

FEATURES:

- Control systems + automation
- Drives, motors + switchgear
- Sensors + switches
- Plant maintenance, test + measurement

11/2020



High accuracy, repeatability & measurement dynamics
Process connection of up to 2 inches



ELECTRICITY + CONTROL

CROWN
PUBLICATIONS



MORE THAN JUST MOTOR MONITORING....

WEG MOTOR SCAN GATEWAY

Industry 4.0 connectivity is now even more efficient



The WEG Motor Scan Gateway sends information to the cloud in real time through WiFi, 3G/4G or ethernet cable, allowing instant monitoring of remote motor performance.

Improved communication and connectivity to enhance the full benefits of Industry 4.0 technology.

Zest WEG is proud to celebrate 40 years of innovation in Africa.



ZEST

WEG Group





As well as monitoring volumetric flow of liquids, ifm's SM series flow sensors monitor the medium temperature, making them particularly suitable for monitoring cooling circuits. (Read more on page 3.)

Editor: Leigh Darroll

Design & Layout: Darryl James

Advertising Manager:

Heidi Jandrell

Circulation: Karen Smith

Editorial Technical Director: Ian Jandrell

Publisher: Karen Grant

Deputy Publisher: Wilhelm du Plessis



Audited circulation: Quarter 2 (April-June) 2020
Total print and e-editions: 6527

Published monthly by:

Crown Publications (Pty) Ltd
Cnr Theunis and Sovereign Sts,
Bedford Gardens, PO Box 140,
Bedfordview 2008

Printed by: Tandym Print

Telephone: +27 (0) 11 622 4770

E-mail: e-mail: ec@crown.co.za; admin@crown.co.za

Website: www.crown.co.za/electricity-control

CROSS PLATFORM CONTENT INTEGRATION:

* Electricity+Control Magazine * Online Edition

* Bi-monthly Newsletter * Website * LinkedIn



Publisher of the year 2018 (Trade Publications)

Electricity+Control is supported by



The views expressed in this publication are not necessarily those of the publisher, the editor, SAAEs, SAE, CESA or the Copper Development Association Africa

What have we learned?

I received a lot of feedback around some of the points I made in my previous comment for *Electricity + Control* – in October – all about the issue of maintenance.

This month we have a focus on maintenance in the magazine, and I urge you to reflect on the situation on your own plant. Very often, and usually in these times of crisis, we do tend to put things off. But I have also learned that in many instances the quickest path to system failure is when you have been forced to stop using the system for a while.

I am not sure what the reason for that is – but I imagine part of it relates to the continuous monitoring of system components and overall performance. And while there is no doubt that the smart systems we use today assist in this regard, I also imagine that just having human eyes looking at things can be very helpful.

Think of an old car, with low odometer reading, but just standing unused...

Be aware that we are fast replacing those human eyes with automated systems set up to monitor specific conditions and subsystems. I think the age of digital transformation is a wonderful time to review quite how we do maintain our systems – but I also imagine that the concept of human care is quite hard to program.

Come to think of it though, I have come across a number of cases recently where the element of human care seemed to have been completely absent!

Be that as it may – the modern world of industry will be made of really smart

systems continually optimising production, and really skilled people keeping an eye on it (as it were)!

Whereas we live in a time when nothing should surprise us, I do continue to marvel at how effectively human-machine, human-computer, brain-computer and robotics are being blended into modern plants. I found it quaint, the other day, to enter a production hall – to find it in darkness. The lights were turned on (as a courtesy) so that I could see what was happening. But the production line itself obviously needs no lights for the robots and other systems to carry out their tasks – and check the quality of what they were doing – perfectly and repeatably.

This kind of thinking does speak to a future world that should, one hopes, be far kinder to people – far more productive – and possibly more sustainable. Although I recognise some of the issues around this observation.

I add these last comments just to reflect: we are a world driven by consumerism. I get that. But I wonder if we learned anything as a species over the past while? Did we learn that we can live with less? Did we learn that some costs are artificially high? Did we learn who the real heroes are – and that actors are just that: actors? That politicians are, well – politicians...

I doubt we ever really expected to see what we now see.

I hope we have learned something that will stay with us forever. Be kind to this planet. It is, so far, the only one we have.



Ian

Ian Jandrell

PrEng IntPE(SA), BSc(Eng) GDE PhD,
FSAAE FSAIEE SMIEEE

CONTENTS

FEATURES

CONTROL SYSTEMS + AUTOMATION

- 4 The new normal: automation in food manufacturing
Omron Industrial Automation
- 6 Products + Services

DRIVES, MOTORS + SWITCHGEAR

- 10 The drive as a sensor for condition monitoring
Norbert Hanigovszki, Jörg Dannehl, Sanjeet Kumar Dwivedi - Danfoss Engineering
- 13 Products + Services

SENSORS + SWITCHES

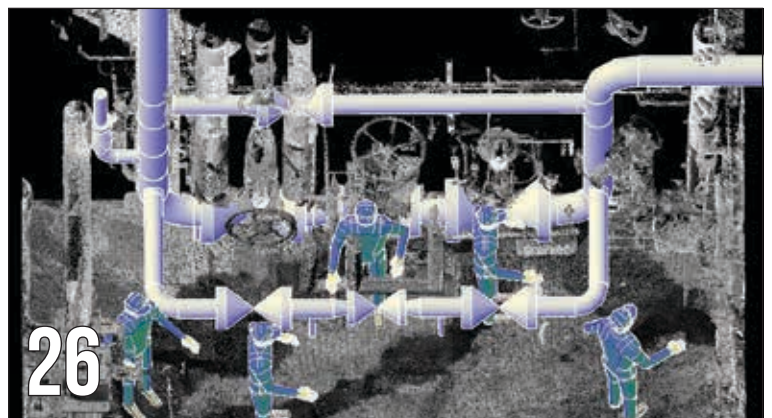
- 18 Laser-line triangulation technology
Pepperl+Fuchs
- 20 Controlling cobots on the production line
SICK Automation
- 22 Products + Services

PLANT MAINTENANCE, TEST + MEASUREMENT

- 23 Optimising boiler performance
Jan-Hendrik Fourie, Bureau Veritas Technical Centre Africa
- 26 Using digital twin technology in plant maintenance
Babcock Ntuthuko Engineering
- 28 Products + Services

REGULARS

- 1 Comment
What have we learned?
- 3 Cover article
Magnetic-inductive volumetric flow meters
- 30 Reskilling, upskilling + training
Solar PV training courses
- 31 Cybersecurity
Managed cybersecurity services
- 32 Write @ the back
Lean in to the new normal



Magnetic-inductive volumetric flow meters

- With volumetric flow quantity, total quantity and temperature indication
- High accuracy, repeatability and measurement dynamics
- For use in conductive media from 20 $\mu\text{S}/\text{cm}$
- With switching output, analogue output and pulse output
- Clearly visible LED display

The magnetic-inductive volumetric flow sensors of the SM series from ifm monitor liquids. They detect the three process categories: volumetric flow quantity, consumed quantity and medium temperature. They are frequently used in cooling circuits, for example in steelworks, the automotive industry and in glassmaking. In water management and industrial installations, the sensors are used for water consumption measurement.

Peak consumption, present consumption or accumulated consumption can be accessed and adjusted via programmed switch and alarm level settings – all at the touch of a button.

The units feature two switching outputs which can be programmed as normally open or normally closed. For output of the measured value, one switching output can

also be configured as a scalable analogue output. For consumed quantity monitoring, the other output transmits counting pulses to the controller.

In addition to volumetric flow monitoring, the SM monitors the temperature of the medium. This is displayed on the unit and provided for signal processing. The sensor is thus particularly suitable for monitoring cooling circuits.

The robust stainless steel housing and high protection rating provide high security even in harsh environments. Depending on the volumetric flow quantity to be detected, devices with different process connections are offered.



The magnetic-inductive flow sensors of the SM series are often used in cooling circuits and water management systems.

**For more information contact ifm South Africa.
Tel: +27 (0)12 450 0400, email: info.za@ifm.com
Visit: www.ifm.com**



In water management applications, SM series flow meters measure water consumption.



In this HVAC system application the SM6500 magnetic-inductive flow meter delivers high accuracy, repeatability and measurement dynamics to optimise energy efficiency.



The new normal: automation in food manufacturing

Looking beyond the Covid-19 pandemic, food and beverage manufacturers can use automation to boost their competitiveness and productivity. Johannesburg-based Omron Industrial Automation suggests that manufacturers focus their resources on four market-driven perspectives: workforce, product quality, flexibility and sustainability.

The coronavirus pandemic has presented immense challenges to companies of all sizes across all industries. It is reported that food and beverage (F&B) companies, like many others, are facing significantly reduced consumption and disrupted supply chains.

How can manufacturers adapt their business strategies and production processes, factories and machinery to the new circumstances – with regard to health and safety protocols relating to the pandemic and for the longer term? The current crisis offers companies a chance to rethink outdated procedures and to use automation to boost productivity, efficiency and product quality. F&B companies looking to prepare for the future should assess the opportunities and possibilities that innovative robotics, sensor technology and holistic approaches to automation offer. In this context four key market-driven factors may be considered: workforce, product and packaging quality, production flexibility and sustainability.

Automation may incorporate robotics and artificial intelligence, but overall, a well thought out structure of fixed, collaborative and mobile robotics, monitoring and control technology, sensors and vision technology tailored to the respective production requirements is needed. The various stakeholders and market drivers should be considered as a whole and integrated into the future production strategy.

Collaboration

The first aspect to be considered in this respect are the employees, the workforce perspective of factory automation. Robert Brooks, Omron Europe's Industry Manager for Food and Beverage, comments: "At present, there are millions of people employed in these sectors. This number has an enormous impact on producers in terms of costs and, primarily, in terms of the health and safety of human resources. The pandemic has led to developments such

as social distancing and tighter safety regulations that companies need to adhere to. Automation can help in overcoming this challenge while also improving security and efficiency in the longer term."

For example, a cobot or mobile robot solution can relieve employees from challenging and repetitive tasks so they can focus on more value-added and fulfilling roles. Daniela Moles, communications expert at Omron Solution Partner LCS Group, says, "In one project in the textiles sector we implemented a fully automatic system to handle heavy rolls of fabric that weigh up to 30 kilograms. This was previously done by people. Automating this exhausting task meant the company could support its employees and boost efficiency and productivity."

The value of automation is in the mix of people plus machines, robots and artificial intelligence. Collaboration is key. While robots show their advantages when it comes to speed and accuracy, people can take care of business-critical issues, customer communication and daily individual tasks.

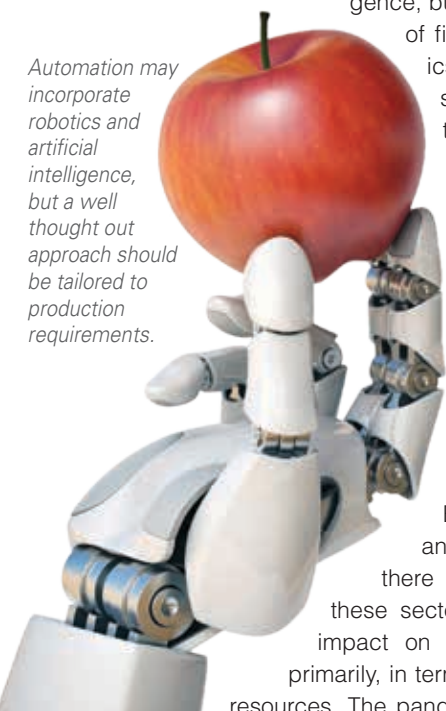
"Regarding the critical aspect of return on investment, companies should increasingly focus on releasing human labour to do value-added tasks. This is important for producers going forward. Collaborative and mobile robots working alongside people as colleagues can assist in lifting or transporting goods or materials and in fulfilling tasks employees cannot do because of distancing or safety rules," says Brooks.

Product quality and traceability

Product and production quality and traceability are further aspects that are increasingly important for manufacturers and customers. Barcode quality is one example of identity tagging that is a key element in many applications. Regulations from international organisations such as ISO or GS1 are widely adopted, and there may be further project-specific requirements driven by suppliers and customers. This leads to the need for reliable systems and tools that ensure bar codes are correct and readable. Solutions can be adapted so they can also check pack design aspects and packaging integrity and completeness.

Alberto Giordani, Product and Project Manager at Omron Solution Partner Alfaced, highlights that innovative solutions

Automation may incorporate robotics and artificial intelligence, but a well thought out approach should be tailored to production requirements.



can understand the quality grade and note if it's on track, or if it's declining, before it's too late. "Production managers can therefore plan preventive maintenance actions to avoid potentially costly errors. In the food industry, it is useful to check labels as they are printed by using a thermal transfer machine with an integrated barcode verifier on the printer. Customers, especially large distribution companies, want to receive only products with the correct information, labelling and barcodes. If this information is incorrect or incomplete, the goods may be returned or a fine may be levied on the supplier."

Information taken from the packaging in the form of codes is also becoming increasingly useful for consumers at the point of purchase. When reading the code at a self-scanning system, for example, they can obtain information about allergens or other specific ingredients such as gluten. Consumers are increasingly taking an interest in information such as the product's country of origin as well. Manufacturers have the chance to engage with consumers via information provided on the item.

Automation can facilitate traceability, and traceability contributes to protecting the brand reputation, the producer and reducing costs.

Brooks adds that a verification solution using vision systems or RFID, and linked into the production management software can help to reduce issues connected with false codes or labels.

Flexibility

In some industries 'batch size 1' is a trending topic. However, for manufacturers in the food and beverage industry, goals are still closely connected to volumes, although it is important that they become increasingly flexible and agile to fulfil changing customer demands and changing regulations.

Mobile robots and flexible production lines provide companies with valuable support. Daniela Moles describes an LCS customer producing coffee pods. "Our customer receives requests for very different types of pods, such as normal plastic or reusable pods, eco-friendly pods, or in different colours and different sizes. By implementing a fleet of Omron's mobile robots that can manage the fluctuating demand over periods of time, or two entirely different requests, we were able to help the pod producer achieve a more flexible environment in the plant."

Moles says, "Being able to adapt and evolve will become more relevant and important in the future."

Many production lines still rely on inflexible conveyor systems, whereas mobile robots provide the manufacturer with the flexibility to move stock and consumables to the required line locations at the right time. Cobots are easy to train, easy to deploy and transportable, features that make them useful in achieving greater flexibility. Omron mobile robots can change routes quickly, dynamically avoiding obstacles or working on different priorities. They can be customised with special add-ons and accessories that allow for more flexibility. The latest solution from Omron combines

At a glance

- The value of automation is in the mix of people, machines, robots and artificial intelligence. Collaboration is key.
- Mobile robots provide greater flexibility in production lines enabling manufacturers to meet changing market demands or regulations.
- Product quality and traceability are increasingly important for manufacturers and customers and can be facilitated by automation.

cobot and mobile technology to offer a mobile manipulator or MoMa solution.

