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CONTENTS



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Editors: Peter Middleton
e-mail: peterm@crow.co.za
Glynnis Koch
e-mail: glynnisk@crow.co.za
Advertising: Brenda Karathanasis
e-mail: brendak@crow.co.za
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PLANT MAINTENANCE, LUBRICATION AND FILTRATION

- 8 Integrated asset management: the Road Map
MechChem Africa's Peter Middleton talks to Karl Nepgen about optimising plant ownership and operations by following the Pragma way, a multi-level approach to implementing physical asset management solutions.
- 12 Reliability-focused maintenance as a profit centre
- 14 Synchronous condenser reassembly and recommissioning
- 16 Mario on maintenance: The engineer's nemesis
- 17 Continuous electronic traceability thanks to valves with RFID

MATERIALS HANDLING

- 18 PVC modifiers re-packaged: a case study
This case study describes an efficient, dust-free system for re-packaging PVC modifiers, designed and installed by bulk materials handling specialist, Flexicon.
- 21 Local wedgewire manufacturer receives a boost
- 22 Reducing maintenance on chute systems is simple
- 23 Local crane company puts rivals to flight

CORROSION CONTROL AND COATINGS

- 24 KPAL acquires Sadolin Paints
MechChem Africa reports on Kansai Plascon Africa's acquisition of Sadolin Paints and presents some of the company's industrial offerings.
- 27 BASF to offer tailor-made product innovations

HEATING, COOLING, VENTILATION AND AIR CONDITIONING

- 28 Global HVAC specialist sponsors art in Africa
MechChem Africa talks to HVAC specialist Jaco Smal of AHJ Carrier about the Silo district's novel HVAC solution and Carrier's R600 000 sponsorship of the Zeitz MOCAA.
- 30 Ozone depleting gas smugglers face clampdown
- 31 Global and local fan specialists merge to offer full ventilation product range
- 32 New approaches to extend the life of HVAC equipment

WATER AND WASTEWATER PROCESSING

- 34 Mine water treatment that improves profitability
Peter Middleton talks to Multotec's Carien van der Walt, who believes that her company's continuous ionic filtration (CIF®) process could change the mining sector's outlook on wastewater treatment.

INNOVATIVE ENGINEERING

- 42 Thermoacoustic refrigerator with no moving parts
This article, from Tokai University's Shinya Hasegawa and colleagues, describes a multistage travelling-wave, thermoacoustic engine capable of powering a refrigerator from waste heat at temperatures lower than 300 °C.

REGULARS

- 2 Comment: Asset management and the state of our nation
- 4 On the cover: Metering with Heartbeat: rethinking instrument health
Peter Middleton talks to Endress+Hauser product managers, Frans van den Berg and Jan Gerritsen.
- 6 SAICHE News: Apps to make an engineer's life easier
- 36 Product and industry news
- 44 Back page

Asset management and the state of our nation

Peter Middleton

COMMENT



I write this following the 2017 State of the Nation address by South African president Jacob Zuma, a violent, divisive affair that can surely do nothing for investor or rating-agency confidence. Once again, Zuma's SONA 2017 address was read to a house filled with only his own ANC colleagues. Not a healthy sign of a maturing democracy.

"In this 23rd year of our freedom, our mission remains the quest for a united, democratic, non-sexist, non-racial and prosperous South Africa," said Zuma, when he was finally able to begin speaking. Who can object to this?

So why is it that the South African house of parliament, after 23 years of practice, cannot have a constructive debate about how to achieve this noble mission. And why is it that each individual aspect of this quest is less attainable now than it was during the first 'Rainbow Nation' parliament?

I am sure we all have opinions about when and why the wheels came off. Perhaps some will argue that they haven't. Most of the facts quoted by Zuma were declared accurate by the 'Fact Checkers', certainly more so than those coming out of the world's benchmark democracy.

Yet the speech has not sparked abundant optimism. And the tone, like the utterances of the new US president, rings populist rather than genuinely responsive to the country's needs.

One of the ANC's 'new' policy directions is 'radical economic transformation'. Superficially, it is hard to imagine its meaning differing from 'economic freedom' – is the ANC deliberately adopting EFF-like policies?

According to Zuma, radical socio-economic transformation means, "fundamental change in the structure, systems, institutions and patterns of ownership, management and control of the economy in favour of all South Africans, especially the poor, the majority of whom are African and female".

"Twenty-two years into our freedom and democracy, the majority of black people are still economically disempowered" ... and "dissatisfied with the economic gains from liberation," he said. The clue as to what this radical transformation might mean in practice was revealed in the statement: "This includes using the state's R500-billion annual budget to procure things from black businesses." Is this new?

For the lead *MechChem Africa* article in the Plant maintenance, lubrication and filtration feature this month, we talk to Karl Nepgen about Pragma's Asset Management Road Map. It is remarkable how multifaceted this 'whole-solution' is.

At its starting point is an evaluation of the matu-

riety level of an organisation's maintenance strategies relative to benchmarked industry best practices. "Asset management looks at the whole lifecycle of a plant or operation, from the identification of a need for new equipment; through the conception, design, construction and procurement processes; the operate and maintain phase; and all the way to winding down, decommissioning and disposal," says Nepgen.

Following the maturity assessment, Pragma's Road Map takes the organisation through gap analysis, which identifies the gaps between the actual and aspirational maturity levels of the plant. This becomes a starting point of developing an Asset Management Improvement Plan (AMIP), typically implemented over a period of between one and three years.

The detail is very comprehensively specified through 17 key performance areas (KPA's) and 150 best practices with monitored key performance indicators (KPI's) carefully specified to match the maturity of the organisation's programme.

In the political space, improvement plans are being formed and reformed continuously. Zuma referenced several in this year's SONA: the National Development Plan; the Nine Point Plan to reignite growth; SANRAL's plan to upgrade the Moloto Road; and a plan to lower the costs of data "for the youth".

But political plans tend to be viewed with scepticism. Perhaps this is why when Zuma talked about radical socio-economic transformation, he said: "We are saying that we should move beyond words, to practical programmes."

Fundamental to ensuring that asset management plans achieve their goals are a structured set of objective checks and balances. Systematic and transparent monitoring of progress enables honest appraisals of what is and what isn't working. While managers are held to account, the processes are designed to encourage responsiveness, responsible decision-making, clarity of purpose and unity across the organisation's implementing team.

It is hard to see South Africa's political maturity level much above fire-fighting mode. Our goals are in place, but our leaders are reacting, not implementing.

South Africa needs to create a Road Map like the one Pragma is applying to keep our assets healthy – one that embeds proper checks and balances and effective accountability.

Perhaps the keywords on Pragma's Road Map may help: diagnose, strategise, comply, stabilise, improve, optimise, sustain and, as a general end goal, well being – for all.

Peter Middleton

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Metering with Heartbeat: rethinking instrument health

Originally developed back in 2012, Endress+Hauser's Heartbeat™ Technology simplifies instrument diagnostics, verification and condition monitoring, leads to better predictability and uptime and lowers costs. Peter Middleton talks to Endress+Hauser product managers Jan Gerritsen and Frans van den Berg.



“Just as every person's health can be monitored by his or her heartbeat, Endress+Hauser's Heartbeat™ Technology strives to track the health of critical plant instruments, such as level and flowmeters,” begins Van den Berg, Product Manager for Flow at Endress+Hauser South Africa.

“When we humans feel a headache coming on, we take two tablets. In the same way, when an instrument detects a problem, it is now able to communicate that information so that an intervention can be planned to quickly restore the instrument to full health. This is important for safety on our customers' plants, to ensure that flooding or spills are always avoided, for example,” he continues.

The technology equips instruments with comprehensive diagnostics, verification and condition monitoring/predictive maintenance capabilities, “for maximum safety and the highest possible availability”.

Heartbeat diagnostics is the first level of instrument health management. “Instruments in safety critical applications, such as flowmeters, must meet the highest requirements in terms of reliability. With Heartbeat™ Technology, our new Proline flowmeters offer unprecedented degrees of diagnostic coverage, from the measuring tube to the outlet,” Van den Berg tells *MechChem Africa*.

Embedded in each Heartbeat-enabled me-

ter is an instrument-specific set of test procedures, which are performed continuously, with all the results being internally logged. “In the event of any failure, alerts can be sent and flags raised so that operators can react in the fastest possible time,” he explains.

“Also, to get health insurance, a person might need to go to a doctor for a medical examination. The doctor will give him or her the certificate that the medical aid requires before contracts can be signed.”

In the same way, any ISO 9001 company needs to be able to produce evidence of the healthy condition of its equipment. “Companies typically have to get a third party to do an audit of their procedures and certificates are required to prove that all instruments and equipment are operating to specifications.

“Heartbeat™ Technology offers built-in proof testing or verification that meets these certification requirements,” Van den Berg assures. “An on-demand report can be made available, based on the ongoing diagnostic data that has been accumulated by the Heartbeat™ system, which serves as a direct substitute for extensive manual verification testing,” he adds.

Simple, predefined procedures guide the designated responsible person through

the verification procedure and verification results are documented in an unambiguous manner. Heartbeat's automatically generated verification protocol supports the evidence commonly required by the majority of regulations, laws or plant standards. Heartbeat™ verification can also be used to perform safety integrity level (SIL) tests, which are routinely embedded in plant safety manuals and documentation.

“Every measuring point is verified and documented *in-situ* without any interruption to the process plant. Safety integrity level tests, such as SIL 3, for example, are done online. This is important because one doesn't have to stop the plant to interrogate a device that might be perfectly healthy.

“Also, Heartbeat verification is underwritten by TUV, which means that 3rd party verification is no longer necessary,” Van den Berg adds.

Does verification reduce calibration requirements? “Our instruments are generally manufactured using electronic sub-systems and the electrical performances – ohms, mA, voltage drop, frequency response, etc – each factory-tested before being put into service.

Heartbeat Diagnostics	Heartbeat Verification	Heartbeat Monitoring
Permanent process and device diagnostics	Documented in-situ verification	Information for predictive maintenance

Heartbeat™ Technology from Endress+Hauser strives for increased plant availability, improved safety, reduced verification and calibration effort and optimised plant maintenance and performance.

These same tests are used during verification to determine whether anything has changed since leaving the factory," responds Jan Gerritsen, Level Product Manager.

"While Heartbeat™ Technology is not a substitute for calibration, if all the electrical parameters are still within the original tolerance ranges, we can be very confident that the instrument's calibration is still accurate. This is important, because to do a full calibration of an instrument such as a flow meter, it has to be removed from its process piping and attached to a dedicated calibration machine. This has cost and downtime implications – plants cannot function with gaps in their piping," Gerritsen points out, "verification can, therefore, increase the period required between calibration schedules."

In addition, Heartbeat™ Technology provides instrument and process data that is ideal for use for predictive maintenance and performance trending, for example. "The goals are performance and cost optimisation and a combination of instrument and process parameters provide all of the important information for the next steps in maintenance or process optimisation," he adds.

"Condition monitoring makes available information about both the status of the instrument and the process, as well as the effect of the process on the instrument. All this data can be collected, communicated and analysed so that degradation can be tracked and replacement options can be costed and planned way in advance of a failure," he explains.

Level metering and the FMP and FMR range

"Based on the 'time-of-flight' principle, our new FMP and FMR6x units use radar signals to measure distances that can be translated into very accurate level data. These meters send out signals that are reflected off the liquid surface of a tank or the stockpile level down mine, for example. By detecting the time taken for the signal to travel the return distance, a precise level position can be established," Gerritsen explains.

"Our level meter range includes frequency options of 1.0 GHz; 6.0 GHz; 26 GHz and 80 GHz, which enables us to offer exactly what is needed for almost any specific application," he adds.

The 1 GHz meter is a contact level sensor that sends out its signal around the outside of rope or rod. This acts as an antenna and keeps the signal from diverging. These systems can accurately detect levels of up to 50 m.

On the other end of the spectrum, the FMR6x units are non-contact instruments that can send an 80 GHz signal into free space. "The high frequency gives a narrower beam angle, so an 80 GHz system can measure over distances of up to 125 m. They are widely used



Endress+Hauser's level meter range includes frequency options of 1.0 GHz; 6.0 GHz; 26 GHz and 80 GHz, "which enables us to offer exactly what is needed for almost any specific application," says Gerritsen.

to measure ore pass levels down narrow mine shafts, for example, to give mine managers continuous data about the amount of mined material on an underground stockpile or conveyor," Gerritsen explains.

The 26 GHz systems are suitable for 90% of level measurement applications, offering good focusing and good performance in turbulent conditions, while the FMR54 6.0 GHz unit is excellent for liquid level applications, particularly where stilling wells are used and when condensation is a problem.

"We have many different level, flow and temperature measurement instruments and each one has its niche application and working range. With Heartbeat, these now come with the connectivity needed to protect the instrument's health and to control plant processes. We can supply Profibus, Fieldbus or PLC-linked systems and these can incorporate GSM or other wireless-based transmission systems in certain applications," Gerritsen tells *MechChem Africa*.

New generation flowmeters

Endress+Hauser flowmeters are available for all of the different flow measurement principles, including: electromagnetic: ultrasonic, Coriolis, vortex and thermal. "The most commonly used are our Electromag meters, which measure volume flow for conductive liquids (down to a conductivity of 5 µS); and high viscosity or inhomogeneous liquids re-

spectively," explains Van den Berg.

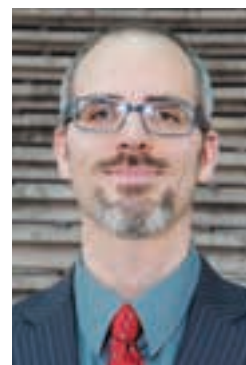
"Our Coriolis flowmeters are ideal for mass-flow measurement for expensive fluids such as fuels, glucose and chemicals. "Our refuelling industry is stuck on volume measurement, but it is actually the mass of fuel in a car that matters, not the volume. When refuelling a plane, for example, a mass meter is used to ensure absolute certainty about whether the plane has enough stored energy to reach its destination," he explains.

Vortex meters, which can be used for liquids, are more widely used for steam and gas flow metering, while Endress+Hauser's thermal range is ideal for dirty or wet gas measurement. "These rely on a thermal dispersion principle. Two probes are inserted into the gas flow: the one measures the ambient temperature of the flow while a second is kept at a temperature 10 °C higher. The amount of energy required to maintain the higher temperature is proportional to gas flow, because of heat convection," Van den Berg explains.

"Endress+Hauser's Heartbeat technology conforms to NAMUR Instrumentation standards, which strive to standardise signals, testing and alarms. All the information needed to ensure that our instruments are accurate and functioning healthily is available via Heartbeat™, which enables, not only a new way of managing instrumentation, but can also change the way plants are maintained and run," Van den Berg concludes. □

Apps to make an engineer's life easier

At the SAIChE IChemE Gauteng members' group meeting last year, Carl Sandrock, a senior lecturer at the University of Pretoria, presented a talk about software applications (apps), highlighting those that may be of particular interest to engineers.



The world of electronic applications (apps) has always been associated with high school teenagers using Facebook, Twitter, Tumblr, and all the many other social media apps, to tell the world what they had for dinner or with whom they went to the movies. Hearing about other apps that are designed to make engineers' lives easier was therefore quite refreshing. And while I recognise that some people are vehemently opposed to our smartphones running our lives, here are some apps that will undoubtedly help you to manage your life better, personally and professionally.

Password manager: Let's start with your passwords. You probably have one or two passwords that you use for all your accounts, from logging into your computer at work to accessing your online banking profile. And you know deep down that this is a bad idea but the alternative is keeping a diary and hoping that you never lose it. The answer is a password manager such as KeePass. KeePass is a free open source password manager, which helps you to manage your passwords in a secure way. You can put all your passwords in one database, which is locked with one master key or a key file. So you only have to remember one single master password or select the key file to unlock the whole database. The databases are encrypted using the best and most secure encryption algorithms currently known (AES and Twofish). For more see <http://keepass.info/>.



With apps such as Dropbox and Trello, you can set up meetings and synchronise them with your personal calendar, upload documents for sharing and set up tasks with reminders.

Collaboration: Another very useful group of apps can be used for online collaboration. Working together with groups of people scattered across the city, the country or even the globe, can be a logistical nightmare but, with apps such as Dropbox, www.doodle.com, forms.google.com and Trello you can set up meetings – and synchronise them with your personal calendar – upload documents for people to add their contributions and set



The ECT Act clearly indicates that electronic signatures are legally recognised in South African law.

up tasks with reminders to ensure that your project runs smoothly.

Google+: Gone are the days that Google is merely a search engine; having a Google+ account will absolutely change your life, especially if you use a smartphone that runs on Android. Switching on the location setting on your device lets you use Google Maps as a GPS – personally I am a proponent of Waze as a GPS app, since it tells you when to leave if you don't want to be late for your next appointment, but I digress. With Google Maps you also have a history of when and where you went, which can be used as a travel log, and it picks up when you are in a shopping centre and you get a notification of the relevant store directory. From your travel history it anticipates when you are travelling to work or home and warns you about traffic incidents on the way. It's a lifesaver.

Google Photos: Still on the same platform, Google Photos uses machine learning that

allows you to take photos of your old photos – you know that box in your attic – which the app then converts to an electronic picture by removing the shine from the flash and cropping out everything that is not the original photo. Google Photos also uses facial recognition to put together albums and animations of people you regularly take pictures of.

These get stored in your Google+ account and you never again have to worry about losing your phone or the photo albums in your study. It also allows you to search your pictures for what they contain, for instance finding all the pictures of babies or puppies.

Electronic signatures: Lastly, never again agree to scanning and emailing a document with your signature on it. With the introduction of the Electronic Communications and Transactions Act 25 of 2002 (ECT Act) South Africa followed a global trend to recognise the legality of electronic signatures. The ECT Act defines an 'electronic signature' as 'data attached to, incorporated in, or logically associated with other data and which is intended by the user to serve as a signature'.

The ECT Act further provides – in Section 13(2) – that: 'an electronic signature is not without legal force and effect merely on the grounds that it is in electronic form'. This clearly indicates that electronic signatures are legally recognised in South African law. For simple signatures, a picture of your signature is legally equivalent to writing your name in plain text on the documents. Make use of apps such as Adobe Acrobat or GnuPG to create cryptographically secure signatures, which allows you to detect if a document has been tampered with. GnuPG is a complete and free implementation of the OpenPGP standard as defined by RFC4880, also known as PGP. GnuPG allows encrypting and signing your data and communication, features a versatile key management system as well as access modules for all kinds of public key directories.

For the full presentation by Carl Sandrock, please visit <http://tinyurl.com/saiche-apps> or follow Carl on Twitter at @chthonicdaemon. Written on behalf of SAIChE IChemE Gauteng Members Group by Zita Harber.

