymer beads, chemically engineered to suit specific ion exchange reactions, are moved in the opposite direction to the water flow. These moving resin beads exchange their pre-loaded ions with the ions being removed from the wastewater solution.

In the adsorption column, for example, cation exchange resin beads with H<sup>+</sup> ions surrounding their surfaces enter the exchange column from the top. These begin to replace the dissolved metallic ions in the contaminated water. As the water rises up the column and through the resin, it becomes less and less contaminated, while the resin becomes more loaded with the contaminating ions as it moves down.

The loaded resin exits the adsorption col-

umn at the bottom and is then moved across to a desorption column. A reagent is added to the column, typically sulphuric acid for cation exchange resins, and air agitated. The acid in this example removes the metal ions from the resin (eg, Ca<sup>2+</sup> ions) and replaces them with H<sup>+</sup> ions from the acid. Once in solution, these ions immediately react with SO<sub>4</sub><sup>2-</sup> ions to form, for example, CaSO<sub>4</sub> (gypsum), which precipitates as a solid.

The solution is passed over a screen to remove the solid particulates, while the resin, which is now regenerated (with H<sup>+</sup> ions), drops into the wash column where it is washed via fluidisation before being transferred back to the loading column, completing a continuous transfer cycle. □

# Women create a space for themselves in engineering

**W**ith the high rise in unemployment, South African women are tapping into sectors that were previously categorised as being only for men. Fiona Kgalema and Ella Mambane are two work-driven women who are making a name for themselves in the engineering industry.

The South African engineering sector has evolved to become more gender-balanced in the past ten years as employment equity measures increasingly ensure equal opportunities for men and women. The Engineering Council of South Africa (ECSA) revealed that 70% of the women who graduate with engineering degrees leave the sector after starting their careers, because they feel isolated in their jobs due to a battle with stigmas in this male-dominated industry.

Fiona Kgalema, who works as a receiving inspector for Unidrive Electric Motors, has been with the company for two years. Her day-to-day duties include, amongst many other responsibilities, inspecting and receiving material purchased and ensuring that all received material complies with the company's specifications.

Starting out as an intern at the company, Kgalema is the first staff member to move from the internship programme to a permanent position in the company, and since then she has gradually worked her way up to her current position.

"Initially I wanted to be a psychologist, but as there is not enough employment for graduates in that sector in our country, I opted to go into the engineering industry, as that would be easier for me," she says.

Currently busy with her studies in electrical engineering, Fiona mentions gender inequality as being one of the major challenges that she faces daily in such a male-dominated industry. "We grew up in families where culture and respect towards a male is very important, hence it becomes quite difficult to express your opinions and tell a man what to do in this industry," she says. Despite all these challenges, Kgalema managed to get



Fiona Kgalema and Ella Mambane.

nominated as 'Employee of the Month' for December 2016.

Another amazing woman at Unidrive Electric Motors is Ella Mambane, who works as a coil winder. Her journey at Unidrive started 27 years ago as the only woman working in the factory. Since then the engineering industry has gradually opened its doors to women. She endured the role of being a woman in a field dominated by men, but her persistence and hard work has been well maintained in the industry for over two decades.

Both these women foresee a prosperous future for themselves in this industry. "I see myself progressing and sharing my experience with new generations of women engineers," says Ella. She also plans on opening a small business in the same industry, fixing small electric motors in her local area.

Kgalema comments: "I see myself working for Unidrive as a qualified electric motor technician and workshop supervisor, as well as working on a programme for high school students who wish to pursue careers in engineering." She also wants to be an inspiration to prospective female engineers.

Unidrive has a total of seven women under its umbrella, three of whom are shareholders and four employees. "Our women shareholders are seasoned and soon to reach retirement age, so we are deliberately bringing in young women, such as Fiona Kgalema, who can soon

take over the reins of the company. As a majority women-owned firm, we want to develop young women leaders who understand the business and the industry. Success to the shareholders would see me working myself out of the job by having developed young women leaders," concludes Theo Mashego, Unidrive's managing director.

Unidrive is SANS 1561-1:2006 listed and complies with SABS 0242. It also complies with SANS 60079-0 and 60079-1 for repairs of flameproof motors and SANS 60079-0/15/19 for spark-proof motors, and is also ISO 9001 certified. The company's key markets are broad manufacturing, mining, agriculture and general industry.

[www.unidrive.co.za](http://www.unidrive.co.za)

## Industry diary

### September 2017

Wearcheck 2017 Oil Analysis  
Oil Analysis 1 – Understanding oil and its analysis  
12-13 September, Namibia  
10 – 11 October, Gauteng  
Oil Analysis 2 – Report interpretation  
12 October, Gauteng  
14 September, Namibia  
[training@wearcheck.co.za](mailto:training@wearcheck.co.za)

Photovoltaic (PV) Solar  
27-29 September, Potchefstroom  
The Solar Training Centre  
[www.suncybernetics.com](http://www.suncybernetics.com)

Battery technologies  
Energy Training Foundation and Pivotal Engineering  
Tuesday 10 October, Benoni  
Kopanong Conference Centre  
Thieda Ferreira  
[thieda@entf.co.za/info@entf.co.za](mailto:thieda@entf.co.za/info@entf.co.za)

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## FILTECH 2018, March 13-15, Cologne

FILTECH is the largest and most important filtration event worldwide. This exhibition is a must for all those concerned with designing, improving, purchasing, selling or researching filtration and separation equipment and services. The conference is the international platform and filtration solution provider for all industries covering every market segment.

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again feature the latest advances and techniques in liquid/solid and gas/particle separation, including dust, gas and air filtration.

The conference and exhibition will take place at the KoelnMesse in Cologne, Germany and is organised by Filtech Exhibitions Germany. For more information contact Suzanne Abetz by email at [info@filtech.de](mailto:info@filtech.de)

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