Towards sustainability in food manufacturing

According to audit, assurance, tax and consulting services firm PwC, three-quarters of super-market customers want to buy products with as little packaging as possible. On the other hand, packaging is required to protect the item and inform the customer, so a balance is needed between

the different drivers. It may come as no surprise that the use of flexible plastic packaging is still expected to grow in future – and, with regard to sustainability, companies in the F&B industry increasingly need to think about the materials they use in packaging their products.

Automation can serve to support sustainability. A simple example, widely used, is seen in the automated control of temperature and pressures, ensuring a product is correctly packaged and reducing waste and scrap. A more complex example may be one where a producer must consider multiple variables such as packaging thickness, ambient temperature and packaging film speeds. This approach requires a system to capture data in real-time, analyse it and make decisions. "If we are able to process and read through this data, we have all the guidelines to work better and implement sustainable actions to achieve a sustainable future," says Brooks.

Omron's Sysmac AI Controller is a smart artificial intelligence solution that collects, analyses and uses data on edge devices within a controller to prolong equipment longevity and detect abnormalities to prevent failures. It combines control functions of manufacturing lines and equipment with AI processing at manufacturing sites in real time.

The food factory of the future

Turning to the future, with the experience of the coronavirus pandemic, companies in the food industry are called on to look closely at new systems and technologies that will help them reduce the workload on employees, increase the quality of their processes and products, and act more flexibly and sustainably. Smart and connected systems, combining robotics, cobots, vision and sensor technology, strong data collection and analytical capabilities, as well as allowing for human machine interaction and full traceability, can assist in this. □



Automation can contribute to product quality and traceability, as well as flexibility and sustainability, to meet today's market demands.

For more information visit: www.industrial.omron.co.za



Eplan Strategic Account
Manager Andreas
Bamberg.

Volkswagen integrates new control cabinet design solutions

Volkswagen has recently released the sixth generation of its VASS (Volkswagen Audi Seat Skoda) Standard, which includes an update to Eplan Version 2.9. The standard – used in production plants for models on the MEB platform – has also been expanded with 3D functionality in switchgear system engineering and with data for bi-directional exchange with PLC project planning tools. In addition, the new VX25 control cabinet

system from Rittal has been integrated into the standard.

Volkswagen's decision to start providing its suppliers with 3D data based on Eplan Pro Panel in the VASS standard libraries means the complete digital twins of control cabinets and the installed components can be depicted. Previously, only 2D representations from Eplan Electric P8 were included in the standard. For suppliers, this creates the foundation for moving into and expanding automated manufacturing steps in control cabinet and switchgear system engineering: from mechanical NC machining, to automated terminal assembly, to wire processing and wiring support. Companies benefit from the fully developed design templates provided by Volkswagen which can be used as a basis for faster and higher-quality system engineering, manufacturing and commissioning.

Uniform plant system documentation

Eplan Strategic Account Manager Andreas Bamberg explains: "The additional 3D functionality from Eplan Pro Panel makes it possible to derive manufacturing information for automated control cabinet and switchgear system engineering directly. Engineering

offices further benefit from the integrated collision check and thermal power dissipation considerations for components, enabling optimised component placement in the cabinet and a more energy-efficient design for Rittal climate control systems." An extra benefit is in the addition of key control technology information to the device and project data that enables completely bi-directional data exchange between Eplan (hardware engineering) and the Siemens TIA Portal (software project planning) using the AML interface. "This reduces the effort required in engineering and for system planning as the PLC hardware structures, pre-defined inputs and outputs and bus topologies can be imported directly from Eplan," Bamberg says.

During plant system operations and for later modifications or expansions, the information from TIA Portal can be fed back into the Eplan Project. This ensures uniform, error-free plant system documentation 'as built' and shorter entry processes for integration into digital production management.

State-of-the-art control cabinet technology from Rittal, with its large control cabinets and small enclosures, has been a part of Volkswagen's corporate standard for years, just as Eplan has been. Global Key Account Manager Automotive at Rittal, Markus Hülsmann says: "The current release of the VASS V6 library delivers fully integrated reference control cabinets in 3D based on the new Rittal VX25 control cabinet system." It also includes fully integrated enclosure accessories and ten variants of the AirSTREAM mounting frame from the company Friedrich Lütze, which can be selected directly from a list of accessories and placed as a complete macro. Hülsmann adds, "This also reduces the work required in engineering as the components can start being placed directly in the cabinet after just a few clicks."

Empowering manufacturers for digital transformation

Rockwell Automation and Microsoft have announced a five-year partnership expansion to develop integrated, market-ready solutions that will help industrial customers improve their digital agility through cloud technology. By combining each company's expertise, in the industrial and IT markets respectively, teams can work together more easily and enable industrial organisations to save on infrastructure costs, accelerate time-to-value, and increase productivity.

Microsoft and Rockwell are working to deliver innovative edge-to-cloud-based solutions that connect information between development, operations and maintenance teams through a single, trusted data environment. This will allow development teams to prototype, configure and collaborate digitally, without investing in costly physical equipment. A unified information environment will also enable IT and OT teams to access and share data models securely – across the organisation and with their ecosystem partners as well.

Judson Althoff, Executive Vice President of worldwide

commercial business, Microsoft, said: "Today, one thing we know for sure is that no business is 100% resilient. Those fortified with digital capabilities and assets are more resilient than others, and the cloud is how they will thrive. We are pleased to deepen our already strong, decade-long relationship with Rockwell Automation to help businesses simplify industrial transformation, accelerate business outcomes and innovate with agility."

To date, the companies have co-developed over 20 use cases across food & beverage, household and personal care and life sciences industries. New solutions will extend the current offerings.

"The partnership provides Rockwell Automation and Microsoft customers with a holistic, simple solution for IIoT development and operations and removes data silos that hinder industrial digital transformation initiatives," said Blake Moret, Chairman and CEO of Rockwell Automation. "By eliminating a core barrier to automation initiatives, industrial organisations can establish a digital thread connecting the entire enterprise, which in turn contributes to

Future VASS releases will include libraries expansions with the Rittal AX and KS enclosures and the respective sample assemblies. Associated enclosure macros in 3D are already available in Eplan Data Portal and can be used when designing with Pro Panel.

Digital manufacturing

Automobile production is becoming increasingly challenging, with ever shorter start-up times, individualised design efforts, new control technologies and high demands on maintenance and repair among other factors. Volkswagen is working on further developing automation standards, which are passed down to the company's suppliers. Daniel Gräser in the Division for Manufacturing Automation and Digital Production at Volkswagen says, "This expansion of the VASS Standard with the newest aspects of Eplan's engineering software and Rittal's state-of-the-art system technology means we're supporting our suppliers in realising digital and automated manufacturing processes. At the same time, we are adding an important component on our path towards the digital factory." The digital twin of the control cabinet as part of the production process is an essential foundation for fully digital operating and maintenance processes of the future.

Eplan offers a three-day VASS V6 training course for suppliers, internationally. It lays the foundation for successful project planning according to the standard.

For more information contact Eplan Software & Service.

Tel: +27 (0)11 609 8294, Mobile: +27 (0)83 925 2054

Email: Reyneke.J@eplan.co.za

Visit: www.eplan.co.za

accelerating innovation, maximising productivity and optimising operations."

Tristan Hunter, GM Automation & Operational Technology at Fonterra Co-operative Group Limited, New Zealand's largest company and responsible for 30% of the world's dairy exports, commented: "Our team has seen the preview release of this new solution and we are excited about collaboration between our strategic partners, Rockwell Automation and Microsoft. Moving data from our on-premises assets securely with context and providing new workflows for us to analyse and drive better outcomes are important to maintaining Fonterra's high standards across our plants globally."

Organisations can access Rockwell Automation solutions now via the Microsoft Azure Marketplace and more solutions are in development. The next phase of co-innovation solutions will be available to joint customers of Rockwell Automation and Microsoft in Q1 2021.

For more information contact Rockwell Automation.

Email: mjunius@ra.rockwell.com

Visit: www.rockwellautomation.com

Shortest control cycles with multiple sampling

The high-performance AX8000 multi-axis servo system from Beckhoff is characterised by high dynamics and very short cycle times. The motor current is scanned in μ s cycles and the minimum adjustable EtherCAT cycle time is 62.5 μ s. With the support of oversampling technology, process data can now be scanned several times within a communication cycle if required and transferred to the controller via EtherCAT.

With the AX8000 servo system, new set-point values can be transferred every 62.5 μ s from the motion controller in the Industrial PC to the servo drive. Comparable control systems usually operate with a cycle time of only 1 ms. Now, the AX8000 firmware additionally supports oversampling technology, familiar from Beckhoff EtherCAT I/Os. This enables multiple sampling of process data within a communication cycle with an oversampling factor of up to 128 and the transfer of all data in an array via EtherCAT. The higher-level controller can transmit several set-point positions or speeds to the drive within one communication cycle, which the drive then follows. In addition, measured variables can be recorded several times in the drive and the buffered values can be made available to the controller within one cycle. In this way, a chart in TwinCAT Scope View can be resolved even more finely, for example.

Synchronisation with other drives – with or without oversampling functionality – is also possible without any problems through the distributed clocks function of the EtherCAT system.

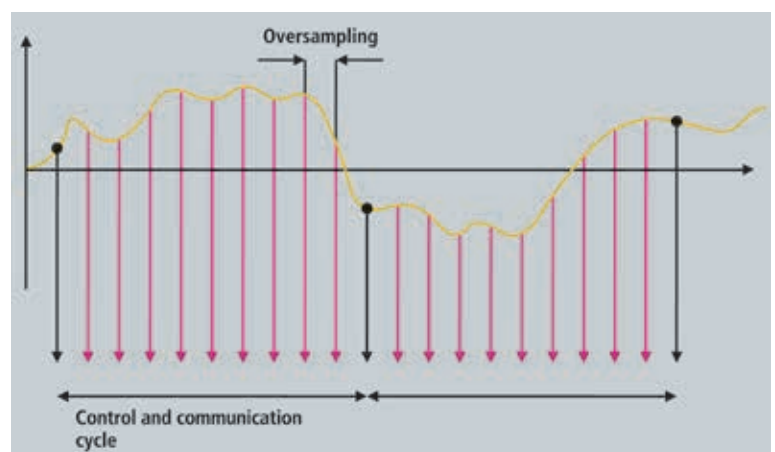
The oversampling method is used in precision processing machines and in other machines and systems for which the evaluation of high resolution measured values is a technological requirement.

For more information contact Dane Potter at Beckhoff Automation.

Tel: +27 (0)11 7952898, Mobile: +27 (0)79 493 2288

Email: danep@beckhoff.com

Visit: www.beckhoff.co.za



The compact AX8000 multi-axis servo system now also supports the oversampling technology familiar from EtherCAT terminals.

Optimal routing and CIP in F&B production

ABB recently launched the ABB Ability™ Liquid Routing Library, a control engineering inventory for manufacturers in the food and beverage industry and in other liquid-related industries, including pharmaceuticals, chemical resins and tank farms.

The new digital application draws on ABB Ability™ System 800xA, a powerful distributed control system (DCS) automation platform, and will support routing and cleaning in place (CIP) functionalities as needed for liquid-led production. It can be used wherever products are transported, stored or processed in tanks and lines and is particularly suitable for dairy, brewing, sugar mills and edible oil application programming.

Ready-made objects including libraries, typicals, and templates for product routing, plus recipe-based CIP, track and trace, preventive plant maintenance, and Excel-based bulk data tools are made available for customers through the library.

Functionalities include alarm handling, alarm propagation between different units, queue handling for online

production changes, control and supervision of process objects, interlocks and transfer of product and equipment settings like product codes, unit names and unit states.

Gernut van Laak, Global Food and Beverage Solution Manager and Dairy & Beverage Specialist in ABB Process Industries Division, says: "ABB Ability™ Liquid Routing Library will support our food and beverage customers in their digitalisation journey. Customers are driving innovation in process automation, digitalising their production sites for greater speed, consistency and quality and the Liquid Routing Library is an important piece of this jigsaw.

"Having a complete library for product routing, with ready-made objects and templates will allow users greater visibility and understanding of what is happening at each stage of the process.

"We know that routing and cleaning in place support are important in food and beverage plants. This is built-in and ABB support or additional documentation is available at any stage. Plant operators will be able to diagnose issues more quickly than before and have solutions ready, in turn saving time and money."

It is estimated that the library will reduce project-specific library development time by 80% and project-specific software requirements by 60%, thus reducing the cost of developing an automation solution while maximising plant operability.

The use of the Liquid Routing Library provides for efficient commissioning and maintenance due to its transparency, granularity and diagnostics. It creates a streamlined environment for reliable control via a dynamic, easy-to-use interface that gives operators access to the whole plant and different layers of information. This can improve operator effectiveness by some 25%.



Process automation technology provides customers with optimal routing and 'cleaning in place'.

For more information visit: www.abb.com

New digital-to-analogue converters

Mouser Electronics Inc., leading new product introduction distributor with the widest selection of semiconductors and electronic components, is now stocking the new AD567xR digital-to-analogue converters (DACs) from Analog Devices Inc. The AD567xR devices are low-power, 12-bit and 16-bit buffered voltage output DACs, operating from a single 2.7 V to 5.5 V supply voltage range. Featuring wide operating ranges and high relative accuracy, the

16-channel DACs are ideal for a range of applications, including industrial automation, optical transceivers, base station power amplifiers, data acquisition systems, and process control.

The AD567xR DACs offer reliable low-power performance, including a power-down mode that reduces current consumption to just 2 μ A. The DACs also feature a power-on reset circuit, which ensures that the output powers up to and holds at zero-scale/mid-scale until a valid write. The converters are housed in a compact 4 mm \times 4 mm 28-lead LFCSP package. Featuring 1.8 V logic compatibility and a user-selectable gain pin, the DACs offer simplified implementation and allow developers to quickly begin working on industrial solutions.

For more information visit: <https://eu.mouser.com>



The low-power AD567xR DACs are suitable for industrial automation applications, among others.

Supporting digital transformation



Lal Karsanbhai,
Executive
President, Emerson
Automation
Solutions.

Global technology and engineering company, Emerson, recently announced another acquisition – of the Progea Group, an industry-leading provider of industrial internet of things (IIoT), plant analytics, human machine interface (HMI) and supervisory control and data acquisition (SCADA) technologies.