Introducing the 'South African Journal of Chemical Engineering'

Elsevier, a world-leading provider of scientific, technical and medical information products and solutions, is the publisher of the open access journal: *South African Journal of Chemical Engineering*. The journal is owned by the South African Institution of Chemical Engineers (SAICHe) and has been licensed to the Institution of Chemical Engineering (IChemE) in the UK, who will support and develop the journal alongside its existing portfolio of chemical engineering journals.

The *South African Journal of Chemical Engineering* aims to be the principal open access journal for the publication of high quality, original papers in all areas of chemical engineering. The journal is fully international with contributions encouraged from both within and outside South Africa. In addition to publishing full research articles the journal also welcomes review papers and shorter communications. The journal has a particular interest in publishing papers on the unique issues facing chemical engineering taking place in countries that are rich in resources but face specific technical and societal challenges, which require detailed knowledge of local conditions to address.

Claudia Flavell-While, director of publications with IChemE, explained, "SAICHe set up the *South African Journal of Chemical Engineering* in the 1980s to publish process engineering research, mainly from South African universities. The journal is accredited by the South African Department of Higher Education and Training, which is very important to local researchers as it enables them to

claim state subsidies for research published in the journal.

"We're thrilled that as part of IChemE's partnership with SAICHe, we were able to include the *South African Journal of Chemical Engineering* in the series of journals IChemE publishes with Elsevier. This gives research published in the journal much greater visibility through its inclusion in ScienceDirect and its state-of-the-art peer review and publishing systems."

Craig Sheridan, vice president of SAICHe IChemE, added, "SAICHe is very excited to see the *South African Journal of Chemical Engineering* published by Elsevier, further expanding its global reach. Many of our technical issues are common across the world; this represents an excellent opportunity for researchers and academics to share their knowledge to the widest possible audience."

The Editor-in-Chief is Dr M Carsky. Some recent articles include:

- Fouling mitigation on a woven fibre micro-filtration membrane for the treatment of raw water.
- Synthesis and characterisation of Ba²⁺ and Zr⁴⁺ co-doped titania nanomaterial, which is in turn used as an efficient photocatalyst for the degradation of rhodamine-B in visible light.
- Structural and phase transition of Mg-doped on Mn-site in La_{0.7}Sr_{0.3}MnO₃ bulk/nanostructured perovskite characterised through online ultrasonic technique.

For more information or to submit a paper, go to www.journals.elsevier.com/south-african-journal-of-chemical-engineering

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Contact details

SAICHe
PO Box 2125, North Riding, 2162
South Africa
Tel: +27 11 704 5915
Fax: +27 86 672 9430
email: saiche@mweb.co.za
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Fundamentals of process safety management

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SAICHe training course diary

Layer of Protection Analysis (LOPA)

24-25 October, Boksburg, South Africa

Covers the methodology of LOPA and the detailed stages of its application. Delegates are shown how to identify significant scenarios, estimate frequencies for worst-case events and assign risk categories while learning how to lead a LOPA study.

Fundamentals of Process Safety Management

6-10 November, Boksburg, South Africa

Contact Femmy le Roux
+27 11 704 5915.
saiche@mweb.co.za
www.saiche.co.za

Integrated asset management:

MechChem Africa's Peter Middleton talks to Karl Nepgen, a partner consultant for Pragma, about optimising plant ownership and operations by following the Pragma way, a multi-level approach to implementing physical asset management solutions.

Born in South Africa in 1990, Pragma started out as a four-man business operating out of Stellenbosch in the Western Cape Province. The initial value proposition arose from their experience in developing implementable best-practice reliability systems for defence engineering, from which a very structured way of ensuring the reliability of key strategic assets emerged. "These principles were then further 'pragmatised' into an asset management solution deliverable to manufacturing and general industry," Nepgen tells *MechChem Africa*.

A prominent organisation in modern asset management is the Global Forum for Maintenance and Asset Management (GFMAM), which has identified 39 'subjects' to fully describe the asset management framework. "GFMAM's set of 39 subjects is a highly practical framework that specifies structured processes to help organisations to implement asset management – and it also touches on delivery and execution aspects," Nepgen notes.

The other significant International Standard is ISO 55000, which is more management-system oriented. "Preceding these relatively new initiatives, we at Pragma have developed our own structured set of processes that align well to both of these key standards. Called AMIP – Asset Management Improvement Planning – our 'Road Map' delivery is based on a comprehensive framework; a structured set of processes, policies and best practices," he adds.

The detail of AMIP is very comprehensive, consisting of 17 key performance areas (KPAs) and 150 best practices. Key performance indicators (KPIs), linked to the maturity of the organisation's programme, are also used to measure how well each best practice is being implemented and performed by the organisation.

As an example, Nepgen describes one of the KPAs called Information Management. "Typical best practices for this KPA include the information strategy, which defines the asset-related information a plant should be collecting, recording and reporting in support of its activities.

"One of the KPIs for this best practice is maintenance information velocity, which measures how long it



takes for data from a maintenance action – a predictive or repair requirement, for example – to generate an action or decision. We measure the action time and the time it takes to report the results for later analysis.

"A system working well might be able to deliver actionable information within an hour, while it can take up to a week if the asset management system is less mature," he says.

Pragma's starting point for implementing AMIP is to determine the maturity of an organisation's asset management framework and the gaps with reference to benchmarked industry best practises. "We measure five levels of maturity, based on ISO 55000 compliance. At Level 1, plants are in fire-fighting mode, simply fixing things as and when they break down. Level 2 is when plants are stabilising their asset performance and have acknowledged the need and value of improvement. Basic routines and systems are in place, typically based on simple spreadsheets.

"Level 3 involves more preventative approaches and involves better decision-making with a view to improving the overall performance and reliability of equipment. Level 4 is called 'optimising' where performance is being improved via feedback from more complex analyses, such as comparing maintenance costs per unit across the organisation or looking at specific costs: per ton mined; per kWh generated; or per kl pumped, for example, and looking for continuous operational cost improvement opportunities," he explains.

The highest maturity level, Level 5, "is about excellence and it is not always economically viable. It is the ideal, super-efficient operation with low breakdown risk and high uptime – a typical requirement of a nuclear power station, for example."

Nepgen suggests that the sensible aspirational level

"A system working well might be able to deliver actionable information within an hour, while it can take up to a week if the asset management system is less mature."

Karl Nepgen graduated from Stellenbosch University with an electrical engineering degree in 1978. He started out as an electronic development engineer and then went into system engineering, which were natural stepping-stones to his asset management expertise.

Nepgen has been an asset management consultant and partner with Pragma for over 25 years. His current role is largely focused on the energy business, and more specifically, the renewable energy sector.

the Road Map

for South African plants is between Level 3 and Level 4, with sound preventative approaches being used along with some key optimisation initiatives.

Compared to maintenance management, the concept of asset management takes a much broader view of operational assets. "While maintenance is confined to keeping equipment operating, asset management looks at the whole lifecycle of a plant or operation, from the identification of need for new equipment; through the conception, design, construction and procurement processes; through the operate and maintain phase; and all the way to winding down, decommissioning and disposal.

"Renewable energy plants in South Africa, for example, are designed to last for 20 years, in line with envisaged power purchase agreements (PPAs). Accordingly, the investment business cases are calculated based on that premise, and plant asset portfolio designs follow suit. After a two-year upfront EPC phase, the plant must be operated and maintained for 20 years, so this stage makes up 90 to 95% of its total life.

"Practically speaking, formal asset management doesn't really make sense for a small workshop where one or two experienced people know all the machines. But as soon as an organisation starts to need a dedicated maintenance facility and risks become appreciable, then aspects of the formal asset management

approach can be productively applied.

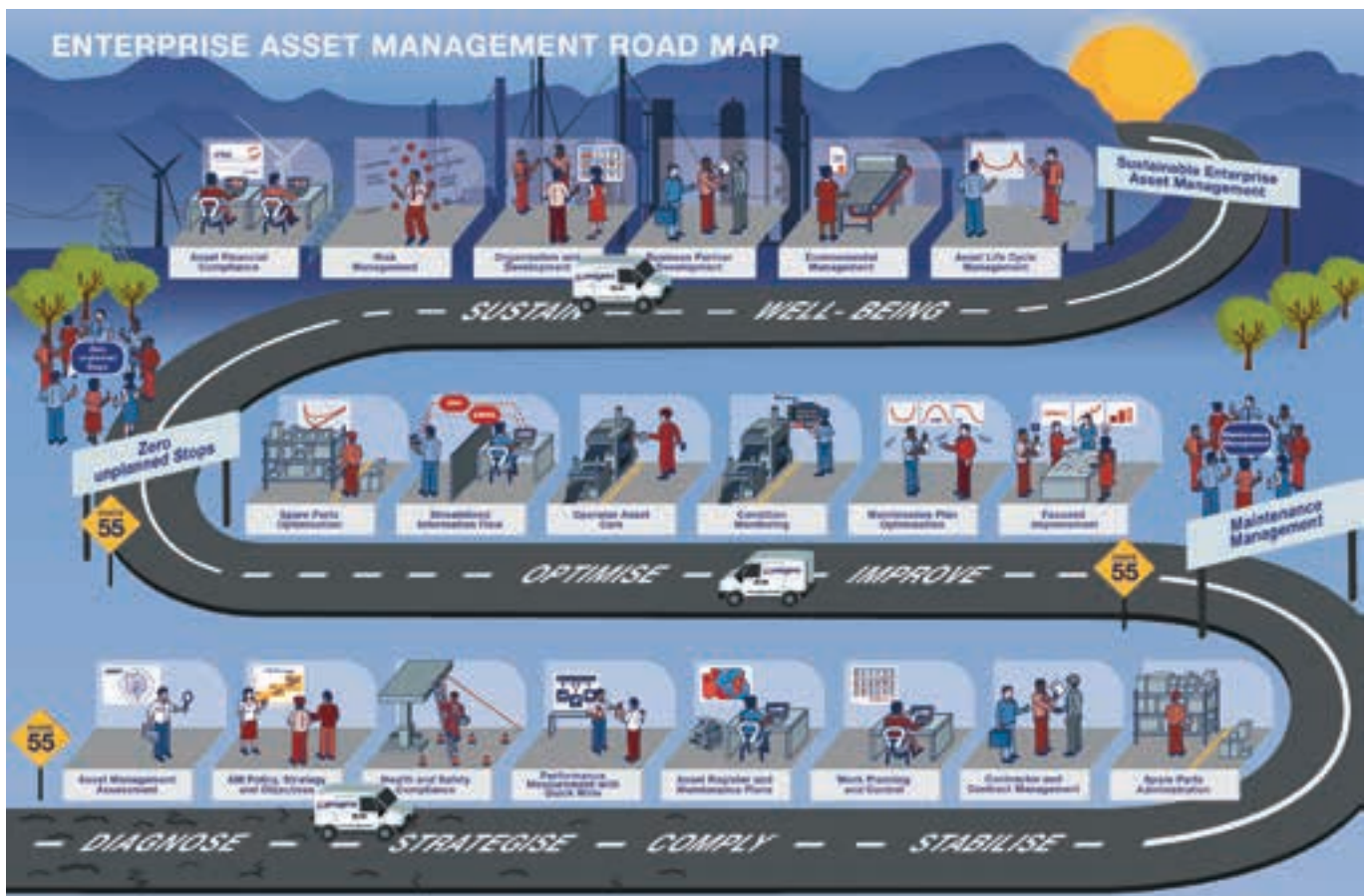
"To help companies implement the system, Pragma has developed its Asset Care Centre concept, which is a contracted outsourcing service, with its computerised asset management software system called On Key as its base. Maintainability and reliability can improve significantly and risks contained, the value of which will almost always exceed the costs of adopting a structured approach to asset management," he suggests.

"It almost always makes sense for large asset-intensive operations such as power plants or refineries, process plants and manufacturing companies," he adds.

As part of maturity assessment of an organisation's asset management practices, the difference between the actual maturity and the target maturity preferred by the client are measured. Called gap analysis, this is used as the starting point for developing an Asset Management Improvement Plan.

A typical improvement plan is implemented over a period of between one and three years. "Following the identification and implementation of some 'quick wins', most of the initial work involves a phase that we call 'stabilisation', starting with the compilation of an Asset (equipment) Register as the backbone. Using On Key, we can usually clone asset types across different locations to reduce the burden," Nepgen says.

"It almost always makes sense for large asset-intensive operations such as power plants or refineries, process plants and manufacturing companies," Nepgen adds.



Called AMIP – Pragma's Asset Management Improvement Planning Road Map is a comprehensive framework consisting of a structured set of processes, policies and best practices.

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By developing some standard solutions, Pragma has made it easier to implement asset management solutions covering all aspects of renewable energy operations.

Describing the structuring of an asset register, he says: “For a power station, for example, we follow the production process from the incoming resource, through steam and electricity generation and out via the switchgear. Or for water treatment, we look at the equipment and processes involved in moving and processing the raw water intake, the filtration, purification processes, pumping and dispatching.”

The second stabilisation step is to get a sense of the work actually being done to manage assets: Are machines being repaired when they break down? Is any preventive, predictive or proactive maintenance being done? “We use the collective term ‘asset care plans’ as ideal deliverable output from this aspect of the programme.”

“The task is to get to grips with the assets the organisation has, how they look after the equipment and how each one complies with health, safety, security and environmental regulations,” he adds.

Citing asset management in the renewable space as an example, Nepgen says: “The cost of renewable energy generation has come down drastically. Compared to Round 1 of the REIPPPP, tender prices are 60 to 70% lower. As a consequence, margins are lower, so very reliable assets and optimised operate and maintain (O&M) costs are imperative.

“Asset management, which has been seen as luxury, now has an integral role to play in keeping renewable plants economically viable. And economies of scale also play a role. By developing some standard solutions, it is easier to implement asset management solutions to renewable energy operations regardless of the technology being applied – wind, solar or hydro – or of the installed OEM equipment. Since our solutions are all based on the ISO 55000 and GFMAM, AMIP is easily rolled out to marginal operations across the sector,” he tells *MechChem*.

“The other effective tool embedded in these solutions is risk management. All plants rely on financing and funding, so investment risks are always of concern. Investors need to know that the assets will be effectively operational for the full 20 years of the power purchase agreement (PPA) and asset management is an essential tool in mitigating against the long term

risks associated with poor plant performance and reliability,” he points out.

“Any investor will want to see what plans have been put in place to ensure efficient operation for 20 years and practical asset management is the obvious way to ensure plant and financial sustainability matches those envisioned,” he continues.

He suggests that many development aid investments on the African continent, while initially beneficial, “fall apart very quickly” due to poor asset management. “So, long term, the donor’s vision is not translated into long-term upliftment,” Nepgen says.

The final destination of the Pragma Road Map highlights the ultimate sustainability objective. “The principle is universally applicable, wherever there are physical assets where the sustainability benefit has to be realised, formalised asset management plays a vital role.

In summary, he says that asset management strives to optimise the balance between three pillars: cost, risk and performance. “By neglecting the assets, the failure risk rises and the performance drops, which will eventually drive up the costs. But if you over minimise the risk, then the care cost could go sky high. It is important to find the sweet spot, where the total costs and risk are minimised and the performance maximised.

“In practice, though, asset management is all about discipline,” he continues. “The higher an organisation progresses on the management maturity ladder, the more discipline plays a role. That is why the outsourced Asset Care Centre (ACC) service we offer is so successful, because it enables discipline to be contracted into a service level agreement from the start,” he concludes. □

“Asset management, which has been seen as luxury, now has an integral role to play in keeping renewable plants economically viable. And economies of scale also play a role. By developing some standard solutions, it is easier to implement asset management solutions to renewable energy operations regardless of the technology being applied – wind, solar or hydro – or of the installed OEM equipment.”



Reliability-focused maintenance as a profit centre

Maintenance as a key part of overall strategy can improve profits by reducing the costly effects of machine downtime. "Indeed, maintenance should be seen as a profit centre," according to Greg Sassen, SKF asset reliability consultant. In this article he talks about SKF asset efficiency optimisation (AEO), combined with proactive reliability maintenance (PRM) hardware and software.

The correct implementation of hardware and software will assist companies in realising a return on their investment by reducing mean time between failures (MTBF), extending equipment life, improving uptime, plant availability, production and profitability.

It is essential for companies to identify key business goals and set associated performance targets in order to remain competitive and profitable. "The overall objective in this effort should be to create a strategy aligned to business goals and then follow a well-defined process to drive down total costs of ownership whilst maintaining or even increasing production time," suggests Sassen.

Maintenance is usually seen as a necessary cost of doing business. "Neglecting maintenance results in equipment failure, unplanned downtime and a drop in production levels,"

continues Sassen. "However, one train of thought suggests that manufacturers could make a return on their investment in maintenance and even that maintenance should be seen as a profit centre."

Implementing maintenance as a key part of overall strategy can improve profits by reducing the scourge of machine downtime. For maximum effect, maintenance should work in partnership with other elements of the business including engineering and production, to pinpoint how a reliability-focused maintenance process can deliver specific business goals.

Sassen recommends an integrated strategy and technology approach. "A strategy will ensure these programmes are implemented cohesively throughout a plant. SKF offers a new generation of integrated approaches that take the needs of the entire organisation into

account. Once implemented, these strategies enable maintenance requirements to be analysed, assessed and managed simultaneously, raising uptime and productivity and improving the bottom line."

"Investigation of maintenance procedures is a good starting point," recommends Sassen. "Factory maintenance has historically been done reactively, linked to set time intervals and machine or component failure. This results in poor control of production assets (people and machines) and drags productivity down."

A more proactive, holistic approach offers better asset control, minimised unexpected downtime and boosted productivity. This is the basis of SKF's AEO plan, a work management process structure that delivers maximum efficiency and effectiveness from activities focused on the overall business aim of the plant. The plan takes account of top-level business forecasting and system-wide analysis. It is a shift away from the reactive approach, to a selective mix of scheduled, proactive, predictive and reactive maintenance. It has in-built sustainability and provides rapid results and payback on investment.

A strategic tool such as AEO helps a company to manage its assets more effectively – ensuring smooth running and minimum downtime across the entire plant. It boosts profitability by increasing output for the same cost, or maintaining output for less cost. There are four integrated elements to an AEO programme: maintenance strategy, work identification, work control, and work execution.

The maintenance strategy sets business goals and objectives, assesses plant criticality and risk, and defines the most important issues and priorities to ensure an effective maintenance plan that is tailored to the needs of the business and can be easily communicated throughout the organisation.

The second element is the identification of work, where critical plant information is gathered by relevant CBM equipment and analysed, allowing informed decisions to be made and the corrective maintenance operations to be carried out.

The third element, work control, involves detailed planning and scheduling of maintenance activity, taking into account timescales,



Asset efficiency optimisation, combined with proactive reliability maintenance, can help maintenance to be seen as a profit generating activity.

man-hours, data feedback, and competence levels. Effective planning at this stage will fully optimise resources and plant efficiency.