The addition of Progea's capabilities in analytics, industrial visualisation and IIoT will build on Emerson's established software and control portfolio for manufacturing, infrastructure and building automation applications and enable customers to streamline comprehensive machine and plant control systems to a single partner. The acquisition will help bridge a critical customer technology gap by lowering total cost of ownership and reducing the barriers that come with working across multiple vendors to drive effective digital transformation and integration.

Lal Karsanbhai, Executive President of Emerson's Automation Solutions business said, "The acquisition of Progea strengthens our ability to provide customers with an integrated package of control, visualisation and IoT to help them improve overall equipment efficiency and accelerate their digital transformation journey. Progea's capability and expertise in machine and plant-level visualisation and analytics provide customers with



a flexible, scalable solution for programmable logic controller (PLC) applications in discrete and hybrid markets."

The Progea Group is headquartered in Modena, Italy. Since 1991 it has been producing software for visualisation, data acquisition and management for industrial automation and is the only Italian company operating internationally in the market for automation software platform manufacturers.

For more information contact Emerson Automation Solutions.

Email: emrsouthafrica@emerson.com

Visit: www.emerson.com

IO-Link rotary encoder for Ex areas

Turck is now offering a variant of the contactless QR24 encoder for use in explosion protected areas Zones 2, 22 and 3GD. The bearing-free IO-Link rotary encoder enables contactless measurement, considerably outperforming bearing-guided optical encoders in dust-laden environments as optical encoders are susceptible to dust.

The sensor unit and positioning element on the QR24 are fully potted and cast as two totally sealed independent units. This gives the encoder optimum protection from dust, vibration, impact and shocks. Unlike encoders with magnetic positioning elements, the QR24 offers a greater resistance to magnetic field interference.

Typical applications for the QR24 Ex include the chemical, mining or food industries – particularly in mills. Many applications in the textile or wood-processing industry also require the use of an encoder with 3GD approval.

The QR24-Ex is a further addition to Turck's Premium encoder line. It outputs its signal via the IO-Link V1.1 interface, offering simpler parameter setting, such as for the output signal or zero point. The encoder can be used as a single-turn, semi-multiturn rotary encoder that

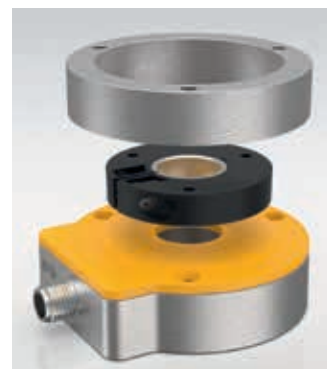
counts its revolutions. For this, the encoder uses 16 bits of the 32-bit IO-Link signal for the single-turn value, 13 bits for the number of revolutions, and the remaining three bits for diagnostics data. Operating status can thus be determined at any time and maintenance can be planned in advance, effectively preventing machine downtime.

For more information contact Brandon Topham at Turck Banner.

Tel: +27 (0)11 453 2468

Email: brandon.topham@turckbanner.co.za

Visit: www.turckbanner.co.za



The contactless QR24 rotary encoder is now also available for use in explosion protected areas.

The drive as a sensor for condition monitoring

Norbert Hanigovszki, Jörg Dannehl, Sanjeet Kumar Dwivedi - Danfoss Engineering

Variable speed drives have been used for over half a century, with the main advantage being the reduced use of electrical energy they enable. With the advance of Industry 4.0, the drive moves from being purely a power processor to being an intelligent element of the automation system. The ability of the drive to act as a smart sensor makes it a natural choice when implementing condition monitoring. Here we look at how this capability can be used in water and wastewater applications.

Today more than 20% of all electric motors are driven by variable speed drives. In water and wastewater applications, drives are used for the reduced energy use they enable, as well as for other reasons – such as in process control (keeping water pressure constant and thus avoiding leakage caused by high pressure), preventing water hammer, or optimising well exploitation.

The introduction of microprocessors to control drives brought with it additional functionality – that of a power processor. For example, drives can perform pump de-ragging in wastewater applications, they can control several pumps in a cascade system in water pumping applications, or can bypass certain frequencies to avoid resonances.

The advance of Industry 4.0 has given an additional boost to these functions. As Industry 4.0 deals with information and networking, we start using drives as smart and networked sensors.

Motor and drive systems in Industry 4.0

Industry 4.0, or the fourth industrial revolution (following the first industrial revolution – mechanisation, the second – electrification and the third – automation), can be characterised by networking. It could be defined as follows: 'Industry 4.0 describes the intelligent networking of people,

things and systems by using all the possibilities of digitalisation across the entire value chain'.

The impact of this trend on motor systems is a migration from what is known as the 'automation pyramid', to networked systems. This means the various elements of the system, such as motors, drives, sensors and controls, are interconnected and are also connected to a cloud – where data is stored, processed, analysed and decisions are made.

The drive as a sensor

In variable speed drive applications, the availability of microprocessors in the drive and bus communication options, combined with current and voltage sensors, opens new opportunities. Moreover, additional sensors (such as vibration and pressure sensors) can be connected to the drive at almost no cost. This allows the drive to be used as a smart sensor for condition monitoring. The available information offers various use cases, for example in: system optimisation, energy efficiency optimisation, and condition-based maintenance.

Embedded condition-based monitoring

Condition monitoring is a technique used to monitor the health of equipment in service. For this purpose, key parameters need to be selected as indicators of developing faults. Equipment condition typically degrades over time. Figure 2 shows a typical degradation pattern, also known as the PF-curve. The point of functional failure is when the equipment fails to provide the intended function. The idea of condition-based maintenance is to detect the potential failure before the actual failure occurs. In this way, maintenance actions can be planned before functional failure, with the advantages of reduced downtime, elimination of unexpected production stops, maintenance optimisation, reduced spare parts' stock, and others.

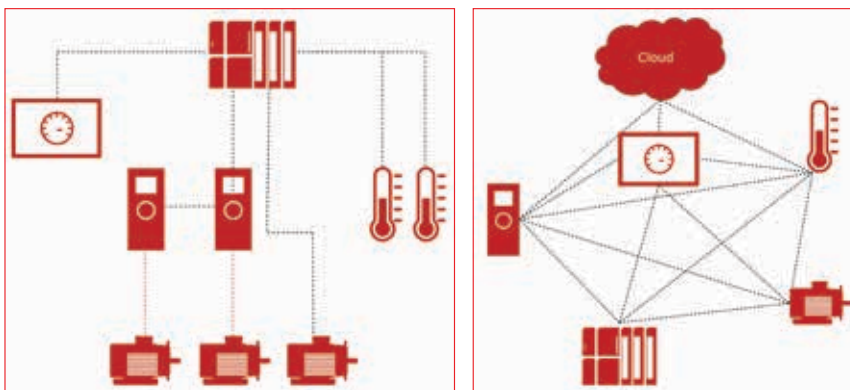


Figure 1: Industry 4.0 sees the transition from the automation pyramid (left) to networked systems (right).

Vibration level monitoring

Many mechanical failures, such as bearing wear-out, shaft misalignment, and unbalances, create some kind of vibration. Hence, vibration monitoring has been established as critical in monitoring rotating machines. Various methods are used, ranging from simple to highly sophisticated and among these, vibration velocity RMS monitoring is widely used. It is based on the RMS value of the vibration signal measured through a vibration sensor. Mechanical faults such as unbalances, shaft misalignment, and looseness, have a significant impact on the RMS of the vibration. However, the challenge in variable speed applications is the dependency of the vibration on the actual speed. Mechanical resonances are typical examples. These are always present and a monitoring system has to cope with them in some way. Often the fault detection levels are set for worst case to avoid false alarms. This reduces the detection accuracy in speed regions where no resonances are present.

With a suitable vibration transmitter mounted and connected to the drive, the drive can offer advanced monitoring by correlating the transmitter signal with drive-internal signals – speed, for example, or other signals that are relevant for the application. The drive can detect faults early and provide ‘traffic light’ information (see Figure 2) on the state of the system to prevent functional failure. Maintenance can be planned and scheduled in advance and the system can continue operating until the next possible maintenance break.

The vibration level in normal and faulty conditions is also dependent on the type, location and mounting of the sensor, and varies with the actual application to be monitored. Hence, a learning period is required. This can be done in different ways. The first approach entails learning the normal vibration levels during the initial period of operation: the application is running normally and the drive learns the vibration in parallel, without affecting the operation. When enough data has been collected, the drive starts to monitor the vibration. Secondly, the drive can execute an identification run. Here, the drive controls the motor in a way that ensures enough data is being collected. The possibility of using this second approach depends on the specific application. For example, in a water supply system the pump may not be allowed to run at full speed at the time of commissioning.

In a test set-up built to demonstrate this functionality, the fault in scope is misalignment of the motor shaft. Shaft misalignment adds mechanical load to the bearings and thus reduces bearing lifetime. It also creates vibrations that can lead to secondary effects in the system. Early detection of misalignment and correction can extend the bearing lifetime and prevent downtime.

Figure 3 shows the test set-up with an induction motor driving a small pump. An angular misalignment can be created by slightly lifting the baseplate with the red handle. A vibration sensor has been installed on the baseplate of the motor to illustrate the concept. The analogue 4-20 mA

At a glance

- Variable speed drives offer a valuable source of data which can be used in condition monitoring, saving unnecessary additional expense.
- The impact of Industry 4.0 on motor systems sees a migration from the ‘automation pyramid’, to networked systems.
- Fault condition indicators can be tracked by monitoring vibration levels, current and voltage, and overload or under-load, for example.

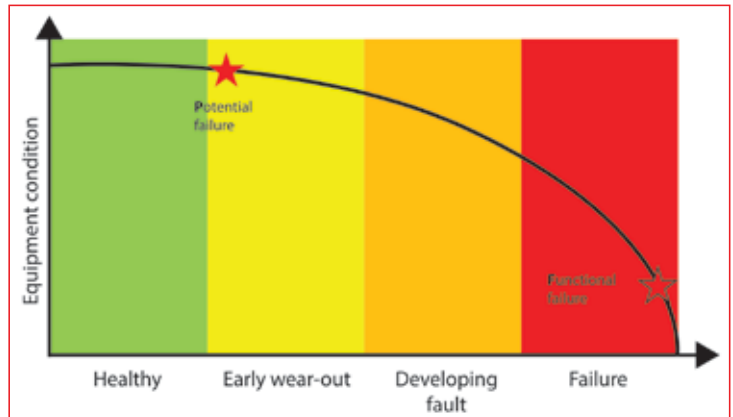


Figure 2: P-F curve representing the ‘traffic light’ condition of a component until functional failure.

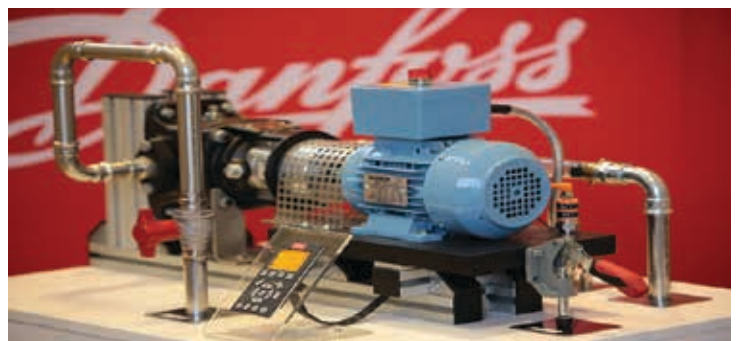


Figure 3: Test set-up with a small pump driven by an induction motor. A vibration transmitter (black/orange) is mounted on the baseplate next to the motor.

sensor signal has been connected to the analogue input of the drive.

Figure 4 shows an example of test results. The measured vibration in mm/s versus the motor speed in RMS is shown for two scenarios. In the first scenario, the system is in its healthy state, providing a baseline measurement. The warning and alarm thresholds are derived from the measured baseline. For the faulty scenario, where the shaft misalignment is created by slightly lifting the motor baseplate, the measured vibration is shown in green.

In the above example, the drive can clearly detect this fault. For other applications, the baseline data can be very different. Typically, even in a machine in a healthy state, vibration is dependent on speed. There may also be resonance points that need to be considered in monitoring. Other types of faults, such as unbalances or looseness, create different patterns.

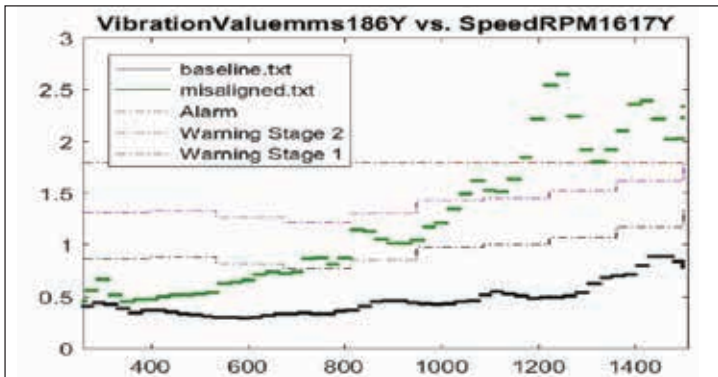


Figure 4: Test data (Vibration RMS value in mm/s versus speed in RPM) for two scenarios: fault-free (black, 'baseline') and faulty (green, 'misaligned').

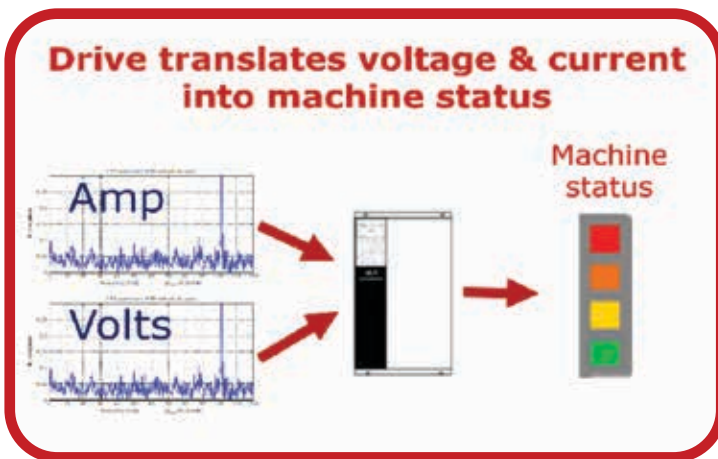


Figure 5: Electrical signature analysis.

Electrical signature analysis

The condition of the motor and application can also be monitored through electrical signature analysis. This technique has been under research for many years. Early studies addressed direct online machines and subsequently, variable speed drive applications have been investigated too. With the available processing power and memory in today's drives, these techniques can now be integrated into products as additional features.

Figure 5 illustrates the basic concept of electrical signature analysis. Fault condition indicators can be extracted from the motor currents and voltage signals. Frequency components of currents and voltages can be related to motor or application faults, such as shaft misalignment or stator winding faults. The current and voltage sensors are essential components of drives anyway as they provide the required signals for controlling the motor. These signals can also be used for monitoring purposes, so there are no additional sensor costs. Signal processing and analytic techniques play an important role in this context.

As the controller of the motor, the drive can correlate the monitoring values – specific current harmonics, for example – with other information available in the drive. Knowing the state of the controller for instance, the drive knows when

meaningful spectrum calculations can be performed. As with vibration level monitoring, the monitored values can be correlated with motor speed, load, and other relevant process data (such as pressure in water pipes) to obtain more accurate fault information.

Load monitoring in pumps

As noted above, drives measure motor current and voltage and the main purpose is to use these measurements in controlling the motor. The primary current and voltage measurement is used to calculate various parameters such as motor power, energy, actual motor speed or torque, and these values can be used to monitor the motor load, of a pump, for example.

In applications where the load depends on the motor speed, the torque estimation can be used to determine overload and under-load deviations. In baseline set-up the drive 'learns' the normal distribution of the load, or the load envelope. As with the other functions, there is a correlation with the motor speed. During monitoring the drive can detect overload and under-load conditions which, in pump applications, can be caused by faults such as fouling, sanding, broken impeller, wear out or others.

Conclusion

Condition monitoring can be used to implement condition-based maintenance – which is an evolution from corrective and preventive maintenance. But condition monitoring relies on sensor data, and installing additional sensors can be expensive. However, if variable speed drives are already used in the application, they offer a valuable source of data which can be used for condition monitoring, saving unnecessary additional expense. □

References:

- [1] DIN ISO 10816 *Mechanische Schwingungen - Bewertung der Schwingungen von Maschinen durch Messungen an nicht-rotierenden Teilen*
- [3] Robert Bond Randall: *Vibration-based Condition Monitoring: Industrial, Aerospace and Automotive Applications*
- [4] Ifm: *Operating instructions Vibration sensor VKV021*, <https://www.ifm.com/mounting/704575UK.pdf>
- [5] Hamid A. Toliyat, Subhasis Nandi, Seungdeog Choi, Homayoun Meshgin-Kelk: *Electric Machines: Modeling, Condition Monitoring, and Fault Diagnosis*, CRC Press, 2013
- [6] Howard P. Penrose: *Electrical Motor Diagnostics, Success by Design*; 2nd edition (2008)
- [7] Sanjeet Kumar Dwivedi, Jorg Dannehl: *Modeling and simulation of stator and rotor faults of induction motors and their experimental comparison*, 2017 IEEE 11th International Symposium on Diagnostics for Electrical Machines, Power Electronics and Drives (SDEMPED)

For more information visit: www.danfoss.com

Software makes drive commissioning easy

Over recent years, ac drive technology has matured to offer significant benefits to industrial operations. Many companies across different industry sectors are choosing to migrate from dc drives to ac drives, which are improving in their functionality and capability, and offer smoother maintenance. However, for some industries it's not practical to migrate to a different technology – due to either the particular application or the existing operational setup. Nidec Control Techniques notes that these industries should not be left without support for drive commissioning and troubleshooting, and the company therefore offers CTSOft free commissioning software. CTSOft is a drive configuration tool for commissioning, optimising and monitoring Control Techniques dc drives.

Bruce Grobler, Regional Manager, Nidec Control Techniques says, "There is much interest in our dc drives and our Mentor MP platform. While ac drives are improving, dc drive technology remains cost-effective, efficient and provides many advantages, especially for regenerative and high-power applications." Often used in the mining and metals industry, Mentor MP offers enhanced field control and easy integration with the existing motor, power supply, application equipment and communication network.

"With Mentor MP, CTSOft acts as a built-in commissioning wizard to assist with the transfer of drive parameters and programs," Grobler explains. The software is user-friendly and intuitive, making use of the same structured parameters list and configuration as other Control Techniques software. "This makes navigation and implementation easy for the user. We have found that familiarity is important for flattening the

learning curve that comes with using new software," he says.

According to Grobler, CTSOft makes setting up the drive as simple as 1-2-3. First, the user selects the drive from a drop-down list. Second, the drive is detected and third, it goes online. "It's really as simple as that. Once online, the user can read and adjust parameters live, without the need to download on completion." For a simple application the user only needs to set the first ten parameters on the structured list, and the motor is ready to run.

"The logical layout of parameters and menu with associated block diagrams and terminal configurations are what makes this tool so easy to use," Grobler says. In addition, the tool makes it easy to save parameters, which can be backed-up and downloaded to the drive later.

"Our customers' favourite aspect of this software is that it is 100% free. There is no trial version, no licensing issues, and no annual fees. CTSOft and its full stack of features can be downloaded and shared on an open licence. This puts Control Techniques a cut above the rest when it comes to customer satisfaction," Grobler adds.

For more information contact

Nidec Control Techniques.

Tel: +27 (0)11 462 1941

Email: bruce.grobler@mail.nidec.com

Visit: www.nidecautomation.com



With the Mentor MP platform, CTSOft acts as a built-in commissioning wizard to assist with transfer of drive parameters and programs.

Compact vector control drives

The Delta ME300 series from ElectroMechanica (EM) is a new-generation compact vector control drive that inherits Delta's superior drive technology with up to 60% volume reduction compared to the previous Delta VFD-EL drives. This reduces cost and allows more installation space in the control cabinet.

Applications include single- and multi-pumps, OEM conveyor and packaging machines, woodworking, textile machines, fans, mixers, cranes and hoists. In addition to improving productivity and reducing direct labour, the main drivers for automation in such applications include increased efficiency, quality and flexibility.

The Delta ME300 series has various essential functions built-in as standard, including user-defined parameter groups, single and multi-pump functions, built-in brake chopper and high-speed pulse input for speed control. It also supports both induction and interior/surface permanent motors for added efficiency and flexibility.

The new screw-less wiring design of the terminal blocks offers a simplified wiring process for fast and

easy installation. User-friendly operation, ultra-compact size and a flexible, durable design provide the end-user with an efficient and stable system.

The Delta ME300 drive delivers 150% high starting torque with a low speed control of 3 Hz. This allows for exceptional machine stability and reliability in starting under extreme conditions. Up to 200% overload capability for three seconds makes the ME300 ideal for demanding and dynamic loads.

A 100% PCB coating (IEC 60721-3-3 class 3C2 standard) ensures drive operation stability and safety in critical environments. An optional NEMA 1 kit prevents dust and other particles from entering the drive and avoids risk from electric shock for added safety, making the drive suitable for applications under critical conditions.

For more information contact ElectroMechanica.

Tel: +27 (0)11 249 5000

Email: karenz@em.co.za, visit: www.em.co.za



The Delta ME300 drive has a number of essential functions built-in as standard.

Supplying ethanol plant expansion in Zimbabwe

Green Fuel's state-of-the-art ethanol facility at Chisumbanje in southeastern Zimbabwe uses the latest technology to produce high-grade anhydrous ethanol, with a high-pressure boiler and a TGM steam turbine generator set increasing energy recovery. This allows the plant to be self-sufficient in its energy needs, and to generate excess electricity. South African company Zest WEG is supplying a TGM planetary gearbox with a WEG variable speed drive (VSD) and a WEG medium voltage motor for the latest mill expansion at the plant.

Leandro Magro, Steam Turbines Manager at Zest WEG, says the equipment is destined for the new sugar cane crushing mill #6 at the facility.

Green Fuel is Zimbabwe's leading producer of renewable fuel. Its ethanol project – awarded National Project status by Zimbabwe's government for its economic contribution – reduces the country's reliance on imported petroleum products. Ethanol produces a lower level of greenhouse gas emissions than unleaded petrol, and can be sold at significantly cheaper prices. The company employs over 3 000 people in its agricultural and industrial operations.

Magro says, "The engineered gearbox for this project is custom-built by TGM in Brazil, a WEG Group company, and is supplied with a WEG VSD and WEG electric motor as a package. The components in this solution are designed to deliver the specific torque required to crush the cane to the customer's specifications, reliably and efficiently."



The TGM planetary gearbox and WEG motor at Green Fuel in Zimbabwe.

The output speed of the gearbox in operation is usually between five and seven revolutions per minute. To deliver the required rotating force, a 750 kW, 3 300 V WEG motor was specified, with a WEG VSD to facilitate speed variations. The volume and quality of cane being brought in from the fields to the mill varies during the harvesting season – usually from April to October or November – so the rate of crushing in the mill needs to be adjustable.

The TGM third-generation planetary gearbox is designed specifically for sugar cane mills, where torque variations are always a factor and robust construction is required. The bearings are designed to achieve more than 100 000 hours of operation. This means the equipment can run for up to 10 years before any major service intervention is required.

"WEG has supplied efficient and reliable equipment

New energy-efficient drive systems

The partnership agreement between BMG and German precision engineers, Getriebbau Nord, formalised in 1996, sees BMG assemble, distribute and support NORD DRIVESYSTEMS throughout southern Africa. BMG has made a substantial investment over the years to ensure assembly, stockholdings and technical support for the Nord range are in line with international quality, safety and environmental standards.

"NORD DRIVESYSTEMS comprise optimum drive configurations to ensure high performance of mechanical speed control for specific applications, in almost every industry," says Deon Crous, National Product Specialist, NORD Drive Systems, Electromechanical Drives division

at BMG. "NORD modular drives – designed for reliability, energy-efficiency, low noise levels, extended service life and reduced maintenance – are used in applications where frequently changing speeds are essential and where a specifically defined sequence of movement is required.

"New to BMG's range is the recently launched IE5+ motor generation from

NORD DRIVESYSTEMS, which combines high efficiency and a compact design and delivers reduced total cost of ownership. The design of the IE5+ motor and its operation with a frequency inverter, means the same motor variant can be used universally. Another advantage is that the same motor type can be used independent of the respective mains voltage or local energy-efficiency regulations.

"The energy-efficient permanent magnet synchronous motors offer a high power density, have considerably lower losses than the current IE4 series and are particularly well-suited for operation in the partial-load range. Compact IE5+ motors, with lightweight aluminium housings, also require less installation space.

"The range is initially available for power ranges from 0.35 to 1.1 kW, with a continuous torque from 1.6 to 4.8 Nm and speeds from 0 to 2 100 min⁻¹. More sizes and various power ratings are planned," says Crous.

BMG's corrosion-resistant Nord IE5+ motors are designed for easy cleaning and wash-downs and ideal for use in hygiene-sensitive applications and harsh environments. The motors are available with nsd tuPH surface treatment, an IP69K protection class, and an integrated mechanical brake. An integrated encoder forms part of the standard equipment.

The IE5+ synchronous motors can be combined with all Nord gear units and drive electronics as a modular system

The new IE5+ motor system combines high efficiency and a compact design.



to Green Fuel since it began operating. In its 2017/2018 plant expansion we supplied a planetary gearbox, motor and VSD for mill number 1," Magro says. "Our current contract is for a second expansion, where Zest WEG will supply similar equipment to mill number 6."

The gearbox is being manufactured and assembled in Brazil, and the WEG VSD with integral transformer will be assembled in South Africa by Zest WEG. The transformer will step down power from 11 kV to the required motor voltage of 3.3 kV. Delivery will take place by year-end, although the high efficiency motor will be supplied earlier from WEG in Brazil, and installation of the equipment will be done in early 2021, over about two weeks. Zest WEG will be involved in the installation supervision and commissioning, which includes the required tests before the start-up.

"We also assist with the start-up of the equipment at the beginning of the crushing season, to ensure everything is running optimally," Magro says.

"Using production facilities within the group and around the world, Zest WEG provides its customers in Africa with integrated solutions that combine the highest quality of equipment with our in-depth industry expertise."

**For more information contact Zest WEG Group.
Visit: www.zestweg.com**

to enhance LogiDrive systems. Standardised geared motor variants – consisting of an energy-saving synchronous motor, a 2-stage helical bevel gear unit and a NORDAC LINK frequency inverter – have been specially developed for use in intralogistics, parcel logistics and airport technology, representing an optimal compromise between energy-efficiency and a reduction of variants.

Solutions are customised to suit specific requirements using the high overload capacity of the motors and the system's wide adjustment load range.

BMG's team of technicians offers a technical advisory and support service across southern Africa to meet the needs of contractors, designers and the end-user. Local assembly at BMG World in Johannesburg provides for prompt delivery of drive systems and the quick availability of spare parts.

**For more information contact BMG.
Tel: +27 (0)21 492 7070
Email: deonc@bmgworld.net
Visit: www.bmgworld.net**

Breaking ground for new drives factory

Drive and control technologies specialist, SEW-Eurodrive has announced that construction has begun on its new R200 million head office and factory in Everton, Johannesburg, planned to accommodate the company's growth.

The 25 000 m² building is being constructed on property acquired by the company two years ago. The required earthworks were completed late September. Construction is due to be completed by October 2021 and the company plans to move in to its new premises – which will also serve as its South African headquarters – in January 2022.

Over a three to five year period the factory will be fitted with state-of-the-art, Industry 4.0 compliant technologies, including automated assembly machines and guided vehicles, which are anticipated to cost at least another R200 million.

Raymond Obermeyer, Managing Director at SEW-Eurodrive South Africa says, "In order to remain globally competitive it's important that this new factory is as automated as possible. The new high-tech facility will allow the company to service customers in Gauteng, South Africa and the rest of Africa more efficiently."

He adds that SEW-Eurodrive expects most of its growth in the years ahead to come from Africa rather than South Africa. "We expect African markets to account for 50% of our turnover within the next three to four years, given that growth in many African countries around the continent is much faster than it is locally.

"We foresee opportunities for growth coming from the establishment of the African Continental Free Trade Area (AfCFTA), and the removal of border restrictions will make it much easier for companies like SEW-Eurodrive to do business on the continent," he says.

The new factory will accommodate a number of the company's assembly plants from around the country, to improve efficiencies and contain costs. SEW-Eurodrive's existing plants in Nelspruit, Durban, Port Elizabeth and Cape Town will continue to operate with a focus on servicing the company's national footprint of customers, and its current head office and factory will become a large gearbox repair centre.

Obermeyer says, "This new facility has been planned for some years already and we're delighted that construction has finally kicked off, paving the way for an exciting period in the company's growth trajectory."

**For more information contact SEW-Eurodrive.
Tel: +27 (0)11 248 7161
Email: JKlut@sew.co.za, visit: www.sew-eurodrive.co.za**



SEW-Eurodrive MD, Raymond Obermeyer and colleagues breaking ground on the site of the new facilities.

POWER UP WITH



BOVA is a leading brand within the safety wear industry, recognised for delivery of quality footwear, workwear and fall arrest equipment throughout Africa and beyond. BOVA prides itself on being **ENGINEERED WITH PURPOSE**, providing the correct protection for the required application, which is why we are proud to introduce BOVA ARC; an innovative range of PPE, engineered for specialised thermal protection against the hazards of an arc flash.