The final element, work execution, sees all this planning and preparation carried out. Feedback is collected via post-maintenance testing and fed back into the maintenance system to ensure constant 'fine tuning' of the maintenance plan and a maximum return on investment.

PRM and asset care are closely linked. Maintenance is carried out under normal operating conditions which means that any potential faults or failures are detected and acted upon at an early stage avoiding the risk of major damage or downtime. This careful monitoring and measuring brings into play the three elements necessary for success; culture, process and technology.

Culture needs to stabilise as it is this complete understanding and adoption of PRM across the business that will enable accepted processes to alter and new technology to be implemented. New monitoring and analysis tools are only effective with trained operators or technicians.

In terms of process and technology stages, data collected by operators or technicians is uploaded onto shared software for analysis and to develop improvements. Only by understanding the causes and consequences of change can the benefits of the supporting technology be fully realised. Short term effects are better run equipment, fewer occasions for repair and a lower energy bill with longer term gains centred on a more transparent cultural environment, with regular interdepartmental collaboration. □

SKF offers new shaft alignment tool

SKF recently announced the introduction of its SKF Shaft Alignment Tool, TKSA 71. Designed for professional alignment in harsh industrial environments, the TKSA 71 provides superior alignment performance and long service life.



The tool is easy-to-use, dedicated software applications enabling different types of alignments: shaft alignment, soft foot correction, vertical shaft alignment, spacer shaft alignment, machine train shaft alignment and dial gauge values. Its innovative instrument design offers high measurement accuracy and excellent protection against dust and water. The versatile TKSA 71 also has ultra-compact measuring units for use in narrow spaces.

Suitable for a wide range of applications, the TKSA 71 is offered as the base model with standard accessories and a rugged case that meets airline standards for cabin luggage. The TKSA 71/PRO includes additional accessories for more demanding applications and is supplied in a larger, rugged trolley case. Models TKSA 71D and TKSA71D/PRO include a display device with protective cover and pre-installed apps that are ready to use without Internet connection or account setup.

The TKSA 71's software apps are designed for intuitive use without prior training and are available free of charge for both Android and Apple iOS platforms. Common features include comprehensive, automatic reports, export and sharing options, instructional videos within the app, built-in tolerance guidelines, disturbance compensation, 3-D live view and a fully functional demonstration mode. □

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Synchronous condenser reassembly and recommissioning

Marthinusen & Coutts was awarded a repair contract at a dc/ac converter station in the Democratic Republic of Congo: for the synchronous condensers, critical components of a power station that feeds the energy-intensive Copperbelt in the Katanga Province.

Successful completion of challenging electrical rotating machinery refurbishment projects has long been the hallmark of Marthinusen & Coutts, a division of ACTOM. It is this reputation that secured Marthinusen & Coutts the contract to complete the reassembly and recommissioning of a very large synchronous condenser in the Democratic Republic of Congo (DRC).

The repair contract was awarded to Marthinusen & Coutts early last year by an international electricity equipment company currently engaged in an upgrade project on the hydroelectric power supply system for the DRC's power utility, Société Nationale d'Électricité (SNEL).

Richard Botton, divisional chief executive at Marthinusen & Coutts, says that this order was placed on Marthinusen & Coutts by an international OEM who is a global leader in electrical engineering.

The synchronous condensers are critical components of the dc/ac converter station in Kolwezi in the DRC, which converts dc power transmitted on a 1 700 km transmission line

from a converter at the Inga hydroelectric power station on the Congo River in the north. The power from the Kolwezi converter feeds the energy intensive Copperbelt in the Katanga Province.

The synchronous condensers supply the necessary reactive power, which cannot be transmitted via the dc transmission line or provided by the converter station. The inertia of the rotating assembly of the condenser provides the necessary energy to stabilise the power system in the region, which aids the overall stability of the grid.

The repair work undertaken on the 90 t rotor of the 70 MVA condenser involved conducting a thorough inspection of the rotor forging and bare rotor by Marthinusen & Coutts' on-site repair team. This was followed by the refurbishment of the bearings and testing and fitting new salient poles that had been manufactured earlier by the international company to replace the original salient poles.

Marthinusen & Coutts is also responsible for the balancing of the rotor. The heavy rotor runs at 750 rpm in a compromised installation



Marthinusen & Coutts Lead Field Services Technician, Wynand Willemsse applies finishing touches to one of the SNEL 70 MVA synchronous condensers completely refurbished in the DRC.

from a foundation stiffness point of view. "We are employing the services of arguably the top balancing specialist in South Africa who will carry out the dynamic balancing on-site," Botton says.

Marthinusen & Coutts' understanding of local conditions in Africa, and specifically the DRC, provides a major advantage. Skilled technical personnel from Marthinusen & Coutts' centre of excellence in Cleveland, Johannesburg, were deployed to site and the condenser is currently being recommissioned, "overseen by our customer and SNEL officials," Botton concludes. □

Rewind and refurbishment of three gearless mill drive rotor poles

A recent project which showcased Marthinusen & Coutts' capability was the rewind and refurbishment of three gearless mill drive rotor poles for a platinum mine in the North West Province. The enormous 17.5 MW, 4 220 V, 2 531 A, 12 rpm, 5.8 Hz grinding mill motors are 15 m in diameter, are driven by cyclo-converters that supply the motors with a variable frequency to control their torque, and allow the speed to be controlled for optimum metallurgical processing.

Rob Melaia, engineering and technical executive at Marthinusen & Coutts, says that these are among the most critical large special high profile motors in the world. There are only two OEMs worldwide that manufacture these enormous machines, which have an assembled mass of 1 000 tons each.

"The rotor poles were subjected to overheating due to an operational error, and we were approached by the mine to assist," Melaia says. "While this contract could be seen as a simple procedure, we believe it is the immediate access to a large local service

provider with OEM capabilities and backup that led the customer to award the contract to Marthinusen & Coutts instead of to the international OEM. It is always critical for operations to have this level of support available, providing skilled technical assistance with very quick response times," he adds.

The removal of the poles required a two-day shutdown during which Marthinusen & Coutts assisted the mine maintenance personnel. The poles were delivered to Marthinusen & Coutts' Cleveland facility where thorough investigative work was undertaken on them. After the results were known, the best method to improve and partially rectify the surface insulation of the remaining 60 poles, was investigated," adds David Motloun, design engineer at Marthinusen & Coutts. A two-part epoxy spray treatment and repeated insulation resistance tests under extremely wet coil conditions were used to achieve this. Motloun says this was to simulate the worst case conditions on site with the ultimate purpose of evaluating a method de-

vised by Marthinusen & Coutts to improve the insulation of the remaining poles still fitted to the machine.

Motloun says that after studying the design of the pole coil it was decided to use a different conductor for the rewind as this would increase the insulation integrity. Test results confirmed that a thicker coil insulation did not cause it to run at a higher temperature due to the reduced heat transfer, and there was a negligible impact from the reduced copper cross sectional area. □



Marthinusen & Coutts' rotating machines design engineer, David Motloun, records photographic evidence of tests on one of the enormous gearless mill drive rotor poles recently refurbished by the company.

Dust collection system upgrade for lime plant

Environmental solutions business unit John Thompson Air Pollution Control (APC), a division of ACTOM, recently won a fast-track turnkey contract to upgrade the dust collection system of one of the main kilns at Idwala Lime's production plant at Danielskuil in the Northern Cape.

The new system, for which John Thompson APC was awarded the contract mid last year, was delivered on schedule at the end of September 2016 to enable it to be installed and ready to go into operation at the beginning of November.

The contract, worth over R30-million, involved converting the original dust collection system comprising an electrostatic precipitator (ESP) serving the plant's No 7 kiln to a reverse pulse bag filter system capable of reducing emission levels to below 20 mg/m³ in accordance with environmental legislation due to come into effect in 2017.

"In redesigning the dust collection system for our bag filter system, the casing of the ESP is retained to be adapted to house the tubular filter bags. This is a cost-saving solution for the customer without

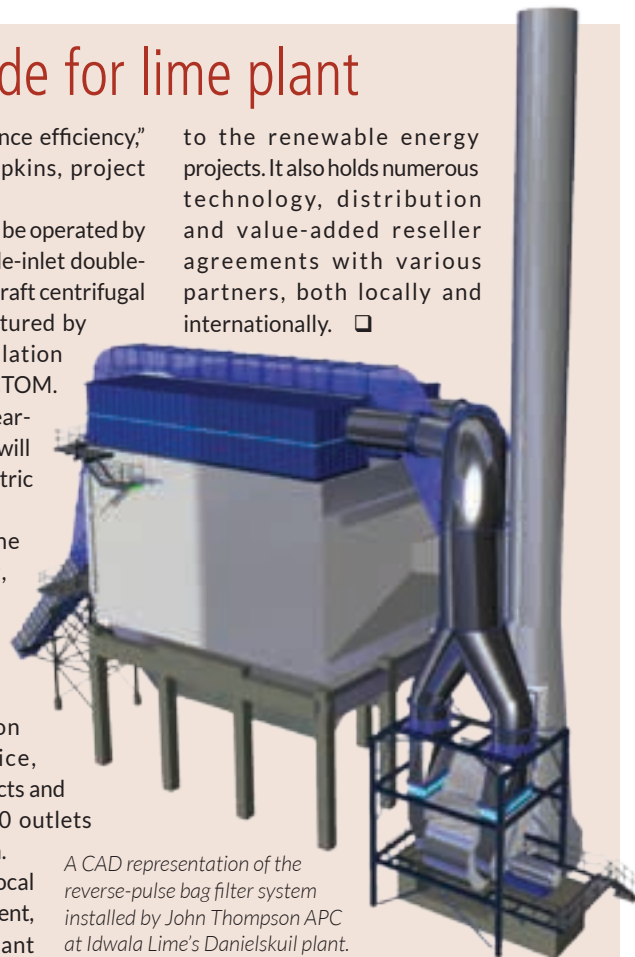
any reduction in performance efficiency," commented Raymond Hopkins, project manager on the contract.

The bag filter system will be operated by a 2 050 mm diameter double-inlet double-width customised induced draft centrifugal fan designed and manufactured by ACTOM's specialist ventilation fans business unit, TLT ACTOM. The fan, made of highly wear-resistant Weldox 700 steel will be driven by a 670 kW electric motor.

ACTOM (Pty) Ltd is the largest manufacturer, solution provider, repairer and distributor of electro-mechanical equipment in Africa, offering a winning and balanced combination of manufacturing, service, repairs, maintenance, projects and distribution through its 40 outlets throughout Southern Africa.

ACTOM is also a major local supplier of electrical equipment, services and balance of plant

to the renewable energy projects. It also holds numerous technology, distribution and value-added reseller agreements with various partners, both locally and internationally. □



A CAD representation of the reverse-pulse bag filter system installed by John Thompson APC at Idwala Lime's Danielskuil plant.



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Mario on maintenance

The engineer's nemesis

In the first Mario on maintenance column for 2017, Martec's Mario Kuisis shares advice for helping engineers communicate effectively with CFOs.



return on investment to something that may not necessarily happen.

So what to do?

The only solution is to take the trouble to learn enough about the financial tick boxes, the perspectives and language of expression so that we can get our message across. Having done that, the rest is easy, as our disciplined approach lends itself to completing the puzzle very well. Each business and situation is different and changes with time, but there are some basics that apply in most situations. The considerations in the table below are not exhaustive but should be helpful to anyone who is in the starting blocks to prepare a justification. It assumes approval is required for purchasing something, but the principle applies equally well to other forms of investment in assets or resources.

Most technical people will find the above perfectly manageable, once they decide it is worth doing. The most serious challenge will come from the thing that most engineers struggle with. How to convey the message succinctly so that the CFO will both read and understand it.

A good target is to make the executive summary fit onto one page or, if in a PowerPoint format, on a maximum of 5 slides.

This goal is to create sufficient interest for the CFO to want to look further. Think you can do it? Sure you can. □

As a whole, engineers and other like-minded technical people are both very versatile and good at a great many things. In fact, I think remarkably versatile compared to most other disciplines. But there is one thing that probably trips up most engineers, things monetary, especially writing financial motivations. I know, because I too am an engineer and I regularly encounter and see the frustrations and consequences of failed capex justifications.

In my opinion, far too many sound engineering projects are trashed simply because the CFO is not persuaded. But, whether we like it or not, without his or her blessing our pet projects will not see the light of day.

If we are prepared to be honest with ourselves, we have to admit that usually the problem lies not in the project or the CFO, but in the way that we present our case. Simply put, it is often not convincing in financial terms in the language of the person who has to 'sign the cheque' – or these days, authorise the EFT.

Now why should that be? Perhaps if we put the CFO into our position, it would be obvious that he or she would not even know what questions to ask about the technical aspects of the project, let alone understand and interpret the answers, identify issues and problems, work out solutions, come up with designs, manage conflicting parameters, etc. Why, then, would it not be the same, in reverse, if we step into the CFOs shoes?

That, I believe, is the nub of the matter. Neither party understands the language of the other.

We must realise that the CFO controls the purse strings. So, the ball is firmly in our court. We therefore have no choice but to adapt our strategy. What this means – and many technical people seem to balk at this – is that we need to learn 'money speak'. In reality, not only money, but many other related things that go with it. Things such as expected life, quantities and volumes, risks of many kinds, forecasts and projections, return on investment, etc.

Why is this a problem for us? I believe we are uncomfortable with them simply because they are not in the usual technical curriculum. In our study and training, all concentration is on gaining technical expertise – and that is usually more than enough for most of us. The fact that financial understanding plays such an important role at certain times in a

technical career is seldom recognised as justifying appropriate course matter in a technical syllabus. But, if the right words and numbers are not in the financial motivation, it will necessarily be rejected because a complete picture is not conveyed.

The subject of this column is maintenance. Unfortunately, this is often amongst the most difficult of areas for which to prepare financial motivations. This is because we are usually dealing with a great many grey areas fraught with uncertainty, such as unplanned failures, uncertain asset life, design changes, impaired performance, safety and environmental issues, etc.

Also, many of the proactive initiatives previously spoken about in this column cannot be motivated on the basis of yields and production achieved, but on the rather more nebulous concept of failures and consequences prevented. Nebulous because it is usually difficult to ascribe a value and hence

Guidelines to help engineers prepare a financial justification for financial consideration

The proposal:	Details what is to be procured, from whom, when and for what purpose; quantity, manufacturer, supplier, model, etc; whether new, replacement or upgrade; and the options considered and reasons for a particular supplier.
Reason:	The rationale and alignment with organisational strategy.
Funding:	The proposed source of capital.
Use of funds:	Whether outright purchase, lease, rental, etc. and why.
Incremental costs:	Impact on depreciation, salaries/wages, consumables, license fees, maintenance, calibration, training, storage, safety requirements, etc.
Assumptions:	Relevant assumptions made in the justification.
Revenue and profit:	Evaluates the value of additional sales revenue, gross margin or other financial benefit that will be realised; where it will be seen in the accounts and when; payback period; and explains the link between investment and return.
Other expense:	Tabulates other operating expenses not already identified and quantified (fuel, electricity, gas, insurance, tracker fees, data fees, toll fees, factory space, etc).
Debt capacity:	Applicable if funding requires an increase in company debt.
Intangible and other benefits:	Public perception, quality, morale, social upliftment, risks mitigated, etc.
Risks:	Business risks associated with the investment, or not making the investment, relevant to the proposal.
Benchmarking:	Relevant peer reviews if available.

Continuous electronic traceability thanks to valves with RFID

It's a fact that requirements for documentation and optimisation of maintenance processes are bringing about a more intensive focus on individual components within a plant. GEMÜ, one of the world's leading manufacturers of valves, measurement and control systems, has recognised this and equipped its valves with integrated RFID chips.



GEMÜ'S equipped valves with integrated RFID chips used for continuous electronic traceability and also for direct maintenance support.

As an innovative manufacturer of valves, measurement and control systems, GEMÜ's integrated RFID chipped valves are not only used for continuous electronic traceability but also for direct maintenance support.

The system, referred to as GEMÜ CONEXO, comprises valves with an integrated RFID chip in the body, diaphragm and actuator, an electronic reading device; the CONEXO pen; and IT infrastructure comprising a CONEXO app for mobile end devices and the CONEXO portal server as a central database – ideally installed at the operator's premises.

This interaction allows the maintenance technician in the field to call up current information about the status of the valve at any time, information such as the valve description, instructions, test reports or maintenance information.

No online connection is required for this; the data is saved on a mobile end device.

Since the information can be read out at the valve itself, the IQ process (installation qualification) is sped up as the required documents and test reports can be called up and compared quickly and easily.

The CONEXO system also offers major advantages for maintenance processes during operation. The maintenance documentation is processed electronically by the CONEXO app. The maintenance technician is guided through the maintenance processes, can record the evaluation of wearing parts electronically and verify this via photo documentation.

This allows the data to be recorded electronically in an organised manner and also allows for further electronic processing in a simple manner, whether for the customer's SCADA environment or in the customer's ERP system. The CONEXO portal can be used to analyse the history of operating media sites, even cross-plant. This enables the maintenance intervals to be optimally adapted too.

CONEXO is designed as an open system which means that many other plant components can be managed in the system in addition to GEMÜ valves. The sales launch of GEMÜ CONEXO took place in August last year.

Over the course of more than 50 years, this globally focused, independent family owned enterprise has established itself in important

industrial sectors thanks to its innovative products and customised solutions for process media control. GEMÜ is the world market leader for sterile valve applications in the pharmaceutical and biotechnology industries. □

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PVC modifiers re-packaged:

When an efficient, dust-free system for re-packaging PVC modifiers was required by the US chemical manufacturing company, Kaneka, bulk materials handling specialist, Flexicon, was chosen to supply the solution. A flexible screw conveyor first transfers powder from the first bulk bag discharger to a bulk bag filler before a second discharger empties into the hopper of the valve bag filler for the sacks under the discharger. This case study describes the process in detail.

Kaneka North America LLC, in Pasadena, Texas, USA, needed an efficient, dust-free method of re-packaging PVC modifiers to replace manual methods in place since 2003.

The plant packages grades of modifier products into bulk bags (907 kg, 771 kg, 454 kg) and 23 kg sacks based on projected customer orders for product grades in specific bag sizes. But when the actual orders do not match the projections, the plant needs to transfer products from one bulk bag size to another.

Previously, forklifts suspended a bulk bag above the hopper of a portable screw conveyor, which transferred the material into the desired-size bulk bag. Similarly, material was discharged from a bulk bag into the hopper of a valve bag filling machine for 23 kg sacks.

Both operations presented safety risks from the suspended bulk bags and generated high levels of dust. Product loss also occurred, and operations frequently had to stop for cleaning and removing dust that poses a safety hazard. "Re-bagging was inefficient, and the fine powders generated dust," says Brian Wilson, staff reliability engineer at Kaneka North America.