INHERENT

"existing in something as a permanent, essential or characteristic attribute".

THE INHERENT DIFFERENCE

When it comes to safety - quality and reliability cannot be compromised. That is why the BOVA ARC Flash Protection range has been manufactured using our specially engineered I-ARC material that is **INHERENTLY** flame resistant.

WHY BOVA ARC?

- Inherent materials maintain their in-built qualities and cannot wash or wear away.
- Low shrinkage - even over time and when subjected to severe heat.
- Superior comfort - the I-ARC material is lighter and more breathable to provide an improved tactile experience.
- Performance vs weight advantage - the same and often better thermal protection at a lighter weight fabric (CAT 2 garments on 215 gsm fabric versus competitors up to 100 gsm heavier).
- Does not contain harmful chemicals.



All of this helps to prolong the life and appearance of the garment, to ensure our garments keep delivering on your safety needs. There should be no compromise on the best balance of protection and durability.





PRODUCT LIST

- **CAT 2:** Rating: 13 CAL/CM²
ARC JACKET | S - 5XL

- **CAT 2:** Rating: 13 CAL/CM²
ARC TROUSER | S - 5XL

- **CAT 2:**
ARC FLASH BALACLAVA | ONE SIZE FITS ALL

- **CAT 2:**
ARC FLASH GLOVES | ONE SIZE FITS ALL

- **CAT 2:** Rating: 13 CAL/CM²
ARC FLASH CHAMBRAY SHIRT | S - 5XL

- **CAT 2:** Rating: 13 CAL/CM²
CHINO TROUSER | S - 5XL

- **CAT 4:** Rating: 52 CAL/CM²
ARC JACKET | S - 5XL

- **CAT 4:** Rating: 52 CAL/CM²
ARC BIB AND BRACE | S - 5XL

- **CAT 4:** Rating: 52 CAL/CM²
ARC HOOD | ONE SIZE FITS ALL

- **CAT 4:**
ARC GLOVES | ONE SIZE FITS ALL

- **ARC SUIT BAG**



MULTI-LAYERED



LIGHTWEIGHT



DURABLE



EVAPORATIVE
COOLING

Laser-line triangulation technology

The line triangulation method is an often underestimated sensing mode for monitoring presence, completeness, position, and similar tasks. In many applications, compact, intelligent light section sensors deliver results that are more precise and reliable than those delivered by other types of sensors. Line triangulation technology is unaffected by extraneous light and reliably detects objects with minimal contrast or no contrast to the background. Pepperl+Fuchs looks at the use of line triangulation technology in different industrial applications.

The primary goals of all automation are high throughput and the elimination of downtime and scrap production. Therefore, an increasing number of sensors in production, processing and logistics applications ensure that the relevant requirements are met. They are used to check the presence, completeness and accuracy of supplied parts. Slides and components must be in the correct position and orientation to be filled, processed, or picked up by a robotic arm. Many of these typical detection tasks can be performed reliably and elegantly using line triangulation technology.

Light section sensors combine all the required components in one compact device and are usually easier to parameterise than 2-D vision sensors. They work on the principle of triangulation, using a projected laser line to detect height profiles and edge contours with high precision. The known distances and angles of the triangle formed by the light source, camera, and object are used to calculate the exact positions of all points along the line projected on the target object.

Key advantages

The use of a sharply defined laser beam provides some decisive advantages when compared to normal vision sensors. Light section sensors can clearly detect low-contrast objects and even zero-contrast objects. They require only differences in height to detect surfaces. And the light section method is more resistant to extraneous light and fluctuating lighting conditions. In 2-D vision

sensors, (unexpected) changes in lighting in particular can significantly reduce or completely disable detection performance, if daylight enters a window, for instance.

When using vision sensors, the exposure time, arrangement of the device and, where necessary, external lighting must always be precisely adapted to the conditions of the application. In contrast, the automatic exposure time control function with which light section sensors are ideally supplied is sufficient for the most applications.

From the automotive industry...

These properties support the use of high-performance laser-line triangulation sensors, such as the SmartRunner Matcher from Pepperl+Fuchs, in numerous applications in the automotive industry, packaging technology, logistics, and in mechanical and plant engineering.

When manufacturing car bodies, it is critical to check that fixing elements such as rivets, screws, clips, and dummy plugs are present and installed in the correct position. These small parts often differ only slightly from the background and the contrast is very low. The light section solution can easily overcome this challenge. The sensor detects height profiles regardless of colour and surface structure and issues a good or bad signal via the switching outputs, depending on the detection result. If the sensor is mounted on a robot arm, diverse elements or scenes can be verified using the same device. Only one sensor is required as it can store multiple detection profiles.

Other applications in the automotive industry include checking anchorages on skids (skid bolts), checking the precision of sheet metal parts before welding, and checking whether anti-vibration pads are correctly glued in place. Laser-line triangulation technology ensures reliable detection in all applications. Its function is not affected by extraneous light, low contrast, or reflections.

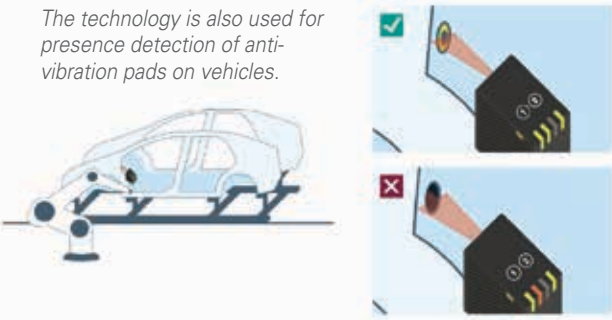
...to packaging

The packaging industry also benefits from line triangulation technology. For instance, plastic trays with multiple compartments are often used to package ready meals. These allow the main course and side dishes to be kept separate

The laser-line triangulation sensor is used for rotation detection for ready-meal trays.



The technology is also used for presence detection of anti-vibration pads on vehicles.



until consumed for reasons of taste and aesthetics. Proper separation of the components is a prerequisite for customer acceptance as well as for correct, air-tight sealing. It is therefore necessary to check the orientation of the trays before they are filled. Here too, the light section sensor can prove its worth, as the plain, mostly white trays offer little contrast. The Matcher always delivers reliable and unambiguous results by detecting the height profiles.

Ready-to-use line triangulation solution

Laser-line triangulation technology offers critical advantages for some applications and has the potential to be used in many others. All these applications can be served by the SmartRunner Matcher laser-line triangulation sensor. The device combines a high-precision light section sensor and a vision sensor in one compact unit. The Matcher is factory-optimised to recognise a previously learned reference contour, can store up to 32 profiles, and can be integrated immediately into applications as a plug-and-play solution. The evaluation results are output via switching outputs as good or bad signals that any control panel can process. Fieldbus solutions and gateways are also available for PROFINET, PROFIBUS, EtherNet/IP, and EtherCAT.

At a glance

- In production, processing and logistics applications sensors serve to check the presence, completeness, accuracy and positioning of supplied parts.
- Light section sensors work on the principle of triangulation, using a projected laser line to detect height profiles and edge contours accurately.
- Laser-line triangulation technology combining a light section sensor and a vision sensor offers critical advantages in some applications.

A useful feature of the device is the option to output the deviation of the current position from the learned X position and Z position. If an application does not allow accurate sensor triggering, standard sensors such as light sensors or ultrasonic sensors are not suitable for presence detection. In such cases, laser-line triangulation sensors can deliver geometric displacement results to the control panel. A powerful LED lighting system is also integrated into the device to generate image documentation of faults, process states, and quality characteristics. Alternatively, the sensor can be easily parameterised using Data Matrix control codes, without requiring a PC. □



The SmartRunner Matcher is designed for easy parameterisation using control codes.

For more information visit:
www.pepperl-fuchs.com/southafrica

SENSORS + SWITCHES : PRODUCTS + SERVICES

Ultrasonic sensors with up to 8 m range

The new ifm ultrasonic sensors in M30 design are distinguished by their long range of up to 8 m. This makes them particularly suitable for the detection of objects at such distance or for continuous level monitoring, of bulk materials or liquids, for example. Unlike photoelectric sensors, ultrasonic sensors are unaffected by colour, transparency or the surface shine of the object or medium being monitored. Due to limited space, unwanted reflections on the inside of a tank may occur in level applications and can lead to faulty measurement results with some sensors.

ifm's M30 ultrasonic sensors

with IO-Link allow for the width of the sound beam to be adjusted and set individually according to the application. The IO-Link functionality also means the user is prepared for Industry 4.0.

The vibrating sound transducer reduces the deposit of dirt and the sensor has a robust stainless steel housing.

**For more information contact
ifm South Africa.
Tel: +27 (0)12 450 0400
Email: info.za@ifm.com
Visit: www.ifm.com**



The M30 ultrasonic sensors are suitable for continuous level monitoring of bulk materials or liquids and other applications.

Controlling cobots on the production line

The ongoing development of small, powerful and flexibly positionable robots that can collaborate with people is progressing fast. SICK Automation reports on the use of sensors as a key component in these developments.

Sensor intelligence plays an important role in orienting and positioning mobile collaborative robots (cobots), and in reliably monitoring their surroundings. Lightweight cobots that are transported to their working position on automated guided vehicles and then autonomously position themselves are the newest development in this area. These cobots are making ‘fence-free’ and flexible work increasingly a standard feature in robotics and provide a new foundation for functional automation.

Smaller and more flexible systems now make industrial robots suitable for a wider range of applications. In particular, mobile cobots mounted on automated guided vehicles and weighing no more than about 15 kg are attracting interest. SICK Automation’s range of sensor solutions for robots and mobile platforms are being used in this area – enabling robot vision, safe robotics, end-of-arm tooling, position feedback, environment perception, and safety.

Cobots and mobile platforms unite

The advantages of collaborative robots are clear. They are especially suitable for flexible applications and can be installed on mobile platforms, temporarily positioned in pro-

duction lines, or permanently integrated into the production process. On mobile platforms, cobots offer an additional boost to productivity because this mobility reduces the time required to set them up at their workstations.

Sensor solutions from SICK are used to move a cobot to its workstation and to position it reliably. The cobot is combined with an automated guided vehicle system to create a mobile unit that can autonomously find its safe position and independently carry out any necessary base corrections with the aid of a robot guidance system. Robot guidance systems such as the PLR, or other robot vision systems from SICK, are especially suitable for this task.

As they move into position, and sometimes need to travel through narrow passageways in production, the mobile platforms with cobots must pose no risk to people or machines. Sensor and system solutions from SICK help to protect people, plant and equipment from collisions, and at the same time collect all the data needed for the dependable and flexible navigation for the automated guided vehicles. These vehicles can manage high speeds even when going around curves due to the switching of protective fields.



Mobile cobots mounted on automated guided vehicle systems are attracting interest in industry.



A cobot solution can be implemented efficiently by using the Robot Operating System.

Collaboration in the community

A cobot solution can be implemented efficiently by using the so-called Robot Operating System (ROS). ROS is an open source framework developed in a university setting and has found its way into industrial applications around the world. SICK is working with its partners to optimise cobot solutions with the help of ROS. Small and mid-sized companies in particular can benefit from this because it enables them to save on development costs and resources.

Robots without fences

Cobots generally have a high level of movement flexibility. A wide range of sensor solutions is therefore required to protect their working space. SICK offers solutions for all aspects of these applications. Laser scanners, for example, guarantee the reliable positioning of cobots in the workspace and protect workers nearby. This includes monitoring the surroundings using safety laser scanners, which reduce the speed of the cobot when a person approaches. An automated restart after a complete stop, requiring no manual intervention from the worker, is also

At a glance

- Sensor solutions are being used in mobile collaborative robots to enable robot vision, end-of-arm tooling, position feedback, environment perception, and safety.
- Mobile cobots are especially suitable for flexible applications and can be temporarily or permanently positioned in production lines.
- Sensors are used to move cobots to their workstations and position them reliably.

part of the solution. Furthermore, the motor feedback systems integrated into the cobot report the position of the robot arms to the controller. This data enables the entire workspace right through to the end-of-arm tooling to be securely monitored.

The last mile

The concept of the 'last mile', as used in logistics, is also used in robotics. In logistics the term refers to the final, fully-automated steps in delivering the goods to the customer. In robotics, the last mile describes the challenge of ensuring that a deployed robot operates in a safe way and can be controlled down to the last millimetre. It is particularly acute in the case of precisely calibrated robots working in an open space with no protective fences. The interplay of a large number of sensors, especially the motor feedback systems, allows safe and trouble-free end-of-arm tooling on the gripper. New solutions at the end of the arm for completely eliminating the risk of injuries to workers' hands are in development. These will use 2D and 3D image-based robot vision solutions, providing a type of 'cobot vision'. □

For more information visit: www.sickautomation.co.za

SENSORS + SWITCHES : PRODUCTS + SERVICES

Digital fibre optic SWIR sensor

The DFS461 short-wave infrared – SWIR – Digital Fibre Optic sensor available from Vepac Electronics is tuned to detect the presence of clear fluids effortlessly, using fibre optic light guides. The slim-line housing with protective lid allows for it to fit in small spaces. The DFS is adjusted by a single push of a button, no guesswork is required from the operator. The sensor default settings work for most applications and the DFS can be adjusted to many configurations to serve simple and more complex applications.

Features and options of the DFS461 include the following.

- Detects water-based fluids
- Intuitive numerical/percentage diagnostic OLED display
- Attractive 10 mm wide housing

- Low power and wide operating voltage
- Advanced remote programming
- Six Autoset modes including window
- Crosstalk rejection between two sensors without a wire
- Programmable output/input configurations
- Combinable dual times and counters
- CE approved.

It also allows for easy setup, provides accurate readings, has low maintenance requirements and is durable and reliable.

For more information contact

Vepac Electronics.

Tel: +27 (0)11 454 8053

Email: sales@vepac.co.za

Visit: www.vepac.co.za



The DFS SWIR sensor is tuned to detect the presence of clear fluids.

Wastewater management for Tshwane Municipality

Bronkhorstspuit Sewage Works handles the wastewater of the municipality of Tshwane. The city's wastewater network includes over 200 wastewater pumps that move liquid matter through pipelines to the sewage works. The submersible pumps operate 24/7/365 and are unmonitored.

This presents a problem. Should a pump block, due to heavy volume or for some other reason, the pump motor will overheat and burn out. Because the pumps are underground and unmonitored, the first sign that there is a fault is when the wastewater starts overflowing the manholes into streets: an expensive, unpleasant and unhealthy situation!