In the new system supplied by Flexicon, a flexible screw conveyor transfers powder from the first of

two BULK-OUT™ bulk bag dischargers to a TWIN-CENTERPOST™ bulk bag filler. The second bulk bag discharger empties into the hopper of the valve bag filler for 23 kg sacks located under the discharger.

Discharging material into various sized bulk bags

In Kaneka's 'bulk-to-bulk' transfer system, the loops of bulk bags are connected to a bag lifting frame which is forklifted onto a cradle at the top of a BULK-OUT™ BFF-C-X bulk bag discharger.

A SPOUT-LOCK™ clamp ring that is raised pneumatically by a TELE-TUBE™ telescoping tube makes a secure, sealed connection to the bag spout, preventing contamination of the plant environment with dust during material discharge. The telescoping tube maintains constant downward tension on the bag as it empties and elongates, promoting material flow into a 226 l hopper.

As the bag lightens, POP-TOP™ extension arms at the top of the four discharger posts increasingly stretch the bag upward into a cone shape, as FLOW-FLEXER™ bag activators raise opposite bottom sides of the bag into a V-shape on timed cycles, promoting total discharge from the bag.

The receiving hopper of the discharger is equipped with a hinged lid and bag tray support, allowing material to be dumped manually from sacks, boxes and other containers.

A 3.6 m long flexible screw conveyor, inclined at 45°, transfers the PVC modifiers from the hopper to a TWIN-CENTERPOST™ bulk bag filler, which has a height-adjustable fill head to accommodate a wide range of bag sizes.

The operator attaches the bag loops to retractable hooks that support the bag during filling. Under PLC control, plant air inflates the bag while an inflatable collar seals the bag spout, which, together with a filtered air displacement vent, prevents the escape of dust.

Load cells supporting the filler transmit weight gain information to the PLC, which stops the flexible screw conveyor once the target weight is gained.

Discharging material from bulk bags to 23 kg sacks

In Kaneka's 'bulk-to-sack' transfer system, a BULK-OUT™ model BFC-C-X bulk bag discharger empties contents of the bulk bag into the hopper of the valve bag filling machine for 23 kg sacks.

The BFC Series discharger differs from the BFF Series discharger in that bags are lifted from the plant floor by means of a cantilevered I-beam with hoist and trolley, eliminating the need for a forklift. This



Two bulk bag dischargers, a flexible screw conveyor, a bulk bag filler and programmable controls allow re-bagging of PVC modifiers into bulk bags of three sizes and 23 kg sacks, efficiently and dust-free.

a case study

hoist assembly was installed to fit limited headroom where the bulk bag discharger is located. As with the 'bulk-to-bulk' transfer system, the discharger employs a SPOUT-LOCK™ clamp ring and TELE-TUBE™ telescoping tube.

Dust-tight system boosts productivity

From start to finish, both operations are completely enclosed, greatly reducing dust emissions. Dust control for both transfer systems has been further enhanced by connecting to a recently installed dust collection system with explosion protection. Vent hoods and mass balance dust collection spouts were installed as required to make the system as clean and safe as possible.

"Dust generated from the re-bagging operation has been significantly reduced. The new system improves our productivity by an order of magnitude," Wilson concludes.

Kaneka North America LLC offers a range of performance modifiers for PVC and engineering resins to meet customers' physical and chemical property requirements. □



Above: An operator in the foreground initiates a bulk bag filling cycle while the operator in the background loads a bulk bag into the discharger frame. **Left:** The operator opens the outer closure of the bag to access the bag spout, which he connects to a dust-tight Spout-Lock™ clamp ring. A TELE-TUBE™ telescoping tube maintains constant downward tension on the clamp ring.



The flexible screw conveyor transfers material from the bulk bag discharger (rear) to the bulk bag filler (foreground). A height-adjustable fill head accommodates bulk bags in any of three sizes used by the company.



'Bulk-to-sack' system: The bulk bag is loaded into the frame using the discharger's cantilevered I-beam, electric hoist and trolley, and then gravity discharged through the telescoping tube into a filling machine for 23 kg sacks.



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Local wedgewire manufacturer receives a boost

FLSmidth, the supplier of specialist equipment to the mining, minerals processing and cement industries, has recently upgraded its South African wedge wire screen manufacturing facility in Edenvale, Gauteng. Using second generation technology in both its control system and its tooling abilities, the new machine produces specialised wire mesh for mining, industrial and food processing applications.

FLSmidth has significantly upgraded its local steel wedge wire screen manufacturing capabilities following the recent commissioning of state-of-the-art technology at its facility in Edenvale, Gauteng.

Buks Roodt, director responsible for Meshcape® Screen Media at FLSmidth in South Africa, says the company's new wedge wire machine was made available from FLSmidth's Australian operation.

The South African operation is one of four global facilities that specialises in the manufacture of this quality screening material for international markets. Known for its ability to significantly reduce blinding and plugging, this specialised wire mesh is used extensively in screening applications for mining, general industry and food processing.

"A team of international FLSmidth experts assisted in commissioning the machine, together with its advanced control system and wide range of tooling. They also provided training for the operators deployed on the wedge wire manufacturing line," says Roodt.

The machine was developed in-house by FLSmidth engineers, and incorporates second-generation technology based on the company's extensive experience in manufacturing wedge wire screening products. The technology provides FLSmidth with the flexibility required to use a range of support rods of varying sizes as well as to manufacture with different wire profiles and aperture sizes.

FLSmidth carries stock of a wide range of profiles and support rods in different materials ranging from ferritic stainless steels to exotic duplex stainless steels, to cater for the different segments of industry using wedge wire in their applications.

The machine incorporates a sophisticated resistance welding head capable of precision welding. This ensures optimum strength between support rods and the wire intersections, enhancing the quality and integrity of the final product.

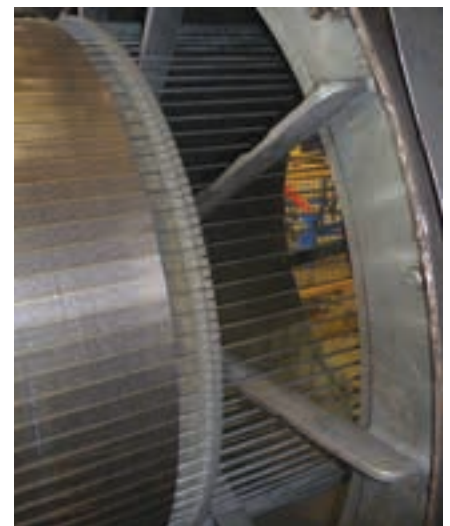
Roodt explains that the advanced welding head can weld wires with head widths ranging from one millimetre (mm) to five millimetres and with high accuracy slot sizes ranging from 0.2 mm to 20 mm. In addition, the machine can produce cylinders with diameters ranging from 650 mm to 1 250 mm and up



The new wedge wire machine recently commissioned by FLSmidth in its Edenvale facility.



The wedge wire machine long wire feed assembly.



Wedge wire being manufactured at FLSmidth.

to 6 000 mm in length. These can be split and rolled to produce flat panels.

Completing this investment is the new automated rod straightener and cutter on the factory floor. This extra sizing and cutting capacity is also being used by other operations at the factory.

This investment has brought the South

African wedge wire manufacturing operations in line with FLSmidth's other international operations. In addition to Australia, the company also manufactures wedge wire in India and the United States. The latter is home to the 'Big Bertha' machine that has the capacity to produce wedge wire cylinders with diameters in excess of 2.0 m. □

Reducing maintenance on chute systems is simple

A simple solution to reducing maintenance costs on transfer points at mines has been developed by South Africa-based Weba Chute Systems, which uses a different engineered approach that incorporates a supertube or cascade and involves putting a boundary layer in place in the chutes.

Transfer points do not need to be high maintenance areas on a mine anymore. This good news is from Mark Baller, managing director of Weba Chute Systems, who says the solution to reducing maintenance costs on transfer points is simple.

“More often than not this issue is addressed by looking at new materials handling solutions including the use of sophisticated lining composite materials, which can be extremely expensive,” Baller says. “The solu-

tion does not have to be as complicated as this and, as soon as engineers realise this, the closer they will be to saving money on their maintenance budget.”

Baller explains that the Weba Chute system is not an alternative to conventional chute systems. “It is, in fact, a completely different engineered approach with a ‘supertube’ or ‘cascade’ scenario with 95% of the material running on material at any time.

“Some engineers may be familiar with the term ‘boundary layer’ which is used in aero-

and fluid dynamics. Study of this phenomenon shows that when a boundary layer is in place, friction can be reduced by up to 30%,” he says.

When viewed in slow motion it becomes apparent that the particles close to the surface actually move in a tumbling motion and are, in fact, moving more slowly than the main flow of material. Baller explains that sliding particles moving at higher velocities cause extensive wear, while those that tumble at a lower velocity cause far less wear.

“Controlling the materials’ movement down the transfer point is only the first step,” Baller says. “By changing the angle of the transfer point the materials can be controlled from entry into the chute right up until the point of discharge.”

This optimal control of material flow during the journey through the transfer point not only reduces wear, but can eliminate spillage. Spillage can be a major cost issue, both in terms of waste and when it comes to cleaning up the area around the transfer point.

Baller says that on a new transfer point it is actually possible to completely eliminate spillage, and on projects where Weba Chute Systems are retrofitted into existing installations spillage can be significantly reduced. This also results in substantial savings for the mine.

Weba Chute Systems currently services six different continents, mainly from its South Africa manufacturing facility, with distributors and agents in most regions. The company holds ISO 9001:2008 accreditation and quality manufacture forms an important part of its process. □



The Weba Chute System is not an alternative to conventional chute systems; it is a completely different engineered approach.



Weba Chute Systems incorporate a supertube or cascade scenario with material running on material.



Weba Chute Systems are engineered to control the materials’ flow.

Local crane company puts rivals to flight

Commissioning trials are taking place for three high capacity travelling workshop cranes to be used to assist with large mine vehicle maintenance. Crane manufacturer, Condra, has developed techniques enabling fast-track production, which contributed to winning the contract.

Three high capacity double-girder overhead travelling workshop cranes, completed on schedule for Exxaro and installed at Grootegeeluk Coal Mine in Northwest Province during September last year, are undergoing commissioning trials.

The three cranes, ordered to assist with large mine vehicle maintenance, were manufactured by Condra on behalf of East Rand Cranes, the company's authorised distributor for Northwest Province, which secured the R7-million-plus contract in 2016.

Two of the cranes are identical 1.4-m span 50/20-ton machines fitted with variable frequency drives on the main hoists to facilitate precise positioning of very heavy loads. Exxaro's third crane, also with a span of 18.4 m, has a single 20-ton hoist.

Design of all three cranes was described by a Condra spokesman as "standard", although they feature live-axle drives in place of the more common ring-gear configuration, part of Condra's mandate to keep maintenance costs to a minimum.

East Rand Cranes is thought to have won the Exxaro order because of a combination of competitive pricing, machine durability, after sales service and Condra's ability to meet short lead times; this according to Condra's managing director, Marc Kleiner.

"We also pursue a market-imposed mandate to continuously drive down machine maintenance costs, which is why we offer live-axle drives.

"In addition, our gearboxes were up-rated some years back to deliver additional power and the company today uses a 36B case-hardened material on most pinions. This material, though expensive, is beneficial in extending crane lifespan.

"Wherever possible, we fit our hoists with high tensile-strength ropes to reduce rope diameter, drum diameter and enable smaller gearboxes and motors to be fitted," Kleiner notes.

Condra's cranes can be used for hook, grabbing, magnet, ladle, bucket or stacking duties and can be operated manually, electrically or both. Overhead cranes are manufactured to specification from some 250 sub-assemblies, including hoists, drives, end carriages, brakes, gearboxes and motors, all of which are manufactured by Condra. □



One of Exxaro's three cranes for Grootegeeluk Coal Mine undergoing load testing at Condra's Germiston factory.

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KPAL acquires Sadolin Paints

In early February 2017, Kansai Plascon Africa Limited (KPAL), headquartered in Johannesburg, South Africa and a subsidiary of Kansai Paint of Osaka, Japan, announced a binding agreement for the acquisition of 100% of Sadolin Paints' operations in Kenya, Uganda, Tanzania, Zanzibar and Burundi – subject to regulatory approvals and other customary conditions. *MechChem Africa* reports this story and presents some of the companies industrial offerings.

Kansai Paint is a global company with major operations in: Japan, China and East Asia; South Asia and South East Asia; the Middle East; and Africa. It is one of the top paint manufacturers and distributors worldwide with a diverse product offering covering the decorative, industrial, protective coatings and automotive space. It has world leading Research and Development facilities catering for development across all products with major R&D facilities in Japan, India and South Africa, which continually drive innovation and excellence in the markets these products serve.

Sadolin Paints is the undisputed market leader in the East African paint industry with a history dating back to 1959. Sadolin Paints is the largest paint manufacturing group in East Africa and the only one with a footprint comprising presences in Kenya, Uganda, Tanzania, Zanzibar, Burundi and Rwanda, with exports to several neighbouring countries including South Sudan, DRC, Ethiopia, Djibouti and Somalia.

The acquisition of Sadolin Paints is part of Kansai Paint's global expansion strategy.

This acquisition further proves Kansai Paint's long-term commitment to the African continent, will reinforce KPAL's leading position in Africa and establish its presence in East Africa with a total population of circa 285 million people, representing around 24% and 9% of the total African population and GDP respectively.

Farid Masood, KPAL CEO says: "We are extremely excited about the acquisition of Sadolin. Our 2020 vision is now being translated into reality as we evolve from a Southern African focused company to becoming a Pan African company, embracing the challenges and diversity of the continent. Kansai's strong brand heritage, global technical capability, and trusted performance coupled with Sadolin's respected reputation and presence in East Africa, will definitely strengthen our position as the leading paint company in Africa, enhancing our future growth and performance."

KPAL believes that the benefits of the transaction will extend to all stakeholders of KPAL and Sadolin Paints, including distributors and other business partners. KPAL intends to work closely with Sadolin Paints'

management and staff to ensure the continuity of the business and services offered to Sadolin Paints' valued customers, and to maintain its position as a market leader in the East African markets.

As part of the transaction, the parties have also agreed to separately investigate the acquisition of Sadolin Paints' operations in Rwanda.

Corrosion-protection for petrochemical plant

Kansai Plascon offers internal and external corrosion-protection systems for tank lining and other hazardous environments in the petrochemical and refinery industry. These coatings offer ideal protection against various fuel types.

The specialist coatings manufacturer and supplier has been involved with the petrochemical and refinery industry since the mid-1970s, points out Mike Byrd, national protective coatings specification manager at Kansai Plascon.

"We assess sights for asset owners in the petrochemical and related refinery sector,



Kansai Plascon offers internal and external corrosion protection systems for tank lining and other petrochemical and refinery plant equipment.



The specialist coatings manufacturer and supplier has been involved with the petrochemical and refinery industry since the mid-1970s.



Kansai Plascon is the market leader in the supply of decorative coatings and aerosol marking paint to the mining industry.

compile reports on our findings, and then provide corrosion-protection solutions specific to each scenario," Byrd explains. "We offer a 360° guarantee, in addition to monitoring all progress."

Specialist coating products supplied to this sector are Plascoline 1000 internal lining, Plascotuff 3000 primer, Plascotuff MIO intermediate coating, and Plascothane 9000 topcoat. In addition, the Protective Coatings division offers technical and aftermarket support, as well as project management.

"We go to great lengths to support and supply our customers, including new product developments. Kansai Plascon has always been at the forefront of coatings development, as we expand our product range with new technologies," Byrd notes.

"Our custom-made solutions extend the life of essential infrastructure in the petrochemical industry by protecting tanks, piping and structural steel from corrosion. By keeping such infrastructure serviceable, these operations run continuously, with no costly stoppages and downtime, which translates into constant production rates," Byrd concludes.

Turnkey coatings for the mining industry

Despite an ongoing slump in the mining sector, Kansai Plascon has maintained its competitive edge as a leading paint supplier to the industry, thanks to the fact that it offers a 360-degree turnkey solution that is comprised of decorative products, mine marking products and protective coating products – all backed by dedicated after-sales support.

Kansai Plascon is the market-leader in supplying decorative coatings and aerosol marking paint to the mining industry. Decorative paint products are used on mining properties, which include staff houses, hostels and offices, while marking paints are used at operational level in shafts. Kansai Plascon brand manager for industrial coatings, Mareta le Roux, says although the company boasts majority market share in these areas, there is still room for growth.

"One area of mining that holds considerable growth potential for us is corrosion protection for processing plants such as smelters and concentrators. We are a relatively minor player in this field at present. However, the strategic five-year plan in terms of resourcing, is to put a focus on corrosion protection for the in mine processing plants. Our protective coating products meet all industry requirements, and it is now a matter of driving them forward," she states.

Over the years, Kansai Plascon has developed fundamentally strong relationships with some of the largest names in the global mining industry. Le Roux believes that this will work

to the company's advantage, when promoting its protective coating range. "This is already bearing fruit, as a large gold mining operation with mines in East, West and Central Africa now specifies Plascon Protective coatings for all of its processing plants. We have also been supplying products to mines in the Zambian copper belt for a number of years. Further expansion in Africa holds the potential for measurable growth."

"We are by far the biggest coatings manufacturer in Southern Africa, and we offer a one-stop shopping experience that our competitors cannot," reveals Kansai Plascon national market manager for mining and minerals and road marking, Rolf Redelinghuys. He adds that technical strength and capability also places Plascon ahead of the competition.

"Our service is not just selling protective coatings, but doing specifications. We are experts as far as that is concerned. We do not just sell the paint and walk away – there is support provided throughout the process. Our technical teams undertake site visits to check if the product is applied correctly, especially when it comes to the corrosion protection," he elaborates.

Corrosion protection is expensive to apply and, le Roux indicates: "It is essential to successfully complete the application of the coating on the first attempt. Bearing this is

mind, we provide extensive training to mining contractors at no additional charge. It's all about the customers' bottom line at the end of the day, and we are there to ensure that everything goes according to plan."

With regard to research and development, Kansai Plascon boasts a state-of-the-art laboratory in Durban, KZN, which features dedicated teams working solely on industrial and protective coatings. "Our laboratory is world-class, therefore, most of our research and development is done locally, based on local customer requirements," says le Roux.

Kansai Plascon also boasts a strong network of distributors in sub-Saharan African regions such as Namibia, Botswana, Zambia, Malawi, Zimbabwe and Mozambique, with plans to expand the network in East Africa and West Africa. This network will enable the company to deliver its range of products in the quickest turnaround times.

In challenging economic times, the current industry trend is to prioritise maintenance. Redelinghuys believes that this works to Kansai Plascon's advantage. "Mining companies are moving towards optimising and conserving their assets, rather than replacing them with new ones. As a result, our sector sales have improved, and I am confident we will gain market share in the foreseeable future," he concludes. □

Kansai Plascon supervises bridge project in Lesotho

Kansai Plascon has provided an on site monitoring service for a major bridge sandblasting project in Lesotho, which also used specialist products from its Protective Coatings division.

The project required sand blasting the steel bridge surfaces to ISO 8501 1:2007 (Sa 2½). This was followed by an application of a zinc rich epoxy primer and two coats each of Plascotuff Epoxy MIO Intermediate Coat and Plascothane 9000 Polyurethane Acrylic.

"Our on site monitoring of the application involved spot checks on the surface preparation, as well as dry film thickness (DFT) readings," explains Mike Byrd, national protective coatings specification manager for Kansai Plascon.

The company had technical specialists on site for the project. The Protective Coatings division has had prior experience with bridge projects, which stood it in good stead in clinching the Lesotho contract.

Byrd adds that the success achieved with this particular project was also due to Kansai Plascon's 360° guarantee system, which involves the end user, applicator and the coatings manufacturer itself.

Plascotuff Epoxy MIO Intermediate Coat is a two component polyamide epoxy containing micaceous (sparkling) iron oxide. It provides a high build barrier coating for protecting steel in aggressive conditions, as well as an abrasion resistant coat for shop coated steel.

Plascothane 9000 Polyurethane Acrylic is a two component re-coatable polyurethane acrylic high performance finish – for maintenance and new construction – with an excellent decorative appearance. It features high gloss and colour retention, long term protection and durability and is available in a range of colours. An added benefit is that a high DFT thickness can be achieved with a single application. □



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BASF to offer tailor-made product innovation

At the European Coatings Show 2017 (ECS), which is going to take place in Nuremberg from April 4 to 6, BASF experts and specialists from BTC, the distribution organisation of BASF, will present new raw materials for the coatings, paint and construction industries at booth 523 in hall 7A.



BASF looks forward to using the ECS trade fair to present various innovative solutions aimed at current market challenges.

The broad range of products offered by BASF includes dispersions, resins, formulation additives, light stabilisers, antioxidants, pigments, hardeners, cross-linking agents, reactive diluents and solvents.

Environmentally compatible corrosion protection

The new water-based Acronal® PRO 7600 acrylic dispersion provides light to medium corrosion protection (categories C2 to C3) for industrial metal coatings. The binder offers an environmentally compatible drop-in solution that does not contain APEO and replaces Acronal® PRO 760, the current market standard. Acronal PRO 7600 can be used for all current applications such as airless, brush, roll or dip techniques.

Excellent rheology and stabilisation of flowable mortars

Self-flowing mortars help to save time and money at building sites. The powdery Melflux® superplasticisers and stabilisers from the Starvis® range of BASF that are used for floor screeds and self-leveling underlayments exhibit very good flow behaviour and perfectly stabilise mineral particles. Starvis prevents unwanted effects such as sedimentation or bleeding. Starvis-based mortar products are

particularly robust when it comes to water and raw material fluctuations: they greatly improve the quality of floor constructions and help to avoid complaints at construction sites. Since Starvis products can be combined with Melflux superplasticisers, they enable a rheology profile that is individually geared towards customer requirements.

High-performance dispersion for interior paints

With the Acronal® 6292 dispersion, paint manufacturers are enabled to produce sophisticated interior paints with highest wet scrub resistance at competitive prices. The water-based styrene-acrylate binder is a high-quality alternative to the conventional technologies and facilitates the formulation of environmentally compatible interior paints: Acronal 6292 is a low-odor product that contains neither ammonia nor coalescents.

Defoamer for water-based systems

Foam formation is a common problem occurring during production and processing of paints and coatings. To avoid such problems, BASF has added a new defoamer to its range of formulation additives that is based on organo-modified polysiloxanes – the FoamStar® SI 2240. Apart from its strong defoaming

effect, FoamStar SI 2240 shows broad compatibility with different binder systems and excellent long-term stability and efficiency. FoamStar SI 2240 is registered worldwide and can, among other applications, be used in water-based architectural coatings, industrial coatings and paints as well as in pigment concentrates. In addition, FoamStar SI 2240 complies with specific FDA and EU requirements for food contact and is therefore suited for printing and packaging applications.

New kaolin-based product for architectural paints

With the launch of kaolin-based Mattex® PRO, BASF continues to develop new technology with focus on sustainability. Mattex PRO enables paint formulators to eliminate flattening agents and crystalline silica-containing minerals while simultaneously providing simpler formulations and the same high-performance results with less titanium dioxide (TiO₂).

“We look forward to using the ECS trade fair to present various innovative solutions aimed at current market challenges that will enable our customers to improve their competitiveness,” says Christoph Hansen, head of the Dispersions & Resins Europe business unit. BASF offers the broadest global range of raw materials for the formulation of coatings and paints in the field of architectural coatings, construction, automotive, industrial coatings, furniture and flooring as well as raw materials for powder coating resins. □

About BASF

BASF creates chemistry for a sustainable future, combining economic success with environmental protection and social responsibility. The approximately 112 000 employees in the BASF Group work on contributing to the success of customers in nearly all sectors and almost every country in the world. BASF's portfolio is organised into five segments: Chemicals, Performance Products, Functional Materials & Solutions, Agricultural Solutions and Oil & Gas.

BASF generated sales of more than €70-billion in 2015. BASF shares are traded on the stock exchanges in Frankfurt (BAS), London (BFA) and Zurich (BAS).

Global HVAC specialist sponsors art in Africa

In keeping with its historic hi-tech heating, air-conditioning and refrigeration success protecting Michelangelo's masterpieces in the Sistine Chapel, AHI Carrier has announced a R600 000 sponsorship for the Zeitz Museum of Contemporary Art Africa (MOCAA) at the V&A Waterfront in Cape Town. *MechChem Africa* talks to Jaco Smal, the company's Cape Town-based commercial sales director.



Above: AHI Carrier has announced a R600 000 sponsorship of the Zeitz Museum of Contemporary Art Africa (MOCAA) at V&A Waterfront in Cape Town.

V&A Waterfront's Silo District is built around the historic Grain Silo complex, once the tallest structures on the city's skyline and central to the economy of the harbour and the Western Province.

Nearing completion, the V&A Waterfront's Silo District is already home to a six-star Green Star SA office space, more than 30 luxury apartments in Silos 1 and 2 respectively; and an additional residential development, a Virgin Active Classic Health Club, and a super-modern office building in Silos 3 to 5.

Currently being finalised, the state-of-the-art Zeitz MOCAA in the Grain Silo complex is a new public not-for-profit cultural institution, the first major art museum in Africa aspiring to be an internationally-renowned destination for lovers of Art from Africa and the Diaspora.

The total investment in the Silo District development at the V&A Waterfront by shareholders Growthpoint and the Government Employee Pension Fund, which is managed by the Public Investment Corporation (PIC), is over R2.5-billion.

Approximately 2 500 people are expected to work at the Silo District, with the original economic impact study suggesting that the expected nominal contribution to GDP from future developments will be over R29-billion by 2023.

A district-wide HVAC solution

"Carrier's involvement with the Silo District began with a request from David Lombard of Lombard Consulting Engineers, who asked several service providers to identify the best equipment available for a centralised Waterfront Silo District cooling and heating plant room," says AHI Carrier's Jaco Smal. "The idea was to supply on-demand chilled and heated water from a central plant room to air-handling units distributed throughout Silos 3 to 6.

"At the heart of the system is the use of seawater instead of evaporative cooling towers

to reject the waste heat," Smal explains. "We circulate naturally-cool seawater through heat exchangers so that the system does not require cooling towers to reject heat into the atmosphere. As well as the better efficiencies associated with water cooling, this avoids having to consume water through evaporation," he explains. "The entire Silo District is built on green principles and energy efficiency. The directive was to achieve the best possible energy efficiency for every tenant," he adds.

Two Carrier AquaEdge 23XRV chillers were chosen to meet most of the demand from the four connected Silo developments. "These state-of-the-art variable speed screw chillers are able to operate off condensed water at a temperature as low as 13 °C, which makes them ideal for chilling from the cold-water temperatures associated with the seawater. We usually run the units at inlet temperatures of 18 °C to 19 °C, but the chillers have to be able to cope when the seawater drops to lower

temperatures," Smal tells *MechChem Africa*.

In addition, a further two Carrier AquaForce 30XW-V water-cooled variable speed screw chillers are used for both cooling and heating. These have very high part-load efficiencies, allowing for exact matching of the cooling capacity to the load.

"Most importantly, these machines are all extremely robust and reliable. In general, highly-efficient machines are often seen as delicate and unreliable. But these are all designed for reliability, for which Carrier is renowned. Since their initial introduction in the US in 2005, we have never had a compressor failure," Smal reveals.

As for the efficiency of the Silo District plant room? "Typically, in peak summer, we





generate chilled water at 7.0 °C, which gives us a COP of between 10.54 and 13.28. This means that the two AquaEdge 23XRV chillers can each produce 1 500 kW of cooling from between 113 and 142 kW.

“For cooling during intermediate months, when the ambient temperature is closer to the set point, we can raise the chilled water temperature to 10 °C, which gives us a COP of 12.7 at 100% capacity, rising to 15.85 at 40%,” Smal tells *MechChem Africa*, adding, “on machines of this size, this efficiency is as good as it gets.”

The Zeitz MOCAA sponsorship

The Silo District developments are focused around Zeitz MOCAA, which sits at the heart of this district. Surrounding the museums

will be a new central pedestrian plaza, Silo Square, a gathering place for locals and international visitors.

Zeitz MOCAA covers 9 500 m², making it comparable in size to the leading contemporary art museums in the world. It will consist of nine floors, of which 6 000 m² will be dedicated to exhibition space. In addition, an educational floor will help to foster a new art-loving, museum-going audience.

The task of repurposing this historic Grain Silo at the V&A Waterfront, once the tallest building in Cape Town, was given to internationally-renowned designer Thomas Heatherwick. This provided the opportunity not only to appropriate a former industrial building to display art, but also to imagine a new kind of museum in an African context.

The R500-million redevelopment project was announced in November 2013 as a partnership between the V&A Waterfront, and former Puma CEO and chairman Jochen Zeitz. The key challenge has been to preserve the original industrial identity of the Heritage-listed building, and to retain choice pieces of machinery to illustrate and maintain its early working character. Heatherwick Studio’s final design reveals a harmonious union of concrete and metal, with crisp white spaces enveloped in light.

While the main goal of every museum is to make objects accessible to the public, researchers and other institutions, it also has to ensure the long-term safety and preservation of the collections. Objects need one set of conditions, while people may need another.

Achieving both is the ultimate aim of having a controlled environment.

At the MOCAA, this will be achieved via sophisticated air-handling units, controlled via the building’s management system (BMS), and supplied centrally with chilled and/or hot water circulating through the Carrier AquaEdge and AquaForce chillers in the Silo District’s centralised plant room.

Carrier is no stranger to the world of museums and art collections, having installed an innovative heating, ventilating and air-conditioning (HVAC) solution for the Sistine Chapel to help preserve Michelangelo’s masterpieces against deterioration caused by the increasing number of visitors.

Ongoing developments

The next exciting project for Carrier? “We are doing something similar for the Canal District, a mixed-use development linking the V&A Waterfront to the Cape Town CBD. As with all other V&A projects, the buildings involved will employ best-practice green design principles that target 5-Star Green Ratings using the Green Star SA Office Design VI rating tool,” Smal says.

“We have worldwide experience in best-practice green HVAC solutions, and the local experience and service support to implement and maintain our technology. With the R600 000 Zeitz MOCAA sponsorship, we are also demonstrating our willingness to give back to communities, and to ensure that our technology brings long-term benefits,” Smal concludes. □

Left: Two Carrier AquaEdge 23XRV chillers were chosen to meet most of the demand from the four connected Silo developments. These chillers are able to operate off condensed water at a temperature as low as 13 °C, which makes them ideal for chilling from the cold-water temperatures associated with seawater.
Right: Two Carrier AquaForce 30XW-V water-cooled chillers are used for both cooling and heating. These have very high part-load efficiencies, allowing for exact matching of the cooling capacity to the load.



Ozone depleting gas smugglers face clampdown

Industries using imported ozone depleting HCFC refrigerants face escalating retrofit and recycling costs and should not be tempted to use illegal alternatives, warned leading industrial gases company, Afrox, which supplies low Global Warming Potential (GWP) hydrofluorocarbons to both industrial and domestic sectors in South Africa.

The South African government has launched a campaign to clamp down on the smuggling of ozone depleting substances (ODSs) into the country and is pouring resources into training and equipping land, air and sea ports of entry to stamp out the trade in illegal refrigerants.

Smugglers use a number of methods including concealing the nature of the material by making false claims on import documents, mis-declaring or hiding ODSs completely. Customs and enforcement officers at sea ports and land border posts have now been trained and equipped with portable ODS detection analysers. Points of entry covered include Durban, Cape Town, East London, Port Elizabeth and Beit Bridge.

In 2016, the DEA trained more officials to cover OR Tambo International Airport



Arkema's Forane 427A is a new 100% HFC blend offering a simplified retrofit solution for existing R22 installations across a broad spectrum of HVAC and refrigeration applications.

and border points at Lebombo, Kopfontein and Groblersdal.

The HVAC&R sector is one of the primary consumers of HCFCs in South Africa today and industrial gases company Afrox is a leading solutions provider through its new-generation low global warming potential (GWP) hydrofluorocarbons (HFCs) offering.

"The HCFC R22 has been the refrigerant of choice for domestic and industrial refrigeration for decades owing to its excellent thermodynamic properties," says Afrox product and business development manager for Chemicals and Refrigerants, Nadine Baird.

Baird adds: "In terms of the Montreal Protocol, of which South Africa is a signatory, local companies that currently import refrigerants containing virgin HCFCs have faced restrictions since 2013.

"Businesses, particularly those that rely on refrigerants for their processes, must face this reality or face escalating costs for retrofitting and recycling. One ready-to-use solution is Forane® 427A, developed by Arkema and distributed by Afrox in South Africa and neighbouring countries."

Arkema's Forane 427A is a new 100% HFC blend offering a simplified retrofit solution for existing R22 installations across a broad spectrum of applications, from air-conditioning to medium- and low-temperature refrigeration.



Nadine Baird, Afrox product and business development manager for Chemicals and Refrigerants.

It offers a similar performance to R22, has no ozone-depleting potential and a GWP of only 2138, making Forane 427A one of the lowest GWP gases of the available R22 retrofit solutions. "It is therefore being welcomed as a viable alternative for use in R22 equipment. It is non-toxic and non-flammable, meeting the highest A1/A1 requirement on both counts," confirms Baird.

"While being compatible with polyolester oil (POE) lubricants, Forane 427A is also unusually tolerant to high levels of residual AB or mineral oil – up to 10% or sometimes even 15% oil tends to remain after the changeover from R22," Baird says. "Optimal performance close to R22 can be achieved without having to apply a long and costly circuit rinsing process.

"With the decline in virgin HCFCs being legally imported, South African users must look more closely at retrofitting machines or maintaining them with reclaimed product that has been cleaned to ARI700 specification," said Baird. "It is acceptable to use recovered and recycled HCFCs such as R22 until 2039, while users make the transition to alternative gases.

"Afrox has geared up to offer a service to purify reclaimed refrigerants by collecting used refrigerant from our clients, supplying them with clean stock and then processing the used refrigerant through our proprietary refrigerant recovery and reclamation system, the ZugiBeast," she adds.

The ZugiBeast is a device that recovers and cleans refrigerants, removing the water, oils, acids, sludge and particulates that build up in refrigeration systems over time.

"With this system we're able to treat all major refrigerants and contaminants. There is an additional benefit of improved productivity and power savings for our customers, since their machines work better on decontaminated refrigerant and cleaner heat transfer surfaces," Baird concludes. □



The ZUGIBEAST is a high-speed decontamination unit used to extract contaminants from refrigerants.

Global and local fan specialists offer full ventilation product range

Following majority shareholder acquisitions of MechCaL and TLT ACTOM, Germany-based firm, TLT-Turbo (GmbH), has announced a collaboration structure involving all three firms that will provide a total solutions approach to the development of integrated, reliable ventilation products.

Following three years of sustained effort, TLT-Turbo, MechCaL and TLT ACTOM will team up to produce and distribute a full range of ventilation products for the mining, construction, industrial and power markets for South Africa and sub-Saharan Africa (SSA). The product lines will be based on the entirety of the group's proprietary ventilation solutions. This includes maintenance and refurbishment of process, power and primary and secondary mining fans, as well as other value-added services as part of a ventilation-on-demand solution. This venture combines the global resources and expertise of TLT-Turbo with the client base, distribution network and product innovation of MechCaL and TLT ACTOM.

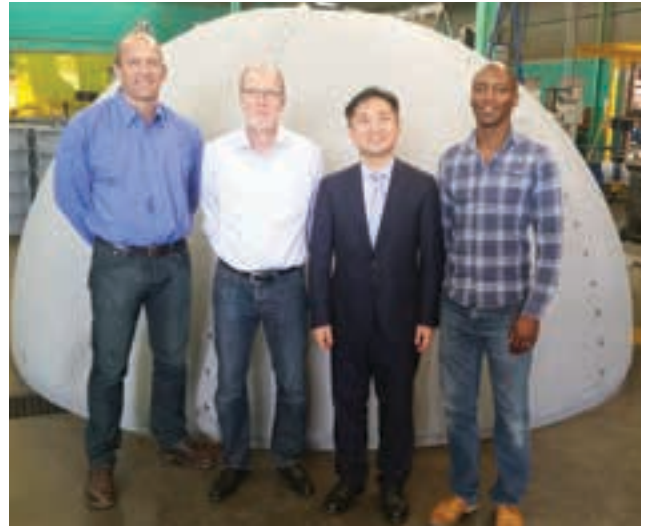
TLT-Turbo's managing director, Rainer Redinger, says that this move forms part of TLT's global strategy to be the world leader in air movement services as well as their long term African growth strategy. "Working together opens a doorway to a broader local and international client base. It will see all the companies involved benefiting from a larger marketing and services footprint with global support infrastructure from TLT-Turbo and its parent company Power China Corporation. Power China is a Fortune 200 company and a leading Chinese corporation that services most of the markets that the TLT-Turbo group focuses on," Redinger explains.