Over previous years, many pumps have overheated as a result of blockages in the impeller (rotating fan) caused by solid material such as diapers and other hard matter being taken up. The pump overheats because it is running dry and burn-out and failure are then inevitable.

Levivi22 Engineering and Projects, contracted for the past four years to the Tshwane Municipality, is responsible for projects, installation and maintenance of instrumentation and specifically the maintenance of pumps that handle wastewater.

Benoit Ntabala, Managing Director of Levivi22 explained: "I have tried a lot of different pumps, some of them well-known brand names, without satisfactory results. I then heard of Instrotech and met with Tinus Ludik, Account Sales Manager, who was keen to go out to the site to see our set-up first-hand, and to understand the problems we were encountering."

The solution was presented in Instrotech's DPM4003 and DPM3001M temperature indicators (with low and high alarm relay outputs) which were recommended to measure and control the temperature of wastewater



Tinus Ludik, Account Sales Manager, Instrotech, with Benoit Ntabala, MD Levivi22 Engineering, contractor to Tshwane Municipality.

pumps. When the temperature exceeds 120°C, the pump is switched off. When the pump has cooled down to 60°C, it is switched on again. This process repeats until the necessary maintenance is done. The DPM4003 indicator has two NO/NC mechanical relay switches that makes this possible. There can be up to four relay switches for other applications.

Tinus Ludik said, "At the end of July 2020, the DPM4003 temperature controller that we installed onto one of the pumps, tripped automatically before the pump could overheat, resulting in a direct saving of about R600 000.

"This Instrotech solution definitely ensures fewer breakdowns and can save the pumps from overheating failure."

For more information contact Instrotech.

Tel: +27 (0)10 595 1831

Email: sales@instrotech.co.za

Visit: www.instrotech.co.za

Customisable object detection systems

Senix ToughSonic® Ultrasonic Sensors, available from Instrotech, are among the most versatile and flexible sensors on the market. They can be used in various object detection applications and can be customised for users' specific needs.

In the current situation of the coronavirus pandemic, for example, businesses around the globe are seeking solutions for social distancing requirements. In industry, applications may range from a beacon needed to signal if a vehicle has pulled up to the loading dock, or a method to indicate when a buffer space has been breached, or an alarm to sound if a pallet or obstacle is left in a controlled area. Senix has an appropriate solution for each instance.

The state-of-the-art non-contact ultrasonic sensors can detect most materials: hard or soft, any colour or transparency, flat or curved. Compared to traditional proximity sensors, Senix ultrasonic sensors operate over longer distances and can be set up to limit object

detection within a user-specified distance band or 'window'.

Senix Object Detection Systems can incorporate multiple sensors; the sensors easily connect with common automation equipment and can control relays, alarms, displays, motor controllers and other functions. Applications range from simple on/off switches to relay connections, PLC inputs and multi-sensor detection networks. They are cost effective and a number of user-adjustable features are built into the sensor's software – SenixVIEW PC software – which enables the user to unlock the sensors' versatility.

Applications for Senix Object Detection Systems include: automated packaging, materials handling, transportation safety signalling, as well as monitoring of social distancing.

For more information contact Instrotech.

Tel: +27 (0)10 595 1831

Email: sales@instrotech.co.za

Visit: www.instrotech.co.za

Optimising boiler performance

Jan-Hendrik Fourie, Bureau Veritas Technical Centre Africa

Boilers and combustion equipment can become an expensive problem for a company if assessments are not conducted on a regular basis to ensure they are performing at optimum levels. Various factors can result in inefficient performance and this can be avoided, saving on unnecessary costs and supporting the life cycle of the equipment.



Jan-Hendrik Fourie, Bureau Veritas.

Jan-Hendrik Fourie, Senior Mechanical Engineer at Bureau Veritas Technical Centre Africa, takes a deeper look at boiler and combustion efficiencies and offers insights into improved testing and energy management methods that enable more environmentally sustainable practices in line with BS 845 or ASME PTC 4.

The performance of boilers and associated combustion equipment depends particularly on several important combustion variables. These include but are not limited to the following:

- Air to fuel ratios
- Stoker performance, that is: bed heights, grate speeds, flame locations, furnace pressures and related factors
- Condition of boiler internals
- Effectiveness of draught group, that is: fans and dampers
- Moisture content in fuel
- Coal particle size distribution
- Ash content in coal
- Water quality
- Air leakages
- Insulation
- Calorific values of the fuel.

Over time, the combustion parameters change, and the cumulative effect causes a loss in combustion and boiler efficiencies.

Fire-tube boilers with coal-fired chain grate stokers have a design boiler efficiency of about 80%. Over time, the efficiency can reduce to 40% or less. There is a direct correlation between fuel consumption and boiler efficiency.

When a boiler's thermal efficiency is 40%, the boiler consumes double the amount of fuel to produce the same steam output. It is therefore crucial to perform boiler and combustion efficiency assessments regularly to determine if combustion variables are within specification. It is also essential to reassess a boiler's performance following major changes and modifications or when the fuel source has changed. Even if no changes or modifications have been made, it is good practice to perform boiler performance assessments on an annual basis.

Boiler owners can also benefit from independent boiler efficiency assessments after commissioning of a new plant or after re-commissioning of a modified plant, to verify com-

pliance with specifications or contractual obligations in terms of performance and efficiency.

It is recommended that a third party is involved to perform independent boiler and combustion efficiency assessments. After efficiency levels have been determined, further analysis and testing should be performed to determine the root causes of efficiency losses and steam production losses. For instance, if the boiler currently achieves a max of 10 tonnes per hour (tph) steam flow from a 21 tph boiler, investigations can be performed into why the boiler loses capacity and recommendations can be provided to restore efficiency and/or capacity.

Calculating boiler efficiencies

Trusted third parties, like the Bureau Veritas Technical Centre Africa, assist clients by validating and optimising the boiler performance. Clients can leverage professional expertise in performance testing to detect design flaws or equipment degradation and can then take corrective action to improve boiler performance.

There are two methods available to determine boiler efficiency.

- With the direct method the major plant inputs required are the fuel consumption and steam flow. Only if both these inputs are accurately measured, can this method be used.



Firetube boilers require regular maintenance to operate at maximum efficiency.



Industrial steam boilers used in process plants also require regular checks and testing to maintain optimum operating efficiency.

- Alternatively, the indirect method is used which entails measuring all the common losses on a boiler and then subtracting all the losses from 100%, to determine the boiler efficiency.

The common boiler efficiency losses include heat losses due to:

- dry flue gas
- evaporation of water formed due to H₂ in fuel
- evaporation of moisture present in fuel
- unburnt combustible gases in the flue gas
- unburnt fuel in fly ash
- unburnt fuel in bottom ash
- radiation and other unaccounted loss.

To quantify most of the efficiency losses, a flue gas analysis is performed. This entails taking flue gas measurements during online boiler testing. In the flue gas analysis, the following are measured:

- Boiler flue gas temperature
- Oxygen (O₂)
- Carbon dioxide (CO₂)
- Carbon monoxide (CO)

In the case of coal or other solid fuel firing, in order to quantify the heat loss caused by unburnt fuel in the bottom ash and to determine the moisture content in the fuel, a fuel and ash analysis must be performed. Samples of the fuel (before combustion) and ash (during online boiler testing) are sampled while boiler testing is performed. After testing, the

Jan-Hendrik Fourie has worked in the power and utilities industry for more than a decade. He holds a Master's degree in Nuclear Engineering, a Bachelor's degree in Mechanical Engineering and qualifications in a host of high-tech courses. Fourie is an accredited Professional Engineer with the Engineering Council of South Africa (ECSA) and is registered at the Association for Energy Engineers (AEE) as a Certified Energy Manager. At Bureau Veritas South Africa he is a member of the Technical Centre Africa team. He has a range of experience unique to pressure equipment such as boilers, piping, heat exchangers and pressure vessels, including condition monitoring of utility boilers.

samples are sent to a lab to perform ultimate and proximate analyses on these samples.

The fuel and ash testing, a combination of ultimate and proximate analyses, can be done at Bureau Veritas coal laboratories. The analyses define the following:

- Fuel constituents (carbon, sulphur, nitrogen, moisture, ash etc.) based on mass fractions
- Ash constituents (sulphide minerals, carbonate minerals, oxide minerals etc.) based on mass fractions
- Inherent and surface moisture in the fuel
- Total volatile matter
- Net and gross calorific values of the fuel
- Carbon mass fraction (lost energy) in the ash samples.

Once the online flue gas analyses and the fuel and ash analyses results are available, the boiler efficiencies can be calculated.

All results are processed using the techniques and correlations given in BS 845 parts 1 and 2, which is the standard for assessing thermal performance of boilers for steam, hot water, and high temperature heat transfer fluids. The same techniques can be used on various boiler designs and combustion types, such as: pulverised fuel, CFBC (circulating fluidised bed combustion), chain grate, natural gas, bagasse, peat, black liquor, and others.

A tried and tested assessment process

To start with, documented information related to the boiler/s to be tested needs to be provided and time given for a process of familiarisation with all aspects of the particular boiler design, past reports and boiler modifications, for assessment purposes. This is done offsite. A plant visit, meeting the client and a plant walk down with the client follows to check out the operations on site.

Preferably, the boiler should be offline and open for an internal inspection to assess the conditions of the heat transfer components. This will be conducted on a separate date from the flue gas analysis because the boiler must be online for the latter tests to be performed.

At a time when the boiler is online, an online flue gas analysis is performed, which entails measuring and recording flue gas properties at various boiler locations at different operating loads. Coal and ash samples are taken at the same time.

The ultimate and proximate coal and ash analysis is performed offsite at the Bureau Veritas laboratory.

Once all results are available, indirect and direct boiler efficiency calculations based on measured plant information are performed offsite. Finally, a comprehensive report detailing the boiler and combustion efficiencies is compiled and recommendations are made to optimise boiler performance.

Regular assessments

There are many benefits in conducting regular performance tests on boilers and combustion equipment. These provide peace of mind for clients and the employees on site.

- There is a great potential for savings on fuel costs by increasing the boiler efficiency. The potential savings on fuel costs significantly outweigh the cost of a boiler performance assessment and the return on investment could be as short as a few months.
- Boiler efficiencies and areas of improvement to reduce fuel consumption are quantified and determined.
- Implementation of recommendations made by Bureau Veritas often enable steam capacity gains on boilers, in cases where there are capacity losses associated with low boiler efficiency.
- Maintenance activities to overcome excessive boiler losses are identified.
- Combustion adjustment requirements to conform to the Air Quality Act or other environmental regulations are indicated.
- Compliance to specifications or contractual obligations after commissioning of a new plant or after the re-commissioning of a modified plant can be verified.
- Implementation of recommendations may reduce boiler operating and maintenance costs.

At a glance

- Regular testing of boiler systems and combustion equipment contributes to optimising operating efficiencies.
- Plant owners can also benefit from independent boiler efficiency assessments after commissioning of a new plant or re-commissioning of a modified plant.
- Trusted third party independent testing, inspection, verification and certification are recommended to provide a valid assessment of equipment.

In conclusion, it is recommended that boilers and combustion equipment are tested on an annual basis to avoid unnecessary complications and ensure maximum performances efficiencies. At Bureau Veritas Technical Centre, we support our clients by providing trusted third party independent testing, inspections and certifications of boiler and combustion equipment to enhance life cycle, prevent unnecessary maintenance and reduce costs, at the same time improving efficiencies and environmental practices. □

For more information visit: www.bureauveritas.com

PLANT MAINTENANCE, TEST + MEASUREMENT : PRODUCTS + SERVICES

New steam generators arrive at Koeberg

The first of Koeberg nuclear power station's long-awaited six new replacement steam generators arrived at the plant 30th September. This is the result of exceptional teamwork and collaboration and heralds a key milestone for Africa's only nuclear power station. The steam generators weigh some 380 tonnes each and are about 20 metres long. The first three new generators will be installed into Unit 1 between February and June 2021.

They are being transported by road from Cape Town harbour, covering the distance of about 40 kms over a period of eight hours, per steam generator. The trailer used to transport the steam generators is the longest in South Africa: 42 metres in length and requiring four trucks to transport each of the steam generators.

They will be housed in the Replacement Steam Generator Facility that has been constructed on the Koeberg site until the old steam generators are removed from the plant during the unit's next outage. The steam generator replacement has been planned into Koeberg's outage schedule and Eskom's generation plan.

As part of the programme to extend the power station's operating life by 20 years, first approved by the Eskom board in 2010, the new steam generators will replace the current steam generators that have been in operation at Koeberg since the first unit was connected to the national electricity grid in 1984. The replacement of the old steam generators is a key part of the larger programme to extend Koeberg's operating life, budgeted to cost an estimated R20 billion, and is reported as the best investment into sustainable and



The new replacement steam generators are part of the programme to extend the operating life of Eskom's Koeberg nuclear power station.

less carbon intensive electricity generation infrastructure that Eskom can buy.

The replacement of steam generators at Unit 2 has also been planned to coincide with the unit's next maintenance and refuelling outage in order to minimise generation downtime on the unit. The replacement will occur between January and May 2022.

On removal from the plant, the current steam generators will be stored on the Koeberg site where they will be packaged and dismantled for final disposal at a national nuclear waste repository, which is the responsibility of the National Radioactive Waste Disposal Institute (NRWDI).

For more information contact Eskom.

Tel: +27 (0)11 800 3304

Email: mediadesk@eskom.co.za

Visit: www.eskom.co.za

Using digital twin technology in plant maintenance

The smart use of data is becoming pivotal to Babcock's Ntuthuko Engineering business, coupled with its deep engineering knowledge and technical expertise to support complex projects. In finding solutions to the challenges customers present, the company increasingly relies on developing a digital twin of the plant or equipment to improve operations, increase efficiency and provide predictive maintenance alerts before problems occur in real time.

By creating a digital twin, Babcock can gain instant insight into how to troubleshoot problems before they arise, using knowledge obtained from a simulated digital model. Solutions can then be safely implemented in real-life systems, at the same time reducing risk and improving efficiencies.

Manager R&D Engineering at Babcock Ntuthuko Engineering, Indrian Govender, says the technology associated with a digital twin enables the company's engineers to make faster, better informed decisions, ensuring sound asset management and integrity.

It also opens clear lines of communication and facilitates collaboration between stakeholders as the data can be shared on platforms that can be easily accessed by the customer. "Digital twins bring us closer to our customers as we share our technologically gained input and enable them to make informed decisions," says Govender.

He explains that this is particularly the case in the power industry where, often, data is not fully available or is of poor quality. Digital models fill the gaps by creating a simulated twin of a physical asset that is continually updated using

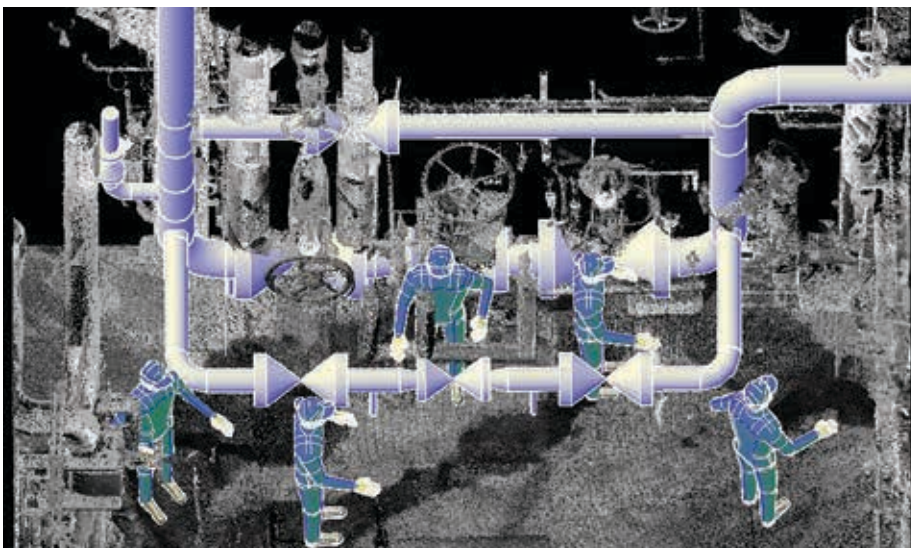
real-time data. "Using our deep system engineering understanding of the assets we manage, we are able to extract the precise data to create a digital twin model," he says.

While digital solutions are increasingly part of Babcock's projects, Govender highlights the ongoing need for skilled engineers who are capable of using digital technology to make the right decisions. In this regard, Babcock trains its qualified engineers in specialised digital technology skills, supported by the research and development division that works on digital twins. "We leverage Babcock's engineering expertise for specialised capabilities as we all understand the system engineering of the assets we manage."

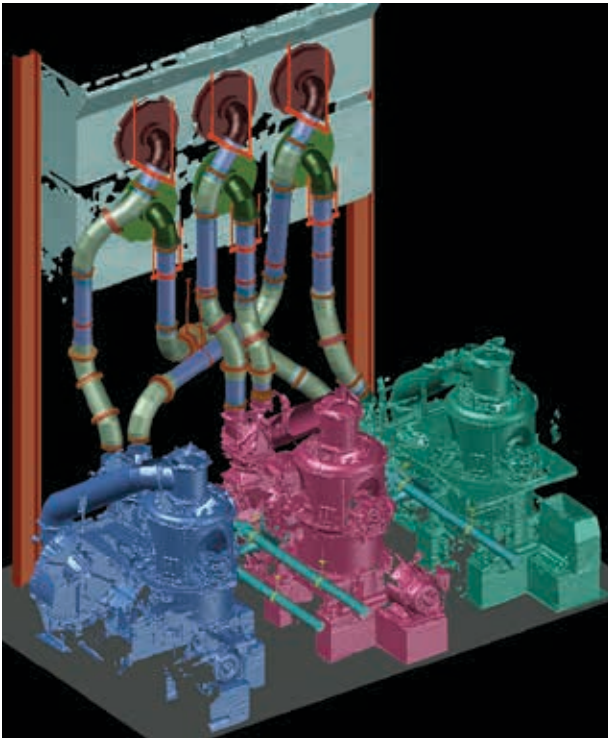
Babcock has already used digital twinning successfully on a number of critical projects. Most recently, the company relied on 3D scanning and digital twin modelling to implement one of the first nitrogen oxide (NOx) abatement projects in the country. The complex project required an approach integrating various engineering disciplines. Babcock used its in-house 3D scanning and modelling capabilities to facilitate and optimise the design phase, while all stakeholders, from the customer and engineers to operators and safety officers, were able to review the process safely, often without needing to be on-site.

Earlier this year, Babcock applied digital twinning to repair a ruptured main-stream piping system at a major power station. 3D scanning was used to assess the extent of the damage to the piping and associated structure, as well as determine how to synchronise it safely back into the power grid. On this project, time was of the essence. Using specialised software Babcock was able to digitise the real-world architecture and by capturing the existing plant conditions and complex geometry, it could quickly identify large sections of pipework and structures which had been displaced during the rupture.

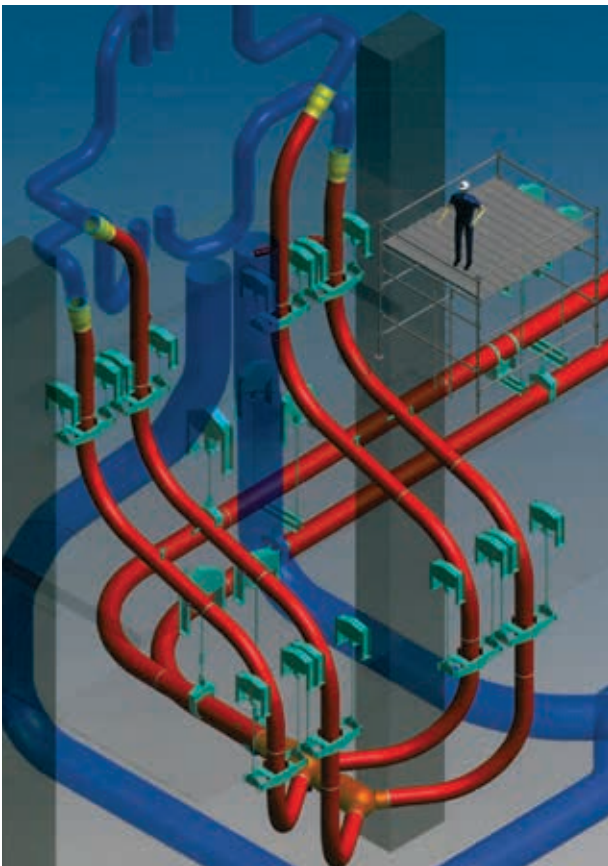
Another previous project that drew on digital twin technology was the replace-



A digital twin of plant or equipment enables the engineering team and the client to make faster, better informed decisions, ensuring sound asset management.



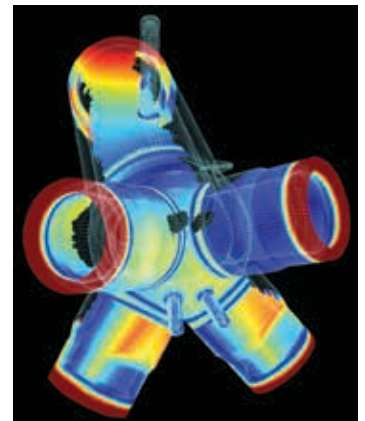
Where there are gaps in plant data, digital models can provide real-time data to fill the gaps.



Babcock is increasingly using 3D modelling and digital twin technology successfully to guide engineering design and inform ongoing asset maintenance.

At a glance

- Digital twin technology opens up communication lines between stakeholders and allows for better informed decisions on asset management and integrity.
- There is a growing need for skilled engineers who can use using digital technology to make the right decisions.
- Babcock has already used 3D scanning and digital twin modelling successfully on a number of critical maintenance projects.



A system component – the real thing and a digitally simulated replica.

ment of an essential 1 100 kPa de-superheater at a steam plant, again under intense time constraints. Two previous attempts by other organisations had been unsuccessful, and Babcock was tasked with completing the project within five months. Installation had to be completed within 11 days. Babcock attributes the fast turnaround time it achieved to the system design, aided by its in-house 3D scanning and modelling capacity to deliver accurate results.

The company's sophisticated digital twin models also provide opportunities to reassess original line design, using state-of-the-art engineering methods. Any measurable form of data can be extracted and combined with Babcock's 3D scanning technologies, engineering analysis and design software, and electronic, control and instrumentation components to develop a digital twin model. These provide for predictive and innovative maintenance solutions leading to improvements in efficiency and maintainability of plant assets, and in turn, improved availability and cost management of the assets for the client.

Babcock's Ntuthuko Engineering business has multi-disciplinary capabilities comprising process, mechanical, piping, EC&I, welding and R&D disciplines – and these are supported by project and system engineering, data management and drawing office departments. They operate individually or as an engineering design group, covering simple and complex projects as customers require. □

For more information visit: www.babcock.co.za



IR thermometers in electrical maintenance

Because electrical currents generate heat – too high a temperature indicates problems – checking temperature is an effective method of condition monitoring to guard against component failure in electrical systems. Non-contact, infrared thermometers enable such checks to be carried out quickly, efficiently and safely, without the risk of electric shocks or the need to shut down the plant or facility.

Typical areas of use include:

- Electrical connections

Check for loose connections caused by repeated on/off operation. Loose connections mean higher resistance, which causes overheating. Overheating can also result from corrosion, the presence of dirt or carbon deposits.

- Electric motors

Check for phase imbalance on three-phase motors, and check windings and bearings for overheating.

- Transformers

Check for hot spots that indicate winding problems.

- Wires and cables

Check for excessive heat as a result of cracks, corrosion or deterioration.

- Uninterruptible power supplies

Check for hot battery terminals suggesting loose connections or corrosion. Detect hot or cold spots in output filters.

- Backup batteries

Check for poorly attached connections in a battery string, which can cause posts to heat up and possibly burn.

- Lighting fittings

Check for loose connections and aging components.

Infrared thermometers can be used to measure temperature accurately from a distance. The IR thermometer should be aimed outside the area of interest and the user simply needs to squeeze the trigger and hold it down, scanning slowly across the target. Laser sighting shows the exact area of measurement and temperature variations appear instantly in the LCD readout. Once the hot spot has been located, the user can focus on the component causing the problem.

Finding faulty components

As the condition of an electrical component deteriorates, its resistance can increase and generate more heat. As the component's temperature rises, the resistance increases further, generating more heat. Using infrared thermography to inspect electrical systems and components under full load, faulty components can be identified and classified by severity. Because heat loss is proportional to the current, unbalanced or overload conditions can also be identified with infrared thermometry.

Checking for overloaded circuits

As the load increases in a circuit, the temperature of the entire circuit and components on the circuit will increase. An even load on each phase of a three-phase system, for example, should result in uniform temperature on all three phases. An anomaly is identified when the overall component and conductor temperature is too high, indicating an overload condition. An unbalanced condition can also be a problem and is indicated by the conductors not displaying a balanced or equal temperature.

IR thermometers are especially useful in detecting faults in electrical equipment and systems.

Remote monitoring of HVAC secures the cold chain

Heating, ventilation and air conditioning (HVAC) systems are critical in various economic sectors: from maintaining the cold chain in the production of foods and beverages, to ensuring the correct operation of servers in data centres.

While the continuous functioning of HVAC systems is critical in such applications, they are notoriously power hungry. They also require robust and reliable backup power solutions to ensure they stay operational in the event of power interruptions.

“It makes sense to invest in technology that optimises HVAC functioning and performance, and ensures backup power,” says Rory Reid, Sales and Marketing Director for Master

Power Technologies (MPT), a leading provider of secure and reliable backup power solutions in Africa.

MPT's remote monitoring solution meets both these requirements and adds the safety and convenience of keeping human intervention to a minimum. The Master Power Universal Controller is at the heart of the solution and incorporates HVAC monitoring in its portfolio of critical applications.

HVAC monitoring

The Universal Controller reads all critical data from HVAC units using Fieldbus communications and digital alarm signals. Status readings, alerts, alarms and operational data are recorded for analyses of system efficiencies, equipment failures, maintenance requirements and breakdown situations. Based on real-time hardware and software monitoring, the Universal Controller takes intelligent, automatic action to address issues that could otherwise cripple essential functions, such as components at risk of failing.

MPT's Universal Controller provides for remote monitoring of HVAC systems in critical applications.



Monitoring localised resistance

A resistor is any component in the electrical circuit, such as connections, wires, fuses, switches and breakers. Under standard operating conditions, each component will have a certain 'normal' resistance associated with it. It is when the resistance deviates from this norm that the component begins to heat up and must be identified and repaired. Origins of the problem can include low contact pressure or wear of the material – decreasing spring tension, worn threads, over-tightened bolts, deteriorated conductors or motor windings. As the component continues to deteriorate, the temperature will continue to increase until the melting point of the material is reached and complete failure occurs. This type of fault can be identified because there is a hottest point – the heat being generated is greatest at the fault point – with a tapering off of thermal energy away from the point of highest resistance.

Detecting harmonic disturbances

Harmonics are currents or voltages that are multiples of the basic incoming frequency serving an electrical distribution system. The most damaging are high frequency harmonics known as triplens. Triplen harmonics can create severe overheating and even melting of neutral conductors, connections, contact surfaces and receptacle strips. Transformers, standby generators, motors, telecommunications equipment, electrical panels, and circuit breakers are also affected by harmonics.

Identifying poor connections

Poor connections are the most common problem on an electrical system. Routine inspection with an infrared thermometer enables a maintenance technician to know exactly where the problem is. As temperature in a conduc-

tor rises, so does its resistance; as resistance increases, the temperature rises. Most thermal electrical problems involve improper torque specifications or improper installation at the junction points. A loosely torqued connector reduces the surface area in which current can flow and consequently increases the contact resistance. Oxidation built up at the connection point can compound the problem by causing an additional rise in resistance. Most conductor, insulation and component problems can be traced to a poor connection.

In manufacturing plants, inspection with an infrared thermometer should be done regularly. All cable runs, bus ducts, distribution panels, motor control centres and other electrical equipment should be checked for hot spots or heat imbalances. This can identify loose connections, overloads, unbalanced loads, and high neutral currents that need to be corrected.

Infrared thermometers provide an easy way to detect small changes in temperature, a non-contact, non-destructive and simple method of detecting impending electrical problems. Inspections can be done at any time without shutting down the plant or facility. As all common electrical problems announce themselves with an increase in temperature, they can be easily detected and repaired as required, reducing maintenance time and unscheduled shutdowns and avoiding replacing good components.

Johannesburg-based R&C Instrumentation supplies Raytek and Ircon portable and fixed infrared thermometers which can be used in electrical maintenance.

For more information contact R&C Instrumentation.

Tel: +27 (0)11 608 1552, mobile: +27 (0)71 471 2056

Email: info@randci.co.za

Visit: www.randci.co.za

In setting up the system, the OEM's maintenance parameters – for example, for filter changes, condition-driven versus time-driven maintenance and pressure drops – can be given pre-set values in the controller. This optimises the balance between system availability, efficiency and operating costs.

Environmental monitoring

Environmental conditions have a direct impact on the functioning of HVAC systems. On dusty farms, for example, where tractors offload fresh fruit in large cold storage facilities, HVAC air filters have to be cleaned and changed more frequently than in cleaner environments like data centres.