This venture will also help to extend the TLT global footprint for the supply of MechCaL's other advanced composite products. According to Luther Erasmus, recently appointed managing director of MechCaL and TLT ACTOM, MechCaL has been rebranded for the purposes of global and regional distribution of its products. Erasmus explained that MechCaL and TLT ACTOM will collaborate closely to develop the SSA market, offering a complete range of fans – from auxiliary to large surface fans – for applications in the mining industry, as well as a broad range

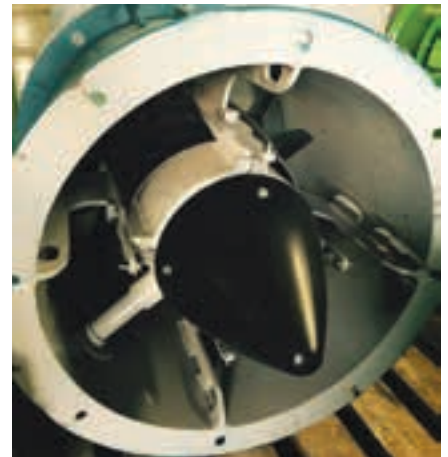
of industrial ventilation and process solutions.

"The full TLT-Turbo range of fans is supplied to the sub-Saharan market by TLT ACTOM while the MechCaL auxiliary fan product range will be sold in South Africa and sub-Saharan Africa under the TLT MechCaL brand, and internationally under the TLT brand," Erasmus explains. "TLT MechCaL will also form part of TLT-Turbo's globalisation roadmap and play a key role as a composites competency centre for the TLT-Turbo group. TLT MechCaL has already developed products and started shipments to the global market," says Erasmus.

Craig Johnston, Operations Director of TLT ACTOM, stated that combining world class German technology with local African knowledge presents a formidable offering. TLT ACTOM will expand its already well-developed footprint in the mining industry to include the innovative TLT MechCaL auxiliary mine fan range. This will lead to TLT MechCaL and TLT ACTOM expanding their projects, service and manufacturing facilities over time to support the expected growth in the mining industry and other industrial applications. □



The 'One TLT for Africa' management team: Luther Erasmus, managing director of TLT MechCaL and TLT ACTOM; Rainer Redinger, managing director of TLT-Turbo and chairperson of TLT MechCaL and TLT ACTOM; Minggang Wan, joint managing director of TLT-Turbo and Power China representative; and Kgashane Mohale, director of TLT ACTOM.



MechCaL's jet fan designs are the result of a development focus on the use of advanced materials for customised solutions.



MechCaL's 45 kW energy efficient axial mine ventilation fans offer significantly lower costs of ownership.

New approaches to extend the life of HVAC equipment

In this article, Neil Cameron of Johnson Controls Building Efficiency – Africa, talks about how condition-based maintenance practices are enhancing the efficiency and reliability of HVAC equipment.

HVAC is a long-term investment: chillers are big-ticket items that are meant to last the lifetime of a building: about 25-30 years. In fact a recent demolition of one of the first four star hotels in Dubai led to the retirement of three YORK® YT Chillers after nearly 34 years of service. These chillers were one of the first centrifugal chiller installations in the region.

While scheduled maintenance may keep the equipment ticking over, condition-based maintenance ensures promised performance and energy efficiencies are achieved. With eco- and cost-conscious mindsets steering buyers' decisions, HVAC companies are increasingly aligned to sustainable maintenance practices. They offer a number of attractive condition-based maintenance approaches to suit the risk and investment positions of companies and property owners.

The reality is that chillers can and do last a lot longer. There are chillers that are over 50 years old that are still putting in a full shift in industrial and commercial environments. The machines that make it to this age are in various states of repair but the best have had a dedicated team attending to maintenance. These chillers are often only retired when replacement parts become difficult to source, or advancing technologies begin to make

strides in efficiency that they cannot hope to emulate. With longevity now a key factor in HVAC vendors' roadmaps, the sophisticated, digitally enhanced machines being built today can last for four decades and more.

What is condition-based maintenance?

Quite simply it is the ability to continuously monitor, assess and refine the performance of plant equipment. Monitoring may include vibration analysis, use of real-time performance data from sensors on and within the machine, and analysis of the chiller's alignment or deviation from its published operating 'signature' – the frequency and rate at which the machine functions at designed conditions.

The major vendors have all released such signatures to support equipment maintenance and care. Specialised service providers can make use of published signatures to provide condition-based maintenance services for a broad array of HVAC equipment.

The value of a 24/7 monitoring is significant.

It enables early detection of out-of-sync operation and identifies precursors to failure. These are errors that can be corrected with a tweak if caught in time. The alternative is that the machine may run to fail, resulting in ex-

pensive replacement of parts and downtime. Compressors and impellers will, for example, last the lifetime of chiller if well maintained.

Monitoring and analysis also enables efficient servicing of equipment. Service providers arrive on site fully equipped to deal with the challenge. With pre-knowledge of potential problems, they can bring along the right spares and equipment needed to fine-tune or repair the machine.

Energy and operational savings can be realised through condition-based maintenance by optimising levels of performance to meet budgets.

Condition-based maintenance approaches

For equipment at different life stages and for owners with different HVAC priority levels, there are different condition-based maintenance models that can be applied.

For owners of newer machines, built-in features such as performance monitoring, an always-on connection to the Cloud or the Internet of Things (IoT), as well as self-identification of potential operating issues, offer a big advantage. It allows the machine to be remotely monitored, its performance to be benchmarked against a vendor database and a global peer set, standard reports to be issued and in-house maintenance teams or outsourced solution providers to be alerted immediately to errors or potential issues. This augments scheduled maintenance, adding significant value.

For owners of older machines, specialised HVAC condition-based maintenance teams can conduct scheduled analysis, providing basic reports regarding consistency, oil and refrigerant levels or potential contamination; pressure and temperature; or even vibration analysis, for example. This helps plant owners to create maintenance schedules and strategies that improve on scheduled maintenance and break-fix efforts, schedules that can be aligned to operating requirements and budgetary constraints. For example, providing suitable planning for downtime or part replacement or ensuring regular checks in periods of intensive use.

For owners considering making use of generic condition-based maintenance service providers – don't. HVAC equipment is complex, it requires more than a generic review.

The future of condition-based maintenance?

Condition-based maintenance of HVAC equipment has been around for about ten years but the reality of what can be achieved with the performance data that is being collected is only just becoming apparent. Cameron believes that within five years' condition-based maintenance will become the



For owners of newer chillers, built-in features such as performance monitoring, an always-on connection to the IoT as well as self-identification of potential operating issues, offer big advantages.

norm. The functionality will be built into HVAC equipment and plant equipment will 'talk' to the building, automatically finding optimal solutions to performance issues in conjunction with other connected systems, automatically scheduling needed maintenance.

Do you have a long-term plan to maximise your HVAC investment? The IoT, the improved ability to use available data intelligently and proven condition-based maintenance approaches make this easy to do, no matter the age or sophistication of your equipment. □

Water cooler range offers reliable active/passive cooling

Intertec has launched a family of high-performance water coolers, specially designed to work in combination with passive cooling systems. The combination of active and passive cooling technologies provides process control and instrumentation engineers with the means to configure field protection cabinets and shelters with extremely reliable cooling. The combination is ideally suited to protecting remote and mission-critical control and instrumentation equipment.



The two cooling technologies can work together to handle extreme climatic conditions, or maintain continued operation in the event of one system failing. Should electrical power fail completely, the passive cooling system continues to operate indefinitely – maintaining low shelter temperatures until maintenance work can be performed.

The new family of Intertec water coolers – dubbed Hybricoool – are housed in tough GRP enclosures, which are suitable for use in the harshest of environmental conditions.

Hybricoool water coolers offer an IP rating of IP65 and can also be provided in versions suitable for use in hazardous areas. A range of sizes and cooling capacities allows users to select optimal cooling solutions for all common scales of outdoor protection applications from enclosures, to larger cabinets and walk-in shelters.

Passive cooling operates by natural convection and requires no electrical power. Intertec's passive cooling systems typically employ water as a medium to store the coolness of the night and use it to moderate temperatures throughout the day. This form of cooling is widely used for 'off grid' applications where electrical power is unavailable and/or unreliable, and in remote locations, such as on SCADA systems for pipelines and oil and gas wellheads.

A passive cooling system can typically limit the maximum internal temperature of cabinets and shelters to around 10 °C above minimum night-time temperatures, making it ideal for applications in arid and desert climates.

The addition of an Intertec Hybricoool water cooler reduces the dependence on low night-time temperatures, opening up applications in a much broader range of climates and geographical locations. Such hybrid or 'semi-passive' cooling systems combining active and passive cooling technologies can easily be configured to maintain internal shelter temperatures at 20 °C or less. □



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Mine water treatment that improves profitability

Minerals processing specialist Multotec believes its continuous ionic filtration (CIF®) process could help change the mining sector's outlook on wastewater treatment. Via its Clean-iX® process, valuable metals can be recovered first, followed by wastewater being passed through the patented dual-stage ionic desalination (DeSALx®) process, to produce potable water quality. *Peter Middleton* talks to *Carien van der Walt*.

According to Multotec environmental process engineer, *Carien van der Walt*, continuous ionic filtration technology augments existing solutions such as reverse osmosis, by achieving higher water recoveries while delivering a zero liquid discharge solution.

"CIF® is a significantly improved version of the familiar and widely accepted ion exchange methodology," says *Van der Walt*, "and it has been tested and proven in treating wastewater in various applications around the world."

The technology was developed by the All Russian Research Institute: Chemical Technology (ARRICT), originally for uranium and rare earth extraction and recovery. Using ion exchange resins, the technology enables uranium ions to be loaded onto the resin from a solution, and then regenerated in order to produce a concentrated uranium solution. This solution can be processed even further to produce a saleable uranium product, "and there are now more than ten uranium recovery plants in Kazakhstan and Russia that have been using the technology advantageously for many years," *Van der Walt* adds.

In 2000, the Australian water treatment and metals recovery specialist, Clean TeQ, which is now commercialising the process, obtained the exclusive license to the technol-

ogy. Some three years ago, Multotec recognised the benefits and became the exclusive partner for the technology in Africa. "It fits in well with our range of solid-liquid separation technologies, such as our centrifuges and filter presses," she tells *MechChem Africa*.

Describing how ion exchange technology works, *Van der Walt* says that ion exchange resins consist of polymer beads chemically engineered to suit specific ion exchange reactions. "The reactions take place on the surfaces and within the porous structure of these tiny spheres. Typically for water treatment applications, an ion exchange resin used for removing cationic elements starts out with hydrogen ions (H⁺) attached to the polymeric structure of the beads. When brought into contact with contaminated water containing, for example, calcium (Ca²⁺) ions, two H⁺ ions are discharged into the water for each Ca²⁺ ion that attaches itself to a bead.

Most traditional ion exchange treatment systems rely on a static resin bed, which is laid out similarly to a sand filtration system, the water being passed through the bed, usually from above.

"As the ion exchange reaction proceeds, the resin in the fixed resin bed becomes saturated and then has to be regenerated. This is, therefore, an intermittent batch pro-



cess that has to be halted at regular intervals while the resin bed is flushed, washed and treated to remove the accumulated Ca²⁺ ions and replace them with H⁺ ions again," *Van der Walt* explains.

The difference between CIF and traditional ion exchange processes? "The key difference is that we do not use a fixed resin bed. Instead, we are moving ion exchange resins through the system in the opposite direction to the water flow," *Van der Walt* responds.

Explaining how the continuous process works, she says: "By moving the resin in the counter current direction to the solution, we enable continuity and we get a chemical advantage by creating a natural driving force for the loading and regeneration reactions to occur."

The water being treated enters at the bottom of the first column, called the adsorption column. Cation exchange resin, that is, resin with H⁺ ions around its surface, enters the exchange column from the top. During a transfer cycle, the fresh resin moves downward creating a concentration gradient within the bed as soon as the contaminated water comes into contact with the resin.

"Because ion-exchange reactions are equilibrium reactions and therefore reversible, Le Chatelier's principle of dynamic equilibrium can be used to optimise the process. As the water rises up the column and through the resin, it becomes less and less contaminated, while the resin becomes more loaded with ions as it moves down.

"So at the bottom of the column, water with a high concentration of dissolved elements comes into contact with the most Ca²⁺ loaded resin. As the water rises, it becomes less and less contaminated. At the same time, however, the resin becomes less and less loaded, which keeps the concentration well to the left of the equilibrium point, so decontamination occurs at an ideal condition over the full length of the column.

"Chemically speaking, we say that the



Multotec's dual stage continuous desalination process consists of cation removal followed by anion removal, with each section consisting of three columns.



When a cationic resin is brought into contact with contaminated water containing Ca^{2+} ions, two H^+ ions are discharged into the water for each Ca^{2+} ion that attaches to a bead.

concentration gradient between the ionic solution and the resin continuously drives the reaction in the direction of decontamination because it prevents the system from ever truly reaching its equilibrium point," explains Carien van der Walt.

The loaded resin exits the adsorption column at the bottom and is then moved across to a desorption column. To prevent the resin having to pass through a pump, Clean TeQ has developed and patented air lift transfer technology: "Since pumping resin damages the soft polymer beads, we transfer the loaded resin back up to the top by creating an air vacuum pulse. Each pulse causes a plug of loaded resin to shoot up the transfer pipe, where it is first passed over a dewatering screen before being passed into the desorption column," Van der Walt tells *MechChem*.

A reagent is added to the column, typically sulphuric acid for cation exchange resins, and the column is air agitated. "The acid in this example removes the Ca^{2+} ions from the resin and replaces them with two H^+ ions from the acid. Once in solution, these ions immediately react with SO_4^{2-} ions to form CaSO_4 (gypsum), which precipitates as a solid.

After another air lift, the resin again passes over a screen that removes the solid particulates, while the resin drops into the wash column where it is washed via fluidisation before being transferred back to the loading column. It thus completes a transfer cycle.

When purifying mine water to potable quality, a second anion removal stage is required to remove dissolved non-metal ions and to reduce the water's acidity. "Anion exchange resins are typically loaded with hydroxide (OH^-) ions, which will go into solution in preference to other dissolved non-metal ions such as sulphates or nitrates.

"Therefore, to treat water continuously, we need a second stage, an anion removal section. The acidic water is passed into the bottom of the anion adsorption column, the anion exchange resin enters the

column from the top and the same basic cycle is used to remove the negatively charged ions," Van de Walt says. The combined cation and anion desalination process is called dual-stage ionic desalination, or DeSALx®. "Our process is fully continuous. Contaminated water can be pumped into one end, and potable water flows out the other, without the need to halt the process to backwash and regenerate fixed resin beds," she adds.

In addition to wastewater treatment, by using the Clean-iX® process, "we can purposefully select resins in order to recover valuable metals. Hence, if on site mine water contains a commodity such as copper, for example, then we can recover that copper before purifying the water," she suggests.

So, by combining DeSALx with the Clean-iX metal recovery technology, wastewater treatment can be used to improve profitability. "Water treatment is often seen as a grudge purchase, but by extracting value from the metal content, water treatment costs can be subsidised by the added-value of the recovered metals. While the payback is dependent on the concentration of the metal in the wastewater, we have found for copper, for example, that if the water contains more than 100 ppm of copper (100 mg/l), then the payback on the initial investment can be less than one year and, in some cases, the clean water can be viewed as a free by-product of the metal recovery process. Even gypsum can have value if it is already a product being used or sold by the plant," says Van der Walt.

Clean-iX is ideal for the recovery of a wide range of valuable metals present in low concentrations, including gold, silver, platinum, nickel, copper, uranium and rare earth metals such as vanadium and scandium.



Multotec employees operating the DeSALx test rig currently installed at the company's premises in Spartan.



Multotec's 1.0 m³/h DeSALx test rig used to do on site test work at customer sites.

"We are also very interested in point-of-use acid mine drainage (AMD), ie, treating mine water to enable it to be reused by the mine rather than allowing it to enter the public water system. This is an ideal long-term solution to AMD in South Africa. Adding a secondary solution that fits onto the backend of current treatment plants is a cost-effective solution that is also much faster to implement than large purpose-built AMD plants," she argues.

"CIF technology is changing the way we see water treatment. Now, instead of being an annoying expense driven by environmental legislation, value-creating propositions can be identified. So being clean can also improve profitability," Van der Walt concludes. □

Tracking industrial trends

Blurring the lines and the new renaissance

In this new quarterly column, *Gary i. Crawford*—Strategic Partner of Mettle Strategic Creativity and an international strategist and stalwart of industrial marketing with experience from beers to stainless steel—talks about increasing integration in engineering, the creative value of interactions across disciplines and the value of breaking out of the ‘silo’ mindset.



There was a time when the world consisted of discrete compartments. As a ‘tradesperson’, one was expected to be an expert in a particular discipline. Even the questioning of the Renaissance of the 14th to 17th centuries failed to convince the masses of the need to be proficient in more than one field.

The term, ‘calling,’ comes to mind. True Renaissance men were few and far between. These cultured men who were knowledgeable, educated and proficient in a wide range of fields are exemplified by Leonardo da Vinci and Michelangelo who, in today’s terminology, thought ‘out of the box’.

In art, this new way of thinking resulted in the development of perspective in oil painting. And, in the less lofty world of construction, the recycled knowledge of how to make concrete. Plus,

of course, Gutenberg’s introduction of metal movable type to Europe, which sped the dissemination of ideas from the late 15th century.

While it is true that many so-called professionals adopted avocations – activities that someone engages in as a hobby outside their main occupation or vocation – it wasn’t until very recently that the ‘silo’ mind-set was challenged. Tertiary education generally meant concentration on one discipline, which, when hopefully mastered, would become the key to later life success.

With hindsight I can now understand why there were quizzical looks when I admitted to studying languages, law, economics, mechanical engineering and architecture alongside my stated major of psychology. Nobody mentioned ‘renaissance’ in describing me. Rather, I’m sure, the monikers of ‘unsure’ or even ‘spoilt’ came to their minds.

I’d have been happy to be called an ‘all-rounder’, but I’m sure that even in my first corporate position as a management trainee at Unilever, I was still seen as the ‘Jack of all trades ... master of none.’ For, in those days when every desk came equipped with a crank-handle-driven Facit calculator, the latest desktop computers had cathode ray tube green screens and you interfaced via MS-DOS, the norm was still to confine yourself to your specific functional ‘silo.’

It was only with the advent of the graphical user interface (GUI) that the computer became mainstream and the world of personal communications opened up to all. This gave birth to the second ‘renaissance’ (‘rebirth’ in English)

... encouraging concepts from different disciplines to be brought together in ‘constructs’ never before contemplated.

More than anyone else, we can thank Steve Jobs for facilitating the ease of use of laptops, enabling communications and helping to dispel the long-held belief in the sanctity of functional silos.

First came the Apple II (1977), the world’s first mass-market personal computer. Home, offices and schools around the world would never be the same. Then, the all-in-one iMac computer in 1998 – marketed as being Internet-ready out of the box. In 1991, the high-end, business-friendly PowerBook laptop line was launched; followed by the iBook in 1999, with Wi-Fi technology; the iPod in 2001; and the iPhone in 2007.

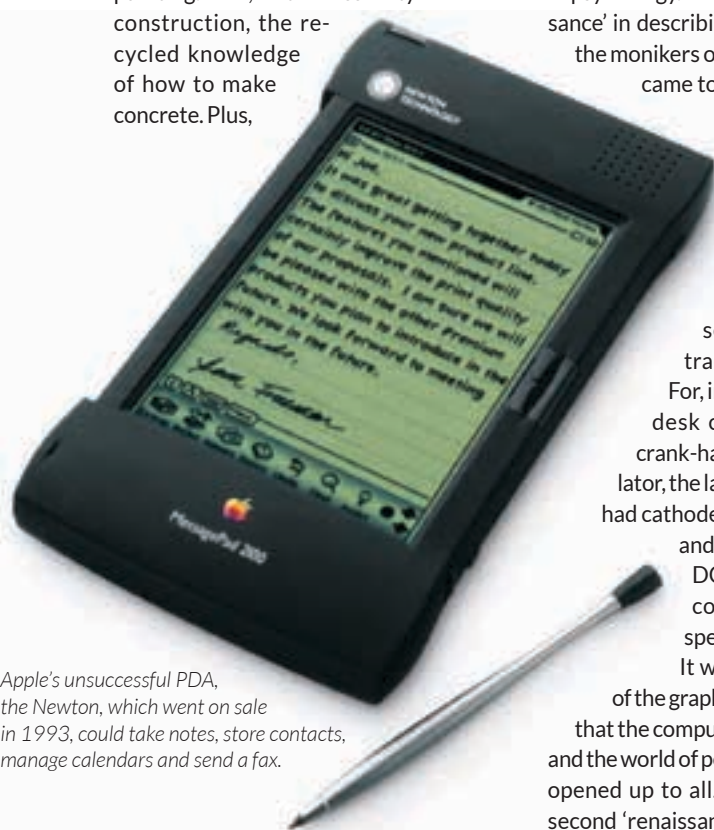
By 2010, Steve Jobs was confident the world was ready to embrace a new type of device, a tablet computer. He was right. The touch-sensitive iPad was an instant success after its introduction, with 15 million of the devices sold in the launch year.

The phenomenal Apple success story was not, however, without its hiccups.

Apple’s handheld PDA, the Newton, went on sale in 1993, at the time that ex Pepsi-Cola’s John Sculley usurped control of Apple. The Newton could take notes, store contacts, manage calendars and send a fax. With it, Apple didn’t just set out to create a new device. It wanted to invent an entirely new class of computer, one that could slip into pockets and go out into the world. In fact, the pocket size was a core design requirement.

At the time, it was extremely difficult to get component manufacturers to build any sort of custom parts. Trying to pull off a design referred to as ‘the Batman concept’, a sleek black pocketable unit, proved difficult.

Famed positioning strategists, Jack Trout and Al Ries, with whom I was interacting at the time, called the Newton “the



Apple’s unsuccessful PDA, the Newton, which went on sale in 1993, could take notes, store contacts, manage calendars and send a fax.

world's most expensive paperweight." At a time when most people were still battling to set the time on a VCR, they concluded and recommended to Apple that the world's first palm-held, portable computer "was too far ahead of its time".

Doonesbury's cartoonist creator, Garry Trudeau, made fun of it. But, Newton had an enemy much bigger than Garry Trudeau. Steve Jobs hated it. He raged against the device for its poor performance and novel input mechanism. "God gave us ten styluses," he said, waving his fingers. "Let's not invent another."

So, when Jobs wrested back control of his company, he scuttled it. As he explained: "My gut was that there was some really good technology, but it was messed up by mismanagement. By shutting it down, I freed up some good engineers who could work on new mobile devices. And eventually we got it right when we moved on to iPhones and the iPad."

Despite its relatively short life, the Newton and the thinking that went into it still resonate, existing in the devices you use today.

New approaches to disciplines

In the 6 June 2012 Princeton Alumni Weekly, the university stated that it "has long held that the study of engineering should be firmly embedded in a liberal education and that prospective engineers should have broad exposure to the humanities and social science disciplines before they graduate. At Princeton, we expect our undergraduates to think deeply, but we also want them to roam widely, exploring a broad range of questions and approaching them from as many angles as possible."

In the words of Dean Vince Poor, "The most inventive and effective solutions often come from unexpected interactions between disciplines. Today, the engineering school is more likely to frame its work in terms of four broad areas of social need – energy, the environment, health, and security – than to define its mission using departmental metrics."

'Blurring' is not isolated to engineering alone. The phenomenon is increasingly impacting on virtually everything in our business and social lives. 'Renaissance' thinking is gaining strength in the construction industry. Take, for example, the building of a typical middle-class South African residence.

Trench foundations are dug and filled with concrete. Two-brick thick walls are built, with apertures for doors and windows being 'bridged' by reinforced lintels. Thereafter, a roof structure is erected, followed by a waterproof covering of tiles



A growing number of architects, materials manufacturers and builders are embracing new construction technologies such as light steel frame building.

or sheeting. Commonly, doorframes and window frames are of wood, the latter fitted with single glazing. Composite board ceilings are installed and painted.

Walls are plastered then painted or tiled. A floor screed is laid, with a final surface finish of tiles, wood or carpet.

When I returned to South Africa in 1994, after a stay of more than a decade in the United States, I paid a visit to the then head of a steel construction association. I asked about the type of home he owned. His reply was something like "a typical brick and mortar building with a tiled roof."

I posed the question why he did not live in a building with a steel structure; seeing that he managed an industry group whose major objective was the increased use of steel as the major structural component. I never received a satisfactory answer.

However, there are, thankfully a growing number of architects, materials manufacturers and builders who are embracing new construction technologies such as light steel frame building. Not to be confused with 'prefabricated' or 'kit' building, it can be described as 'off-site' building as a good deal of manufacturing takes place off site. Structural wall panels and trusses are assembled from cold formed, light gauge steel sections, which are taken to site for erection, typically on raft foundations, and cladding with weatherproof materials. The

final result is an environmentally friendly and structurally sound building.

From being virtually non-existent in 2012, light steel frame building technology is fast finding favour. It is now the fastest growing sector of the South African steel construction industry.

And, it was heartening to note that the previous steel association head I visited now lives in a bespoke steel and glass home using light steel frame technology.

Many other advanced construction materials and techniques are currently being researched or applied, with universities such as University of Johannesburg and University of Pretoria leading the way. Materials range from membranes for building envelopes to aerated light-weight concrete, fibre-reinforced concrete, multi-use conduit, wall construction methods and virtually every product with potential to offer structural integrity, environmental friendliness, ease of construction and economy for the life cycle.

Interest is so fast-growing that an industry association has been planned to promote and guide development of this strategically important movement. And, as in most cases involving modern physical products, advances being made incorporate multi-disciplinary engineering components.

Gary i. Crawford.

In the words of Dean Vince Poor, "The most inventive and effective solutions often come from unexpected interactions between disciplines. Today, the engineering school is more likely to frame its work in terms of four broad areas of social need – energy, the environment, health, and security – than to define its mission using departmental metrics."

New head for SEW Repair Service Centre



SEW-Eurodrive recently appointed Paul Clark to head up its Repair Service Centre. “Effective and efficient repairs are an integral part of our Zero Defects drive”, says Clark who has given significant input regarding SEW’s

assembly line at the Johannesburg manufacturing facility.

He explains that all units that can be repaired are passed onto the Repair Service Centre, or the Sales Department if a quotation is required for a new replacement unit. In addition, any equipment that breaks down or requires attention on-site is attended to by the Field Service Department.

“It is important to find a balance between repair and maintenance on the one hand, and capital equipment on the other,”

Clark says. Whereas major customers such as mines tend to opt for new equipment, smaller companies prefer repair as the more viable and cost-effective option.

“While a unit can be restored to its original condition, it is important to weigh up this cost against that of a new unit. Our aim in the Repair Service Centre is to restore units as completely as possible to their original mechanical and electrical condition,” he explains.

The Repair Service Centre is flexible enough in that it can turn a repair around in a single afternoon, if required. “We have to be very responsive, especially if you take into account clients such as breweries or manufacturing plants, where any downtime has a major impact on total production and the bottom line.”

The Repair Service Centre also operates a Standby Service to cater for any unforeseen contingencies. In addition, SEW-

Eurodrive has a range of preassembled products precisely for such emergencies.

There are certain companies that engage in proactive maintenance, sending units in to be checked in order to prevent any potential problems or future breakdowns. “SEW-Eurodrive plays a major role in training customers about the importance of maintenance through its Drive Academy, in addition to full training on our entire product range,” Clark adds.

The Repair Service Centre has a fully automated system in place, whereby repairs are logged in. “We open a parts list in conjunction with an assessment sheet. The unit is stripped, cleaned, and then inspected. A full quotation is submitted to the customer. The necessary repairs are then processed upon receipt of an order number. The unit is tested according to full German specifications, and a warranty issued in terms of the repairs that have been carried out,” Clark concludes.

www.sew.co.za

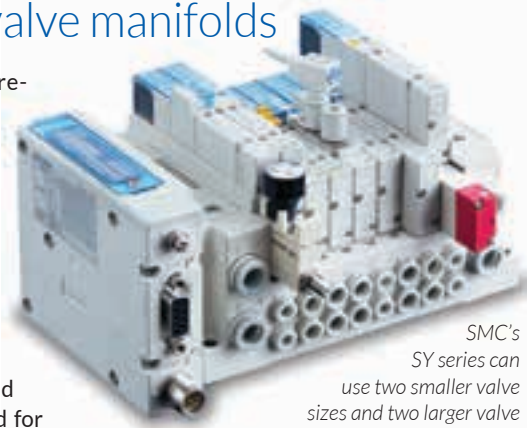
New-generation SY-series pneumatic valve manifolds

New trends in automation for flexibility and products that are lighter and more compact is on the rise, and according to SMC Pneumatics South Africa (SMC), this type of product development is becoming more and more standard. The all-purpose series of valve manifolds from SMC is available in three sizes, namely: SY3000, SY5000 and SY7000. Thanks to its flexibility and innovative redesign, the SY series sees a 29% space saving in installation while offering increased flow rates.

Looking at the SY series’ use, two of the smaller valve sizes or two larger valve sizes can be mixed on one manifold to closely

match application flow requirements. The manifold offers piping options to the top, side or bottom with various port size options. This results in a flow rate of up to 1 500 l per minute through the biggest valve mounted on the manifold.

The SY series offers further savings due to its ability to drive bigger cylinders with reduced cycle times, mitigating the need for larger, more expensive solenoid valves and is available in either rubber or special metal seal versions with the latter opti-



SMC’s SY series can use two smaller valve sizes and two larger valve sizes mixed on one manifold to closely match application flow requirements.

mised for higher operating frequencies and extended lifetime performance; boasting switching of up to 200-million cycles.

The SY series incorporates SMC’s energy-efficient V100 pilot valve, a power-saving option that reduces power consumption per valve coil down to just 0.1 W.

The series offers a myriad of options, optimised for customised projects and applications. A single valve can be mounted on a base, for example, which will offer flow rates exceeding 1 500 l/min – connected with SMC’s M12 waterproof connector.

Overall safety in applications has been improved via optional configurations such as the addition of a built-in back pressure check, which means it can also be retrofitted. A manual pressure release valve for every cylinder can also be fitted, where required.

www.smc Pneumatics.co.za

Interactive lubrication website launched

Lubrication system technology and equipment specialist, Lincoln Lubrication, launched its interactive website at the end of last year. “The new website incorporates the latest functionalities without compromising practicality and convenience,” says Lincoln Lubrication sales manager for Africa, Danie Swart. “While a website serves as an essential marketing platform, simplicity and user-friendliness are fundamental to its success. We have populated our website with useful information but, with user convenience as a key driver, we have also made sure that it is easy to navigate, placing everything at the browser’s fingertips.”

The new website encapsulates the com-

pany’s comprehensive product solutions and provides direct technical product information through links to supplier information sites. “This gives us the benefit of staying up to date with product developments and sharing the latest technology with our customers,” adds Swart.

An interactive enquiry field ensures that sales and any other enquiries are directed to correct departments within Lincoln Lubrication. The Google-active website will conveniently direct customers to the location of Lincoln Lubrication’s Germiston head office as well as the company’s six country-wide branches and regional distributors in Mozambique and Zambia. www.skf.com



Variable-reach trucks ideal for steel

“Meclift variable-reach trucks – available exclusively in South Africa from BLT SA, are compatible with a range of specially designed attachments that offer the versatility for one machine to be able to safely handle different materials, with no damage to the goods,” says Charity Gumede, marketing director for BLT SA.

“Unlike conventional forklift trucks, these compact variable-reach trucks are able to drive into containers or reach inside a container for easy loading and unloading of goods and equipment. Meclift’s versatile solutions ensure total control over logistics in ports, factories and cargo holds and also increase efficiency and safety during materials handling procedures. Operating costs and handling times are significantly reduced.”

Meclift loading boxes, which are designed to effortlessly lift, carry and lower aluminium bundles, also prevent scratching or bending of goods. These loading boxes handle rod diameters between 152 mm and 254 mm, a 7 000 mm maximum load length and a maximum load weight of 11 300 kg.

Meclift has extended its range of accessories to the steel industry to include new C-hooks. These robust C-hooks have a hydraulic 360° rotation and 64° tilting and are compatible with all Meclift machines and coil attachments to enable



The Meclift range of heavy lifting equipment, available exclusively in South Africa from materials handling specialists, BLT SA, is available with a coil ram attachment for handling steel coils.

the efficient transportation and accurate positioning of coils. The C-hook attached to an ML3018RC variable reach truck, can handle steel coils up to 32 metric tons.

Coil ram and clamp attachments, with customisable dimensions, enhance the performance, efficiency and safety during the handling of steel coils. Compact variable-reach trucks can load the container from the back end, by driving steel coils inside the container. It is also possible to load a container from the outside by using the side shift feature to carefully position cargo.

Meclift air cargo pallet forks (ACPF) act as an extension to a roll conveyor during loading and unloading of air cargo in confined spaces, especially inside containers. This system lifts pallets off the ground and lays them directly on the roll conveyor by rolling and can also be used to slide sheet materials into the container.

www.bltsa.co.za

Cummins and food and trees for Africa

Food & Trees for Africa is assisting Cummins with its successful food-garden initiative at four Gauteng schools, namely Ivory Park Secondary School, Ingqayizivele High School, Minerva Secondary School, and Manzini Primary School. The initiative has managed to double its production, with ten times the diversity of produce, thanks to the assistance from Food & Trees for Africa.

The year-long partnership came into effect when Cummins assisted Food & Trees for Africa on an initial tree-planting and education initiative, which eventually developed into an ongoing drive to promote sustainable projects.

“We realised that, in order for these projects to be sustainable, we had to partner with an organisation such as Food & Trees for Africa, which has a unique

business model in this regard,” Cummins Harrowdene deputy CIT team leader René du Plessis comments.

The food-garden project at the four schools involved planting indigenous trees and vegetable gardens, and assisting local communities to generate their own organic vegetables. A total of 60 indigenous trees and 60 fruit trees were supplied at Ivory Park Secondary School, Ingqayizivele High School and Manzini Primary School, together with compost and seedlings to each of these under-resourced schools, including Minerva Secondary School.

An important part of the food-garden initiative is to ensure buy-in from the participating schools and local communities. “It is vital that teachers, learners, and community members lend their support in

Multi-function weighing transmitter

Instrotech, a Comtest Group company, has added a multi-function weighing transmitter to its range, the model 6004MF version II.

This transmitter is a powerful, compact, field-mounted unit that can

be selected for a variety of weighing functions. Specifically designed for servicing organisations, weighing equipment manufacturing companies and individual users, the 6004MF is a single electronic unit that can be used for almost any application in the weighing industry.

The 6004MF finds application in the areas of load cell transmitting, belt-weighing, loss-in-weight measurement, throughput weighing, bag filling, batch weighing and dynamometry. A multi-function unit allows the user to keep one spare that can replace any of the above-mentioned functions in the field. This also reduces the stock holding requirements for manufacturers, integrators and factories.

Version II of the 6004MF has an improved and simplified user menu interface and operation service manual, as well as much improved EMI immunity. Design technicians have also improved on the standard SD card functionality for fast on-site Internet software upgrades with remote registration. While busy, they also vastly improved the on-board PI control and the on-board system diagnostic information and simulation.

Instrotech – a Comtest Group Company – distributes and manufactures a range of process control instrumentation and specialised systems, which are sold locally and internationally through a number of designated distributors.

www.instrotech.co.za



Planting of seedlings in progress at Ingqayizivele High School in Gauteng.

order to ensure a successful and sustainable outcome,” Du Plessis concludes.

www.africa.cummins.com

Growing Africa-wide on-site maintenance capability

Multotec has grown its Africa footprint over almost two decades, and puts its success down to developing local capacity – including skills and infrastructure – as close to the customer as possible, to allow quick and effective response.

“We prioritise skills transfer and



A Multotec-hosted technical workshop in Ghana: “The focus of the training is to bridge the gap between the theory that mine staff will have learnt in tertiary studies and the practical day-to-day mechanics of working with equipment in a plant environment,” says Holtz.

capacity-building in our African facilities, and also train our customers’ staff in the maintenance of our equipment,” says Multotec CEO Thomas Holtz. “It is becoming increasingly important – both to us as suppliers and to our customers, the mines – to invest in local skill development as a key sustainability practice.”

Multotec has for many years provided training in process-related topics in South Africa and, in recent years, has rolled this out in a more formal and structured manner in other regions. The group’s equipment can today be found in almost 50 countries on six continents, with a portfolio in all commodities.

Holtz says the focus of the training is to bridge the gap between the theory that mine staff will have

learnt in tertiary studies and the practical day-to-day mechanics of working with equipment in a plant environment.

“The culture of a fly-in-fly-out consultant is expensive and generally does not empower local professionals and operators,” he says. “Where we can build local capacity to support our products, the customers appreciate that – and we’ve seen growing interest in this training over the past two to three years.”

According to Multotec Africa managing director Jaco du Toit, the cradle-to-grave concept ensures compliance with the mine’s ISO 14000 environmental management standards – where the group provides the equipment, technical expertise and maintenance, as well as the removal and recycling of the product at the end of its life.

www.multotec.com

Particle counter delivers indoor air quality

Fluke, represented locally by The Comtest Group, is offering the Fluke 985 particle counter, a rugged, highly accurate meter that measures airborne particles to troubleshoot and monitor indoor air quality (IAQ).

The 985 is ideal for facility maintenance and for use by HVAC and IAQ professionals to monitor clean rooms and to conduct HVAC filter testing and IAQ commissioning and investigations in buildings. Other applications include: contamination and quality control; energy assessment; indoor air quality investigations; filter testing and leak detection.