Environmental monitoring is therefore critically important to ensure the overall effectiveness of the site where the HVAC system is installed. HVAC monitoring combined with environmental monitoring provides the information needed to make decisions that can drive down operational costs and extend equipment life.

The Universal Controller's temperature and humidity monitoring hardware runs wirelessly on a frequency of 868 MHz, rendering it safe for use in data centre applica-

tions as well as cold storage environments. In a typical application, temperature sensors are placed at regular intervals to draw a heat map of a room and identify areas where heat builds up. With this information, the HVAC system can be adjusted to be more efficient, preventing fresh produce from spoiling or data servers from overheating.

In addition to temperature and humidity, the unit monitors air quality and pressure, and can detect water leaks. With four digital inputs and outputs the Universal Controller can control and manage devices connected to the wireless temperature monitor, such as fresh-air fans and dampers. Other environmental monitoring features include door status access control, motion monitoring and fire detection and suppression.

"Effective HVAC monitoring is key to ensuring highest efficiency and longest life of the system at lowest operational costs," Reid says.

For more information contact Master Power Technologies.

Tel: +27 (0)11 792 7230, email: sales@kva.co.za

Visit: www.kva.co.za

Solar PV training courses

The SAPVIA Solar PV GreenCard (PVGreen) Course is structured to accommodate different levels of experience, including beginners, and the week-long course ends with all participants tackling the practical installation of a solar PV system.

The course is presented by the North West University's Solar Training Centre (STC) and hosted by the Southern African Energy Efficiency Confederation (SAEEEC). The SAEEEC is a non-profit coordinating body that aims to promote the energy efficiency industry across southern Africa.

Over the five days' training, candidates will be familiarised with the fundamental principles (solar irradiation, annual yield, effects of shading and more), and typical components of solar photovoltaic (PV) systems (PV panels, inverters, batteries, mounting structures); followed by system design and integration, and practical installation and commissioning of PV systems. This is done using a small-scale solar PV set-up at the training venue.

The SAPVIA Solar PV GreenCard training programme is outlined below.

- Day 1 – Introduction to solar PV

Electrical basics, characteristics of solar energy, different types of solar systems, and how to differentiate between them; different PV modules, inverters, chargers, batteries and roof mounting structures. Site visit checklist and relevant quality certification for PV solar components.

- Days 2 & 3 – Design and system integration of solar PV systems

Integration of different solar PV components, interpretation of datasheets, types of solar PV systems, single line diagrams, design and calculations for solar PV systems, understanding municipal/Eskom requirements and processes for solar PV, latest SANS 10142-1-X requirements for embedded generation and software simulations.

- Days 4 & 5 – Practical installation and commissioning of systems

Preparation and planning of installation, practical installation of solar PV components, testing and commissioning of systems, document and evaluate installation.

PVGreenCard Assessment Centres provide an independent review of the installer's competence for delegates trained through the SAEEEC programme. Delegates need to

book and pay for their assessment directly with the available Assessment Centre. The SAEEEC offers only the training and does not provide the assessments.

Anyone interested in taking the training course should contact the SAEEEC. Different rates apply for SAEEEC members and non-members, for classroom-based training and livestreamed training, and for the on-site practical.

A separate range of accredited solar PV design and installation courses is offered by PQRS. Its Excel and Exceed courses are also presented, livestreamed, through the SAEEEC. As one of the leaders in the development of brand-neutral solar PV training course material in South Africa, PQRS provides a specialist training environment for and on behalf of most of the major solar equipment distributors locally. These two courses are among the most popular courses in this field in South Africa; during 2019 more than 1 000 students attended solar installation and design courses through PQRS.

The Excel and Exceed courses are structured for electricians and engineers or candidates with a fair knowledge of electricity and wanting to expand their services to include solar design and installation. These two practical courses cover the key components in solar system design and references to standards and regulations support the course content.

The Excel Online Course is aimed at electricians and engineers as well as aspirant installers, entrepreneurs and home owners.

- Day 1 covers: solar technology & solar principles, power versus energy, MPPTs, IV curves, hybrid, off-grid and grid-tied systems, LCOE and grid parity.
- Day 2 covers: an in-depth comparison between lead acid and Li-ion battery technology, and a complete system sizing.

The Exceed Course is aimed at installers, electricians and engineers wanting to extend their knowledge on solar technology design and installation.

- Day 1 covers: revision of all calculations, mounting structures, and wind forces acting on solar modules.
- Day 2 covers: regulations and standards, lightning protection, surge protection and earthing.

ECSA CPD credits

All the courses outlined above are accredited with the Engineering Council of South Africa (ECSA), providing continuing professional development (CPD) credits: SAPVIA PV Greencard, 4.5 CPD credits for the whole course; PQRS Excel, 2 CPD credits; and PQRS Exceed, 2.5 CPD credits.

Bookings for upcoming courses in November and December can be made online.

For more information visit: www.saeecconfed.org.za



Managed cybersecurity services

John Mc Loughlin, CEO, J2 Software

South African businesses are becoming more susceptible to cyberattacks and seem to be easy targets for criminals. Data breaches are now a recurring phenomenon with Nedbank, Momentum, Lombard Insurance, Experian and Stefanutti Stocks quite recently making headline news.

There has been an ongoing rise in cyberattacks from year to year and it is only recently that these are being exposed in the media. But these publicly known breaches are only the tip of the iceberg. Cyber criminals are infiltrating and taking down systems on a daily basis. Until businesses take effective action, we can expect a continuing increase of successful attacks.

Many small business assume they are too small to be attacked, but businesses of all sizes are targets. A cyber-attack on a small or mid-sized enterprise (SME) can have a devastating effect. SMEs are increasingly targeted because they are often easier to access as little or no attention is given to cybersecurity.

Furthermore, poor advice and lack of understanding means that a small business may have a false sense of security with only the free anti-virus software between it and a cyberattack. Many SMEs do business with larger business and this is another reason that an SME may be a valuable target for cybercriminals.

Account takeover is rife and the use of weak passwords, or reuse of passwords is a contributing factor. Once an attacker has the credentials, all they need to do is wait. They set rules, forward emails and add themselves to management groups – waiting for the right piece of information to target the attack.

At one company, we recently discovered in a pool of over 400 mailbox rules on Microsoft 365, there were four malicious rules configured to scrape for financial information and then forward the information out to a gmail account. The rules had been in place for some time at the company and it was unaware of the intrusion. The rules were set using known user credentials and were never checked.

Visibility of real and available sources of information enable us to combat the growth in cybercrime. We recommend that all businesses should have visibility across data, machines, applications and people to understand what is really happening across the business environment. Focusing only on the network is not sufficient, as is evident from the recent spate of reported breaches. Businesses need to push towards a user-centric approach to security. The users are the people and systems accessing information and these are the places that an attacker will target. Your network is wherever the user is. With the remote workforce and changing office

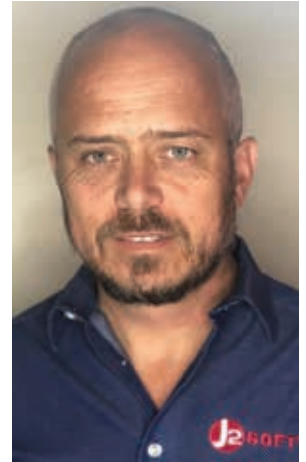
landscapes, increased visibility is critical.

There is a misconception that cybersecurity is unaffordable – sometimes fuelled by cybersecurity service providers taking advantage of a lack of knowledge or fear expressed by their customers. We prefer to remove the 'fluff' and get things done.

There is no value in deploying tech for the sake of tech and not doing the basics. Covering the basics of cyber resilience will ensure that your business can properly maintain, monitor and prevent cyberattacks. Using a combination of proven tools and services, cybersecurity is achievable for a listed multinational or a small family-run home business.

Finally, it's important to partner with a reliable service provider to ensure increased visibility and to report to stakeholders. Businesses can bolster their cyber defences by running a simple, comprehensive and effective cyber resilience program.

For more information visit: www.j2.co.za



John Mc Loughlin, CEO J2 Software.

J2 Software is a security focused African technology business founded in 2006 to address the need for effective cybersecurity, governance, risk and compliance solutions in Africa.

With the continuing rise of cybercrime, identity theft and confidential data leakage J2 Software's managed security services not only provide a competitive advantage, but become a business necessity. The company offers managed cyber security services for businesses at any scale, ensuring customers have greater visibility to identify risky behaviour and enhancing their capability to respond to prevent losses, reducing risk and lowering costs.

It has provided services and solutions to organisations with sites in South Africa, other African countries, as well as Australia, the UK and Malta.

Lean in to the new normal

In a recent blog post, Canninah Mapena, Managing Director, Rockwell Automation Sub-Saharan Africa, shared some interesting thoughts and a valuable perspective on how businesses in South Africa should embrace change and prepare for growth.

Businesses in South Africa have had a bumpy ride this year. What started as a year like any other, with modest economic growth, became an unprecedented rising tide of crises with economic contraction on the horizon. As we continue to weather the storm, the time has come for us to stop panicking about the 'new normal', and rather focus on tangible business activities that will see a return on investment through the highs and lows.

Turbulence is nothing new

I have a strong history of leading business activities in sub-Saharan Africa and can say with certainty that no industry sees smooth sailing 100% of the time. Having worked to bring industrial automation and software solutions to various industries, including mining, minerals, metals, power, energy, and oil & gas, I have learnt that businesses that focus on aligning their people with their processes and technology, are those that can survive a storm and thrive when things stabilise.

While fear and uncertainty are natural reactions to a crisis, it is time to lean in to the discomfort, let things get shaken up, and embrace the opportunity to become more robust. How can this resilience be achieved? Well, as for any successful voyage, there should be a strong focus on the capabilities of the crew.

Invest in your best

The number one mistake I have seen companies make is to worry more about their bottom line than the people who can affect it. I believe that people are at the heart of any successful operation. While the implementation of ever-evolving technology and optimised business processes are hailed as tools for modern day success, the advantages of these are nothing without people to drive the change. People are your best asset. If you can keep investing in them through difficult times, your return on that investment will come when you find your workforce is well-prepared to take on any challenge, fulfil any order, and use their competencies and capabilities to win your company market share when others falter.

In assessing your human resources, it is important to remember that today's workforce is evolving and seeks purpose. Leaders need to make sure employees understand the vision and strategy, how it's connected to

the work they do, and that they see and feel that their work is meaningful. These employees will look beyond the mechanics of their jobs and will be more inclined to innovate and optimise.

In my experience, communication and transparency are key in this. Leaders should be approachable and show integrity when interacting with their teams. Developing a relationship with your people will help identify those who are enthusiastic about their opportunities and help you address their professional development needs.

To retain these valuable employees, leaders should provide them with a vehicle to develop their careers – the ability to move around, perform different roles and gain a variety of career experiences. Fostering a culture that's agile gives employees the ability to collaborate and make decisions.

Leading your team through digital transformation

Digital transformation is heralded as an enabler of greater productivity. However, it is my experience that digitalisation is as much a change-management issue as it is a technology one. Business leaders who are looking to invest in innovation need to remember that they are managing a change-weary workforce who have likely been through continuous hardware and software upgrades requiring changing digital capabilities and tools. These workers need to be properly prepared for what is coming. Leaders should develop a strategic plan for digital adoption, update employees on what is expected from them, and provide appropriate employee training.

Weathering the highs and lows is not just about having the right technology; it requires support from the right people. Innovation goes beyond gadgets – investing in your workforce will empower them to rise to the business challenges to come and take advantage of the opportunities over the horizon.

Rockwell Automation has recognised the management challenges presented by the digital transformation journey. We have created Management Perspectives – a hub of resources for executive industrial decision-makers, providing the information you need to thrive in the evolving digital landscape. Access the portal online for help in unifying your people, processes and technology to achieve better business outcomes.

For more information visit: www.rockwellautomation.com



*Canninah Mapena, MD,
Rockwell Automation
Sub-Saharan Africa.*

DIARY DATES – With almost all conferences and exhibitions being cancelled, rescheduled or staged virtually, as a result of the global coronavirus pandemic, Electricity + Control will reintroduce the column of Diary Dates as events are scheduled for the year ahead.

2021

RATES + FEATURES

ELECTRICITY + CONTROL

ENERGY + INFORMATION IN INDUSTRY



Published by Crown Publications

Print and online editions reach more than 6 500 readers each month

Website: more than 21 000 unique visitors every month

Twice monthly eNewsletter mailed to more than 5 700 readers

LinkedIn: with a fast-growing following

FEATURES 2021

JANUARY

Control systems + automation
Drives, motors + switchgear
Measurement + instrumentation
Safety of plant, equipment + people

FEBRUARY

Industry 4.0 + IIoT
Energy management + the industrial environment
Sensors + switches
Plant maintenance, test + measurement

MARCH

Control systems + automation
Drives, motors + switchgear
Measurement + instrumentation
Transformers, substations + cables

APRIL

Industry 4.0 + IIoT
Energy management + the industrial environment
Measurement + instrumentation
Safety of plant, equipment + people

MAY

Control systems + automation
Drives, motors + switchgear
Sensors + switches
Plant maintenance, test + measurement

JUNE

Industry 4.0 + IIoT
Energy management + the industrial environment
Measurement + instrumentation
Transformers, substations + cables

JULY

Control systems + automation
Drives, motors + switchgear
Measurement + instrumentation
Safety of plant, equipment + people

AUGUST

Industry 4.0 + IIoT
Energy management + the industrial environment
Sensors + switches
Plant maintenance, test + measurement

SEPTEMBER

Control systems + automation
Drives, motors + switchgear
Measurement + instrumentation
Transformers, substations + cables

OCTOBER

Industry 4.0 + IIoT
Energy management + the industrial environment
Measurement + instrumentation
Safety of plant, equipment + people

NOVEMBER

Control systems + automation
Drives, motors + switchgear
Sensors + switches
Plant maintenance, test + measurement

DECEMBER

Industry 4.0 + IIoT
Energy management + the industrial environment
Measurement + instrumentation
Transformers, substations + cables

REGULAR COLUMNS

■ Cybersecurity ■ Reskilling, upskilling + training ■ Engineering the future ■ Write @ the back

Editorial submissions are welcome – email: ec@crownc.co.za

For advertising contact Heidi Jandrell, Advertising Manager – email: heidij@crownc.co.za



A quantum leap in flow rate measurement technology



Suited for liquids with a conductivity from 20 $\mu\text{S}/\text{cm}$

Variable use for different flow directions

With integrated empty pipe detection and simulation mode

Also available with EPDM seal for drinking water applications

With indication of volumetric flow quantity, total quantity and temperature

ifm - close to you!



www.ifm.com

Int.: +27 12 450 0400