Fluke’s 985 particle counter features: six particle size channels with a range of 0.3 µm to 10 µm, assuring accurate measurements; rugged, ultra-lightweight, ergonomic design for easy single-hand operation; in-device storage of 10 000 records for easy access to historical data; and ten hours of standard-use battery life to last a full working day.

The 985 has a large 3.5 inch (8.9 cm) QVGC colour display with backlight and

intuitive icons, plus a large font option for easy navigation and viewing. It features configurable settings for the display, sample methods and sample size alarm. Data can be presented in traditional tabular or as a trend graph and exported to a USB memory stick or directly to a PC via a USB or Ethernet cable. The meter meets ISO 21501, JIS B9921 and CE standards.

The 985 comes with a cradle for charging and USB and Ethernet communications, ENET CAT5E cable, USB-A to MINI-B cable, 12 Vdc power supply, zero count inlet-filter, filter adapter, sample inlet protective cap, hard case, getting started manual and a user manual on CD.

www.comtest.co.za



Atlas Copco sets non-financial goals

Atlas Copco, a leading provider of sustainable productivity solutions, has revised the key performance indicators (KPIs) and goals for its non-financial priorities for sustainable profitable growth. Last year Atlas Copco identified five priorities to support sustainable profitable growth: ethical behaviour, health and safety, competent teams, resource efficiency, and innovation.

The newly established goals for the first four priorities are common for all Atlas Copco Group companies and include such items as zero fatalities, 100% of managers signing compliance to Atlas Copco’s Business Code of Practice, and continued reduction of energy consumption from operations in relation to cost of sales.

The Innovation KPIs and goals are set individually by each division to be relevant to their specific businesses. These strive to ensure higher productivity, energy efficiency, safety and ergonomics for customers.

“We achieve sustainable profitable growth by continuously developing the most energy-efficient and productive products for our customers,” says Ronnie Leten, Atlas Copco’s President and CEO.

www.atlascopcogroup.com

Condition monitoring capacity increase

WearCheck’s oil analysis and reliability solutions services received a boost with the recent appointment of several professionals.

Jacques Bignaut (right) is the new chemist in WearCheck’s Pinetown laboratory. The capacity for this position has developed as the laboratory becomes busier due to the company’s expansion around Africa. Bignaut, who holds a Masters Degree in chemistry, will also be assisting with research and development for WearCheck.

Paul Nhlapo has been promoted to handle business development and technical support for WearCheck Middelburg and the surrounding areas.

Jacoba Schwartz is WearCheck’s new agent in Kathu, covering the areas from Kuruman to Upington and surrounds, developing sales, processing quotations and collecting filled sample bottles to dispatch to the laboratory.

www.wearcheck.co.za





WEG SA acquires turbines OEM, TGM

WEG SA recently announced the acquisition of a controlling stake in Indústria e Comércio de Turbinas e Transmissões Ltda. (TGM), a Brazilian manufacturer of turbines and transmissions with headquarters in Sertãozinho, State of São Paulo, Brazil.

Founded in 1991, TGM is a leading Brazilian provider of solutions and equipment for power generator drivers, focusing on thermal and wind renewable energy, from the initial viability studies to the complete plant operation, including systems studies and industrial energy planning. It also provides equipment for mechanical drives such as hoods, fans, shredders, water pumps, mills, sugar cane levellers, turbo chargers, turbo blowers and a specific line for industrial processes.

In addition to the Sertãozinho headquarters, which occupies an area of 70 000 m², TGM also has units in Maceio (AL), São José dos Campos (SP) and Nuremberg, Germany, employing around 1 000 people. Net revenue in 2015 was approximately R\$ 238-million (R1 025-million).

According to Eduardo de Nóbrega, WEG Energy managing director, the TGM

acquisition will expand WEG's product line in thermal generation and other industrial segments. "We will offer complete solutions that will be more competitive and more attractive. In addition, TGM has an

important presence in the external market, which strengthens our position as a global company," he explains.

The transaction is subject to certain conditions and to the approval from the competition authorities.

www.weg.net

New intrinsically safe I/O platform

Manufacturers and industrial operators can now bring devices deployed in hazardous areas into The Connected Enterprise via EtherNet/IP using the new Allen-Bradley Bulletin 1719 Ex I/O platform from Rockwell Automation. With the new platform, users can access data from field devices and more easily control process operations in hazardous areas.

As part of the PlantPAx distributed control system (DCS) from Rockwell Automation, the Bulletin 1719 Ex I/O allows users to monitor operations using a common platform that communicates with the DCS or other automation systems. This helps create a seamless flow of information throughout the plant and enterprise.

"The Bulletin 1719 Ex I/O platform is ideal for organisations that are embracing intelligent manufacturing and seeking

to capitalise on the power of their own information in a Connected Enterprise," says Christo Buys, business manager for Control Systems, Rockwell Automation sub-Saharan Africa.

www.rockwellautomation.com



The Allen-Bradley Bulletin 1719 Ex I/O platform from Rockwell Automation enables the connection of intrinsically safe field devices.

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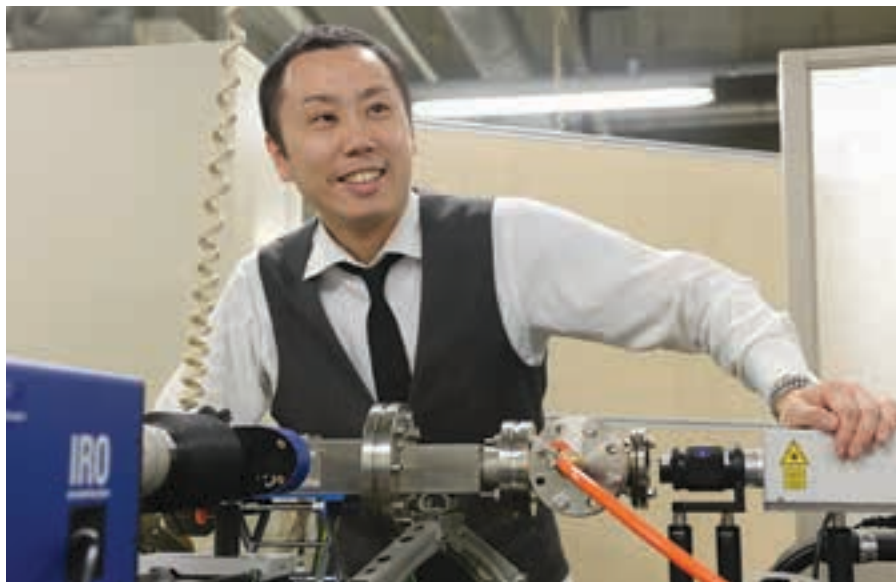


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Thermoacoustic refrigerator with no

Shinya Hasegawa and colleagues at Tokai University in Japan have developed a refrigerator capable of generating temperatures down to $-107\text{ }^{\circ}\text{C}$, powered by waste heat at temperatures lower than $300\text{ }^{\circ}\text{C}$. The heat is used to generate sound waves in an innovative multistage travelling-wave, thermoacoustic engine.



Associate professor Shinya Hasegawa.

Tokai University's innovative thermoacoustic refrigerator, developed by associate professor Shinya Hasegawa and his colleagues, can produce gas oscillations and refrigeration using heat at a temperature lower than the boiling point of water and, at an input heat temperature level of $270\text{ }^{\circ}\text{C}$, it can achieve a refrigeration temperature of $-107.4\text{ }^{\circ}\text{C}$. These findings are published in the journal of *Applied Thermal Engineering*, November 2016.

The principle of thermoacoustic (TA) engines is based on the heating, cooling and oscillation of acoustic (sound) waves created by the thermal expansion and contraction of gases such as helium enclosed in purpose-designed tubes and cavities.

The potential of TA engines for generating clean and renewable energy started being demonstrated in seminal reports published in the late 1990s and early 2000s by researchers in the USA. These reports into the modern implementations of TA engines have led to increased worldwide research on the development of high efficiency TA engines to convert heat into useful power.

Two of the main hurdles preventing the proliferation of this

technology are: high efficiency systems need to be able to operate at less than $300\text{ }^{\circ}\text{C}$ as compared to the currently possible 400 to $600\text{ }^{\circ}\text{C}$ range; and the robustness of the designs to enable the systems to be used in a wide range of environments such as fishing boats and heavy industries.

Hasegawa and his colleagues have designed a high-efficiency multistage-type thermoacoustic (MS-TA) engine, without moving parts that operates at less than $300\text{ }^{\circ}\text{C}$, which is the temperature of more than 80% of available industrial waste heat.

The design of the MS-TA engine was based

on linear analysis conducted by Hasegawa and his group.

Background and aims

"TA engines do not have moving parts, are easy to maintain and, potentially operate at high efficiency at low cost," says Shinya Hasegawa, an associate professor at the Department of Prime Mover Engineering, Tokai University, Hiratsuka, Japan. "My goals in this research are to develop TA engines that operate at less than $300\text{ }^{\circ}\text{C}$ with more than 30% efficiency and to also demonstrate a refrigerator operating at $-200\text{ }^{\circ}\text{C}$ driven by these lower waste heat temperatures."

Double loop travelling wave thermoacoustic refrigerator (TWTR)

The TWTR consists of three etched stainless steel mesh regenerators installed at optimal positions, "close to the sweet spots" within the prime mover loop and the refrigerator loop. This configuration was designed to trigger thermoacoustic oscillations at lower temperatures and yield a refrigerator temperature of less than $-100\text{ }^{\circ}\text{C}$.

The diameters of the regenerators ranged between 0.2 to 0.3 mm and their lengths were 30 to 120 mm , depending on location. Furthermore, the TWTR had heat exchangers in the form of parallel plates of copper (1.0 mm thick and 27 mm long) with a 2.0 mm gap.

The thermoacoustic energy conversion of this design is determined by two factors: the ratio of the diameter of the flow channel and the thermal penetration depth; and the phase difference between the pressure and cross-sectional mean velocity.

The overall performance of the TWTR system is expressed in terms of the coefficient of performance (COP) and given by the ratio



The double loop TWTR consists of three etched stainless steel mesh regenerators installed within the prime mover loop (left). This creates acoustic waves that drives the refrigerator loop (right).

moving parts

of the cooling power to the total input heating power, that is, the sum of the heating power of each engine.

Results

The COP increased as the temperature of the heat exchangers in the primer loop was increased and the maximum value of COP was 0.029 at 260 °C, with corresponding cooling power of 35.6 W.

Furthermore, the researchers obtained gas oscillations at 85 °C – that is lower than the boiling point of water – thereby opening up possibilities for applications of this technology for refrigeration and power generation using low temperature waste heat in factories and automobile engines. Also, refrigeration at -42.3 °C was achieved using input heat at 90 °C.

Next steps

“The addition of multiple regenerators in the vicinity of the ‘sweet spot’ of the prime mover loop is a major advance in travelling-wave TA engines,” says Hasegawa. “This configuration

reduces the temperature for TA oscillations and improves cooling performance.”

Following the successful development of the prototype thermoacoustic refrigerator system, the next step in this research at Tokai University is the development of practical TA engines with a primary goal of contributing to overcoming environmental problems. □

References

1. Esmatullah Maiwand Sharify; Shinya Hasegawa: Travelling-wave thermoacoustic refrigerator driven by a multistage travelling-wave thermoacoustic engine: *Applied Thermal Engineering*, November 2016. DOI: <http://dx.doi.org/10.1016/j.applthermaleng.2016.11.021>
2. Mariko Senga; Shinya Hasegawa: Design and experimental verification of a cascade wave-wave thermoacoustic amplifier: *Journal of Applied Physics (JAP)*, 119, 204906 (2016). DOI: <http://dx.doi.org/10.1063/1.4952983>
3. Shinya Hasegawa website (in Japanese) <http://www.ed.u-tokai.ac.jp/thermoacoustic/index.html>
4. Video, Thermoacoustic refrigerator. <http://www.ed.u-tokai.ac.jp/thermoacoustic/VIDEO.zip> Password: thermoacoustic.

Thermoacoustic refrigeration

Thermoacoustic (TA) engines use a steep temperature gradient to induce high-amplitude sound waves and/or they use high-amplitude sound waves to pump heat from one place to another.

Thermal energy applied to the prime mover generates a temperature gradient along a porous regenerator. At a specific temperature gradient, self-sustained acoustic waves are generated inside an acoustic resonator.

The acoustic wave can be used to generate power via a piezoelectric diaphragm, placed at the end of the resonator, which converts the acoustic vibration directly into electrical energy.

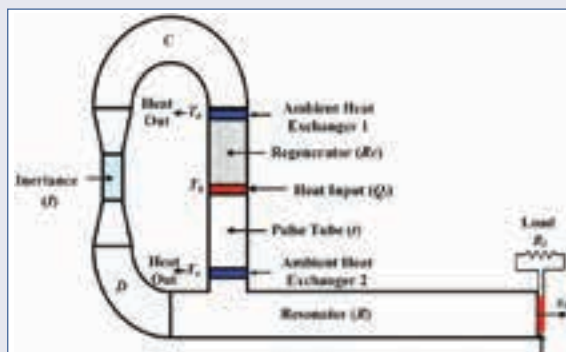
Also, though, the resonating acoustic vibrations can be used to produce a heat pump/refrigeration effect, via separate hot and cold heat exchangers. Compared to vapour refrigerators, thermoacoustic refrigerators have no ozone-depleting or toxic coolant and few or no moving parts. They therefore require no dynamic sealing or lubrication.

The technology is also very attractive because of its simple low-cost construction, low maintenance cost and envi-

ronmental friendliness. These systems also have the potential to utilise low-quality heat sources such as industrial waste heat, solar energy or flue gases from combustion processes for energy recovery.

From acoustics to cooling

Acoustic waves are longitudinal waves made up of alternating high-pressure and low-pressure zones. At a micro level, the temperature of the gas in a high-pressure zone is raised, while that in the low pressure zone is lowered. By locating these different zones precisely via resonance, it is possible to use heat exchangers to extract heat and to create increasingly hot and cold temperature zones. □



A schematic representation of a thermoacoustic hot-air engine/prime mover. The alternately hot and cold zones cause self-sustained acoustic waves to be generated inside the acoustic resonator.

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3D Visual Inspection System for automated, railcar maintenance

Chromasens, a leading manufacturer of line-scan camera systems for 2D and 3D machine vision applications, is improving railcar safety with a new scanning system consisting of 3D colour cameras and ultra-bright lighting. The first of its kind, the system provides maintenance crews with precise stereoscopic 3D images of the undercarriage and sides of railcars, detecting various potential faults on couplings, hoses, pressure tanks and wheels, as well as locating loose screws that would otherwise remain unnoticed on a standard 2D-image.

“For years, intelligent diagnostic technology has played an important role in improving the safety and costs of railcar maintenance work,” notes Klaus Riemer, product manager at Chromasens. “Our 3D system offers railway centres a fully automated method for maintenance that ensures safer, more fault-free operation of complex railway networks.”

Riemer explains that the inspection system incorporates six Chromasens 3DPIXA line-scan cameras to produce overlapping stereoscopic images at resolutions of up to 7 300 pixels per line: “The 3DPIXA cameras are capable of graphically displaying practically any object’s pre-

ceive 3D dimensions in real time. Although highly advanced, their optical configuration is very flexible and can be adjusted to the respective surroundings and environment. In the case of the train inspection system, for example, an optical resolution of less than 0.5 mm was configured for optimal results.”

Recognising that the system was being deployed in a highly challenging outdoor location, Chromasens enclosed each 3DPIXA camera within a rugged scanner box to protect it against dirt, dust and water. Chromasens also engineered the cameras’ optical measuring technology to mitigate distorting factors such as vibrations, changing light conditions and varying temperatures.

Importantly, a train does not have to be taken out of service and removed to a maintenance centre for inspection by the Chromasens system. Instead, digital scanning can occur at any arbitrary spot on the rails with the train passing the control points at usual cruising speed. Image capture is triggered by a light barrier that recognises the oncoming train and measures its speed. Data is transmitted via optical fibre cables

to a nearby processing station where it is transformed into 3D images for analysis using mathematical algorithms developed by Chromasens.

As more and more railway operators adopt lean management strategies, the Chromasens 3D system represents a positive step towards reducing the cost of maintenance for passenger and freight railcars,

Chromasens’ inspection process uses six high-resolution 3D line-scan cameras with overlapping stereoscopic image capture for a detailed representation of the sides and undercarriage of the train.



Power and Electricity world Africa, PEWA 2017

PEWA, Africa’s longest running and largest power and energy show, takes place on 28 and 29 March 2017 at the Sandton Convention Centre in Johannesburg.

The exhibition with 7 000 attendees and a host of solution providers spanning three halls and thousands of square metres offers free entry to all visitors.

The event includes free seminars to equip professionals with hands-on knowledge around Power Plant Asset Management, Energy Storage, Distributed Generation, Transmission and Distribution, Grid Connection, Power Generation, Clean Technology, Solar, Water, Energy Efficiency, Lighting and Onsite Generation.

Product launches and live demonstrations have been organised by various exhibitors and the exhibition will showcase hundreds of the latest solutions in the power and energy sector.

In addition, the organisers are setting up meetings with top industry solution providers via its Jublia networking platform.

enquiry.uk@terrapiinn.com

which is estimated by industry experts to be upwards of US\$15 000 annually per car. First, the system eliminates delay costs associated with taking a car out of service for manual inspection; second, by monitoring safety-critical railcar components, it permits early detection of deteriorating components to help in the reduction of equipment-caused derailments and in-service failures; and third, by making railcar maintenance more predictive, it allows operators to order new parts as needed, rather than keep large and expensive inventories. In addition, by helping maintain railcars more efficiently, railways benefit from improved car availability and asset utilisation.

www.chromasens.de

Industry diary

The KZN Construction Trade Expo 2017

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helen.bleasdale@hypenica.com
<http://kznconstruction.co.za>

Martec Training: Airborne and Structure Borne Ultrasound – Inspector Training Level 1

Trainer: Tom Murphy – SDT International
Level 1: 22-24 February 2017
Level 2: 27 February 2017 – 1 March 2017
Pragma Group Building, Midrand
Kim Dare – Business Development
+27 11 848 6940
Kim.Dare@martec.co.za

2 KG Training Courses 2017 Advanced Pumps by Willem van der Westhuizen

8-9 March 2017, Mercure Hotel, JHB
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Index to advertisers

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Atlas Copco	3
Bearings International.....	10
Donaldson Filtration	41
Endress+Hauser	OFC
GEMÜ Valves	13
Hytec Fluid Technology, HFT	17
Krohne	33
Martec	IBC
Powermite.....	23
SKF	IFC
SMC Pneumatics	43
Vega Controls	26
Wearcheck	15
Weir Minerals Africa.....	20

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